

# **ENVIRONMENTAL MANAGEMENT**

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## Subject: ENVIRONMENTAL MANAGEMENT

## SYLLABUS

## **Concept and Principles of Environmental Management**

Introduction; Principles of Sustainable Development; Stakeholder Concept; Environmental Problems; the Concept of Environment and Environmental Management.

## **Policies and Legal Aspect of Environmental Management**

Stockholm Conference; The Earth Summit Agreement; Environmental Governance in India since 1972; Environmental Protection and Fundamental Rights; India's International Obligations; Public Interest Litigation; Public Participation.

## **Environmental Impact Assessment (EIA)**

Introduction: Definition; Planning; Relevance; Significance; EIA Inputs to the Project Cycle and the Outputs of the EIA Process; Environment Impact Assessment Practices in India; EIA Practices in India; Future Trends in EIA.

## **Emergence of Industrial Response for Environmental Issues in India**

Introduction; Regulatory and Economic Instruments; Types of Standards; Corporate Environmental Responsibility; Environmental Reporting Practices in India In the Past Decade

## ISO 14000 and Environmental Management System Standard

Introduction; Need for the New Standards; To whom does the Standard Apply? Where does the Standard Apply? What does the ISO 14000 Series Cover? General description ISO 14001; Benefits of ISO 140001; Steps in ISO 14000 Certification Process; ISO Definition of Terms

## **Environmental Ethics**

Introduction; Development of Environment Ethics; Ethical Theories: Consequential; Deontological; Other Theories; Ethical Theories Applied to Environment; Environment iii Ethics in Spirituality; Relationship Between People and Environment; Ethical Dilemma; Environment Ethics and Population; Environment and Technology; Challenge of a World Environment Ethics.

#### WTO Environmental Issues

Introduction; Trade and Environment, WTO; its Structure and Principles; GATS, IPR; Trade without Discrimination; Trade and Environmental Milestones; Reconciling Trade with Environment; Environmental Concerns and WTO; Public Participation.

#### Waste Management

Introduction; Disposal Methods; Avoidance and Reduction Methods; Waste Handling and Transport; Waste Management Concepts; Education and Awareness; Biomedical Waste Management; Hazardous Waste Management; Radioactive Waste and Toxic Waste Management.

## **Case Studies**

(i) Ashok Leyland's ISO 14001 Journey; (ii) Six Critical Skills Needed to be a Successful Environmental Professional in the Global "GREEN" Economy ; (iii) Solid Waste Disposal; (iv) Karnataka Integrated Rural Water Supply and Environmental Sanitation Project, Mysore District.

## **Suggested Reading:**

- 1. Environmental Management Text and Cases by Bala Krishnamoorty, Publisher: PHI Publication
- Handbook of Environmental Laws, Guidelines, Compliance & Standards, Vol. 1 & 2 by R. K. Trivedy, Publisher: Environ – Media Karad, India
- 3. ISO 14001 Certification Environmental Management System, by W. Kurge, Publisher: Prentice Hall
- 4. Environmental Management Systems: Requirements with Guidance for Use India Search Monograph on ISO-14001

## AN INTRODUCTION TO MATERIALS MANAGEMENT

## Structure

1.1. Introduction

- 1.2. Principles of Sustainable Development
- 1.3. Stakeholder Concept
- 1.4. Environmental Problems
- 1.5. Concept of Environment and Environmental Management
- 1.6. Environmental Resources
- 1.7. Environmental Conflict
- 1.8. Review Questions

## **1.1 INTRODUCTION**

In this new millennium, organizations are rapidly changing their structures, systems, work processes and activities. This changing- environment calls for enterprising managers to manage and respond to the changes in an appropriate manner. It is, therefore, necessary for them to develop a clear focus and direction to facilitate proper decision-making process.

The emerging trends that characterize this millennium are:

- An era of information revolution, which has influenced the new economy.
- The traditional supply chains are fast disappearing, paving way to new virtual supply chains. This change calls for an entire revamping of the internal processes and procedures, so far followed in the organization.
- The relationship among organizations, their customers, suppliers and manufacturers is also undergoing a drastic change.
- Organizations are becoming extended enterprises. The idea of the extended enterprise with its focus on supply chain management will become the standards for assessing performance in future.
- There is an increasing concern about the environmental performance and reporting practices. There is also a move towards looking at environmental performance as competitive advantage. There is an increase in demand from the stakeholders for

## environmentally responsible behavior from the companies across the globe.

Let us discuss in more detail the environmental problems and the growing concern about them. It is no longer possible to ignore the needs of the society and quite appropriately, management education must address new areas of .interest. In light of this, issues concerning protection, conservation and management of the physical environment are to be addressed with a view to imparting knowledge, increasing awareness, and developing the required skills to solve the environmental problems. This area of action affects almost all sectors and, therefore, calls for action from people all over the world.

Thirty years ago, the international community gathered in Stockholm for the United Nations Conference on Human Environment to sound an alarm about the perilous state of Earth and its resources. That landmark event is widely credited with environmental issues being placed on the international agenda, leading, in turn, to the establishment of environment ministries at the national level, and the increased awareness of the impact that even local decisions can have, on the global environment.

Every activity generates unavoidable environmental impact of some kind or the other, but the ability of people and societies to adapt themselves to and cope with the change is varied.

People in developing countries, particularly in the less developed countries, have less capacity to adapt to change and are more vulnerable to environmental threats and the global change. Poverty is generally recognized as one of the most important causes of vulnerability to environmental threats because the poor tend to have much lower coping capacities and, therefore, they bear a disproportionate burden of the impact of disasters, conflicts, drought, desertification and pollution.

A close study of all the major displacements that have taken place due to development activities reveal that the poorer and the ignorant sections of the society suffer more due to displacements and *related job loss* and change in livelihood options, etc. Moreover, development initiatives do not always bring benefits to the people who have been dislocated due to them. Human health is increasingly determined by environmental conditions. Deterioration of environmental conditions is a major contributory factor to poor health and a reduced quality of life. The statistics goes like this:

- 1. Poor environmental quality is directly responsible for some 25 per cent of preventable diseases, with diarrhea and acute respiratory infection heading the list.
- 2. Air pollution is a major contributor to a number of diseases.
- 3. Globally, 7 per cent of all deaths and diseases are due to inadequate or unsafe water, and lack of sanitation and hygiene. Approximately 5 per cent of the deaths are attributed to air pollution.

The importance of preservation of the environment and respect for nature form the underlying principle of many cultures of various developing countries. For example, a study of the ancient Indian text *Vedas* would clearly indicate the importance of love and respect for nature. While environmental conservation may have been a part of cultural and religious heritage of many

developing societies, consideration of environmental issues within the developmental context has generally been of comparatively recent origin, certainly not more than two decades.

While addressing the World Conservation Strategy on March 6, 1980, the then Indian Prime Minister, Smt. Indira Gandhi, spoke thus: In India the interest in conservation will not a sentimental one, but the rediscovery of a the truth well known to our ancient sages. The Indian tradition teaches us that all forms of life-human, animal and plant-are so closely interlinked that disturbance in one gives rise to imbalance in the others.

The essence of man's attitude to nature in India is characterized by harmony. Lack of awareness of the laws and forces of nature that keep ecological balance leads to improper behavioral pattern, which results in environmental problems. India is a country with vast cultural variations. We have both ancient and modem culture parallel to each other. We still have human beings like the tribal existing as part of nature, in perfect harmony with it, unaffected and uninfluenced by the technological changes of recent times. They draw from nature only what they require and continue to exist as part of the ecosystem. On the other hand, there is the advanced socio-economic system developed by man in which he is a co-creator and in conflict with nature and is dominated by considerations of greed. In such systems there are all kinds of interactions with the ecosystem characterized by exploitation and optimum extraction principles. We have thus problems that confront both developing and developed countries. This is true of all phases of national development. The situation in India is relevant to developing as well as the developed world (T.N. Khoshoo, 1988).

The element of sustainability implies enjoying the bounties of nature, without prevailing over it. As exploitation starts, we cease to utilize nature for our good, and for the benefit and the welfare of our fellow human beings. For example, Kalidasa the great Indian poet, in *Kumara Sambavam* talks of "milking" earth and not exploiting it. Milking earth is akin to milking a cow. We have to feed and care for the cow before we can milk it. As we can understand, milking is what sustainable development is all about.

There are two basic reasons for our concern with environmental pollution:

- (i) Human health and welfare, and
- (ii) Sustenance and survival of mankind.

Environmental contamination and its impact on human life is already well known. Only the coping mechanisms have undergone changes due to increasing awareness and the tremendous pressure of population increase on the environmental resources. The ancient civilizations had imposed self-restrictions to avoid different forms of pollution, by religious and other spiritual bondage, and not necessarily through legal measures. Legal measures to regulate environmental behaviour are a recent development in all the countries of the world. The fact that environmental pollution can make people susceptible to many diseases and even cause premature deaths is a major driving force for pollution control.

# **1.2 SUSTAINABLE DEVELOPMENT**

# The concept of Sustainable development (Bruntland Commission 1972) broadly means that the development initiatives be initiated in such a way that the future generations can enjoy the benefits of nature without any compromise. It reiterates that we must use the resources only to the extent to which it is sustainable. Since the Stockholm Environmental Conference in 1972 the focus has been on regulating for the caring capacity of the globe. The important elements in the attempts to achieve sustainability have been on

- 1. Regulation
- 2. Consumer awareness
- 3. Companies' solution of end-of-pipe problems
- 4. Companies' green product development.

The government of each country has developed guiding principles of sustainability from the Stockholm Conference. The United Nations have given an impetus to these Stockholm principles by providing the Agenda 21 through the Earth Summit at RIO in 1992. The principles listed below serve as a source of inspiration to evolve action areas by the national government, depending upon their capacity.

## **PRINCIPLE 1**

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

## PRINCIPLE 2

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

## **PRINCIPLE 3**

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

## **PRINCIPLE 4**

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

## **PRINCIPLE 5**

All states and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and meet the needs of the majority of the people of the world.

## **PRINCIPLE 6**

The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

## **PRINCIPLE 7**

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the contributions to global environmental degradation. States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

#### **PRINCIPLE 8**

To achieve sustainable development and a higher quality of life for all people, the State should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

#### **PRINCIPLE 9**

States should cooperate to strengthen endogenous capacity, building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

## **PRINCIPLE 10**

Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

#### **PRINCIPLE 11**

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular, the developing countries.

#### **PRINCIPLE 12**

States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges

outside the jurisdiction of the importing country should be avoided. Environmental measures addressing trans-boundary or global environmental problems should as far as possible be based on International consensus.

## **PRINCIPLE 13**

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further International law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

## **PRINCIPLE 14**

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

## **PRINCIPLE 15**

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

## **PRINCIPLE 16**

National authorities should endeavor to promote the internationalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

## **PRINCIPLE 17**

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

## **PRINCIPLE 18**

States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

## **PRINCIPLE 19**

States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse trans-boundary environmental effect and shall consult with those States at an early stage and in good faith.

## **PRINCIPLE 20**

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

## **PRINCIPLE 21**

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

## **PRINCIPLE 22**

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

## **PRINCIPLE 23**

The environment and natural resources of people under oppression, domination and occupation shall be protected.

## **PRINCIPLE 24**

Warfare is inherently destructive of *sustainable* development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

## **PRINCIPLE 25**

Peace, development and environmental protection are interdependent and indivisible.

## **PRINCIPLE 26**

States shall resolve all their environmental disputes peacefully and use appropriate means in accordance with the Charter of the United Nations.

## **PRINCIPLE 27**

States and people shall cooperate in good faith and in a spirit of partnership in the fulfillment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

The concept of Sustainable Development facilitates good and sound economic growth that can be maintained with minimum environmental impact. It provides a continuous monitoring emphasis as the approach itself calls for overall sustainable orientation. The factors that can promote sustainable development are the following:

- 1. Population stabilization and health care;
- 2. Integrated land use planning and watershed management, ensuring availability of adequate area for use as cropland, woodland and grassland for food, fuel, timber and fodder;
- 3. Re-vegetating marginal land and greening the uncultivated area;
- 4. Water pollution control in rivers;
- 5. Air pollution control in industrial pockets;
- 6. Use of non-polluting renewable energy;
- 7. Waste recycling and reuse;
- 8. Conservation of biological diversity;
- 9. Human settlements without congestion;

- 10. Slum improvement;
- 11. Environmental education and awareness.

## **1.3 STAKEHOLDER CONCEPT**

The theory describing the relationship between companies and stakeholder influence was introduced several decades ago (see, for example, Millstein and Katsh, 1981; Freeman, 1984), and has since been applied in a number of sector studies in the primary, secondary and tertiary sectors. The stakeholder approach basically views the firm as a set of interrelated, explicit or implicit connections between individuals and/or groups of individuals. Stakeholders are generally defined as individuals or groups with a legal, economic, moral and/or self perceived opportunity to claim ownership, rights or interests in a firm and its past, present or future activities-or in parts thereof. Stakeholders with identical interests, claims or rights can be classified into different categories, e.g. employees, shareholders, customers, suppliers, regulators, NGOs, etc. These can be further classified into primary and secondary stakeholders (Clarkson, 1995).

## **Primary stakeholders**

Primary stakeholders are stakeholders without whose continuing and direct participation or input the firm cannot survive as *a going concern*. Such stakeholders include owners, investors, employees, suppliers, customers and competitors, as well as Nature (physical resources and carrying capacity).

#### Secondary stakeholders

Secondary stakeholders can be defined as those who, in the past, present or future influence or might be influenced by the firm's operations without being directly engaged in transactions with the firm in question and thus are not essential for its survival. Examples of secondary stakeholders are local communities, local government, social activist groups, and business support groups.

According to Carroll (1992), a stake can be (i) an interest, (ii) a right (legal or moral), and/or (iii) an ownership. Some stakeholder groups, e.g. the company's shareholders, mainly have one type of stake (i.e. an ownership), whereas other stakeholders can have more than one. An example of the latter is local authorities, which have a legal obligation, as defined in regulations and common interests, to create an active business climate as well as to maintain a healthy social and physical environment.

Stakeholder management is about handling stakeholder relationships and the multiple and, often, conflicting interests (stakes) within the complex and dynamic web of persons and/or groups (holders) that at all times surround any company. The critical strategic issue here is that interactions, coalitions, differences in behaviour, attitudes and preferences within and across the various group of stakeholders are not static, but in a constant state of flux. The individual group of stakeholders has various means of exerting influence, including rhetoric, ethics, regulation, formal control mechanisms and market mechanisms. As noted by Hill and Jones (1992), stakeholders are identified through the actual or potential harm and benefit they experience, or

anticipate experiencing, as a result of the firm's actions or inactions. Therefore, the stakeholder model in Figure 2.1 is an organizational construct, inasmuch as it describes the connections and their internal constituents and legitimacy. The inner circle represents primary stakeholders and the outer circle, secondary stakeholders.

'In practice, it is often difficult and costly, if not impossible, to identify and meet all the demands of a company's stakeholders. Consequently, it is crucial for management to identify, analyze and assess the meaning and significance of each individual group of generic stakeholders and to determine their respective power, in order to be prepared for the conflict that may follow from the prioritizing of competing groups of stakeholders.

Traditional stakeholder management literature has focused heavily on the stakeholder approach to obtain an overview of threats caused by primary and secondary stakeholders. However, additional emphasis should be laid on the opportunity dimension of stakeholder analysis since this can be nurtured and supported by an interactive and symmetrical two-way communication between stake, cause and stakeholder. The rationale behind the classic SWOT (Strength Weakness-Opportunity-Threat) analysis and the stakeholder strategy matrix can also be applied to the operationalization of the model described previously. The outcome is referred to as Secondary - Primary- Opportunity ~'Threat (SPOT) analysis (Ulhoi, 1997). The focus of the SPOT analysis is to identify the stakeholders exerting, or trying to exert, influence on the company's decisions and activities. The nature of the strategic information provided by a SPOT analysis depends on the situation of the company in question. Once the stakeholder groups have been identified and assessed by management, the stake of each group can then be determined. Thereafter, stakes and groups can be categorized as threats and opportunities.



Figure 1.1: The stakeholder model

There .has been a steady increase in the number of environmental issue to be tackled in all the developing countries. It is necessary here to clarify the term *environmental issue*. Environmental issue refers to areas of human activity that have potentially adverse and direct impact on public health and the environment. It encompasses specific environmental concerns or problems, or

perceived problems, for which an adequate policy or a technological response has yet to be properly planned. Acid rains, global-warming and loss of wetlands are regarded environmental issues within the scope of this, definition. Factors such as lack of adequate infrastructure and trained personnel have further aggravated the problem in an already grim situation marked by increasing industrial pollution, uncontrolled emission from the automobiles, and lack of safe water supply. The role of government machinery to control pollution brings about changes in the behaviour of different groups, both in public and private, and using the resources becomes very crucial and is demanded from them by the way of new rules and regulations In India the "Bhopal gas leakage" triggered a lot of momentum to the environmental movement in all the different sectors. This was followed by governmental initiatives to regulate activities, leading to environmental degradation.

In the recent past, issues like the "Surat plague outbreak" brought awareness among people about environmental problems which are partially attended to by the civic authorities. In such a situation, it is important to look at the institutional set-up existing in the government for managing the environment at different levels. "Institutional set-up" or framework refers to the organizations and government departments directly or indirectly involved in handling the issues, and activities that lead to deterioration in the surrounding conditions. "The surrounding conditions" refer to the human being's immediate operational environment and the adverse impact of the developmental, industrial, and other activities on the environment. The effect most often has lasting impact on the people of the locality. The severity of a situation is decided by the extent to which environmental pollution affects the health of the inhabitants residing in the locality and the ecosystem, thereby producing further damages.

Environmental issues have assumed greater importance for the last two decades. After the United States Agency for International Development (US AID) canvassed its overseas mission in 1971 to identify the most serious environmental problems confronting the 35 African developing countries. It concluded (USAID, 1974) that there was little evidence of awareness of environmental problems among the people of developing countries or among their government administrators. Many countries are preoccupied with the development of their natural resources, and to that extent, concern does exist for the environment, there is an apprehension that social and economic costs of environmental protection may far outweigh the benefits.

The most serious problems in Asia are urban environmental degradation, industrial pollution, atmospheric emissions, soil erosion, land degradation, deforestation, and loss of bio-diversity. These problems are caused by varied activities including: pollution from rapid industrialization and increasing energy use, land degradation due to deforestation, unsustainable agricultural practices, unsound watershed management and water resources, ecological damage attributable to large infrastructural projects, and loss of bio-diversity due to widespread developmental and population pressures. Environmental problems are crosscutting in nature, and impacts of activities in one sector often have cascading effects on other sectors too.

## 1.4 ENVIRONMENTAL PROBLEMS

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The major environmental problems are listed as follows;

- 1. Intensive agriculturization including degradation of soils due to overuse of chemicals, fertilizers, and mono culture degradation of groundwater quality, increase in the use of pesticides leading to health hazards, and decline in the crop diversity. All these further aggravate the problems of degraded soil, the problem of pest and plant diseases, some of which have remained uncontrollable.
- 2. Population explosion has further increased the pressure on natural resources such as forest and mangroves. Besides, the failure to realize the link between poverty and sustenance of environment has further aggravated the problems. All these factors has snowballed into major environmental problems, such as declining in forest cover increase soil erosion, silting of reservoirs and lakes and decline in bio-diversity, etc.
- 3. Problems related to industrialization and urbanization.
- 4. The lopsided development policies have resulted in degraded soil depletion of water tables, increased floods, desertification, water logging and salinity, pollution of water and air and loss of bid diversity.
- 5. Adoption of less environment friendly technologies has resulted in air and water pollution, which has made most of our major rivers dirty.
- 6. While the major industries are responsible for macroenvironmental problems, the unchecked growth of informal manufacturing sector in most of the urban centers has spoiled the microenvironment.
- 7. The concentration of coal mining, thermal power plants, and fertilizer plants in the urban areas has led to serious problems with regard to air, water and land pollution.

# 1.5 CONCEPT OF ENVIRONMENT AND ENVIRONMENTAL MANAGEMENT

*Environment* as a term is very widely used and means different things to different people. It is used. in management literature to refer to the external environment in which the organization functions. Ecologically, environment refers to the sum of all the external conditions and influences affecting the life and development of organisms (Webster, 1961). Two main aspects of the environment are biotic and abiotic (living and non-living organisms). Ecology is the study of the relation of the organisms to their environment. It is concerned with the biology of groups of organisms with functional processes on lands, in oceans and in fresh waters. Environment refers to the region, surroundings or circumstances in which anything external to the organism exists.

The environment of the human being includes abiotic factors-land, water, atmosphere, climate,

sound, odor, and taste; biotic factors-animals, plants, bacteria, and viruses; and social factors like aesthetics.

Environment refers to all the surrounding things, conditions, and influences affecting the growth or development of living things (World Book Dictionary, 1989). Environment as an area of study is thus a conglomerate of all basic and applied sciences, engineering, socioeconomic aspects, management and law. The environment of a region, country, state, district, city, and village is influenced by several factors, as there is a high degree of location specificity in the environment, on account of an all round diversity, ranging from ethnic, geological, geographical, climatic, and social considerations to economic and cultural circumstances.

The term *human environment* denotes those aspects of man's activities that by affecting the natural biological and ecological systems of man-of which he is a part-affect his own life and well-being.

To quote Lynton Keith Caldwell (United Nations Preparatory Committee on Human Environment), "Human environment is a matrix of elements derived by evolution through nature and contained by men through culture".

Environment, as the United Nations Committee describes, is the sum total of identified and identifiable natural resources, existing in finite quantities. on earth and, of the quality of the environment of the milieu, which constitutes an important element of the quality of renewable resources. "In generic sense, it is the aggregate of surrounding things, conditions, or influences. In specific sense, it is a thin layer of life supporting systems called biosphere, divided into physical and biological environment".

## **Environmental pollution:**

It is the reduction in the, quality of the environment due to disposal of the residuals. It refers to the presence of any substance in excess, which is harmful to the living beings, and hence termed as *pollutants* due to the ill effects of their presence.

## **Environmental management:**

Environmental management is the optimal utilization of the finite resources between different possible uses. Environmental criteria and economic considerations demand that such an allocation be efficient. Simultaneously, the available resources should be protected from degradation, and scarce and diminishing resources should be conserved. Environmental quality can be defined as the level and composition of the stream of all the environmental services except the waste receptor services.

## **Environmental philosophy:**

Environmental philosophy concerns itself with its evaluative and moralistic connotations as applied to the following relationships:

1. Man and his biophysical environment/surroundings;

2. Man and his fellow human beings as these relationships affect his thoughts and actions with respect to his biophysical surroundings;

3. Within each of us as individual beings, as these notions influence our cognition and behaviour.

## **Environmental degradation:**

It refers to increase in the air, water, noise and soil pollution that affects the quality of the environment.

# 1.6 ENVIRONMENTAL RESOURCES

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- 1. The physical environment provides all the resources necessary for life, including raw materials, energy, water, air, land and living resources (plants, fish, animals).
- 2. Most of the environmental resources are in the biosphere (life zone) of the earth-a 6-km thick layer on the surface of the earth-which includes the atmosphere.
- 3. The economic view is that the natural environment is an asset or capital commodity that directly and indirectly provides man with economic benefits.
- 4. Throughout history, societies have ensured their continued existence by adapting to the changing natural environment. Some societies have achieved considerable progress by adopting natural resource management methods, land-use planning, pollution control and environment conservation measures.
- 5. Growing world population and environmental exploitation impose an ever-increasing strain on natural resources. Resource supplies are not unlimited. Therefore, protection measures must include conservation resources and also be cost effective.
- 6. Total world resources are never fully known. Every year new technology and new information systems provide new data on the resources.

Environmental resources were once classified as "free goods" in economics because they were available in abundance (e.g., water, air, land). They were used as common property for which no ownership rights are identifiable. These common property resources provide multiple services and functions. However, such "free goods" are now recognized as limited ones. Environmental managers aim at long-term management of natural resources and control of social and economic development processes which have environmental impacts. Limits to common property are prescribed in environmental standards, which can be voluntary or mandatory as enacted in environmental law (e.g., air quality laws, water management laws, etc.). These laws establish the responsibilities of government agencies for environmental protection, the liabilities of the polluters, and the means of enforcement.

Resources that the environment provides may be:

- Tangible: Airflows, water, minerals, fuels, food, materials, etc.
- *Intangible:* Nutrient cycling, climate regulation and removal, dispersion, storage, degradation of residuals or wastes, and so on.
- *Aesthetic:* Scenic, recreational and other pleasing features.

Resources may also be either *renewable* or *non-renewable*. Renewable resources refresh themselves within a short time if properly managed (e.g., air, water, and land). Non-renewable resources, once used, are lost for ever (e.g., minerals and oils).

Environmental functions are the vital link between the internal structure (management/worker) of the enterprise and the external, physical and social structure outside the enterprise. Thus, an enterprise, which ignores the impacts it is making on the environment, is headed for environmental conflict. As resource becomes more and more scarce, the potential for conflict increases accordingly. Since prevention is usually much less costly than cure for the system as a whole (enterprise, community and the natural environment), each enterprise/system should devise an internal mechanism to prevent environmental degradation and potential conflicts.

# **1.7 ENVIRONMENTAL CONFLICT**

Conflict results from the use of the resources and functions by one party at the expense of the other parties. It may also result from the overuse or abuse of environmental resources and functions.

Conflict between the enterprise and the community or government may result from incompatible values and goals or scarcity of resources. Successful environmental management internalizes environmental concern through measures taken at the decision-making stage. Recognition of environmental issues and the "actors" and their influence on economic, social and political factors is the first stage towards resolving conflicts. Once an enterprise has identified the resources and "actors" in an environmental conflict it can tailor its objectives to suit environmental conditions.

An appraisal must be made to discover whether resources are compatible with the needs of the enterprise. Then make an adaptation of enterprise goals (strategic fit) to the community's needs. The "opportunity cost" of delay in manufacturing operations may be significant. Thus, the avoidance of conflicts by management may save time and be highly cost effective.

Environmental Management is not "management of the environment"; it. is the management of activities within tolerable constraints imposed by the government with full consideration of ecological factors. The objective is to meet basic human needs within the potential and constraints of environmental systems. Environmental Management introduces three new dimensions into traditional socioeconomic development. Namely:

- 1. It broadens the concept in scope to include development and enhancement of environmental quality;
- 2. It extends the concept of time to include sustainable long-term feasibility; and
- 3. It assesses the costs to the society and the environment in achieving the desired balance between dimensions 1 and 2 mentioned above.

Environmental Management covers functions designed to facilitate comprehensive planning that takes into account the side effects of man's activities and thereby protects and improves the

human environment for the present and future generations. (United Nations, Development and Environment, 1972.)

Environmental Management also includes the preparation of plans and legal evaluation of administrative and technical solutions to various environmental problems in terms of both preventive and remedial measures, taking into account the multidisciplinary approaches to development.

Environment Management is understood to mean prudent or optimal use, maintenance and enhancement of both the quantity and quality of national and local resources-primarily natural and mostly renewable such as land, water, air and forest, but inclusive of other resources as well, such as human, socio-cultural and institutional for purposes of "development"-or raising the quality of life of all the people in a given society (Ram Malhotra, 1990).

Besides these, Environment Management refers to all the systematic planned efforts by the policy makers/bodies, directed towards regulating and managing the utilization of natural resources and minimizing irreversible damages to the environment through all types of human activities. So the term, *environment*, is used here to refer to the immediate physical environment which serves as the base for drawing natural resources for all human activities into which flows the wastages of residential, industrial, developmental and similar other activities.

Thus the study of Environmental Management covers the conscious and planned efforts and activities undertaken by the government departments and agencies to minimize damages to the environment and meas4res undertaken to regulate the ongoing activities in different areas. Generally, the institutional framework that exists for managing the environment broadly refers to the government institutions, non-government institutions, and the other autonomous bodies functioning independently with a given set of roles and responsibilities, to fulfill certain objectives set forth by each, and, at the same time, collectively contributes to the overall objective of managing the environment.

## **Impact of Environmental Management Decisions:**

- 1. The enterprise and the community are part of one system; therefore, decisions must be taken by the community.
- 2. Good environmental management looks at the potential consequences of actions before their implementation to assess their impact on the total system. In this way, decisions reached are balanced solutions for the enterprise as well as the community.
- 3. Sound environmental management, which is cost effective since it achieves higher productivity through a more efficient use of energy and raw materials, increases workforce motivation (most of the workforce comes from the affected community), achieves enterprise goals of survival, growth and profitability, with limited community conflict.
- 4. Environmental management is a series of compromises using limited resources to achieve multiple goals.

# REVIEW QUESTIONS

## .....

- 1. Explain the terms environment and environmental pollution.
- 2. What are the most common environmental resources and what are their characteristics?
- 3. Why is it significant to control and conserve the environmental resources?
- 4. Managing the environmental activities involves resource management, increasing the awareness about the depletion of resource base, problems due to sharing the common resource base, waste management, and other similar activities. Comment
- 5. Is there a conflict between development and environmental conservation? Explain the concept of sustainable development.
- 6. What are some of the most common pollution problems faced by developing countries? Explain with suitable examples.

## POLICIES AND LEGAL ASPECT OF ENVIRONMENTAL MANAGEMENT

Structure

- 2.1 Introduction
- 2.2 Stockholm Conference
- 2.2.1 The earth summit-the Rio declaration on environment and development, 1992
- 2.3 The Earth Summit Agreement
- 2.4 Environmental Governance in India since 1972
- 2.5 Environmental Protection and Fundamental Rights
- 2.6 India's International Obligations
- 2.7 Public Interest Litigation
- 2.8 Public Participation
- 2.9 Conclusion
- 2.10 Review Questions

# 2.1 INTRODUCTION

In 1972, at the time of the United Nations Conference on Human Environment, in Stockholm, the list of environmental issues was already formidable. UN Secretary General U Thant declared, "Inhabitants of the world have perhaps ten years left to improve human environment". The Stockholm Conference strengthened and accelerated international action against dumping wastes at sea and trades in endangered species, and it led to the establishment of United Nations Environment Programme (UNEP).

The Stockholm Conference was the beginning of the awakening of national consciousness on environmental issues in India. The Bhopal Gas Tragedy gave the real impetus to this issue. Though Air (P & C.P.) Act and the Water (P & C.P.) Act were already in existence, the Environment Protection Act was enacted only in 1986 as a response to the Gas Tragedy, which created a nation wide uproar.

The World Commission on Environment and Development (1987), Our Common Future reports the situation thus,

A major reorientation is needed in many policies and institutional arrangements at international as well as national levels because the rate of (environmental) change is outstripping the ability of scientific disciplines and our current capabilities to assess and advise ... A new international programme for co-operation among largely non-governmental organizations, scientific bodies and industry groups should there be established for that purpose.

Three decades later, the number of environmental issues has increased, and several issues such as stratospheric ozone depletion and loss of tropical forests have become much more acute. Yet, much more progress has been made in identifying the sources and effects of environmental

changes and in responding to them. Along with the evaluation of specific policies, to prevent pollution, protect health, and conserve nature, the debate increasingly encompasses the deliberate design of the .organizations and decision-making procedures that provide a framework for knowledge and action. Many things have occurred since Stockholm. The UN Conference on Environment and Development also called as "Stockholm-II" took place in Brazil in June 1992. It reflected a new awareness of environmental issues, the way in which human population grows and develops both in the developing nations of the South and the industrial nations of the North.

Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.

"People are entitled to a healthy and productive life in harmony with nature. Peace, development and environmental protection are interdependent and indivisible".

## **2.2 STOCKHOLM CONFERENCE**

On June 16, 1972, the United Nations Conference on Human Environment, to which we have already alluded, adopted a declaration consisting of a preamble and 26 principles. By the preamble, the Conference proclaimed that the defense and improvement of the human environment-both natural and man-made had become an imperative goal for mankind, to be pursued together with the fundamental goal of peace and worldwide economic and social development. The achievement of this goal was the responsibility of citizens, communities, enterprises and institutions at every level.

By this preamble, the Conference also, among other things, affirmed that in the developing countries most environmental problems were caused by underdevelopment, whereas in the industrialized countries they were generally related to industrialization and technological development. The Conference also declared that the natural growth of population continuously presented problems on the preservation of the environment and required the adoption, as appropriate, of adequate policies and measures. The Conference then laid down 26 Principles. Among these, Principles 17 and 25 deserve special mention. Emphasizing the role of the state in the protection of its environment. Principle 17 states that "appropriate national institutions were to be entrusted with the task to plan, manage and control the environmental resources of states with a view to enhancing environmental quality". At the same time, Principle 25, this also states, to coordinate international cooperation towards this goal. It goes on to add that "States were to ensure that international organizations played a coordinated, efficient and dynamic role for the protection and improvement of the environment".

The world conservation strategy is intended to stimulate a more focused approach to the management of living resources and to provide policy guidance on how this can be carried out by three main groups. All these developments at the international level have injected a new dimension to public responsibility by making it obligatory for the Central Government, state governments and every citizen to protect and improve the environment (42nd Constitution Amendment Act, 1976).

# 2.2.1 The Earth Summit-The Rio Declaration On Environment And Development, 1992

The Earth Summit in Rio de Janeiro (Brazil) was unprecedented for a UN conference, in terms of both its size and the scope of its concerns. Twenty years after the first global environment conference, the UN sought to help Governments rethink economic development and find ways to halt the destruction of irreplaceable natural resources and pollution of the planet. Hundreds of thousands of people from all walks of life were drawn into the Rio process. They persuaded their leaders to go to Rio and join other nations in making the difficult decisions needed to ensure a healthy planet for generations to come.

The Summit's message-that nothing less than a transformation of our attitudes and behaviour would bring about the necessary changes-was transmitted by almost 10,000 on-site journalists and heard by millions around the world. The message reflected the complexity of the problems facing us: that poverty. as well as excessive consumption by affluent populations, place damaging stress on the environment. Governments recognized the need to redirect international and national plans and policies to ensure that all economic decisions fully took into account any environmental impact. And the message has produced results, making eco-efficiency a guiding principle for business and governments alike.

- Patterns of production-particularly the production of toxic components, such as lead in gasoline, or poisonous waste-are being scrutinized in a systematic manner by the UN and Governments alike.
- Alternative sources of energy are being sought to replace the use of fossil fuels which are linked to global climate change.
- New reliance on public transportation systems is being emphasized in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smog.
- There is much greater awareness of and concern over the growing scarcity of water.

The two-week Earth Summit was the climax of a process, begun in December 1989, of planning, education and negotiations among all Member States of the United Nations, leading to the adoption of Agenda 21, a wide-ranging blueprint for action to achieve sustainable development worldwide. At its close, Maurice Strong, the Conference Secretary-General, called the Summit a "historic moment for humanity". Although Agenda 21 had been weakened by compromise and negotiation, he said, it was still the most comprehensive and, if implemented, effective programme of action ever sanctioned by the international community. Today, efforts to ensure its proper implementation continue.

The Earth Summit influenced all subsequent UN conferences, which have examined the relationship between human rights, population, social development, women and human settlements-and the need for environmentally sustainable development. The World Conference on Human Rights, held in Vienna in 1993, for example, underscored the right of people to a healthy environment and the right to development---controversial demands that had met with resistance from some Member States until the Rio Summit.

## Background

The relationship between economic development and environmental degradation was first placed on the international agenda in 1972, at the UN Conference on the Human Environment, held in Stockholm. After the Conference, Governments set up the United Nations Environment Programme (UNEP), which today continues to act as a global catalyst for action to protect the environment. Little, however, was done in the succeeding years to integrate environmental concerns into national economic planning and decision-making. Overall, the environment continued to deteriorate, and such problems as ozone depletion, global warming and water pollution grew more serious, while the destruction of natural resources accelerated at an alarming rate.

By 1983, when the UN set up the World Commission on Environment and Development, environmental degradation, which had been seen as a side effect of industrial wealth with only a limited impact, was understood to be a matter of survival for developing nations. Led by Gro Harlem Brundtland of Norway, the Commission put forward the concept of sustainable development as an alternative approach to one simply based on economic growth--one "which meets the needs of the present without compromising the ability of future generations to meet their own needs".

After considering the 1987 Brundtland report, the UN General Assembly called for the UN Conference on Environment and Development (UNCED). The

primary goals of the Conference were to come to an understanding of "development" that would support socio-economic development and prevent the continued deterioration of the environment, and to lay a foundation for a global partnership between the developing and the more industrialized countries, based on mutual needs and common interests, that would ensure a healthy future for the planet.

# 2.3 THE EARTH SUMMIT AGREEMENTS

In Rio, Governments-108 represented by heads of State or Government adopted three major agreements aimed at changing the traditional approach to development:

- 1. *Agenda 21 --* a comprehensive programme of action for global action in all areas of sustainable development.
- 2. The *Rio Declaration on Environment and Development -- a* series of principles defining the rights and responsibilities of States.
- 3. *The Statement of Forest Principles -- a* set of principles to emphasize the sustainable management of forests worldwide.

In addition, two legally binding Conventions aimed at preventing global climate change and the eradication of the diversity of biological species were opened for signature at the Summit, giving high profile to these efforts:

• The United Nations Framework Convention on Climate Change

• The Convention on Biological Diversity

Agenda 21 addresses today's pressing problems and aims to prepare the world for the challenges of the next century. It contains detailed proposals for action in social and economic areas such as combating poverty, changing patterns of production and consumption, and addressing demographic dynamics. The proposals also call for conserving and managing the natural resources which form the basis for life-for example, protecting the atmosphere, oceans and biodiversity; preventing deforestation; and promoting sustainable agriculture.

Government agreed that the integration of environment and development concerns will lead to the fulfillment of basic needs, improved standards for all, better protected and better managed ecosystems, and a safer and a more prosperous future. "No nation can achieve this on its own. Together we can.

The Rio declaration on Environment and Sustainable development supports Agenda 21 by defining the rights and *responsibilities* of States regarding these issues. Among Its pnnclples:

- That human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature;
- That scientific uncertainty environmental degradation irreversible damage;
- That States have a sovereign right to exploit their own resources but not to cause damage to the environment of other States;
- That eradicating poverty and reducing disparities in worldwide standards of living are "indispensable" for sustainable development;
- That the full participation of women is essential for achieving sustainable development;
- That the developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

The Statement of Forest Principles, the non-legally binding statement of principles for the sustainable management of forests, was the first global consensus reached on forests. Among its provisions:

- That all countries, notably developed countries, should make an effort to "green the world" through reforestation and forest conservation;
- That States have a right to develop forests according to their socio economic needs, in keeping with national sustainable development policies; and
- Those specific financial resources should be provided to develop programmes that encourage economic and social substitution policies.

At the Summit, the UN was also called on to negotiate an international legal agreement on desertification, to hold talks on preventing the depletion of certain fish stocks, to devise a programme of action for the sustainable development of small island developing States, and to establish mechanisms for ensuring the implementation of the Rio accords.

## **UN FOLLOW-UP**

The Earth Summit succeeded in presenting new perspectives on economic progress. It was lauded as the beginning of a new era and its success would be measured by the implementation-locally, nationally and internationally-of its agreements. Those attending the Summit understood that making the necessary changes would not be easy: it would be a multi-phased process; it would take place at different rates in different parts of the world; and it would require the expenditure of funds now in order to prevent much larger financial and environmental costs in the future.

In Rio, the UN was given a key role in the implementation of Agenda 21. Since then, the Organization has taken steps to integrate concepts of sustainable development into all relevant policies and programmes. Income-generating projects increasingly take into account environmental consequences. Development assistance programmes are increasingly directed towards women, given their central roles as producers and as caretakers of families. Efforts to manage forests in a sustainable manner begin with finding alternatives to meet the needs of people who are overusing them. The moral and social imperatives for alleviating poverty are given additional urgency by the recognition that poor people can cause damage to the environment. And foreign investment decisions increasingly take into account the fact that drawing down the earth's natural resources for short-term profit is bad for business in the long run.

In adopting Agenda 21, the Earth Summit also requested the United Nations to initiate talks aimed at halting the rapid depletion of certain fish stocks and preventing conflict over fishing on the high seas. After negotiations spanning more than two years, the UN Agreement on High Seas Fishing was opened for signature on 4 December 19945. It provides for all species of straddling and highly migratory fish—those which swim between national economic zones or migrate across broad areas of the ocean—ro be subject to quotas designed to ensure the continued survival of fish for our children and grandchildren to enjoy.

Also at the summit, Governments requested the UN to hold negotiations for an international legal agreement to prevent the degradation of dry lands. The resulting international conventions to Combat Desertification in Those Countries Experiencing Serious Draught and/or Desertification, particularly in Africa, was opened for signing in October1994 and came into force in December 1996. it calls for urgent action to be taken in Africa, where some 66 per cent of the continent is desert or dry lands and 73 per cent of agricultural dry lands are already degraded.

In order to promote the well being of people living in island countries, the Summit called for the UN to convene a Global Conference on the Sustainable Development of Small Island Developing States. The Conference was held in Barbados in May 1994 and produced a programme of action designed to assist these environmentally and economically vulnerable

countries.

In addition, three bodies were created within the United Nations to ensure full support for implementation of Agenda 21 worldwide:

- 1. The UN Commission on Sustainable Development, which first met in. June 1993.
- 2. The Inter-agency Committee on Sustainable Development set up by the Secretary-General in 1992 to ensure effective system-wide cooperation and coordination in the follow-up to the Summit.
- 3. The High-level Advisory Board on Sustainable Development, established in 1993 to advise the Secretary-General and the Commission on issues relating to the implementation of Agenda 2L

Action areas list for Agenda 21 are the following

## **Environment and Development Agenda**

- 1. Combating poverty
- 2. Changing consumption patterns
- 3. Demographic Dynamics and sustainability
- 4. Protection and promotion of human health
- 5. Promoting sustainable human settlement development
- 6. Integrating Environment and Development in decision making
- 7. Protecting the atmosphere
- 8. Integrated Approach to the planning and management of land Resources
- 9. Combating Deforestation
- 10. Managing Fragile Ecosystems: Combating Desertification and drought
- 11. Managing Fragile Ecosystems: Sustainable Mountain Development
- 12. Promoting Sustainable Agriculture and rural Development
- 13. Conservation and Biological Diversity
- 14. Environmentally sound Management and biotechnology
- 15. Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas and coastal areas and the protection rational use and development of their living resources.
- 16. Protection of the quality and supply of fresh water resources: application of integrated approaches to the development, management and use of water resources.
- 17. Environmentally sound management of toxic chemical!' including prevention of illegal international traffic in toxic and dangerous products. Environmentally sound management of hazardous wastes including prevention of illegal international traffic in hazardous wastes. Safe and environmentally sound management of radioactive wastes.
- 18. Global Action for women towards sustainable and. equitable development
- 19. Children and youth in sustainable development
- 20. Recognizing and strengthening the role of indigenous people and their communities.

21. Strengthening the role of Non Government Organizations-partners for sustainable development.

22. Local authorities' initiatives in support of Agenda 21

- 23. Strengthening the role of workers and their trade unions
- 24. Strengthening the role of business and industry scientific and technological community
- 25. Strengthening the role of farmers
- 26. Financial resources and mechanisms
- 27. Transfer of environmentally sound technology, cooperation and capacity building
- 28. Science for Sustainable Development
- 29. Promoting Education, public awareness and training
- 30. National Mechanisms and international cooperation for capacity building
- 31. International Institutional arrangements-International Legal Instruments and mechanisms
- 32. Information for decision making

## UN Commission on Sustainable Development (CSD)

The Earth Summit called on the General Assembly to establish the Commission under the Economic and Social Council as a means of supporting and encouraging action by Governments, business, industry and other non-governmental groups to bring about the social and economic changes needed for sustainable development. Each year, the Commission reviews implementation of the Earth Summit agreements, provides policy guidance to Governments and major groups involved in sustainable development and strengthens Agenda 21 by devising additional strategies where necessary. It also promotes dialogue and builds partnerships between Governments and the major groups which are seen as key to achieving sustainable development worldwide. The work of the Commission was supparfcc:16y numerous inter-seasonal meetings and activities initiated by Governments, international organizations, and major groups.

Under a multi-year thematic work programme, the Commission has monitored the early implementation of Agenda 21 in stages. Each sectoral issue - health, human settlements, freshwater, toxic chemicals and hazardous waste, land, agriculture, desertification, mountains, forests, biodiversity, atmosphere, oceans and seas-was reviewed between 1994 and 1996. Developments on most "cross-sectoral" issues were considered each year. These issues, which must be addressed, if action in sectoral areas is to be effective, are classified as follows: critical elements of sustainability (trade and environment, patterns of production and consumption, combating poverty, demographic dynamics); financial resources and mechanisms; education, science, transfer of environmentally sound technologies, technical cooperation and capacity-building; decision-making; and activities of the major groups, such as business and labor.

In 1995, the Commission established, under its auspices, the Intergovernmental Panel on Forests, with a broad mandate covering the entire spectrum of forest-related issues and dealing with conservation, sustainable development and management of all types of forests.

Reports submitted annually by Governments are the main basis for monitoring progress and identifying problems faced by various countries. By mid-1996. some 100 Governments had established national sustainable development councils or other coordinating bodies. More than 2,000 municipal and town governments had each formulated a local Agenda 21 of its own. Many countries were seeking legislative approval for sustainable development plans, and the level of NGG involvement remained high.

Three perspectives help suggest the lessons that influence the urgency and specific needs for

innovation in organizational arrangements and decision making processes. The first looks at indicators of the underlying forces of economic and population growth and development. The second looks directly at the conditions of the environment. The third perspective visualizes changes in management and institutions.

# 2.4 ENVIRONMENTAL GOVERNANCE IN INDIA SINCE 1972

## .....

The concern for environment has its early beginning in India with the concern for public health, water supply, and disposal of waste. The rise in the awareness of environmental degradation due to the impact of modern industrial development in the 1970s brought a major change in the perceptions at the national and regional levels. The establishment of new legal frameworks and the creation of governmental bodies designed especially to protect the environment and prevent pollution followed soon. The focus on prevention of pollution continued into the 1980s, but was reinforced by new concerns about the resource conservation. These included the need to use the resources sustainable to treat ecosystems as integral units and promote the need to preserve forests and biodiversity.

The rapid growth of institutions to deal with environmental protection has been accompanied by the rise in public awareness about environmental issues. The new "environmental establishments" include many significant nongovernmental organizations formed to voice public concern. The national developments have been simultaneously reflected at the regional and international levels. Thus, international treaties have been signed to deal with the increasingly complex conservation and pollution prevention problems. There has been a steady progress in the establishment of public and nongovernmental organizations. All of this, as components of a system, has an important role to play in the maintenance of a healthy environment.

India responded to environmental problems, 'which dates back to April 1972, when the then Prime Minister, Smt. Indira Gandhi, established a National Committee on Environmental Planning and Coordination (NCEPC). She stated,

Our emphasis, should be on the improvement in the quality of life as a whole rather than on the quantitative growth of various sectors in the economy. Our attention cannot be diverted from the main question before us which is to bring basic amenities within the reach of our people and to give them better living conditions without alienating them from nature and their environment, without despoiling nature of its beauty and of its freshness and purity so essential to our lives.

The achievement of the goal of environmental protection depends on the sound assumption about the behaviour of individual groups-including firms and public institutions. The role of the institutions and legislations in providing and carrying out environmental planning and management is vital. This role is critical to make our projects sustainable, and the laws and statutes should be designed to suite the social and political context. The institutional framework for environmental protection needs to be adequate in terms of both funding and political status.

The focus on prevention of pollution continued into the 1980s, but reinforced by new concerns

about the resource conservation and uses of the resources sustainable to treat the ecosystems as integral units and promote the need to preserve forests and biodiversity. The rapid growth of institutions to deal with environmental protection has been accompanied by the rise of public awareness about environmental issues across all sections of the society. The new "environmental establishments" include many significant nongovernmental organizations formed to voice public concern. The national developments have been simultaneously reflected at the regional and international levels. Thus, international treaties have been signed to deal with the increasingly 'complex conservation and pollution prevention problems.

## The Forty Second Amendment Act

Environmental protection and improvement were explicitly incorporated into the Constitution by the Constitution (42nd Amendment) Act of 1976. Article 48A was added to the Directive Principles of State Policy., It declares: "The State shall endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country." Article: 51A (g) in a new chapter entitled "Fundamental Duties", imposes a similar responsibility on every citizen "To protect and improve the natural environment including the *forests*, lakes, rivers, and wildlife, and to have compassion *for* living creatures"... Although the language in the two articles differs, the difference appears to relate to form rather than substance together, the provisions highlight the national consensus on the importance of environmental protection and improvement.

The Directive Principles are policy prescriptions that guide the government. Although unenforceable in a court of law, the directive principles are increasingly being cited by judges as being complementary to the fundamental rights (AIR, 1981).

In several environmental cases the language of Article *48A* has guided the courts. Indeed, the Supreme Court has held:

Whenever a problem of ecology is brought before the Court, the Court is bound to bear in mind Article 48.60 of the Constitution ...and Article 51A (g)... when the Court is called upon to give effect to the Directive Principles and the Fundamental Duty, the Court is not to shrug its shoulders and say that the priorities are a matter of policy and so it is a matter for the policymaking authority. The least that the Court may do is to examine whether appropriate considerations are borne in mind and irrelevancies excluded. In appropriate cases, the Court may go further, but how much further will depend on the circumstances of the case. The Court may always give necessary directions. However, the Court will not attempt to nicely balance relevant considerations. When the question involves the nice balancing of relevant considerations, the Court may feel justified in resigning itself to acceptance of the decision of the concerned authority. (AIR, 1987 SC 1109, 1114-1115).

The 42<sup>nd</sup> amendment also expanded the list of concurrent powers in the Constitution. The Amendment introduced a new entry "Population Control and Family Planning," while "Forests" and "Protection and wild Animals and Birds" were moved *from* the State List to the Concurrent List. Did these changes give the Parliament new powers to legislate on environmental matters? Article 253 of the Constitution empowers Parliament to make laws implementing India's international obligations as well as any decision made at an international conference, association or other body.

Article 253 states: "Notwithstanding anything in the foregoing provisions of this chapter, Parliament has power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body." In view of the broad range of issues addressed by international conferences, treaties and agreements, Article 253 apparently gives Parliament the power to enact laws on virtually any entry contained in the State List.

Parliament has used its power under Article 253 to enact Air (Prevention and Control of Pollution) Act of 1981, and the Environment (Protection) Act of 1986. The preambles to both the laws state that these Acts were enacted to implement the decisions reached at the United Nations Conference on the Human Environment held at Stockholm in 1972. At the Conference, members of the United Nations agreed to work to preserve the world's natural resources, and called upon each country to carry out this plan.

The broad language of Article 253 suggests that in the wake of the Stockholm Conference in 1972, Parliament has the powers to legislate on all matters linked to the preservation of the natural resources. Parliament's use of Article 253 to enact the Air Act and Environment Act confirms this view. The subjects "Forests" and "Preservation of Wild Animals and Birds" relate to natural resources. It appears, therefore, that the expansion of concurrent powers by the Forty-Second Amendment in 1976 only made explicit powers that Parliament already possessed under Article 253.

In 1980, the Tiwari Committee recommended that a new entry on "Environmental Protection" be introduced in the Concurrent List to enable the Central Government to legislate on environmental subjects. The Committee's recommendation was based on a note from the Indian Academy of Environmental Law, which observed that there was no direct entry in the 7th Schedule enabling Parliament to enact comprehensive Environmental Laws. The note, however, did not consider Parliament's power under Article 253.

## 2.5 ENVIRONMENTAL PROTECTION AND FUNDAMENTAL RIGHTS

## The Right to a Wholesome Environment

The Supreme Court expanded Article 21 to include environmental protection. The apex Court interpreted the right to life and personal liberty to include the right to wholesome environment and introduced stiffer penalties. Now, the pollution control boards, may close down a defaulting industrial plant or may stop its supply of electricity or water. These boards may also apply to courts to restrain emissions that exceed prescribed standards. Notably, the 11th Constitutional Amendment introduced a citizen's suit provision into the Air Act and extended the Act to include noise pollution. The Rules issued under the Air Act focus on procedural matters.

The first indication of the right to a wholesome environment may be traced to the Dehradun Quarrying Case. (AIR, 1987 SC 1048). In July 1983, representatives of the Rural Litigation and Enlistment Kendra, Dehradun wrote to the Supreme Court alleging that illegal limestone mining

in the Mussoorie -Dehradun region was devastating the fragile ecosystems in the area. On July 14, the Court directed its registry to treat the letter as a writ petition under Article 32 of the Constitution, with notice to the Government of Uttar Pradesh and the Collector of Dehradun. The fundamental right to life in Article 21 best fits the bill. Justice Singh's concluding observation justifying the closure of polluting tanneries in the Ganga Pollution (Tanneries) Case supports this view: "We are conscious that closure of tanneries may bring unemployment, loss of revenue, but life, health and ecology have greater importance to the people." (M.C. Mehta, AIR, 1988 SC 1048).

In addition, at least four High Courts have explicitly recognized an environmental dimension to Article 21. For example, while considering a writ petition to enjoin the Life Insurance Corporation and the Income Tax Department from building residential houses in a recreational zone, the Andhra Pradesh High Court held: "[I]t would be reasonable to hold that the employment of life and its attainment and fulfillment guaranteed by Article 21 of the Constitution embraces the protection and preservation of nature's gift without (which) life cannot be enjoyed. The slow poisoning by the polluted atmosphere caused by the environmental pollution and spoliation should also be regarded as amounting to violation of Article 21 of the Constitution. In R.L& E. Kendra v. State of UP., AIR, 1985 SC 652, the Supreme Court has entertained environmental complaints alleging that the operations of limestone quarries in the Himalayan range of Mussoorie resulted in the degradation of the environment affecting ecological balance...[T]he Supreme Court in an application under Article 32 has ordered the closure of some of these quarries on the ground that their operations were upsetting ecological balance. Although Article 21 of the Constitution is not referred to in these judgments of the Supreme Court, those judgments can only be understood on the basis that the Supreme Court entertained these complaints under Article 32 as involving violation of right to life as envisaged in Article 21.

Judges of the High Courts of Rajasthan, (AIR, 1988 RAJ 2.4), Kerala (KER L.T.730, 731, 1988), and Himachal Pradesh (AIR, 1988 HP 4, 9) too have observed that environmental degradation violates the fundamental right to life. Indeed, short of articulation by the Supreme Court, the right to wholesome environment seems to be widely accepted by the higher judiciary as implied by Article 21.

## The Right to Livelihood

Another recently revealed aspect of the right to life-the right to livelihood can potentially check government action with an environmental impact that threatens to dislocate the poor and disrupt their lifestyles.

The Supreme Court first recognized the right to livelihood in the case of *Olga Tellis* v. *Bombay Municipal Corporation*. (AIR, 1986 SC 180). The petitioners, a journalist and two pavement dwellers, challenged a government scheme to deport the pavement dwellers from Bombay to their places of origin. The main plank of the petitioners' argument was that the right to life includes the right to livelihood, and since the pavement dwellers would be deprived of their livelihood if they were evicted from their slum and pavement dwellings, their eviction would be tantamount to deprivation of their life, and was hence unconstitutional. Accepting the petitioners' argument, the Court held:

Deprive the person of his right to livelihood and you shall have deprived him of his life. The state may not by affirmative action, be compellable to provide adequate means of livelihood or work to the citizens. But, any person, who is deprived of his right to livelihood except according to just and fair procedure established by law, can challenge the deprivation as offending the right to life conferred by Article 21.] The Court directed the Municipal Corporation to provide alternative sites or accommodation to the slum and pavement dwellers within a reasonable distance of their original sites; to earnestly pursue proposed housing scheme for the poor, and to provide basic amenities to slum dwellers (AIR, 1986 SC 180).

## The Right to Equality

Apart from Article 21, the right to equality guaranteed in Article 14 of the Constitution may also be infringed by government decisions that have an impact on the environment (AIR, 1981 SC 487, 499).

Article 14, among other things, strike at arbitrariness, "because an action that is arbitrary must necessarily involve a negation of equality." The urban environmental groups often resort to Article 14 to quash "arbitrary" municipal permissions for construction that are contrary to development regulations. Besides, Article 14 may also be invoked to challenge governmental sanctions for mining and other activities with high environmental impact, where the permissions are "arbitrarily" granted without an adequate consideration of environmental impacts (AIR 1988 HP 4, 9).

## Freedom to Trade vis-à-vis Environmental Protection

As environmental regulation grew more stringent and its enforcement became more vigorous, industrial challenge to *agency action* is likely to increase. Although there are over 200 Central and state statutes that have some bearing on environmental protection (Tiwari Committee, 1980), in most cases, the environmental concern is incidental to the law's principal object. For example, the Mines and Minerals (Regulations and Development) Act of 1957, which is aimed at regulating and promoting mineral prospecting, contains a peripheral rule-making to regulate the discharge of tailings, slime and other waste products. Such scattered and piecemeal "environmental" provisions held the field until the 1970s (see MPCB, 1969).

## **Ministry of Environment and Forest**

Governmental institutions for environmental policy formulation, implementation and enforcement are in place in most countries since the early 1980s. In India, the environmental debate was set in motion in the Parliament on August 11, 1980, under the title of "Rape of Earth", led by the then Minister of Environment, Shri Dig Vijay Singh. To provide explicit recognition to the pivotal role that environmental conservation must play for sustainable development, the government of India set up a Department of Environment in November 1980. Since January 1985, it forms part, of a new Ministry of Environment and Forest. An integrated department called "Department of Environment, Forest and Wildlife" in the Ministry of Environment and Forest came into being with effect from September 25, 1985. The department plays the role of a *watchdog* and serves as a *nodal agency* in the administrative structure of the government for the integration of environmental concerns in the planning process.

The Ministry at the Centre, in turn, created the Departments of Environments at the state level to control pollution caused by the industrial activities. The Department of Environment initially

functioned as part of the Urban Development Department. The Ministry of Environment and Forest serves as the focal point in the administrative structure of Central Government for planning, promotion, and coordination of environmental and forestry programmes. The statutory responsibilities for pollution control are implemented through the Central Board for the Prevention and Control of Water Pollution.

## **Central Pollution Control Board**

The Central Board for Prevention and Control of Water Pollution, together with the state pollution control boards, look after the implementation of the government policy in respect of improvement of water and air quality in the country. Minimal National Standards (MINAS) for pollution discharges from specific industries have been formulated and control measures implemented in a phased manner. About 50% of the large and medium industries in the country have so far installed pollution control devises. A Central Ganga Authority (CGA) headed by the Prime Minister has been set up to oversee the implementation of the Ganga Action Plan. The CGA has been approved an investment of Rs. 304.26 crores during the Seventh Five Year Plan in 27 class cities of UP, Bihar and West Bengal. Till the end of March 1988, 194 schemes at a cost of Rs. 200.22 crore in three states were under execution. An elaborate scheme for monitoring the water quality has been prepared. The department also closely interacts with the R&D, educational institutions, voluntary organizations and, of course, the concerned government ministries, departments, etc. at the state levels.

## **Environmental Protection Activities of the Departments**

Environmental protection activities undertaken by the Department have the following objectives:

- 1. To play the role of a "watch dog", to study and bring to the attention of government and the Parliament instances, causes, and consequences of environmental degradation in all sectors.
- 2. To serve as a nodal agency for environmental protection and eco development in a coordinated manner.
- 3. To carry out environmental appraisal of the development projects.
- 4. To have administrative responsibility for:
  - a) Pollution monitoring and regulations,
  - b) Conservation of critical ecosystem designated as biosphere reserves, and
  - c) Conservation of the marine ecosystem.

These tasks are being fulfilled through the following activities:

- Assistance to organizations implementing environmental and forestry programmes
- Promotion of environmental and forestry research
- Environmental impact assessment
- Extension education and training to augment the required work force.
- Collection and management of environmental information
- Creation of environmental awareness at the national level

The National Committee on Environmental Planning and Coordination, which was constituted on the recommendations of the Tiwari Committee, of *stressed* "Proper management of the country's natural resources of land, forest and water in order to conserve the nation's ecological base and recommended that a central Land Commission should be set up as a first step to achieve this goal". It also identified three major areas of concern namely:

- 1. The need to preserve threatened species of flora and fauna and fragile ecosystem from extinction.
- 2. The need to protect the pollution of air, water and land by industrial effluent and wastes; and
- 3. The need to improve the condition of our human settlements.

To address these concerns, the Tiwari Committee formulated a five-point framework:

- 1. Land and water management
- 2. Natural living resources
- 3. Environmental pollution
- 4. Human settlement
- 5. Environmental Education and awareness.

Though environmental law appears to be a new creation, it has a clear past. The Government of India appointed a committee to recommend the legislative measures for environmental protection. The terms of reference of the Committee for recommending legislative measures and administrative machinery for ensuring environmental protection were as follows:

- 1. To review the existing laws on the subject of environmental protection and recommend legislative measures required for environmental quality.
- 2. To review the existing administrative arrangements for the protection of the environment and recommend for improvement, if any.
- 3. To recommend appropriate and adequate machinery in government, both at the Central and state levels, for improving environmental quality and to maintain ecological balance.

Many provisions in our Constitution relating to improvement in the quality of life had been made since its adoption in 1950. However, a direct reference to environmental protection and improvement became a part of it only in 1976, with the 42nd Amendment. The Central Government makes rules for carrying out provisions of the Act-:- The Air (Prevention and Control of Pollution) Act, 1981, passed by the Government of India makes provisions for prevention, control and abatement of air pollution, for establishment of Boards for conferring powers and function related to such matters. These Boards have been empowered to establish air laboratories, to enable them to perform their functions efficiently.

Environmental pollution as a subject matter of legislation did not find a place in the Indian Penal Code Book until 1974 (Suresh, et. al., 1992). Before 1974, the only recourse available to citizens against pollution of any nature was under the provisions of the Indian Penal Code, the Criminal Procedure Code and the Civil Procedure Code. However, there was no regulatory and preventive enactment as. far as environmental pollution was concerned. Very often, cases were lodged because of mere procedural and technical irregularities. It was only in the year 1974 that the Water (Prevention and Control of Pollution) Act, 1974 was enacted. Then came the Water (Prevention and Control of Pollution) Cess Act, 1977, and the Air (Prevention and Control of

Pollution) Act, 1981.

The Environment (Protection) Act, 1986, which has been brought into force with effect from November 19, 1986, was the first comprehensive legislation with regard to environmental pollution. The objectives of the Act passed were: "Protection, regulation of discharge of environmental pollutants, handling hazardous substances, speedy response in the event of accidents threatening environments, and giving deterrent punishment to those who endanger human environmental safety and health.

## The Statements of Objects and Reasons of Environment Protection Act, 1986

Under the Act, the Central Government has been vested with powers of entering and inspecting any place through any person or agency authorized by it. The Act also authorizes the Central Government to issue direction for closure, prohibition or regulation of any industry's operation or process. It also authorizes the Central Government to stop or regulate the supply of electricity or water or any other service directly without obtaining a court order (Environment Protection Act, 1986).

After a review of the existing legislation on environment, the Environment (Protection) Act, 1986 has been legislated to plug the gaps and to provide a single focus for environmental issues. The Central Enactments-Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 have been reviewed extensively and suitably amended to make the provisions more effective.

Environmental Impact Assessment is carried out for evaluation of environmental implications and for incorporation of necessary safeguards for development activities having a bearing on environmental quality. The project authorities are required to incorporate a chapter on aspects in their feasibility reports. Thus, incorporation of environmental consideration in development process is an important scientific element for protecting the environment, the absence of which in the past caused environmental degradation. For selected polluting industrial projects which come under the licensing system, a formalized procedure has been evolved so as to ensure that environmental considerations are taken into account right at the site selection stage itself.

## **Functions of Government Agencies**

Government agencies have generally adopted three major functions. These are:

- 1. *Policy formulation:* This function involves research into environmental standards, setting environmental goals, and integrating environmental protection into development, including regional development, and planning.
- 2. *Policy implementation:* This function involves direct responsibility for environmental monitoring, and execution of environmental rehabilitation or protection, including the use of environmental impact assessment (EIA).
- 3. *Policy enforcement:* This function has a watchdog or regulatory role for monitoring the breach of environmental regulations and then taking action to get the offender penalized. A high-level agency will be required to enforce these regulations amidst a tangle of other political priorities. In most countries, these central economic planning organizations and sector development agencies generally do not have environmental units of their own; nor

do they consider the protection of the environment as part of their function. In addition, the centralized environmental bodies, at the inception of development planning or natural resource management, consult these organizations only intermittently when decisions are made regarding the design of the projects. So there is a lack of integration of economic and environmental policies. There are exceptions to this. In Australia, environmental units are established within many ministries, including treasury, and the minister responsible for environment is a member of the Structural Adjustment Committee (Economic).

The developments at the international level have injected a new dimension to public responsibility by making it obligatory for the Central Government, state governments, and every citizen to protect and improve the environment (The 42nd Amendment Act, 1976).

## The 42nd Amendment Act

The 42nd Amendment Act has made certain changes in the Seventh Schedule of the Constitution. In the Concurrent List after entry 17, entry 17 A was inserted, which provides for "forest". Originally, forest was a state subject and, as there was no uniform policy followed by the state government in respect of protection of forest, this subject was transferred to List III. The legal sanction to protect different segments of the environment in India has been provided by successive enactments of certain laws. The Wildlife (Protection) Act, 1972, clearly states that the main objective is to protect the wild animals and birds, particularly rare species. Another significant Act in environment protection in India is the Water (Prevention and Control of Pollution) Act, 1974. The objective of the act is to prevent and control water pollution and also to maintain and restore wholesomeness of water.

Forest (Conservation) Act, 1980 was passed by the Government. Under the Act, the Central Government may constitute an Advisory Committee to advise it regarding grant of approval under Section 2 and any other matter connected with the conservation of forest, which may be referred to it by the Central Government (Forest Conservation Act, 1980).

## The Indian Forest Act of 1927

Although it embodies the colonial policies of the pre-independence era, the Forest Act of 1927 remains in force. This Act consolidates, with minor changes, the provisions of the Indian Forest Act of 1878 and its amending Acts.

The 1927 Act deals with four categories of forests, namely, reserved forests, village forests, protected forests, and non-government (private) forests. A state may declare forestlands or waste lands as reserved forests and may sell the produce from these forests. Any unauthorized felling of trees, quarrying, grazing and hunting in reserved forests is punishable with a fine or imprisonment, or both. Reserved forests assigned to a village community are called village forests. The state governments are empowered to designate protected forests and may prohibit the felling of trees, quarrying and the removal of forest produce from these forests. The state governments is enforced through rules, licenses and criminal prosecutions.

The Forest Act is administered by forest officers who are authorized to compel the attendance of witnesses and the production of documents, to issue search warrants and to take evidence in an
inquiry into forest offences. Such evidence is admissible in a magistrate's court.

#### The Factories Act of 1948

Passed shortly after the Bhopal gas tragedy and the Supreme Court's judgment in the *Shriram Gas Leak Case* (AIR 1987 SC 965), the 1987 Amendment to the Factories Act introduced special provisions on hazardous industrial activities.

The 1987 Amendment empowers the states to appoint Site Appraisal Committees to advice on the initial location of factories using hazardous processes. The factory inspector and the local authority have to keep a close watch on all particulars regarding health hazards at the factory, and the preventive measure taken. These preventive measures must be published among the workers and nearby residents. Every occupier must also draw up an emergency disaster control plan, which must be approved by the Chief Inspector. The occupier is required to maintain workers' medical records and must employ operations and maintenance personnel who are experienced in handling hazardous substances. The permissible limits of exposure to toxic substances are prescribed in the Second Schedule to the Act. Safety committees consisting of workers and managers are required to review periodically the factory's safety measures.

The Factories Act after its 1987 Amendment defines "occupier" as a very senior level manager. Such person is held responsible for compliance with the

The Insecticides Rules of 1971 prescribe the procedures for licensing, packaging, labeling and transporting insecticides. They also provide for workers' safety during the manufacture and handling of insecticides through protective clothing, respiratory devices, and medical facilities.

### The Wildlife (Protection) Act of 1972

In 1972, Parliament enacted the Wildlife Act pursuant to the enabling resolutions of 11 states under Article 252(1) of the Constitution. The Wildlife Act provides for state wildlife advisory boards, regulations for hunting wild animals and birds, establishment of sanctuaries and national parks, regulations for trade in wild animals, animal products and trophies, and judicially imposed penalties for violating the Act. Harming endangered species listed in Schedule I of the Act is prohibited throughout India.

Hunting other species, such as those requiring special protection (Schedule II), big game (Schedule III) and small game (Schedule IV) is regulated through licensing. A few species classified as vermin (Schedule V) may be hunted without restrictions. Wildlife wardens and their staff administer the Act. An amendment to the Act in 1982, introduced provisions permitting the capture and transportation of wild animals for the scientific management of animal populations.

### The Water (Prevention and Control of Pollution) Act of 1974

The Water Act of 1974 was the culmination of over a decade of discussion and deliberation between the Centre and the states. The history and the preamble of the Water Act suggest that only state governments can enact water pollution legislation. The Act, therefore, was assessed by Parliament pursuant to enabling resolution by twelve states, under Article 252(1) of the Constitution. Article 252 empowers Parliament to enact laws on state subjects for two or more states, where the state legislatures have consented to such legislation.

The Act vests regulatory authority in state boards and empowers these boards to establish and enforce effluent standards for factories discharging pollutants into bodies of water. A Central Board performs the same functions for union territories and coordinates activities among the states. The boards control sewage and industrial effluent discharges by approving, rejecting or conditioning applications for consent to discharge. The state boards also minimize water pollution by advising state governments on appropriate sites for new industry.

Prior to its amendment in 1988, enforcement under the Water Act was achieved through criminal prosecutions initiated by the boards and through applications to magistrates for injunctions to restrain polluters. The 1988 Amendment strengthened implementation provisions of the Act. Now, a board may close a defaulting industrial plant or withdraw its supply of power or water by an administrative order; the penalties are more stringent, and citizens' suit provision bolsters the enforcement machinery.

### The Water (Prevention and Control of Pollution) Cess Act of 1977

The Water Cess Act was passed to help meet the expenses of the Central aJ1d state water boards. The Act creates economic incentives for pollution control and requires local authorities and certain designated industries to pay a cess (tax) for water consumption. These revenues are used to implement the Water Act. The Central Government, after deducting the expenses of collection, pays the Central Board and the states such sums as it deems necessary to enforce the provisions of the Water Act. To encourage capital investment in pollution control, the Act gives a polluter a 70 per cent rebate of the applicable cess upon installing effulge treatment equipment.

### The Forest (Conservation) Act of 1980

Alarmed at India's rapid deforestation and the resulting environmental degradation, the Central Government enacted the Forest (Conservation) Act in 1980. As amended in 1988, the Act requires the approval of the Central Government before a state "deserves" a reserved forest, uses forest land for non-forest purposes, assigns forest land to a private person or corporation, or clears forest land for the purpose of reforestation. An Advisory Committee constituted under the Act advises the Centre on this approval.

### The Air (Prevention and Control of Pollution) Act of 1981

To implement the decisions taken at the United Nations Conference on the Human Environment held in Stockholm in June 1972, Parliament enacted the nation-wide Air Act under Article 253 of the Constitution. The Act's statement of objects and reasons contains the government's explanation of the contents and the scope of the law, and its concern for the detrimental effect (of air pollution) on the health of the people as also on animal life, vegetation or property.

The Air Act's framework is similar to the one created by its predecessor, the Water Act of 1974. To enable an integrated approach to environmental problems, the Air Act expanded the authority of the Central and state boards established under the Water Act, to include air pollution control. States not having water pollution boards were required to set up air pollution boards.

Under the Air Act, all industries operating within designated air pollution control areas must obtain a "consent" (permit) from the state boards. The states are required to prescribe emission standards for industry and automobiles after consulting the Central Board and noting its ambient

air quality standards. Prior to its amendment in 1987, the Air Act was enforced through mild court administered penalties on violators. The 1987 amendment strengthened the enforcement machinery.

#### The Environment Protection Act of 1986

In the wake of the Bhopal gas tragedy, the Government of India enacted the Environment (Protection) Act of 1986 under Article 253 of the Constitution. The purpose of the Act is to implement the decisions of the United Nations Conference on the Human Environment of 1972, in so far as they relate to the protection and improvement of the human environment and the prevention of hazards to human beings, other living creatures, plants and property. The Act is an "umbrella" legislation designed to provide a framework for Central Government coordination of the activities of various Central and state authorities established under previous laws, such as the Water Act and the Air Act.

#### The Scope of the Act

The potential scope of the Act is broad, with "environment" defined to include water, air, land and the inter-relationships which exist among these, and human beings, and other living creatures, plants, microorganisms and property (Section 2(a». "Environmental pollution" is the presence of any environmental pollutant, defined as any solid, liquid or gaseous substance present in such concentration as may be, or may tend to be, injurious to the environment (Sections 2(b) and (c». "Hazardous substances" include any substance or preparation, which may cause harm to human beings, other living creatures, plants, microorganisms, property or the environment (Section 2(e».

Section 3(1) of the Act empowers the Centre "to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution". Specifically, the Central Government is authorized to set new national standards for the quality of the environment (Ambient standards) as well as standards for controlling emissions and effluent discharges, to regulate industrial safeguards for preventing accidents, and to collect and disseminate information regarding environmental pollution.

The Department of Environment, Forests and Wildlife of the Ministry of Environment and Forests is responsible for making rules to implement the Environment (Protection) Act. The Department has adopted industry specific standards for effluent discharge and emissions for 24 designated industries and have prescribed general effluent standards for other water polluters. The Department has also designated certain state and Central officials to carry out specified duties under the Act, and have designated specific laboratories for testing the samples of air, water and soil obtained under the Act. However, no rules requiring the publishing .of information by polluters have been framed. The Hazardous Wastes (Management and Handling) Rules, issued under the Act in July 1989 have introduced a permit system to regulate the handling and disposal of hazardous wastes. These Rules fix responsibility for the proper handling, storage and disposal of such wastes on the person generating the wastes.

The Manufacture, Storage and Import of, Hazardous Chemicals Rules of November 1989, spell out the responsibilities of those handling hazardous substances (other than hazardous wastes).

Under these Rules, a hazardous industry is required to identify major accident hazards, take adequate preventive measures and submit a safety report to the designated authority. An importer of hazardous chemicals must furnish complete product safety information to the competent authority and must transport the imported chemicals in accordance with the Central Motor Vehicles Rules of 1989.

Rules to regulate the manufacture, use, import, export and storage of hazardous microorganisms and genetically engineered cells were issued under the Environment Act in December 1989. Under these Rules, a Genetic

Engineering Approval Committee has been established in the Ministry of Environment and Forests to license experiments and field trials of genetically engineered organisms.

The Act empowers the Central Government to establish standards for the quality of the environment in its various aspects, including maximum allowable concentration of various environmental pollutants (including noise) for different areas. These standards could be based on ambient levels of pollutants sufficiently low to protect the public health and welfare. Emission or discharge standards for particular industries could be adjusted to ensure that such ambient levels are achieved. The Environment (Protection) Rules of 1986 do allow the state or Central authorities to establish more stringent emission or discharge standards, based on the quality of the recipient system, than the current uniform standards prescribed under these Rules (Rules 3(2)). However, no uniform measures of "adequate" ambient quality have yet been established under the Environment (Protection) Act to guide authorities in setting more stringent discharge standards. Can adequate emission and discharge standards be established without determining the quality of the environment to protect public health and welfare? What other factors must be considered in determining whether to set more stringent emission or discharge standards? In December 1989, the Environment (Protection) Rules were amended to prescribe ambient air quality standards respect of noise. These standards lay down the day time and night time limits of noise in industrial, commercial and residential

areas as well as in "silence zones" an area up to 100 meters around hospitals, educational institutions, courts, etc. which is so declared by the competent authority. The use of vehicular horns, loudspeakers and the bursting of crackers are banned in silence zones. The Rules adopted for the prohibition and restriction on the location of industries provide only standardized guidelines (Rule). For example, the sitting authority may consider the standards of environmental quality in its various aspects laid down for the area. This is difficult to apply in practice since no such standards have yet been promulgated. Likewise, under the current rules, the sitting authority may consider the proximity to human settlements, but no margins of safety are established to guide bureaucrats responsible for evaluating the location of hazardous industries.

Under this Rule, the Central Government may prohibit or restrict the location of any industry and the conduct of certain activities in notified areas. Any aggrieved person, including an affected industry, may file an objection against the imposition of the prohibitions and restrictions. For areas that are not notified, however, no provision is made for the public to challenge the sitting of an industry at a given location. The Act provides for the collection and dissemination of information regarding environmental pollution, but the Government has not yet adopted regulatory provisions to implement this power.

#### Violations of Penalties under the Act

The Environment (Protection) Act was the first environmental statute to give authority to the Central Government to issue direct written orders, including orders to close, prohibit, or regulate any industry, operation or process or to stop or regulate the supply of electricity, water or any other service(section 5). Other powers granted to the Central Government to ensure compliance with the Act include the power of entry for examination, testing of equipment and other purposes (section 10), and the power to take samples of air, water, soil or any other substance from any place for analysis (section 10).

The Act explicitly prohibits discharges of environmental pollutants in excess of prescribed regulatory standards (Section 7). There is also a specific prohibition against handling hazardous substances except incompliance with the regulatory procedures and standards (Section 8). Persons responsible for the discharge of pollutants in excess of prescribed standards must prevent or mitigate the pollution and must report the discharge to government authorities (Section 9(1).

The Act provides for severe penalties. Any person who fails to comply with or contravenes any of the provisions of the Act, rules, orders or directions issued under the Act shall be punished for each failure or contravention, with a prison term of up to five years or a fine of up to Rs. 1 lakh, or both. The Act imposes an additional fine of up to Rs. 5,000 for every day of continuing violation (Section 15(1)). If a failure or contravention occurs for more than one year after the date of conviction, an offender may be punished with a prison term, which may extend to seven years (Section 15(2)). The failure, when attributable to any neglect on the part of any director, manager, secretary or other officer, that person shall also be liable for the offence (Section 16(2)). Similar provisions extend liability to the heads of departments of government and other department officers (Section 17). Section 24 provides that if any Act or omission constitutes an offence punishable under the Environment (Protection) Act as well as any other law, the offender shall be liable to be punished under the other law and not under the Environment (Protection) Act.

Section 24 of the Act is a curious and controversial provision. Generally, more recent legislation, which conflicts with previous legislation, supersedes the previous legislation.' Standards established under the Environment (Protection) Act are also the subject of other statutes, such as the Water Act and Air Act. Until the amendment of the Air Act in 1987, and the Water Act in 1988, both these laws prescribed less stringent penalties than did the Environment (Protection) Act. This situation led one commentator to describe the Environment (Protection) Act as a cobra which is seemingly fierce but has no venom in its fangs. Although the Act contains severe penalties, Section 24 ensures that these penalties will remain only on paper (d'Monte, 1986).

Consider another potential problem with Section 24. Suppose the Water Act allows discharge of a higher concentration of a particular pollutant than the concentration permissible under the Environment (Protection) Act. If a factory discharges wastewater containing the pollutant at a level higher than allowed under the Environment (Protection) Act but within the allowable limits of the Water Act, does the Water Act penalty provision apply? One of the basic purposes of law, which is to promote uniformity and predictability in the application of rules and regulations, is being defeated here.

Section 5 gives the Central Government broad powers to enforce the Act, including the power to order the closure of any industry. Section 23 expressly empowers the centre to delegate such of its powers, as it may consider necessary, by notification in the official gazette. Under this section, the Centre has delegated its power under Section 5 to several states without providing any guidelines as to when these powers should be exercised.

"Should there be closure of any industrial concern resulting in the loss of livelihood to the employers as well as to the employees? How are the conflicting rights of ... people to livelihood and the claims of society to a clean environment going to be balanced? Speaking in this context, the Supreme Court observed: This would undoubtedly cause hardship to them, it is a price to be paid for protecting and safeguarding the right of the people to live in a healthy environment with minimal disturbance of ecological balance" *[Rural Litigation and Entitlement Kendra, Dehradun* v. *State of Uttar Pradesh,* AIR, 1985 SC 652, 656]. However, this extreme step should be taken with great caution, since, as per the rulings of the Supreme Court, under Article 21 of the Constitution, [the] right of life includes [the] right to livelihood.

Enforcement of the Act: the Environment (Protection) Act contains significant innovations for its enforcement, not contained in any other pollution abatement legislation at the time of the Act's adoption. Section 19 provides that any person, in addition to authorized government officials, may file a complaint with a court alleging an offence under the Act. This "citizens' suit" provision requires that the person give notice of not less than 60 days of the alleged offence and the intent to file a complaint with the government official authorized to make such complaints. The citizens' suit provision appears to give the public significant powers to enforce the Environment (Protection) Act.

What if the government decides to file a complaint against the alleged polluter but then does not diligently pursue prosecution? Should a citizen be allowed to file a separate action or intervene in the ongoing prosecution? The Act allows, but does not require, the Central Government to obtain reports, returns, statistics, accounts, and other information in relation to its functions under the Act from any person, officer, state government or other authority. Could the citizens' suit provision become an effective enforcement tool if industries were required to make mandatory public reports concerning their pollutant emissions and discharges? Severe penalties could be imposed for false reporting, and the government could undertake random sampling to ensure that industries are complying with the reporting requirements. Mandatory reports submitted by industry under the Clean Water Act in the United States have been used by the citizens' group as evidence in suits filed against polluters.

The Environment (Protection) Act has been invoked in at least one case. In *Rural Litigation and Entitlement Kendra* v. *State of Uttar Pradesh* (AIR 1988 SC 2187), the Supreme Court considered whether to order the closure of limestone mining operations which were affecting the water quality and degrading forest land in the Dehradun Valley. The defendant mining companies argued that because the issue of location of industries was one of the powers given to the Central Government under the Environment (Protection) Act, the courts no longer have jurisdiction to consider the issue. The Court 'summarily rejected this argument, noting that the Act does not purport to oust jurisdiction and indeed the Act perhaps could not constitutionally oust the Court's jurisdiction.

# 2.6 INDIA'S INTERNATIONAL OBLIGATIONS

India has obligations as a contracting party or signatory to numerous treaties and agreements that relate to regional or global environmental issues. Specific obligations vary, of course, with each treaty or agreement. The nature and degree of implementation depend on a number of factors, viz., (i) the capability and persistence of the staff of the international institution (typically a United Nations subsidiary) charged with coordinating national treaty compliance efforts, (ii) the political will of India to allocate staff time and resources, including research missions, devoted to accomplishing the agreement's purpose, and (iii) such trade and diplomatic pressures as may be brought to bear by parties for whom a particular agreement is especially important. International environmental treaties and agreements are not enforceable as such, and depend entirely on the determination of each party to meet its treaty obligations.

Conflicts or litigations can be normally avoided initially or can be compromised compounded by mutual appreciation of positions. This has a prerequisite of open-minded dialogue and good public relations with:

- Citizens or farmers being affected nearby
- Environmental groups
- Environmental brigade
- Political representatives
- Eco-clubs
- District environmental committees.

The Policy Statement of Government of India, 1992 indicates that it expects and encourages more and more of public participation in future. Some relevant extracts are:

The public must be made aware in order to be able to make informed choices. A high governmental priority will be to educate citizens about environmental risks, the economic and health dangers of resource degradation and the real cost of natural resources. Information about the environment will be published periodically. Affected citizens and non-governmental organizations play a role to environmental monitoring and, therefore, allowing them to supplement the regulatory system and recognizing their expertise where such exists and their commitments and vigilance will also be cost effective. Access to information to enable public monitoring of environmental concerns will be provided by the Government.

# 2.7 PUBLIC INTEREST LITIGATION

Public interest litigation has successfully demonstrated that responsible nongovernmental organizations and public spirited individuals can bring about significant pressure on polluting units for adopting abatement measures. This commitment and expertise will be encouraged and their practical work supported.

As the present system of jurisprudence does provide for compensation to individuals for environmental damage, including effects on health and environmental damage caused by pollution, it is proposed to set up special legal institutions to redress this deficiency and also make adequate arrangements for interim relief.

The Government of India Notification circulated on May 14, 1993, as draft rules called "Environmental Audit Statements Rules", explains what is meant by "good management practice". The Government of India Gazette Notification dated January 27, 1994, on the environmental site clearance and impact assessment [S.O. 60(E)] has fully recognized the point of public acceptability and public involvement.

The periodical compliance report prepared by the project proponent and submitted to the Impact Assessment Agency shall be made publicly available. An understanding of the most common strategies and policy instruments used in developed and developing countries to achieve pollution control and waste management objectives will help us know the industrial environmental responsibilities in the right perspective. The objective is to show how these instruments are used to control air and water pollution, protect ground water, and manage solid and hazardous wastes.

#### The Regulatory Control Measures

The regulatory control measures include physical as well as fiscal measures. Physical controls include the imposition of a legal ceiling for pollution emission and directions to industrial units to install pollution control equipment to reduce emission or discharge of waste water.

#### **Fiscal Measures**

Fiscal measures include the imposition of taxes, pollution permits, and the allocation of property rights. The imposition of financial liabilities and tax burdens are the weapons under this mechanism.

#### **Promotional Measures**

Promotional measures include subsidies and voluntary programmes, which have a moral and social responsible impact on potential polluters. The voluntary programmes include moral education and popularization of social responsibility and ethical considerations.

#### **Participatory Measures**

Participatory measures include direct investment by the government in waste management; effluent treatment and slum clearance, and increasing forest cover programmes. Direct participation will yield quick results. However, it is not a permanent solution to industrial non-compliance and non-cooperation in the issues of public interest.

The two main approaches to pollution control and waste management are:

- The command-and-control; and
- Economic strategies.

The command and control approach forms the initial stages of environmental policy formulation

in the developed and industrialized countries. The command and control strategy refers to the process of direct regulation along with monitoring and enforcement systems. This approach generally requires the government to set healthy environmental objectives and specify the standards or amount of pollutants that can be discharged or the technology by which polluters should meet those objectives. This approach specifies schedules for meeting the standards, permitting and enforcing procedures for facilities, liability assignment, and penalties for non-compliance. The responsibility for defining and enforcing the standards and other requirements are normally shared in legislatively specified ways between the national, state and local governments.

Command-and-control strategies have made substantial progress in reducing pollution. This approach has been criticized for not achieving legislative mandates and being economically inefficient and difficult to enforce. These strategies are inefficient for the regulatory authority because the regulatory authorities .do not have detailed information concerning production processes and suitability of various pollution control devices. As there are diverse industries, it is extremely difficult and expensive to obtain the required information.

Although standards may be applied differently depending on the age or type of facility, many polluting industries using the same production process are required to meet the same standards. Polluting industries that could reduce pollution at a lower cost are not given the opportunity. The command and control approach provides little incentive for innovation in pollution control technology once the standards are achieved. Moreover, this approach is ineffective in addressing many of the recent pollution control. and waste management problems confronting environmental managers, such as non-point source pollution, solid waste disposal, and global environmental problems.

#### **Economic Incentives**

Economic Incentives include various economic instruments, namely, pollution charges, marketable permits, subsidies, deposit and return systems, enforcement incentives to introduce more flexibility, efficiency, and cost effectiveness into pollution control measures. Most of these instruments operate as incentives to polluters who can determine the most efficient and cost - effective means for achieving environmental targets. To a great extent they incorporate 'the polluter-pays and user-pays principles. According to the polluter-pays principle, the polluter pays a financial penalty for higher levels of pollution and pays a smaller penalty or receives a financial reward for lower levels of pollution.

According to the user-pays principle, the user of a resource pays the full social cost of supplying the resource, such as for water and related services including treatment costs. While some economic instruments apply direct costs e.g., charges based on the volume and toxicity of discharges, pay-per-bag systems for solid waste disposal, permit fees for air emissions where the fees vary with the volume emitted, refundable deposits on containers, etc. Other instruments involve indirect costs such as pollution taxes on inputs.

The economic approach has several advantages. When properly implemented, it can:

- Promote cost effective means for achieving acceptable levels of pollution;
- Stimulate development of pollution control technology and expertise in the private

sector;

- Provide Government with a source of revenue to support pollution control programmes;
- Provide flexibility in pollution control technologies;
- Eliminate a Government's requirement for large amounts of detailed information needed to determine the feasible and appropriate level of control for each plant or product.

There are certain disadvantages too. One significant problem is that the effect of economic instruments is not always predictable since polluters may choose their own solutions. Some polluters may also choose to pollute if the charges for a certain type of pollution are very low or not set at an appropriate level. From the perspective of developing countries, the major problems are such types of instruments require sophisticated institution to implement and enforce them.

Theoretically, economic *instruments have the* capability to control pollution according to market mechanisms and thus facilitate deregulation and a reduction in government's involvement. In practice, however, they have not eliminated the need for regulations, enforcement, and other forms of government participation. In industrialized countries, there are instances where economic instruments have fully replaced direct regulation of polluting activities.

# 2.8 PUBLIC PARTICIPATION

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The Policy Statement of Government of India, 1992 indicates that it expects and encourages more and more of public participation in future.

Now, recently the Government of India gazette Notification dated January 27, 1994 on the environmental site clearance and impact assessment [S.O. 60 (E)] has fully recognized the point of public acceptability and public involvement. It mentions the following points:

- 1. The Impact Assessment Agency to have interaction with affected population and environmental groups.
- 2. On request the following documents shall be made available to the concerned parties or environmental groups, viz. summary feasibility report, detailed environment management plan and recommendations and conditions subject to which environmental clearance is given.
- 3. A public hearing may be arranged.
- 4. The periodical compliance report prepared by the project proponent and submitted to the Impact Assessment Agency shall be made publicly available.

Government has consciously constituted certain institutions as a follow up of above public participation policy:

- Eco-clubs under all Zila Parishads.
- Environmental Brigade under selected District Collectors.

• District Environmental Committees under every District Collector.

### **Eco-Club at Schools**

The concept of Eco-club is designed by the Ministry of Environment and Forests, Government of India, as a component of Environment Awareness Campaign (1986). The Mother Nature takes care of all the living creatures and plants. However, if there is an assault on environment, the whole system will be endangered. For a feeling of oneness with the nature, the students at their tender age should be given a mind-training. Though this subject is already included in the school textbooks, it is felt desirable to make special practical efforts by establishing an Eco-club.

It is expected that the Eco-clubs will undertake various programmes in order to:

- 1. Create. environmental library,
- 2. Plan a nursery,
- 3. Undertake tree *plantation* and its protection,
- 4. Improve sanitation,
- 5. Visit forests, reserve forests, forts, etc.
- 6. Increase awareness through essay, drawing, poster competitions and holding debates, lectures and film shows,
- 7. Arrange exhibitions, and
- 8. Celebrate World Environmental Day, Forest Day and Earth Day.

### **Environmental Committee**

The Ministry of Environment and Forests, Government of India has published a Resolution that in every district a District Environmental Committee shall be constituted for advising the state government on district level matters of environmental protection and pollution control. The Committee shall especially undertake the following programmes:

- 1. To plan Environmental Awareness Campaign in the district.
- 2. To make recommendations to the state government on Action Plan based on a district level review of environmental problems such as land development, soil erosion, social forestry, and water and air pollution.
- 3. To coordinate activities of agriculture, irrigation and animal husbandry.
- 4. To prepare a District Environmental Status Report.

It is possible for an industry to take help from this committee by adopting a right approach to see if some of its problems can get a solution at the district level itself. There are instances where a diligent and honest industry came nearer to a solution by getting land for disposal of treated effluent by bilateral agreement, or by having a mutual aid system in an off-site emergency plan, or by getting an abandoned quarry for land-filling type of disposal of hazardous waste, etc. An alert modem manager, having a rapport with such committee, can know much in advance if public opinion is going against them, and by what speed. He can improve his existing system accordingly.

### **Environment Brigade**

Also called *Paryavaran Vahini*, this is established in certain selected industrialized districts, with a sanctity provided by Government of India Resolution dated November 17, 1992. The object

and purpose is to:

- 1. Encourage direct public participation from the citizens to develop environmental awareness and to prepare Action Plan,
- 2. Make an investigative report on illegal acts related to pollution, environment, forest and wildlife,
- 3. Increase the forestry and restore it to the original level, in the district,
- 4. Collect and analyze water and air samples and vehicular emissions,
- 5. Submit a comprehensive report of investigation as above, every month to the District Collector for discussions in the monthly meetings.

The membership number for the present will be 20, which may be extended in future to 100 per district. The members of the brigade will be supplied with identity cards. The said Paryavaran Vahini will actively try to secure pollution control and environmental protection in the district.

The industries may find that the Brigade has an active part unlike the Eco-club. The latter is merely an awareness campaign while the former is for investigative reporting to the District Collector who is also the District Magistrate. The Brigade members will be more knowledgeable than the Eco-Club members, and have a power to collect samples and analyze them. However, at the same time as the Brigade member has experience, there is a possibility that he will be able to appreciate the efforts made by the relevant industry. It is for the industry that, instead of brushing aside any complaint, they invite the member, explain the degree of problem as it existed a few years back, the present efforts of the industry, the success achieved and the failures for which solutions are being explored. This type of approach may avoid a situation for misunderstanding, and even help identify the real source of anxiety. Assuming that both the parties come to know the real intentions of others, the dialogue may put them on constructive path and the conflicts may be avoided or at least postponed by gaining time.

There, indeed, are instances where initial complaint of death of cattle alleged to be due to effluents from a pesticide industry near the site of incidence later proved to be a road accident, or an alleged mass-kill of hundred sheep downstream of a chemical plant, on investigation proved to be about only three in number and the cause of death being ingestion of diseased grass. It is a wiser counsel that the industry should not only cooperate with any enquiry, but also encourage and steer the investigation. This is a way of avoiding commencement of an environmental conflict by participation or inviting litigation for non-cooperation.

The State Legislative Assembly is another forum where matters of imminent public interest are discussed. The various tools available include, Assembly Questions (LAQ or LCQ), cut-motion, calling attention notice and half-hour discussions. The Press, too, with public interest in mind, pull out reports on matters of environmental interest. These two institutions represent the public opinion. The industries which take prompt cognizance of any grievances get sufficient time to redress them. The experienced industries gain confidence by open, transparent and timely dialogue. When the industry successfully secures a good will of the Press and public representative of their area by open channel of communication, not only the situation but also the litigation is saved.

#### Non-Government Organization (NGO) Cell

An NOD cell has been set up in the Central Pollution Control Board in every State Pollution Control Board. The NGO cell will coordinate the following tasks:

- .Enlisting NGOs involved in pollution control activities;
- Providing training for NGOs and equip them with testing kits;
- Organizing mass awareness programmes through NGOs.

NGOs may take up activities to help implement prevention and control of pollution. Established NGOs may even take up the job of training small NGOs and help form NGO network in states.

# 2.9 CONCLUSION

Environmental issues are multi sectoral in impact. Enforcement of policy regulations has been very slow due to various reasons. The legal proceedings against the defaulters have been very slow due to lack of proper evidence and the presence of loopholes in the system. Stakeholders generally do not have pro-active approach; rather they are defensive in their outlook towards environmental issues. The major reasons include most importantly the lack of pricing mechanism for environmental goods. A lot of emphasis also needs to be laid on transparency in all the activities and in documenting them. The pressures building up from both national and international agencies will bring about change, which is inevitable. We must concentrate on effective management of change and systematic environmental planning and management.

# 2.10 REVIEW QUESTIONS

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- 1. "Environmental law is the need of the hour", comment using suitable examples.
- 2. For developing countries the only alternative is to have a proper enforcement of regulations. Discuss.
- 3. Write a short note on Air pollution. What are the major pollutants in Air?
- 4. National Ambient Air Quality Monitoring Programme by the Central Pollution Control Board (CPCB) classified the major cities and towns of India into 5 groups: Dangerous, Bad. Poor, Fair, and Good. Do a desk research and write a report on it.
- 5. The quality of water is described by the end use. On the basis of these, write a short note on Water Pollution.
- 6. Municipal solid waste and Industrial solid waste are two main categories of Solid Waste. - Write a brief report on Solid Waste Management

# ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

#### Structure

- 3.1 Introduction
- 3.2 Definition
- 3.3 Planning
- 3.4 Relevance
- 3.5 Significance
- 3.6 EIA Inputs to the Project Cycle and the Outputs of the EIA Process
- 3.7 Environment Impact Assessment Practices in India
  - 3.7.1 Legal framework for EIA
  - 3.7.2 Legislative and Institutional Regimes for EIA
  - 3.7.3 Requirements for EIA
  - 3.7.4 Institutional Aspects of Implementation of the Plan
- 3.8 Future Trends in EIA
- 3.9 Review Question

# **3.1 INTRODUCTION**

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The level and pace of socio-economic advancement in developing countries has important implications for the efficacy with" which legislature and institutional regimes are developed and applied for the promotion of environmental management. In the first instance, the imperatives of rapid social and economic development could influence the political will to initiate, implement and enforce appropriate environmental policies and laws. Second, these development imperatives often circumscribe the limits of resources available for environmental protection. Third, implementing agencies often operate under severe resource constraints, and fourth, the relatively low level of public awareness, particularly environmental, does little to "trigger a sense of urgency and resolve for political and legislative action for environmental legislation and the environmental impacts of human activities, there is likely to be no spontaneous observance of normative demands for efforts at environmental protection and enhancement. In the last instance, the desire to satisfy basic social needs could very well override even basic environmental considerations.

Environmental management in many countries, especially in the developing countries, is achieved not only through environmental legislation, namely, laws, regulations and rules, which are enforceable in a court of law, but also through measures such as administrative orders, technical standards, etc., which are applied through various administrative mechanisms. This is especially true in relation to the implementation of international environmental conventions. Very often, many years pass before provisions are established in laws for the implementation and application of the provisions of international agreements. It is equally true in the implementation, especially at its early stages of environmental policy, such as the requirement of environmental impact assessment in respect of development projects and the procedures are to be followed in respect of such assessments. From this perspective, environmental legislation is one of the chief tools for formulating environmental policy.

The State is required to conduct 'Environmental Impact Assessments' in respect of activities that are likely to affect the environment in a big way. This has been reflected in Principle 17 of the Rio Declaration on Environment and Development. Article 5 of the Legal Principle for Environmental Protection and Sustainable Development adopted by the Expert Group on Environmental Law of the World Commission on Environment and Development, and the Goals and Principle of Environmental Impact Assessment developed under the auspices of UNEP by the Working Group of Experts on Environmental Law in 1987 were adopted by the UNEP Governing Council at its 14th session, and commended to States to be considered for use as a basis for preparing appropriate national measures including legislation. Similar requirement in the context of trans-boundary impacts has also been incorporated in several regional agreements, e.g., UNIECE Convention on Environmental Impact Assessment in a Trans-boundary Context (1991), and several Regional Agreements concluded under UNEP's Regional Seas Programmes and resolutions of international bodies, e.g. 1984 ECA Council Resolution on Environmental and Development in Africa, and the 1984 EEC Council Directive on Assessment of the Effects of Major Public and Private Projects on the Environment.

# 3.2 DEFINITION

Environmental Impact Assessment (EIA) may be defined as a formal process used to predict the environmental consequences of any development project. EIA thus ensures that the potential problems are foreseen and addressed at an early stage in the projects planning and design. The purpose of the environmental assessment process is:

- To support the goals of environmental protection and sustainable development;
- To integrate environmental protection and economic decisions at the earliest stages of planning and activity;
- To predict environmental, social, economical, and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity.
- To provide for the involvement of the public, concerned department of the government and government agencies in the review of the proposed activities. Balanced assessment of effects on the environment should encompass a number of considerations. Depending on the nature, scope and significance of the project or proposal, the assessment may include consideration of ecological, economic, cultural, aesthetic, health and safety, social, and amenity impacts in relation to decisions on the sustainable management of natural and physical resources.

# 3.3 PLANNING

Thus, Environmental Impact Assessment is, in its simplest form, a 'planning tool' that is now generally regarded as an integral component of sound decision-making. As a planning tool, it has both an information gathering and a decision-making component, which provide the decision maker with an objective basis for granting or denying approval for a proposed' development. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers. By usil1g EIA, both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoid treatment/clean-up costs and impacts of laws and regulations. The concept has ramifications, in the long run for all development activities, because sustainable development.

# **3.4 RELEVANCE**

One of the aims is to prevent environmental degradation; but this is done in two parts. The EIA is the first part, and all it does is to give planners and decision-makers better information about the consequences, which development actions could have on the environment. The second step is to make sure that weight is given to such information, and that decisions are taken in a direction that gives an environmentally favorable result and depends on having additional policies or laws which aims at securing such results.

This means that measuring the effectiveness of EIA is really about how well taken are the decisions. The end result of a well taken decision might still damage the environment; so the amount of environmental damage cannot be used as an indicator of how good the EIA system is.

EIA is multidisciplinary, systematic and predictive; it is, therefore, different from the more retrospective process of environmental audit. It can playa role in checking conformity with regulations as well as investigating physical impacts.

# **3.5 SIGNIFICANCE**

The issue to be addressed today is how environmental damage can be avoided or reduced so as to ensure that development initiatives and their benefits are sustainable. The aim of environmental management should be to achieve the greatest benefit presently possible for the use of natural resources without reducing their potential to meet future needs and the carrying capacity of the environment. Taking environmental considerations into account in development planning does not imply that the pace of socio-economic progress will be slowed down, and taking environmental considerations into account in the various phases of the project cycle must not be seen as placing undue constraints on a country's development options. When a project is to be suspended on environmental grounds, alternative opinions that are environmentally sound must be provided to meet the country's developmental needs. Moreover, implications of environmental impacts assessed from the global standpoint cannot be insensitively translated into specific action in the developing countries in the absence of concrete alternatives-that would enable the developing countries to relate the short-term wellbeing of their populations to their long-term wellbeing, and to that of the world.

For most projects, particularly those involving large public investments in areas such as infrastructure, an Environmental Impact Assessment (EIA) should be carried out and linked to the cost-benefit analysis. The objective of the EIA is to ensure that environmental aspects are addressed and potential problems are foreseen at the appropriate stage of project design. EIA should be envisaged as an integral part of the planning process and initiated at the project level from the start.

# **3.6 EIA INPUTS TO THE PROJECT CYCLE AND THE OUTPUTS OF THE EIA PROCESS**

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### **Principles of Environmental Analysis**

Environmental Impact Assessment is designed to ensure that the environmental consequences of all development policy programmes or project options are understood and adequately considered during the planning process. The term 'environmental' is used in its broadest context to encompass biological, physical and socio-economic components. Natural resources have intrinsic economic value and must, therefore, be sustained, as they are not inexhaustible.

Several basic principles underpin the concept of environmentally sound management practices. To ensure that such principles are effectively applied, an environmental analysis must be undertaken early in the project cycle. In this way, adverse impacts can be identified, minimized or mitigated to avoid costly remedial measures. Alternatives can be given due consideration and the positive aspects of all programmes, policies and development proposals can be optimized.

Compliance with environmental principles during development means accountable decisionmaking process-an open participatory approach in the planning of proposals and consultation with interested and affected parties. It also provides an opportunity for public and specialist input throughout the evolution of the project. Thus an attempt is made to ensure that the long-term social benefits of the project outweigh the social costs.

The introduction of environmental analysis procedures into the project cycles ensures that all the principles mentioned above are taken care of in the beginning of the project and delays in implementation" due to unanticipated environmental problems are avoided.

### **Environmental Categorization of Projects**

Ideally, all proposed projects should initially undergo an Initial Environmental Evaluation (IEE) Report. Thereafter, the projects are assigned to one of the three categories according to the expected degree of environmental impact. This, in turn, determines the type of EA required. The categorization of each project is made according to the physical and ecological characteristics of the site and its surroundings, the current land use and landscape character, cultural resources, socio-economic characteristics of the affected public, infrastructure, services, existing social and community services and facilities, health and safety risks, and current and predicted pollution levels as well as the availability of cost-effective mitigation measures.

**Category A:** Projects with significant adverse environmental impacts. These require a full Environmental Impact Assessment (EIA).

**Category B:** Projects with adverse environmental impacts but of a lesser degree and/or significance than category 'A' impact. In this case, the IEE will determine what the issues the EIA should address are. If necessary, the analysis may be upgraded to Category A during the assessment.

**Category C:** Projects unlikely to have adverse environmental impact or those that will improve the environment. An EIA is not normally required. The categorization of the project is based on the conclusions of the IEE. The conclusions of the IEE and project classification will be included in the Project Proposal Report (PPR).

# **Environmental Assessment (EA)**

For optimum sustainability of a project, environmental considerations should be incorporated early in the project cycle. Early environmental assessment is important, but other environmental considerations persist at all stages of the cycle. If biophysical impacts exist, they have to be described or quantified through an environmental assessment (EA) comparing environmental impacts with and without the project, and by the project components. Environmental impacts have to be identified on a wider space and time scale than projects without impacts.

EA is a flexible procedure, which should vary in depth, breadth and type of analysis, depending on the project. It is carried out during the project proposal stage and before appraisal. EA covers project-specific and other environmental impacts in the area of influence of a project.

As in the case of economic, financial, institutional and technical analysis, environmental analysis is an essential part of project preparation and is, therefore, the proponent's responsibility. Close integration of environmental analysis with major aspects of the project cycle ensures that environmental considerations are given adequate weight in all stages of the project design.

# **Project Identification and Proposal**

The IEE is completed during project identification and prior to the submission of the Project Proposal Report (PPR). The consultant and the proponent should agree on the contents of the IEE report and ensure that appropriate consultation with interested and affected parties has taken place. The conclusions of the IEE report will be incorporated in the environmental module of the PPR. The environmental category according to which further environmental analysis will take place will also be stipulated.

# **Project Appraisal**

Following the PPR, the environmental specialist, environmental consultant or project leader will

discuss the scope of the required EA and ToR with the project proponent. The ToR should provide for appropriate consultation and coordination with affected groups and NGOs active in the area. The EA must form part of the overall project preparation. Thus, where environmental consultants prepare the EA separately, there should be close liaison with the project preparation team. In cases where the consultant, environmental agency or the project team consider that the EA report warrants public scrutiny and comment, the full EA report should be made available upon request to interested and affected parties at least 60 days prior to final consideration of the project. The findings and recommendations of the EA process should be clearly stated in the project's appraisal report and briefly stated in the Summary.

### **Project Implementation**

The capability of the implementing agency, the adequacy of their environmental procedures, and their ability to comply with environmental requirements should be examined at the time of appraisal. If these institutions are not found to be capable, a suitable mechanism to build or strengthen institutional capability should be considered where appropriate.

During implementation of the project, the Environmental Mitigation and Management Plan, as developed during the EA and set down in the EA report, should come into operation. Once the project has been implemented, the Environmental Monitoring Plan, as determined and set down in the project description should be made operational.

# **Project Monitoring**

Once in a year, all projects, which required specific environmental treatment during implementation and operation, should be monitored. These will mostly be Category 'A' projects but some may be Category 'B' projects. A monitoring team should be engaged to determine, with the implementing agencies and communities, the extent to which mitigation and monitoring measures earlier agreed upon by the proponent and the project leader have, or are being, implemented. It is the task of the monitoring team to verify that environmental safeguards built into the project design are satisfactorily implemented by the proponent or implementing agency during the construction and operation of the project.

The monitoring team should examine and evaluate operation and maintenance arrangements, institutional commitments and any loan conditionally covering environmental planning and management requirements. The status and implementation of measures to reduce the impact and the results of the monitoring programme should also be assessed.

# **Completion Report**

The Project Completion Report should include a general assessment of any significant environmental impacts experienced during project implementation, particularly with reference to those issues considered at the time of project appraisal and on monitoring their implementation and effectiveness if the project included environmental control measures. The report should include a final assessment of the degree to which the project satisfied proposed environmental requirements, the effectiveness of the mitigate measures and institutional development, and whether any unanticipated effects were visible as a result of the project activities.

### Evaluation

The evaluation plan should be developed early in the project cycle, preferably during the appraisal phase. This is particularly important for category A projects. EA should be combined with the evaluation of other aspects of the project, such as economic and social aspects. Evaluation specialists, in consultation with environmental specialists, should carry out the evaluation.

# **3.7 ENVIRONMENT IMPACT ASSESSMENT PRACTICES IN INDIA**

The Ministry of Environment and Forests (MoEF), Government of India, under the Environmental (Protection) Act, 1986, promulgated a notification on January 27, 1994, making environmental clearance mandatory for expansion or modernization of any activity. or for setting up new projects listed in schedule-I of the notification. Till 1994, EIA clearance was the administrative requirement for big projects undertaken by the Government or public sector undertakings. Now, EIA clearance is required for 29 categories of industries from the Central Government which can be broadly categorized under sectors of industries, mining, thermal power plants, river valley, ports, harbors and airports, communication, atomic energy, transport (rail, road, highway) and tourism (including hotels, beach resorts). For some projects, EIA is not needed.

The notification states that the requirement of EIA can be dispensed with by the IAA (Impact Assessment Agency which presently is the MoEF, Government of India). Environmental appraisal committees constituted by the MoEF for various types of developmental projects include river valley, multipurpose irrigation and hydroelectric projects, atomic power and nuclear fuel projects, mining projects, industrial projects, thermal power projects, tourism/transport and miscellaneous projects, and port and harbour projects.

MoEF has developed guidelines for the preparation of EIA reports along with questionnaires and check lists for the following sectors, namely, industry and mining projects, thermal power projects, river valley projects, rail, road, highway projects, port and harbours, airports, communications projects, new towns, parameters for determining ecological fragility.

MoEF amended the EIA Notification (S.O. No. 60E) on April 10, 1997, making public hearing mandatory for environmental clearance. The public hearing will be conducted by the State Pollution Control Boards before the proposals are sent to MoEF for obtaining environmental clearance and, for site specific projects, it is even before the site clearance applications are forwarded to MoEF. MoEF is also in a process of decentralizing the responsibilities of conducting EIA. In a move, central government has notified (dated April 10, 1997, S.O. No. 319E) that certain category of thermal power plants, namely, all capacity co-generation plants, captive coal and gas/naphtha based power plants up to 250 MW, coal based power plants up to 250 MW using fluidized bed technology, and gas/naphtha based plants up to 500 MW requiring environmental clearance from the state government. In case of pithead thermal power plants, the applicant shall intimate the location of the project site to the state government while initiating any investigation and surveys. Proposals where forestland is a part of the project site need prior forestry clearance before

forwarding to MoEF for environmental clearance. In the environmental clearance process, the documents to be submitted to MoEF are project report, public hearing report, site clearance for site specific projects, no objection certificate from State Pollution Control Board (SPCB), environmental appraisal questionnaire, EIA/EMP report, risk analysis for projects involving hazardous substance and rehabilitation plans-if more than 1000 people are likely to be displaced.

# **3.7.1 Legal Framework for EIA**

Environmental policy without appropriate legislation will be ineffective as it will, in turn, be legislation without enforcement. Economic and financial pressures will tend to dominate other concerns. In many developing countries, legislation on environmental issues has been in existence for many years. For example, laws exist in most countries for the prevention of water pollution, the protection of cultural heritage, and for minimum compensation flows. Much of the existing legislation or regulations have not been considered "environmental". Recently, much specific new environmental legislation has been enacted. This may be as a response to major disasters, or result from government policy or public pressure or the generally increased international awareness of the environmental protection legislation needs stating, understanding and analyzing as part of EIA.

New legislation may include a statutory requirement for an EIA to be done in a prescribed manner for specific development activities. When carrying out an EIA, it is thus essential to be fully aware of the statutory requirements and the legal responsibilities of the concerned institutions. These are best given as an annex to the terms of reference. The legal requirements of the country must be satisfied. New laws can impose an enormous burden on the responsible agencies. The statutory requirement to carry out an EIA for specific projects will, for example, require expert staff to carry out the study, as well as officials to review the EIA and approve the project.

Laws designating what projects require EIA should, ideally, limit the statutory requirements to prevent EIA merely becoming a hurdle in the approval process. This will prevent large volumes of work being carried out for little purpose. For most of the projects, EIA is a discretionary requirement. The discretionary authority is usually the same body that approves an EIA. This arrangement allows limited resources to be allocated most effectively. However, it is essential that the discretionary authority is publicly accountable.

When external financial support is required, it will also be necessary to satisfy the obligations of the donor organization. Most major donors now require an EIA for projects relating to irrigation and drainage. Chapter 6 gives details of publications outlining the requirements of the main donors.

The function of environmental legislation can vary. It is not easy to give a precise definition of when an EIA is needed. Therefore, the statutory requirement for an EIA is not particularly well suited to law. On the other hand, law easily addresses many of the most important environmental hazards. For example, it is easy to set legal limits for pollution, flow levels, compensation, etc. The problem, however, is one of enforcement. It is normal for an EIA to assess the acceptability or severity of impacts in relation to legal limits and standards. But, it is important to highlight

cases where existing standards are I not stringent enough to prevent adverse impacts and to recommend acceptable standards. Enforcement problems can be partially addressed by changing institutional structures.

Laws relating to irrigated lands are complex and, according to an FAO study of five African countries, they are not generally applied (FAO, 1992). There are conflicts between modem and customary laws: the former tend to be given prominence though the latter are usually strong locally. Traditional and customary rights have often developed in very different historical and political contexts and can vary greatly over a short distance. They may also be mainly oral and imprecise. Local participation in the preparation of the EIA will help one to understand important customary rights and highlight possible weaknesses in any proposed development.

# 3.7.2 Legislative and Institutional Regimes for EIA

Though a universally applicable model of legislation for environmental impact assessment may not be feasible, it is possible to identify certain crucial elements of the EIA process that may be regulated through legislative means. In this connection, it might also be borne in mind that law in the sense of statutes enacted by the legislature represent only one type of law-making and could give an incomplete picture of the regulatory regime, which may also include administrative directives, judicial decisions, and customs.

Having regard to the principles of Environmental Impact Assessment that we have discussed and the State practice in the legislative and institutional fields, it would appear that the following constitute the principal elements of a national regulatory regime for EIA.

# **3.7.3 REQUIREMENTS OF EIA**

The criteria and procedure for determining which activities require EIA, e.g., lists of relevant projects, areas and resources, and requirement of a preliminary assessment may be based on the following:

- 1. Institutional arrangements-the establishment and empowerment of a designated authority to undertake Environmental Impact Assessments and supervise the process.
- 2. Communication procedures and time tables.
- 3. Format and requirement of EIA report-responsibility for preparing report, having regard to requirements of objectivity and transparency.
- 4. Review of EIA-scientific and technical review-institutional arrangements.
- 5. Public participation-rights of the public; procedural matters.
- 6. Decisions-making process.
- 7. Appeals from decisions of authorized bodies-administrative, quasi-judicial and judicial.
- 8. Trans-boundary impacts-requirements of notification, consultation and accommodation.

9. Continuous monitoring of all the processes.

The regulation governing EIA should indicate, as clearly as possible, which projects are subjected to EIA procedure and which are not, so as to avoid bureaucratic constraints on minor activities. If it is felt that the requirement for EIA would change with time, it may be appropriate to make only a general statement in the body of the legislation and keep the specifics for supplementary guidelines or regulations.

On the contents of EIA, the law may provide for submission of a written document to a designated agency or decision-making body describing the environmental impact of a proposed project and / or alternatives, and mitigating measures and their assessments. At a minimum, the document should contain the following:

- 1. A description of the proposed activity,
- 2. A description of the potentially affected environment, including specific information necessary for identifying and assessing the environmental effects of the proposed activity,
- 3. A description of practical alternatives as appropriate,
- 4. An assessment of the likely or potential environmental impacts of the proposed activity and alternatives, including the direct, indirect, cumulative, short-term and long-term effects,
- 5. An identification and description of measures available to mitigate adverse environmental impacts of the proposed activity and alternatives, and an assessment of those measures,
- 6. An indication of gaps in knowledge and uncertainties that may be encountered in compiling the required information,
- 7. An indication of whether the environment of any other State or areas beyond national jurisdiction is likely to be affected by the proposed activity, and the possible alternatives.

The EIA legislation or provision should establish effective review and dispute settlement procedures to avoid unnecessary delays in decision-making. Technical review may be undertaken by an independent agency of environmental experts on the proposed project. There is a need for a tribunal or arbitrator for dispute settlement since the ordinary courts may be too busy to act on EIA cases promptly because of the workload they have. An independent arbitrator or a special body could be provided for to hear objections and make decisions with reasonable dispatch. Such an arrangement will ensure that EIA countries become a tool to aid development rather than being an impediment to it.

### Contents of the Plan

Environmental characteristic of any area is likely to be significantly affected by the plan/programme:

- Any existing environmental problems relevant to the plan/programme. Likely significant direct and indirect environmental effects of implementing the plan.
- Alternative ways considered for achieving the objectives; reasons for not adopting the alternatives.

- Measures to prevent, reduce and, where possible, to offset significant adverse environmental impacts.
- Difficulties encountered in carrying out environmental assessment.
- Non-technical summary of the environmental statement.

#### The other new approaches include:

- 1. **Class assessments**, which cover the common impacts of similar projects that are unlikely to vary with location.
- 2. **Programmatic environmental impact assessments,** which address the impacts of large-scale projects at many sites.
- 3. Sectoral environmental impact assessments, which highlight the impacts of developments in an industrial sector by comparing different technologies that may be eventually chosen.
- 4. **Regional master planning:** In this case, an entire river basin, a watershed, an air quality district, a managed. Eco-system, a costal zone, or an island is analyzed for the probable environmental impacts of all types of economic development. Current and future pollution controls are estimated. Programmes are organized and coordinated by the local government.
- 5. **Development strategies,** which require environmental assessments because they select technologies, and set priorities and timetables for large financial investments.
- 6. **National budgets,** which should have a specific reference to environmental protection expenditures and environmental degradation costs. The so-called 'green report cards' are being considered by both the Organization for Economic Cooperation and Development (GECD) and the World Bank for noting the environmental management performance of various countries.

# **3.7.4 Institutional Aspects of Implementation of EIA**

In order to carry out an objective and effective implementation of the environmental impact analysis programme, the institutional arrangements for the process of environmental impact assessment should be determined and made public. Here, it is essential that the roles of the various participants, namely, the decision-maker, the assessor, the proponent, the reviewer, other expert advisors, and the public, as also international bodies be designated. It is also important that timetables for the impact assessment process be established so that proposed actions are not held up unduly and the assessor and the reviewer are not so pressed that they undertake only superficial analysis.

Any recent developments and real-life case studies in the field of institutional models for implementation of the various EIA models should be considered.

The main focus should be on the process of impact assessment within single jurisdictions since multiple decision-makers might not bode well for the decision-making aspects of such sensitive

issues. The institutional and methodological considerations associated with large-scale and even global assessments require separate treatment because of their vital contribution in the whole gamut of activities.

Considering the high sensitivity of the issues involved, no general recommendation can be made on the institutional arrangements. The most appropriate step is to avoid serious confrontations. However, intergovernmental authorities, such as the International Joint Commission established by the United States and Canada, have sometimes been successful, to a large extent, in resolving trans-boundary problems.

The whole implementation process-planning, initiation, and operation should remain under review to ensure that the designated environmental quality standards are achieved, for example, by continued monitoring of certain features of the environment. Not only may such data be used to verify the predictions made for the selected alternative, but also they may contribute to the improvement of future assessments. The continuing review may improve the goal-setting and decision-making processes by providing information on the environmental effectiveness of each action.

Further, detailed information on socio-economic states may be required for developing and maintaining the time frames during the implementation of the action (e.g., during the construction stage). Various studies have highlighted the need to evaluate the actual cost-benefit ratio in terms of environmental costs, together with the cost of project implementation and consequent increase in agro-productivity. It is necessary to achieve a balance between the requirements of irrigated agriculture and environmental protection / management. Impact analysis and environmental management methodologies are important considerations in this regard. Appropriate Impact Assessment methodologies have the potential to establish linkages between the process of agro-development and impacts on the environment.

# 3.8 FUTURE TRENDS IN ENVIRONMENT IMPACT ASSESSMENT

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As the living standards increase, people are demanding better environmental quality and greater say in development decisions. In addition to considering the broad range of issues, Environmental Impact Assessments are becoming more inclusive with respect to the participation of the interested stakeholders. Most of the governments are forced to re-examine the basic principles involved in their EIA processes. The re-examination is giving increased impetus to make EIA processes more effective.

#### Sustainability

EIA is expected to play an increasing role in ensuring that projects meet the sustainability criteria. To achieve this, EIA of the future must take a leading role in planning industry, tourism, urban infrastructure and other developments towards cleaner production, waste minimization, and pollution prevention. Therefore, the future trends for EIA reports would be to evaluate the requirements for selected projects to meet ISO 14000, to recommend self monitoring potentials and integrate such with recommended command and control monitoring and to recommend voluntary compliance alternatives.

# 3.9 REVIEW QUESTIONS

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- 1. Why should we care about environmental impact assessment in program or project design? At what point in the project/activity cycle should environmental impacts be assessed?
- 2. What is screening? During what phase of the environmental impact assessment or EA process is it undertaken?
- 3. Assuming an environmental impact assessment or EA is required; give two reasons why Scoping is important.
- 4. When should the Scopes of Work for individual EIA or EA team members be prepared?
- 5. Why is consideration of the "no action" alternative in environmental impact assessment or EA important? What does it entail?
- 6. When is value judgment applied in EIA or EA?

#### Structure

- 4.1 Introduction
- 4.2 Regulatory and Economic Instruments
  - 4.2.1 Types of Standards
- 4.3 Corporate Environmental Responsibility
- 4.4 Environmental Reporting Practices in India In the Past Decade
  - 4.4.1 HINDALCO
  - 4.4.2 National Organic Chemical Industries Limited
  - 4.4.3 BSES Limited
  - 4.4.4 The Andhra Petrochemical Limited
  - 4.4.5 BOROSIL
  - 4.4.6 United Phosphorous Limited
  - 4.4.7 HYUNDAI
  - 4.4.8 Mangalore Refinery and Petrochemicals Limited

4.5 Review Questions

# 4.1 INTRODUCTION

Environmental issues and concerns are common to all sectors and all activities. The life support systems include five elements: air, water, land, flora and fauna, which are interconnected, inter related and interdependent, and have co- evolved and are co-adapted in the biosphere to sustain themselves as well as enable future generations to meet their own needs. Deterioration in one factor inevitably affects the other four elements. If the deterioration is for a short term, the life support system has enough resilience. It resuscitates on its own and reverts back to the original state. If the deterioration continues, the whole system of life will be thrown out of gear.

United Nations Environment Program (UNEP) was designed to be "the environmental conscience of the United Nations," and, in an attempt to allay fears of the developing world, it became the first UN agency to be headquartered in a developing country, with offices in Nairobi, Kenya. In addition to' attempting to achieve scientific consensus about major environmental issues, a major focus for UNEP has been the study of ways to encourage *sustainable development-increasing* 'standards of living without destroying the environment. At the time of

UNEP's creation in 1972, only 11 countries had environmental agencies. Ten years later that number had grown to 106, of which 70 were in developing countries.

A growing number of international agreements have been reached in an effort to improve the world's environmental status. In 1973 the Convention of International Trade in Endangered Species (CITES) was first approved, with the goal of reducing trade in animals and plants which are at the brink of extinction. In 1982 the International Whaling Commission agreed to a moratorium on all commercial whaling. Perhaps the most important international agreement was the 1987 Montreal Protocol on Substances that deplete the Ozone Layer. For the first time, an international pact was signed that set specific targets for reducing emissions of chemicals responsible for the destruction of the earth's ozone layer. The international community again came together in 1989 to limit the movement of hazardous wastes among countries.

The developing countries have to necessarily support the increase in the development initiatives in all sectors including the industries. The industrial sector as a whole and the chemical and pharmaceutical industries in particular are pressurized to adhere to the environmental norms as the damage caused by these sectors is long-term and, very often, restoring the environment to the predevelopment levels, on arresting/stopping the deterioration is impossible. Therefore, we see that in the past decade there was a constant and consistent effort made in this regard by the regulating authorities insisting on conformance and responsible behavior.

In India and in many other developing countries, industrial approach to controlling pollution has so far been only to attend to the worst complaints. For example, in the end of pipe treatment method, the wastes generated at various stages in the production processes are treated to acceptable levels by installing appropriate waste treatment systems. The method of treating waste at the end of pipe pollution control measures does not indeed prove to be a right solution in the long run because of the following reasons:

- Waste treatment requires substantial investment and allocation of budget to meet the operating costs.
- Waste may be used as a resource unutilized rather than as a loss in production opportunities.

These two are most common strategies and policy instruments used in developed and developing countries to achieve pollution control and waste management objectives. Till now the developing countries have faced financial resource constraints as one of the most important reasons contributing to the slow adoption of pollution prevention technologies and position themselves in a competitive advantage as far as the industrialized countries are concerned.

The Government of India constituted the National Committee on Environmental Planning and Coordination (NCEPC), on the recommendations of the Tiwari Committee. The Tiwari Committee recommended proper management of the country's natural resources of land, forest and water in order to conserve the nation's ecological base and also recommended that a central Land Commission should be set up as a first step to achieve this goal. It also identified three major areas of concern; namely:

- The felt-need to preserve threatened species of flora and fauna, and fragile ecosystem from extinction.
- The dire need to protect the air, water and land from pollution, industrial effluents and wastes.
- The urgency to improve the condition of our human settlements.

The Five-point Framework that was provided by the Tiwari Committee was:

- Land and water management;
- Natural living resources;
- Environmental pollution;
- Human settlement;
- Environmental education and awareness.

# 4.2 REGULATORY AND ECONOMIC INSTRUMENTS

The command and control approach to pollution control and waste management relies primarily on regulatory instruments. The economic approach usually incorporates regulatory instruments as well as economic instruments such as charges, marketable permits, and subsidies. A brief description of the regulatory and economic instruments used to control pollution and manage waste in both developed and developing countries is provided in the following sections.

#### **Regulatory Instruments**

Standards are prominent means for direct regulation of environmental quality in most of the developed world. They define environmental targets and establish permissible amount or concentration of particular substances or discharges into air, water, land, or consumer products.

### **4.2.1** Types of Standards

#### 1. Ambient Environmental Quality Standard

This establishes the highest allowable concentration of specified pollutants in the ambient air or water.

#### 2. Effluent or Emission Standard

This standard establishes the legal ceiling on the total quantity or concentration of a pollutant discharged from a pollution source. Effluent standards may include maximum effluent limitation for specified time periods and monitoring requirements.

#### 3. Technology Based Standard

This is a type of effluent standard that specifies a specific technology a firm must use to comply with environmental laws and regulations.

#### 4. Performance Standard

This is a type of effluent standard that defines a performance measure and allows the discharges and provides flexibility to select the best means to meet this standard.

#### 5. Product Standard

This establishes a legal ceiling on the total quantity or concentration of pollutants that can be discharged into the environment per unit of product output.

#### 6. Process Standard

This standard limits the emission of pollutants associated with specific manufacturing processes.

#### 7. Permits and Licenses

The granting or withholding of permits, licenses, or other authorizations is another important tool for controlling pollution. One major advantage of permits and licenses is that they facilitate the enforcement of environmental programmes by including in one document all of the facility's pollution control obligations.



Figure 4.1 Corporate sustainability ladders.

Industrial units are required to obtain from the concerned State Pollution Control Board (SPCB) consent to operate the unit. Such consent is subject to the unit complying with the prescribed standards. The polluting units are persuaded by the SPCBs (State Pollution Control Boards) to take steps to comply with the prescribed standards, failing which, legal action is taken against the defaulting units, including direction for closure as also to stop water supply and electricity to such units.

The corporate sustainability ladder depicted in Figure 4.1 illustrates the worldwide trend in adopting environmental performance. This is an indicator of the emphasis given by companies to integrate environmental performance with the core business functions. For example, a company, which only responds by addressing worst complaints, is only reactive and is at the bottom of corporate sustainability ladder. If a company at a particular level of environmental performances wishes to enter into alliance with another company with higher level of environmental performance and accountability, it has to improve its internal processes to a substantial extent before entering into alliance by incurring heavy costs. Most companies have realized this situation and are in the process of strengthening their environmental performance. During 1980s, companies could do away with just compliance which very often was not monitored by the regulating authorities in developing countries like ours due to lack of awareness, very low priority being given to environmental issues, and absence of training and similar other constraints.

# 4.3 CORPORATE ENVIRONMENTAL RESPONSIBILITY

Industrial participation and commitment to industrial environmental management can be seen in the company's approach towards owning the environmental responsibilities. These companies openly state their environmental policy and integrate this into all the operating processes of the industry. A company's commitment to environmental responsibility is generally reflected in the following formal initiatives:

- 1. Top management commitment;
- 2. Public relations;
- 3. Dialog and cooperation with the government and regulating authorities;
- 4. Motivating the employees;
- 5. Waste prevention;
- 6. Resource savings;
- 7. Compliance with environmental requirements at present and in future. Minimization of risks by way of corrective action;
- 8. Reduction of risks;
- 9. Emergency preparedness;
- 10. Sensitizing of suppliers and customers.

Communication has a critical role to play in all the environmental coordination activities within and outside the company. Environmental risks pertaining to handling of hazardous materials, emergency and safety guidelines conveyed to workers and others frequently must constitute an important part of the communication process. A responsible behaviour pattern from the part of the industrial unit will involve regular review and audit of the following environmental issues:

- Assessment, control and reduction of environmental impact;
- Resource management, including water;
- Waste avoidance, recycling, reuse, transportation and disposal . Evaluation, control and reduction of noise;
- Prevention and limitation of environmental accidents;
- Information and training of staff on environmental issues;
- External information on environmental issues.

# 4.4 ENVIRONMENTAL REPORTING PRACTICES IN INDUSTRY IN INDIA IN THE PAST DECADE

Responsible environmental management reporting does take place through the company's annual reports. Though the reporting practices are restricted to large companies, it is interesting to see the level 6f identification that is taking place in the company and the extent of owning the responsibility. Though it may still take a few years for companies to look at themselves strategically on the extent of environmental management practices, the search has begun in Indian companies. The trigger for such a change can be anything. It may be due to the internal pressures mounting from the employees to upgrade the technology, it may be due to the increase in quality consciousness, or it may be due to external pressures from the regulatory bodies, International awakening and Indian response from the non-government organizations, (e.g., Green Peace) or even the consumers and the market place demanding for the greener products. It is a similar trend that brought about drastic change in the western countries in the late 1980s, when the companies were threatened with mounting pressure from the market for better products and a good quality of life. Given below are excerpts from the annual reports of some of the companies to show the extent of reporting taking place in a formal manner. This is one form of environmental communication. Such a communication provides a clue to the society that the company is considering environmental reporting as a form of socially responsible behaviour. Though it is difficult to quantify anything from the statements, it does tell you that the environmental processes are in place in the company, and the company is keen on declaring itself as an eco-friendly company. It is always possible to get detailed reports from the companies. Some of these companies have also gone ahead to certify them for the ISO Environmental Management.

# 4.4.1 HINDALCO

In the company's own words: We subscribe for eco-efficiency. It entails manufacturing products and providing services in a manner that conserves natural resources, minimizes wastes, and ensures pollution control.

For a company better environmental management enables us to contain costs. In the power plant, and in the foil and aluminum alloy wheel plant, we resort to product stewardship, pollution prevention and clean technologies. We were the first aluminum major to be awarded ISO 14001 EMS certification Aspect Moody Certification U.K. our plants are audited by EARA Environmental Auditors Registration Association. State-of-the-art environment industrial effluent treatment plants operate at all our units. Treated water is recycled to meet 'the needs of the plants. Our aim is to attain *zero effluent discharge status* in the foreseeable future. The solid waste sludge that emanates from the effluent treatment plant is used as a soil conditioner for the trees: We also make efforts to provide dust-free atmosphere. Scrubbers, cyclones and electronic precipitators operate in our environs. High tech dry scrubbing system is used to ensure the lowest possible emission of Fluorine. We have switched to dry ash disposal technique, which helps disposal of 100 per cent fly ash generated in the aluminum complex.

# 4.4.2 NATIONAL ORGANIC CHEMICAL INDUSTRIES LIMITED

The company has continued its efforts in protecting and improving its environmental performance. The forestation project of the company has achieved great success and all the hills behind the factory are having a dense forest, which has become the pride of Thane-Belapur area and a popular picnic spot for local residents.

### 4.4.3 BSES LIMITED

The company's care and concern for environment continue to be recognized and appreciated with awards from prestigious institutions. During this year 2001, the company was honoured with the Millennium Business Award for Environmental Excellence from International Chamber of Commerce and United Nations Environmental Programme and the FICCI Award 2000 for Environmental Excellence. The company is also in recipient of Indo-German GreenTech Foundation Award for Environmental Excellence.

# 4.4.4 THE ANDHRA PETROCHEMICALS LIMITED

In the company, safety, occupational health and environmental protection continue to be accorded priority, and safety standards are continually reviewed. Pollution control devices have been installed to control effluents generated.

# 4.4.5 BOROSIL

The company is striving to ensure:

- Pollution control in the manufacturing and other units;
- Safe working conditions to all employees.

### Safety, Health and Environment\*

\*From Directors' Report in Forty Fifth Annual Report for the year ended 31<sup>st</sup> March, 2008

- The Company is continuously endeavoring to ensure safe working conditions for all its employees.
- The manufacturing activities of the Company do not have any negative impact on the environment.

# **4.4.6 UNITED PHOSPHOROUS LIMITED**

- The company continues to fulfill its responsibility towards maintaining the ecological equilibrium.
- The subsidiaries formed by the company for furthering the objective of a safe and pollution-free environment at Ankleshwar and Bharuch are significantly contributing to the realization of this responsibility.
- Safety, occupational health and environmental protection continue to be accorded priority, and safety standards are continually reviewed. Pollution control devices have been installed to control effluents generated.

# 4.4.7 HYUNDAI

Hyundai Motor Group, the world's No. 5 automaker, will go ahead with plans to develop environment-friendly cars despite the segment's low profitability and an industry downturn.\*

Author(s): Cheon Jong-Woo Source: Planet Ark (Australia)

# 4.4.8 Mangalore Refinery and Petrochemicals Limited

For the first time in the Oil Industry, a biogas plant has been set up by MRPL for converting waste from Canteen and Housing Colony into bio-gas, which is being used in the canteen, replacing the valuable LPG.

The company has identified a few Energy Conservation Schemes as part of Clean Development Mechanism (CDM), under Kyoto Protocol. The public hearing in respect of projects identified has been completed and the schemes will be presented to international agencies for final acceptance

One of the important developments in industrial response is the interest shown by companies to adapt ISO 14001 standards, which are expected to bring about transparent environmental practices in the industry.

# **4.5 REVIEW QUESTIONS**

# .....

- 1. Which are the major industries that contribute to industrial pollution?
- 2. Analyze the causes of the industrial pollution in India.
- 3. How can the companies control their pollution problems effectively?
- 4. Analyze the corporate sustainability concept and its significance to companies, which would like to internationalize their operations.
- 5. Write short essays on the following:
  - a) Building competitive advantage through environmental quality management
  - b) Legal and social obligations
  - c) Eco-friendliness and green products for consumers
  - d) Sustainability

# ISO 14000 AND ENVIRONMENTAL MANAGEMENT SYSTEMS

#### Structure

- 5.1 Introduction
- 5.2 Need for the New Standards
- 5.3 To whom does the Standard Apply?
- 5.4 Where does the Standard Apply?
- 5.5 What does the ISO 14000 Series Cover?
  - 5.5.1 General description: ISO 14001
- 5.6 Benefits of ISO 140001
- 5.7 Steps in ISO 14000 Certification Process
- 5.8 ISO Definition of Terms
- 5.9 Conclusion
- 5.10 Review Questions

# 5.1 INTRODUCTION

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The international environmental standards are intended to provide organizations with the elements of an effective environmental management system, which can be integrated with other management requirements to assist organizations to achieve environmental and financial goals. These standards specify the core elements of an environmental management system to support environmental protection in balance with socio-economic needs. The current international standards on environmental management system cover the following major areas:

- Environmental management system;
- Environmental auditing;
- Environmental labeling;
- Environmental performance evaluation
- Life cycle assessment, and terms and definitions.

ISO 14000 builds a single global management system that allows effective management of environmental responsibilities, liabilities, costs, document commitment to government, and promotes concern for the society. Lack of an effective environmental management system (EMS) and proper guidelines cost the company in the following areas:

- Missed opportunities to reduce energy consumption and material waste. In disabled administrative staff, to address the literally thousands of environmental regulations in India and the countries in which business transactions take place.
- Fines and penalties through government audits because your environmental aspects are out of compliance.
- Loss of confidence by stockholders and financial institutions who are unsure of environmental risk factor.
- Poor public image and loss of opportunities to describe the products to those who prefer to buy environment friendly products.

The task of management is to control internal costs and maximize market opportunities by enhancing the product, and company's image of giving thrust to areas of environmental importance, such as quality, health, and safety.

ISO 14000 is a way of empowering businesses to take control of environmental responsibility and encouraging government departments to approach the challenge with far greater flexibility. In the United States, the environmental protection agency has developed what is called "Project XL" which (Excellence in Leadership) is an effort that allows companies with demonstrated leadership in pollution control to operate under lower requirements than the law provides, with the company's assurance that it will strive to go beyond current standards.

ISO 14000 does not only relate entirely to massive global companies. The standard states that "It has been written to be applicable to all types and sizes of organizations. and to accommodate diverse geographical, cultural and social conditions." Even small, non-manufacturing local companies are embracing ISO 14000 because, while their operations are local, their partners in joint ventures and alliances are spread all over the world. In the web of today's business relationships, most companies are partners or suppliers to larger, international corporations.

ISO 14001 Certification is an initiative to bring about uniformity in environmental compliance standards to reduce impediments to trade among countries. If it is accepted and implemented properly, it can bring about a lot of changes in the present Indian scenario.

The ISO 14000 series of standards are designed to cover the whole of environmental issues for organizations in the global market place. This series emerged primarily out of the Uruguay Round of the GATT negotiations and the RIO Summit on the environment held in 1992. While GATT concentrates on the need to reduce non-tariff barriers to trade, the RIO Summit generated a commitment to protection of the environment across the world. The environmental field has seen a steady growth of national and regional standards. The British Standards Institution has BS 7750, the Canadian Standards Association has environmental management, auditing, ecolabeling and other standards, the European Union has all these plus the eco management and audit regulation, and many other countries (USA, Germany and Japan) have introduced ecolabeling programmes.

After the increase of environmental standards around the world, ISO assessed the need for international environment management standards. They formed the Strategic Advisory Group on the Environment (SAGE) in 1991, to consider whether such standards could serve to be effective instruments of pollution control.

### 5.2 NEED FOR THE NEW STANDARDS

A set of international standards, which bring worldwide focus on the environment, encourage a cleaner, safer, healthier world for all of us. The existence of these standards allows organizations to focus their environmental efforts on the basis of internationally accepted criteria. At present, many countries and regional groupings are generating their own requirements for environmental issues, and these vary between the groups. A single standard will ensure that there are no conflicts between regional interpretations of good environmental practice. The fact that companies may need environmental management certification to compete in the global market place could easily overshadow all ethical reasons for environmental management. Within Europe many organizations gained ISO 9000 registration, which is a primarily meant requirement to meet growing demands from customers. ISO 9000 quality registration has become necessary to do business in many areas of commerce. Similarly, registration in the ISO 14000 management systems may become the primary requirement for doing business in many regions or industries.

## 5.3 TO WHOM DOES THE STANDARD APPLY?

The standards apply to all types and sizes of organization and the design to encompass diverse geographical, cultural and social conditions. For ISO 14001, except for committing to continual improvement and compliance with applicable legislation and regulations, the standard does not establish absolute requirement for environmental performance. Many organizations engaged in similar activities may have widely different environmental management systems and performance to comply with ISO 14001.

- Promote a common approach to environmental management similar to quality management;
- Enhanced organizations ability to attain and measure improvements in environmental performance; and
- Facilitate trade and remove trade barriers.

In 1992, on the basis of SAGE recommendations, a new Committee TC 207, International Environment Management Standards was created. Industries, standards organizations, governments and environmental organizations represented this Committee from many countries. The new series of ISO 14000 are designed to cover:

- Environmental management systems;
- Environmental auditing;
- Environmental performance evaluation;
- Environmental labeling;
- Life cycle assessment;
- Environmental aspects in products standards.

The international certification for acceptable extent of environmental performance by itself may not be sufficient. In fact, many Indian industries are not even meeting the requirements of national standards that are comparatively less stringent than the international standards. The emphasis must be more on the attitudinal change and accepting new ways of doing environmentally green business rather than imposing more standards and regulatory measures. Therefore, the ISO standards discussed below are meant only to provide an update; on the future developments and to further emphasize that environmental governance is here to stay.

ISO 14000 is a group of standards encompassing the following areas:

- Environmental Management Systems (14001, 14002, 14004);
- Environmental Auditing (14010, 14011, 14012);
- Evaluation of Environmental Performance (14031);
- Environmental Labeling (14020, 14021, 14022, 14023, 14024, 14025);
- Life Cycle Assessment (14040, 14041, 14042, 14043).

ISO 14001 is the only standard intended for registration by third parties. All the others are for guidance. ISO 14001 is a management standard, it is not a performance or product standard. The underlying purpose of ISO 14001 is that companies will improve their performance or the level of improvement will be raised. It is the process for managing companies' activities that have impact on the environment. Some unique characteristics of ISO 14001 are:

- It is comprehensive: All members of the organization participate in environmental protection; the EMS considers all stakeholders and there are processes to identify all environmental impacts.
- It is proactive: It focuses on forward thinking and action instead of reacting to command and control policies.
- It is a systems approach: The stresses are on improving environmental protection by using a single environmental management system across all functions of the organization.

### 5.4 WHERE DO THE STANDARDS APPLY?

This is primarily for the company to decide and document the extent of coverage. However, limited coverage to a small (inconsequential) array provides competitors with an ideal marketing opportunity. There does not appear to be a limit to the coverage of environmental management systems in that it can include facilities such as organizations' product, services, activities, operations, facilities and transportation.

From a slightly different viewpoint, all of the elements in the previous sentence should be considered for environmental impact resulting from current practices, past practices and future practices, and should further be reviewed for their impact under normal, abnormal and emergency conditions.

### 5.5 WHAT DOES THE ISO 14000 SERIES COVER?

The best way to answer and understand the structure of the series is by the following table:

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Standard	<u>Title/Description</u>
14000	Guide to Environmental Management Principles, Systems and Supporting Techniques
14001	Environmental Management Systems-Specification with Guidance for use
14010	Guidelines for Environmental Auditing-General Principles of Environmental Auditing
14011	Guidelines for Environmental Auditing-Audit Procedures Part 1 Auditing of Environmental Auditing Systems
14012	Guidelines for Environmental Auditing-Qualification Criteria for Environmental Auditors
140131/15	Guidelines for Environmental Auditing-Audit Programmes, Reviews and Assessments
14020/23	Environmental Labeling
14024	Environmental Labeling-Practitioner Programmes-Guiding Principles, Practices and Certification. Procedures to multiple criteria programmes
14031/32 14040/43	Guidelines on Environmental Performance Evaluation
14050	Life Cycle Assessment, General Principles and Practices Glossary
14060	Guide for the Inclusion of Environmental Aspects in Product Standards

#### 5.5.1 General description: ISO 14001

ISO 14001 is a specification document. A specification document contains requirements which may objectively be audited. Other ISO 14000 documents are guidelines.

A guidance document contains non-mandatory advice, comments, further information, recognized methods and state-of-the-art practices.

ISO 14001 requires an environmental policy to be in existence within the organization, fully supported by senior management, and outlining the policies of the company, not only to the staff but also to the public. The policy needs to clarify compliance with environmental legislation that may affect the organization and stress a commitment to continuous improvement. Emphasis is on the policy as this provides the direction for the remainder of the management systems.

The environmental policy provides the initial foundation and direction for the management system and will be more stringently reviewed than a similar ISO 9000 policy. The statement must be publicized in non-technical language so that the majority of readers can understand it. It should relate to the sites within the organization encompassed by the management system, it has to provide an overview of the company's activity on the site and the description of those activities.

### 5.6 BENEFITS OF ISO 14001

#### **Intangible Benefits**

- Continuity of operations
- Clear objectives and targets
- Clear job procedures, responsibilities and accountability
- Increased communications
- Environmental reviews of suppliers
- Ability to attract and maintain a high quality workforce through employee price
- Improved community goodwill.

#### **Tangible Benefits**

- Potential cost savings
- Reduced raw material usage . Reduced waste disposal costs . Recoverable resources
- Reduced penalties
- Lower insurance premiums
- Lower capital repayment rates.

## 5.7 STEPS IN ISO 14000 CERTIFICATION PROCESS

There are two phases in establishing an ISO 14000 EMS: creating the EMS and getting registered. The first step is to create an EMS as described below.

#### Create an EMS

Creating an E~S involves the following sequential steps:

1. Establish a project committee responsible for learning about ISO 14000 and managing the creation of EMS

- 2. The project committee prepares a briefing for top management describing ISO 14000, the EMS, registration, costs and benefits.
- 3. Top management commits to the EMS process.
- 4. Perform a gap analysis to determine how well the organization meets the ISO 14000 requirements and what will it take to meet them.
- 5. Presents results of gap analysis to the management and receives approval for continuation of the process.
- 6. Prepares a draft environmental policy with the top management participation.
- 7. Designs a procedure to identify the environmental aspects of the operation.
- 8. Identifies the environmental aspects and impacts.
- 9. Designs a procedure to identify the legal and other requirements of the organization.
- 10. .Identifies the legal and other requirements.
- 11. Creates environmental objectives and targets for each relevant function and level in the organization.
- 12. Establishes a programme for achieving targets and objectives.
- 13. Presents the EMS to the top management for approval.
- 14. Top management accepts the EMS.
- 15. Policy and EMS are implemented and an audit function is established.
- 16. Final gap analysis is performed to determine if the organization is ready for registration audit.
- 17. Organization applies for certification by the outside auditors.

Organizations are registered by outside auditors or "registrars" for meeting the ISO 14000 standard. The registration can be for the specific company site, for several sites, or for the entire company. Very specific' attributes of an EMS are specified in the 14001 standard. The steps in the registration period are:

- 1. Establish the scope of the registration. This can be done internally or with the help of outside auditors;
- 2. Apply for registration. This is a written application to the registration body;
- 3. Outside auditors perform full assessment;
- 4. The certification body based on the auditors' findings grants registration. An organization will receive one of the three designations: Approval-Conditional or Provisional Disapproval. When a company is registered, it receives a certificate listed in the certification register;
- 5. Ongoing activities are then required to maintain the registration. These include:
  - Monitoring and measuring the EMS;
  - Investing and handling non-conformances;
  - Implementing corrective action and preventive action;
  - Maintaining environmental records;
  - Establishing and maintaining an ISO 14000 standard and programme.

### 5.8 ISO DEFINITION OF TERMS

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#### **Environment:**

Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.

#### **Environmental Target:**

Detailed performance requirement, quantified where practicable, applicable to the organization or parts thereof, which arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

#### **Environmental Objective**:

Overall environmental goal arising from the environmental policy that an organization sets itself to achieve and which is quantified where practicable.

#### **Environmental Policy:**

A written statement on the organization performance, which provides a framework for action and for setting of its environmental objectives and targets.

#### **Environmental Impact:**

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from organization activities, products or services.

#### **Environmental Aspects:**

Elements of organization activities, products or services through which a company interacts with the environment.

#### **Environmental Management System:**

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

## 5.9 CONCLUSION

Since the time of Union Carbide Tragedy (Bhopal Incidence 1984), the industries have become aware of the various environmental damages that result from their industrial activities. The commitment, which is a result of accepting and owning the responsibility for pollution created by the production processes, is yet to evolve in a substantial manner. Though the industrial countries have introduced the principles of 3P's (Polluters Pay Principle), in India it is still in infancy. Industries are still looking for incentives from the government. The very fact that companies constantly point their fingers at the transport and automobile sector reflects on their irresponsible behaviour. The best practices emerging from some of the large-scale industries in India are an indication of better things to follow.

One might ask the question as to why the industries are blamed more than the other sectors. The answer lies in the fact that the degree of damage done by the industries is much more than the impact of many other sectors put together.

The pressures acting on the industries and other polluting activities are increasing steadily. The regulating bodies are coming up with more stringent regulations and they are also strengthening their implementing arm. The NGOs are becoming stronger. with their increasing awareness and global interaction. The pressure is also building up from the consumers and the day is not far off when they will reject all items produced using hazardous materials and are harmful to nature. Globalization has thrown open the protected Indian industries to compete in the international market, thereby necessitating conformance with environmental standards. Presently the environmental resources are available free of cost. When we introduce pricing for environmental resources it will also bring about responsible behaviour from the industries. India is a country rich in cultural heritage, with people worshiping nature. The day is not far off when people will behave more responsibly and progress towards a sustainable development process. Environmental impact is multi-sectoral in its nature and only recently we have turned our attention to managing the resources in a sustainable manner. Therefore, we still have to build up our information database and training activities to facilitate sustainable development.

#### 5.10 REVIEW QUESTIONS

- 1. What is ISO 14000?
- 2. Explain in brief the history of ISO 14000.
- 3. What is ISO 14001?
- 4. What are other ISO 14000 series standard?
- 5. Explain Environmental Management System (EMS) and ISO 14000 standards.
- 6. Write Short notes on the following:
  - a) Landmark events to initiate change-Bhopal Gas Accident;
  - b) Emphasis on environmental compliance;
  - c) Environmental pressure factors, e.g., legislations;
  - d) Trade related pressures for environmental performance;
  - e) International conventions;
  - f) NGOs activism and awareness building;
  - g) Consumer activism.

### ENVIRONMENTAL ETHICS

#### Structure

- 6.1 Introduction
- 6.2 Development of environmental ethics
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  - 6.5.1 What is the environment?
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#### **6.1 INTRODUCTION**

"A decision is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends to be otherwise". This is how Aldo Leopold, a naturalist, defined environmental ethic. Human health and welfare, and our concern about the remainder of nature are two reasons we care for nature. Ancient civilization, which depended completely on nature for their sustenance and practiced self-imposed restraint. However, with the dominance of Western powers over the world, their idea of mankind's domain over the earth and all its creatures spread throughout the world. Social structures, religion and technology are three arguments offered for environmental degradation. The author concludes that we cannot blame these separately as the root cause of environmental degradation.

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"The environmental crisis is an outward manifestation of mind and spirit... The crisis is concerned with the kind of creatures we are, and what we must become in order to survive," says Lynton K. Caldwell. The birth of environmental ethic as a force is partly a result of our concern for our own long term survival as well as our realization that humans are but one form of life and that we should share the earth with our fellow human beings. One of the first to recognize the degradation of the environment and to voice the concern for nature was Henry David Thoreau, the well-known American naturalist and writer. His solution to this eloquently stated concern was withdrawal, which was perhaps morally admirable but realistically ineffective. It is one thing to be concerned, but it is far more effective to take action, in order to promote the concern.

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### 6.2 DEVELOPMENT OF ENVIRONMENTAL ETHICS

The inspiration for environmental ethics was the first Earth Day in 1970, when environmentalists started urging philosophers who were involved with environmental groups to do something about environmental ethics. An intellectual climate had developed in the last few years of the 1960s in a big way because of the publication of two papers in *Science:* Lynn White's "The Historical Roots of Our Ecologic Crisis" (March 1967), and Garett Hardin's "The Tragedy of the Commons" (December 1968). Most influential with regard to this kind of thinking, however, was an essay in Aldo Leopold's noted work *A Sand County Almanac-"The* Land Ethic""-in which Leopold explicitly claimed that the roots of the ecological crisis were philosophical. Although originally published in 1949, *Sand County Almanac* became widely available only in 1970, in a special Sierra Club Ballantine edition, which included essays from a second book, *Round River*.

Most of the academic activities in 19705 was spent debating the Lynn White thesis and The Tragedy of the Commons. These debates were primarily historical, theological on religious, but not philosophical. Throughout the decade, philosophers sat on the sidelines trying to determine what a field called 'environmental ethics' might look like.

William Blackstone organized the first philosophical conference at the University of Georgia in 1972. The proceedings were published as "Philosophy and Environmental Crisis" in 1974, which included Pete Gunter's first paper on the Big Thicket. In 1972, a book called *Is It too Late? A Theology of Ecology*, by John B. Cobb, was published. It was the first single-authored book by a philosopher, even though the primary focus of the book was theology and religion. In 1973, an Australian philosopher, Richard Routley (now Sylvan), presented a paper Congress of Philosophy at the 15th World "Is There a Need for a New Environmental Ethic?" A year later, John Pass More, another Australian, wrote Man's Responsibility for Nature, in which, reacting to Routley, he argued that there was no need for an environmental ethic at all. In 1975, environmental ethics came to the attention of mainstream philosophy with the publication of Holmes Rolston's paper, "Is There an Ecological Ethic in Ethics?"

In 1973, Arne Ness, a Norwegian philosopher and the founding editor of the journal *Inquiry* authored and published a paper in that journal-"The Shallow and the Deep, Long-Range Ecology Movement", which was the beginning of the deep ecology movement. Throughout 1970s, *Inquiry* was the primary philosophy journal that dealt with environmental ethics. Environmental ethics was, for the most part, considered a curiosity, and mainstream philosophy journals rarely published more than one article per year. Opportunities for publishing dramatically improved in

1979 when Eugene C. Hargrove founded the journal *Environmental Ethics*. The name of the journal became the name of the field.

The first five years of the journal was spent mostly arguing about rights for nature and the relationship of environmental ethics, and animal rights/animal liberation, and rights lost Animal welfare ethics was determined to be a separate field with a separate journal, first, *Ethics and Animals*, which was later superseded by *Between the Species*.

Cobb published another book in the early 1980s, *The Liberation of Life* with Charles Birch as coauthor. This book took a 'process philosophy approach' in accordance with the philosophy of organism of Alfred North White Head. Robin Attfield, a philosopher in Wales, wrote a book called The *Ethics of Environmental Concern*. It was the first full-length response to Passmore. Donald Scherer and Tom Attig edited an anthology of papers, *Ethics and the Environment*.

It was a turning point when, in 1988, many single-authored books began to hit the stands. Paul Taylor's *Respect for Nature;* Holmes Rolston's *Environmental Ethics;* Mark Sagoffs *The Economy of the Earth;* and Eugene C. Hargrove's *Foundations of Environmental Ethics* were some of them. 1. Baird Callicott created a collection of his papers, *In Defense of the Land Ethic.* Bryan Norton wrote *Why Preserve Natural Diversity? followed more recently by Toward Unity among Environmentalists.* Kristin Shrader-Frechette has written a large number of books on economics and policy.

In 1980s, a second movement called "Eco Feminism developed. Karen Warren is the key philosopher, although the Eco-Feminism Movement involves many thinkers from other fields. It was then followed by a third, *social ecology*, based on the views of Murray Bookchin. An important link between academics and radical environmentalists was established with the creation of the Canadian deep ecology journal, *The Trumpeter*. In 1989, *Earth Ethics Quarterly* was started as a more popular environmental publication. Originally intended primarily as a reprint publication, and now as a publication of the Centre for Respect for Life and Environment, it is focused more on international sustainable development.

The 1990s began with the establishment of the International Society for Environmental Ethics, which was founded largely through the efforts of Laura Westra and Holmes Rolston, III. It now has members throughout the world. In 1992, the first issue of a second refereed philosophy journal, Environmental Values was dedicated to environmental ethics, was published in England. In 1996, a new journal *Ethics and the Environment* was published by University of Georgia. (In 2001, it became a publication of Indiana University Press). In 1997, a second international association was created, the International Association for Environmental Philosophy, with an emphasis on environmental phenomenology.

On the theoretical level, Taylor and Rolston, despite many disagreements, can be regarded as objective non-anthropocentric intrinsic value theorists. Callicott, who follows Aldo Leopold closely, is a subjective no anthropocentric intrinsic value theorist. Hargrove is considered a weak anthropocentric intrinsic value theorist. Sagoff is very close to this position although he doesn't talk about intrinsic value much, and takes a Kantian rather than an Aristotlian approach. At the far end is Bryan Norton who thought about weak anthropocentrism but wanted to replace

intrinsic value with a pragmatic conception of value. The anti-intrinsic value pragmatic movement includes such philosophers as Anthony Weston and Andrew Light, although Ben Minteer has recently indicated that intrinsic value could be included in an environmental pragmatism.

Environmental ethics deals with the following topics: Genetic Engineering, Cloning, Resource Allocation, Animals and Vegetarianism, Air and Water Pollution, Radiation, Ozone Crisis and Global Warming, Population and Environment, Eco Feminism, Indigenous Peoples, and Spirituality and the Environment.

The ancient civilizations had imposed self-made restrictions to avoid different forms of pollutions, through religious and other means not necessarily through legal measures. Legal measures were unheard of, at that time.

We have already shown how Leopold argued convincingly toward the adoption of environmental values other than economic, and his writings have had a major impact on the growth of environmental awareness.

Environmental ethics is a subject without definition and without consensus. And yet, every person on this planet makes everyday decisions that relate to environmental ethics. Questions as simple as "What should I eat?" or "How should I move from place to place?" all raise environmental and ethical issues.

Environmental ethics is very recent as an academic discipline and there is much to be studied and acted upon. The need for an environmental ethic is, however, critical. The earth's climate is already changing measurably, the rate of human population increase appears to be out of control, and no part of the earth is untouched by human activity.

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#### **6.3 ETHICAL THEORIES**

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An ethical theory is an attempt to answer certain questions about ethics. Ethical theories do not directly provide answers to specific questions but decide what moral principles should be adopted. In the western tradition, ethical theories are mainly of two types.

#### 6.3.1 CONSEQUENTIAL THEORIES

Consequential theories evaluate acts, policies, practices and institutions according to their consequences: Stated simply, a right action is one that overall .has good consequences; a wrong action is one that in general has bad consequences. The most influential consequentiality theory is utilitarianism. For a utilitarian, an act is right in proportion, as it tends to increase the sum of human happiness or decrease unhappiness, and is wrong if it tends to be reverse.

#### **6.3.2 DEONTOLOGICAL THEORIES**

Deontological theories hold that certain actions are right or wrong regardless of their consequences. In this view, rational persons will not be prepared to adopt a rule for themselves unless they find it is applicable to all persons. F~r example, some acts such as telling the truth are a categorical imperative for all persons regardless of the situation or consequences. Because

these acts are always required, they can be universalized or expected of all persons at all times.

#### **6.3.3 OTHER ETHICAL THEORIES**

Situation ethics: This is based on the ethical responsibility of the agent; right actions are those that one does out of love for others.

Virtue ethics: It takes the view that ethics is not a matter of bringing about good consequences or about carrying out duties, but rather one of developing a particular character, of becoming a particular kind of person.

Feminist ethics: Its development has influenced many other areas in applied ethics-particularly environmental ethics. Some believe that men and women are inherently very different, that they think and experience the world in different ways and have different emotional and spiritual lives; other feminists link male domination of women with environmental destruction. Women are naturally superior to men, ethically, because, they are inherently cooperative and caring rather than aggressive and competitive. Thus a. nurturing role is natural for women.

Existentialists. It focuses on the uniqueness of each choice, and on the responsibility of individuals to make their own moral choices. In instances of severe environmental damage, deontologists believe in retribution, that criminals deserve to suffer solely because they have broken the law-benefited themselves at the expense of others and failed to respect their fellow citizens. In contrast, consequential theorists see punishment In terms of the good it will achieve-deterrence. That is, punishment makes sense only if it results in protection of the society or reform the offender and rehabilitates him. On the other hand, a person who is willing to accept some pollution in return for inexpensive consumer products is calculating the benefits and costs, and can be called a utilitarian.

#### 6.3.4 ETHICAL THEORIES APPLIED TO THE ENVIRONMENT

The scope of the moral community concerns human attitude, not only towards other human beings but also towards the rest of nature. Classical ethics has always been concerned with relations between humans, and only recently has it been accepted that we have some obligations towards the non-human world too. This ethic is very selective and doesn't extend to such lower animals as bugs or bacteria, not to mention plants. We recognize our duty to preserve wilderness areas for aesthetic enjoyment and scientific study and to conserve resources for future generations, but we do not treat a tree with the same respect as we do to a human.

The Cartesian tradition credits humans with a non-material soul as well as a body, unlike other living things which are merely bodies. Only humans can think, have emotions, make choices, or feel pleasure and pain. Since animals are mere machines, we cannot harm them anymore than we might hurt a clock.

Most people today do not believe that animals are insensitive to pain, but they do believe that animals lack other mental characteristics. Many people condemn bull fighting but see nothing wrong with intensively raising animals for food, so long as no physical pain is caused. Ignorance about animal behavior and ignorance about what happens to animals reinforce each other. Most people never see what goes on in intensive rearing facilities, in slaughterhouses and in the transport of livestock. Likewise, they do not realize that new products (consumer durables like hair spray) are routinely tested on animals and that millions of them suffer and die every year in such testing. Finally, most people assume that medical research provides great benefits for humans at the cost of minimum, unavoidable suffering to animals. The utilitarian approach to ethics recognizes suffering as a loss of happiness and, therefore, an undesirable outcome and have even extended this concept to the suffering of animals.

Classical theorists view nature only valuable to the extent that it benefits humans. We would not want to kill useful animals, but also would not want to exterminate species, as they might not somehow be useful in the future. This "instrumental value of nature" approach to environmental ethics has a number of limitations, It allows us to kill or torture individual animals as long as this does not harm other people. Secondly, basing environmental ethics only on instrumental values implies that the rest of the world is here only to serve human needs.

We believe that we should care about non-human life and the natural environment, not for our selfish personal ends but because it seems to be the right thing~ to do. But there seems to be no ethical theory that explains this attitude. Perhaps the solution to this problem lies in expanding the moral community. If we can include animals and the environment generally in our moral community, perhaps we can learn how to treat them ethically

#### 6.4 ENVIRONMENTAL ETHICS IN SPIRITUALITY

In this section we will discuss several spiritual approaches to environmental ethicstranscendentalism, deep ecology, eco feminism, Judeo-Christian tradition, Asian religions and Islam. In each case, the environmental ethics appeals to a faith that ultimately is not based on rational arguments but affords an opportunity to construct a useful and satisfying environmental ethic.

#### 6.4.1 TRANSCENDENTALISM

Transcendentalists learn the truth about human life by looking at the universe. According to them, only by contemplating nature can we understand the spirit that provides life. They do not distinguish the sacred from the profane. Everything is sacred. Since nature was unspoiled by human activity, it was there that humans could come into contact with their deeper reality. Nature became sacred because this is where spirituality could be found.

#### 6.4.2 DEEP ECOLOGY

Here, environmental ethics evolve from two fundamental values, i.e., self. realization and biocentric equality. Self-realization is the recognition of onesel1 as a member of the greater universe and *not just* as a single individual or ever as member of a restrictive community. Biocentric equality follows from self. realization, in that, once we realize ourselves as one with other creatures and places in the world, we cannot regard ourselves as superior. Everything has al equal right to live and grow and humans have no special rights. We must eat (those who are non-vegetarians) and use other creatures to survive and no exceed the limits of our "vital" needs.

#### 6.4.3 JUDEO-CHRISTIAN TRADITION

The Judeo-Christian is that God created the world explicitly for man's benefit and and rule: no item in the physical creation has any purpose save to serve man objective. He is the crown of creation *Christian thought also contains a more* responsible environmental alternative in the writings of Saint Francis of Assisi who says that all nature is important to God and that to love God is to take care of God's creatures.

#### **6.4.4 ORIENTAL RELIGIONS**

Buddhism has its main tenet in Ahimsa-"do not destroy life". Buddhism teaches compassion for all forms of life, including trees, forests and wild! Hinduism maintains that all animals (man is also a rational animal) incarnations of other living things. The central tenets of Hinduism require I and compassion for animals and for nature.

While Islamic law contains references to the environment, and Pro' Mohammed clearly was sensitive to the sufferings of animals, environment {concerns are not central to the religion.

#### 6.4.5 ANIMISM

In religious traditions following animism, the spirits do not take human form. They simply are within the tree, or the brook or the sky. It is possible to commune with these spirits, talk to them, feel close to them, and thereby feel close to nature.

Before the middle of the last century, people did not view the environment sympathetically. In fact, nature was a force to be fought with, to be subdued or conquered. Trees, rivers and rocks were the 'others', and human beings did not belong to this nature and were clearly superior to it.

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#### 6.5 FUNDAMENTAL CONCERNS

Ethics is the branch of philosophy that studies and evaluates human conduct in the light of moral principles, the latter conceived to be either innate matters of conscience or powers of discrimination acquired through experience. However, moral principles are normative; they concern what is right or wrong, good or bad. In general, they guide conduct away from egoism toward altruism, from selfishness toward selfishness, from insensitivity to sympathy. Melden observes that acting out of self-interest is not a moral reason; while Warnock claims that the proper general object of morality is to expand our sympathies, so as to reduce the damage inherent in narrowness of knowledge and of limited interests.

Nevertheless, ideas of self-interest, either egocentric or by extension, ethnocentric or anthropocentric, underlie most ethical theories. The prudent utility of acting well-in the more or less disguised interest of the self, the society or the species-is the popular theme. Small wonder then that zealots of natural sciences have convinced the general public that the world can be explained in terms of selfish genes and competitive species. Thus, Darwin's idea that ethics have evolved to facilitate social cohesion underlies and justifies Aldo Leopold's Land Ethic, positing reproductive advantage for common thoughts and behaviour patterns. The individual may think that altruism impels him/her to respect the land as an ecological community but, as explained by

Leopold, "the path of social expediency is not discernible to the average individual." Having identified to his satisfaction, the hidden "scientific" prudential source, Leopold advocated respect, love and admiration for the land.

Much earlier, David Hume supported the idea that altruism is a normal human attribute. He argued that feelings of esteem, respect, regard, kinship, affection and sympathy are as natural to us as self-love. Their expression and scope, he suggested, depend on how reason and understanding inform them. Although he had society in mind as the beneficiary of its citizens' altruistic sentiments, I see no reason why benevolence should stop there.

Starting from this generous appraisal of human nature, the central problem for ethics is posed by the question:- Beyond myself, what is important? On what larger group, society, community or world shall I centre my natural sentiments of sympathy and compassion? What shall I love here on Earth? The answer, it seems to me, is the World, the Ecosphere, as the natural surrounding environment.

But what exactly do these words mean? The way environment is conceptualized is supremely consequential and an early task of environmental ethics is to define an environment worthy of human sympathy. Without a clear and compelling concept of the world-of-Nature and of its significance, the question as to how people ought to behave and act, individually and socially, is ambiguous and unanswerable. Once this importance-base is established, the next task is to construct a system of normative guidelines to govern attitudes, behaviour and action toward that environment or nature. Therefore, a strong environmental ethic should provide answers to three basic questions:

- What is the environment?
- What is the relationship between people and the environment?
- What attitudes should govern people's relationship to the environment?

#### 6.5.1 WHAT IS THE ENVIRONMENT?

Today Earth's creation story is being rewritten in accordance with what has been learned from evolution, ecology and the earth sciences as well as with what has recently been seen from outer space. We have all heard our history of relatedness from simple beginnings: of our cell parts indistinguishable from bacteria that appeared on Earth billions of years ago, of our DNA genetic material similar to that in other organisms, of our hemoglobin resembling the chlorophyll in plants, of our blood salinity like sea water, our bones made from the stuff of corals and phosphorus-rich sediments. Obviously, we belong to this surrounding system. Further, looking in from outer space, we have seen the blue cloud-swathed planet and realized with a sudden shock our status as deep-air animals, living at the bottom of the atmosphere, enveloped in its transparent skin. How obvious now that we are Earthlings, evolved out of stardust, air and water, warmed by sunlight. No need to search for reasons, nor labour arguments as to why we ought to place high valuation on the environment and protect it.

Nature or the Ecosphere is what we are immersed in: a magical ecological system that daily and seasonally renews its organic presence and cyclically replenishes its energy, air, water and soil.

Nature is neither the capricious bitch whose secrets science is justified in taking by force as Francis Bacon argued, nor the soulless machine that Descartes conceived; not the heathen God of place as opposed to the ludaeo-Christian God of history, nor merely the residue after all of human worth has been wrung out of the world as C.S. Lewis proposed. The Ecosphere or Nature, our earthly environment, is the foremost unitary reality that we directly experience. It is the whole of which we are parts.

One of the most important ecological truths is as follows. The Ecosphere, not organisms, is the bearer of life. Whatever the vivacious element or essence of the world, its residence is clearly in ecosystems not in isolated protoplasm. How long would organisms remain "alive" deprived of their life-giving air, earth and water? The whole world is filled with vitality which, though expressed most animatedly in organisms, should also be in their surrounding matrix. Environmental ethics that does not bother to find reasons for preserving "non-living" Nature should review its position. If 'life' is valuable and worth

preserving, then chunks of earth-space, the sectoral ecosystems of the Ecosphere, are the primary objects of concern. Attention to the wild ones wilderness, the unprocessed-symbolizes our care for the whole, our belonging and not-owning.

#### 6.5.2 RELATIONSHIP BETWEEN PEOPLE AND THE ENVIRONMENT

The foundation on which environmental ethics stands is ecological, based on the knowledge, belief and faith that what has passed for years inconspicuously as 'environment' is a reality more important than you, me and all of us. We are components of a greater entity that, somehow, over 4.6 billion years, produced us and continues to sustain us. That the whole is more important than the parts establishes the moral priority of the ecocentric over the anthropocentric perspective.

Deriving an "ought" from an "is" seems straightforward enough when reality is conceived of as wholes and parts because, functionally, parts must serve the whole that comprises them. If they do not, then they are deformities or pathologies-which they ought not to be. This is precisely our current relationship to the planet, and the diseases that we have caused by our unconscionable numbers and polluting industries are, among other things, accelerated soil erosion, desertification, acidification, destruction of biological diversity, and changes in atmospheric chemistry. The world is running a fever and we are the flu. Humanity ought not to be a disease or a deformity in the body Earth.

The part must serve the whole. Just as the function of the heart is to maintain a healthy body so does the function of people--one tissue among Earth's 20 million others--ought to be keeping the Ecosphere healthy, beautiful, creative and vital, rather than pursuing the present goal of oxidizing, as rapidly as possible, the hydrocarbon seams and pools that hitherto lay safely sequestered underground.

## 6.5.3 WHAT ATTITUDES SHOULD GOVERN PEOPLE'S RELATIONSHIP TO THE ENVIRONMENT?

The attitude that is slowly killing the world and which, if continued, will finish the human race, is *anthropocentrism:* the religion of humanism that puts people first in all matters. Its highest goal is service only to the human community. It is our legacy of many thousands of years, the

natural mood of a conscious species inclined to be self-congratulatory and short on ecological sense. And till today, paternalistic religions and male-dominated societies hone the vanity and presumptuousness of an imagined man-centered world.

The saving attitude, the attitude in short supply, is ecocentrism that identifies the ecosphere as the centre, a focal point not only for ethics but also for art and religion, at least in the latter's immanent aspects. Can the world be valued in all three modes? Yes, only when its surpassing importance is widely recognized, when wondering admiration for nature becomes our second nature, when we value the ecosphere above all else. But cultural obstacles stand in the way.

Environmental ethics is a topic of applied ethics that examines the moral basis of environmental responsibility. In these environmentally conscious times, virtually everyone agrees that we need to be environmentally responsible. Toxic waste contaminates ground water, oil spills destroy shorelines, fossil fuels produce carbon dioxide, thus adding to the greenhouse effect, and use of fluorocarbon gases depletes the earth's protecting ozone layer. The goal of environmental ethics, then, is not to convince us that we should .be concerned about the environment-most of us already are. Instead, environmental ethics focuses on the moral foundation of environmental responsibility, and how far this responsibility extends. There are three distinct I theories of moral responsibility to the environment. Although each supports environmental responsibility, their approaches are radically different.

The first of these theories is anthropocentric or human centered. Environmental anthropocentrism is the view that all environmental responsibility is derived from human interests alone. The assumption here is that only human beings are morally significant persons and have a direct moral standing. Since the environment is crucial to human well-being and human survival, we have an indirect duty towards the environment, a duty that is derived from human interests. This involves the duty to assure that the earth remains environmentally hospitable for supporting human life, and that its beauty and resources are preserved so that human life on earth continues to be pleasant. Some have argued that our indirect duties towards the environment, and the benefit that future generations will receive. But critics have maintained that, since future generations do not yet exist, strictly speaking, they cannot have rights any more than a dead person. Nevertheless, both parties to this dispute acknowledge that environmental concern derives solely from human interests.

A second general approach to environmental responsibility is an extension of the strong animal rights view discussed in the previous section. If at least some animals qualify as morally significant persons, then our responsibility toward the environment also hinges on the environmental interests of these animals. According to this view, then, environmental responsibility derives from the interest of all morally significant persons which include both humans and at least some animals. Like anthropocentrism, here too, environmental obligation is indirect.

The third and most radical approach to environmental responsibility, called *eco-centrism*, maintains that the environment deserves direct moral consideration, and not one that is merely derived from human (and animal) interests. The terminology used to express this direct

responsibility is varied. It is suggested that the environment has direct rights that it qualifies for moral personhood, that it is deserving of a direct duty and that it has inherent worth. Common to all of these claims is the position that the environment by itself is on a moral par with humans.

There are two basic reasons for our concern with environmental pollution: (a) human health and welfare, and (b) our care about the remainder of nature. Up concern mentioned in (b) is not only for the benefits we might derive from nature but because all of nature has its own right to exist. Human health and well-being can be impacted by environmental pollution in' two distinctively different ways. On a personal level, detrimental health effects due to contaminated water, air, or food lead to a progressive deterioration of our habitat, resulting in the eventual destruction of human life, and perhaps all life. Such a concern is not very personal, as the probabilities of that occurrence are extremely low.

#### 6.6 THE ETHICAL DILEMMA

Almost everyone recognizes that we must preserve our national heritage-our parks and wildlife, our farms, our wetlands and forests. And few dare to question that equal justice and universal human rights are essential axioms of morality. Simultaneously, people accept the necessity of protecting the environment and they also assume the moral obligation that every human being has an equal right to health, education, and employment, regardless of where a person is born or where he is facing hardship or persecution. To satisfy these demands, it becomes a moral necessity to create more jobs, to build more housing, to expand the infrastructure, to produce more food and water, and to provide more sanitation, healthcare and educational facilities. The only problem is that success in attaining these worthy goals is possible only in an infinite world where no conflict need ever arise between individual, societal, and environmental needs.

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#### 6.6.1 ENVIRONMENTAL ETHICS AND POPULATION

Population naturally tends to grow "geometrically," or, as we would now say, exponentially. In a finite world this means that the per-capita share of the world's goods must decrease. Is ours a finite world? A fair defense can be put forward for the view that the world is infinite or that we do not know that it is not. But in terms of the practical problems that we must face in the next few generations with the foreseeable technology, it is clear that we will greatly increase human misery if we do not, during the immediate future, assume that the world available to the human population is finite. "Space" is not an escape in the near future. A finite world can support only a finite population; therefore, population growth must eventually equal zero.

#### 6.6.2 ENVIRONMENTAL ETHICS AND POLLUTION

In a reverse way, in the case of problems of pollution, it is not a question of taking something out but putting something in-sewage, chemical, radioactive and heat wastes into water; noxious and dangerous fumes into the air; and distracting and unpleasant advertising signs into the line of sight. Based on the calculations of utility, the rational man finds that his share of the cost of the wastes he discharges is less than the cost of purifying his wastes before releasing them. Since this is true for everyone, we are locked into a system of "fouling our own nest," so long as we behave only as independent, rational, free entrepreneurs.

Private property or something formally akin to it averts the problem of a food basket. But the air

and water surrounding us cannot readily be fenced, and so the problem must be prevented by different means, by coercive laws or taxing devices that make it cheaper for the polluter to treat his pollutants than to discharge them untreated. We have not progressed very far with the solution of this problem. Indeed, our particular concept of private property, which deters us from exhausting the positive resources of the earth, favours pollution. The owner of a factory on the bank of a stream-whose property extends to the middle of the stream-often has difficulty seeing why it is not his natural right to muddy the waters flowing past his door. The law, always behind the times, requires elaborate stitching and fitting to adapt it to this newly perceived aspect of the commons.

The pollution problem is a consequence of population. It did not matter much how a lonely American frontiersman disposed of his waste. "Flowing water purifies itself every ten miles," the grandfathers used to say, and the myth was near enough to the truth during their times, for there were not too many people. But as population became denser, the natural chemical and biological recycling processes became overloaded, calling for a redefinition of property rights.

The idea that contamination of the environment is detrimental is not new. The ancient civilizations had imposed self-made restrictions to avoid different forms of pollutions, through religious and other means, not necessarily through legal measures which were unheard of at that time. The fact that environmental pollution can make people sick 'and even prematurely kill them through various forms of environmentally mitigated diseases is a major driving force for environmental pollution control. It is clear from archaeological and anthropological studies, as well as from contemporary investigations of the behaviour of indigenous peoples, that some form of eventual spirituality-a reverence for the individual elements and totality of the natural environment, steered the sustainable lifestyles of early humans.

The form of the 'right' relationship between *Mankind and Mother Earth* (Toynbee, 1976) has been the subject of many deep philosophical reviews (e.g., Passmore, 1980; Thomas, 1984). These reviews point to the role of the dominant belief in forming Western environmental behaviour patterns, patterns that were to be exported throughout the world by exploration, conquest and colonialism. The logical outcome of this Western ethic was the triumphant period of exploitation, which we now call Industrial Revolution.

Environmental ethics holds that we, the people, have a moral responsibility to all animals, plants, and perhaps even inanimate objects even though they cannot return such moral responsibility.

Before the middle of the last century, people did not view the environment sympathetically. In fact, nature was a force to be fought with, to be subdued or conquered. Trees, rivers, and rocks were the 'others', and human beings did not belong to this nature and were clearly superior to it. Humans had continual battle with the forces of nature for survival. By the mid 19th century, writers like R.W. Emerson argued that nature was not some evil force, but rather, a great provider, and that we should be grateful for the many blessings nature yielded for our benefits. Emerson wrote, even as the great rape of the environment was in progress, with forests and minerals and fossil fuel deposits being exploited without regard to the future. Stuwart Udall called this the "myth of super abundance", we could not probably run out of any of these resources-they were so abundant. In any province when a farmer tilled a piece of ground for

three years and planted tobacco and stripped it of nutrients, he simply moved on to the next plot of ground. There was more than enough for everyone to go around. In recent years we view such exploitation with horror and recognize that nature has its instrumental value. Nature should not be treated callously because it is of so much value to us. Likewise, we now recognize that global problems such as the depletion of the ozone layer and the destruction of forest can result in permanent harm to us and to our future generations.

#### 6.6.3 VALUE OPTIONS

Is it possible to explain that values of terrestrial nature do not orient human behaviour sufficiently for the prevention of global catastrophe? The causes of environmental deterioration are not (always) ignorance, lack of understanding, or irresponsibility. Under certain social conditions, which may be technological or economic, it is often very difficult to live in a way other than at the cost of nature and the environment. What could present, as a fruit of insufficient knowledge, insufficient intellectual capacity or lack of morals is a result of conflicts of values, which have a social basis.

Citizens have usually a limited range of opportunities to contribute to the conservation of nature. Nevertheless, every citizen can do what is in modern democratic societies one of the conditions of overcoming of environmental crisis. He can rethink-from the point of view. Determined by this crisis-how he lives and how he wants to live, how others live, and how they want to live. He can-rethink his goals and values and the goals and values of others. If he finds that the terrestrial nature is not respected sufficiently, he can express it as a customer and a voter. Our ecological crisis renders a further expansion of an already high material consumption problematic. We need to examine the possibilities and limits of an ecologically guided consumption-so called "green consumerism"-as well as to recall the values of moderation and frugality.

It can appear as a cynicism or as naivety if those who live at or under the poverty level are reminded of the moral priority of frugal life. The unwillingness to recognize that in finite terrestrial nature the levels of consumption taken for granted by the advanced countries are not attainable by all may also be viewed cynically by many. Given the precipitous rise of population, the Earth would become inhabitable before its habitants could attain that goal.

Western civilization has long been guided by a quest for a life-style associated with ever increasing material consumption. Numerous politicians hold that out as a goal for the countries of the poor southern hemisphere. In the countries of Central and Eastern Europe, that is often taken to be the goal of rebuilding market economics and pluralistic political systems as well.

Granted, a certain measure of material consumption is necessary for. the development of personality while affluence does broaden the scope of free choice and responsibility. However, it is also evident that there comes a point at which further expansion of material consumption becomes pointless.

Once we pass the limits of poverty, the level of consumption is no longer the chief factor in determining human happiness. Contentment in family life and at work, satisfying leisure time, the supportive friendship of others as well as other factors that make for happiness can then be largely independent of the volume of material consumption.

It is when the deep human need for the p9sitive regard of others remains unfulfilled that humans seek to replace it with conspicuous consumption. The hope of changing the destructive-and also antisocial-practices that follow from it may thus be closely linked with healing the destructive relations among humans. Not only affluence, but also squalor can endanger the biosphere. The record of some developing countries shows that an impoverished people can survive only at the cost of destroying its environment, which in turn, adds to its impoverishment.

Both the upper and the lower limit of acceptable consumption can be determined in terms of values such as human health and dignity of life as well as the stability and diversity of nature. Material consumption should neither sink nor rise so much that it would endanger any of these. A satisfying life sinks into squalor or rises into superfluous ness when level of consumption become so low or so high as to endanger health, dignity and the integrity of nature.

A life-style appropriate in our environmental crisis is neither self mortifying nor ascetic, as the critics would claim; it seeks only to give to consumption its appropriate place among the many sources of human fulfillment. The point is not to consume less but to consume better, wanting only as much as we can or should have. We believe that such a life-style could increase pleasure in living and improve the quality of life beyond the present levels.

We cannot take a quick and easy way to blame technology, social structure or religion separately as the root cause of environmental degradation. It is difficult to argue that primitive societies should be re-established. The society is after all a reflection of the needs and aspirations of the people. People establish societies, and thus it cannot be argued that social systems are the root cause of all our environmental ills.

Engel (1990) describes sustainable development as representative of the core of the new environmental ethic. He claims, "Our present political and economic arrangements are only retained because they are perceived to be legitimate, and their legitimacy rests ultimately on the perception of that they are ethically justified". History teaches us that once this ethical justification is challenged by new moral sensibilities, and legitimately withdrawn, the arrangements are likely to change.

In the case of global environmental problems, ethical stances are likely to be more diverse. We cannot take Western or scientific perspective to be pervasive and adopt them. Engel goes on to suggest four ways in which an interest in spirituality, morality and ethics has practical utility:

- 1. It helps explain the role of human values.
- 2. It explains human motivations.
- 3. It gives moral guidance to alternative courses of action. 4. It helps resolve conflicts.

Arvil (1967) goes further to offer candidates for environmental ethics in an era where mankind is depressed from the impact of technology and is too far from the primitive origins to follow the sustainable patterns of behaviour followed by Indigenous people.

According to Robert Arvil, the candidates for environmental Ethics are: Integrity-to infuse

ecological precepts and a true environmental ethos into your lifestyle.

*Humanity-to* share the earth's resources more equitably with all life on earth, today and tomorrow.

*Determination-to* arrest pollution and squalor and to promote quality in your surroundings *Judgment-to* choose wisely between competing and conflicting aims and values in order, with humility, to promote the trusteeship of society for the environment.

#### 6.6.4 IS OUR ENVIRONMENTAL CRISIS A CRISIS OF VALUES?

Why do we care about the future generations is an interesting philosophical question.

The Earth is the only place in the universe that offers humans a suitable habitat, yet the devastation of that Earth in our time has reached an unprecedented extent. The Earth and its living nature are a product of an unrepeatable evolution. They have grown under conditions that are no more, and in a time, that is irreversible. The extinction of a species and the destruction of an ecosystem represent an irreversible loss. This creates-among others-a value of terrestrial nature.

The term crisis' originally meant a conflict, a moment of decision-a moment of trial and judgment. Today, we can speak of a crisis since we are speaking of a historical situation in which we humans are threatening and devastating nature while its finitude and fragility force us to rethink and reevaluate our actions as well as our ideas, goals and values.

The devastation of the Earth attests to the fact that the direction of our civilization is flawed because it cannot be sustained. A civilization is sustainable only if it can meet the needs of those now living without endangering the sustenance of those yet to come. Our present ecological crisis is also a crisis of our civilization to the extent to which that civilization, in devastating the Earth, endangers and destroys the possibility of future development. The demands of expansion are destroying natural' resources for the future. However, there is a value dimension to it as well.

One of the main causes of the devastation of the Earth is a way of valuing which does not respect its value. The current environmental crisis is a crisis of valuing in this sense. A value system can be said to fail when it no longer provides an ethically satisfactory orientation for human life-as when it deprives human life of dignity. It fails when it does not warn humans against devastating the Earth and against living at the expense of future generations. In that sense, the ecological crisis calls on us to rethink and re-evaluate what we value.

The need for a re-evaluation of our values becomes pressing when what we value begins to destroy what is valuable. The problem is not simply that our values lead to a collision with our physical and biological limitations, or that they fail us in our instrumental interaction with nature. What we value itself loses value when it does not respect the plurality of life forms, the unique value of finite and fragile nature. What we value, we believe, is rendered valueless by a lack of respect for both life and the Earth.

This recognition need not imply a rejection of the great religious and philosophical value systems, which make up our .cultural treasure. Recognizing that we belong to this Earth and learning to respect life and the Earth calls only for a rejection of the quest for a domination of

nature. It does not deny the need to interact with nature, it only sets that interaction within the limits of wisdom and experience. Far from rejecting other values, it purifies them of an indifference to nature and so protects them from being used as an excuse for devastating the Earth. So purified, our traditional values can provide a far clearer guide to a life worth living.

Our religious and philosophical heritage was shaped at a time when the fragility of nature did not appear a problem for humanity. As a result, it left us unprepared for the ecological crisis. That crisis helps give us a new understanding of what we believe. Humans bear a responsibility for preserving the diversity of life on the Earth, for preserving its habitability for all who dwell therein, be they fellow humans, plants, other animals, or microorganisms.

Each generation inherits the successes and the failures of the preceding generations. Then, how can we plan anything for the future? It will become possible when dawn on us the recognition that though we do not know in detail what the future generations will be like, we can assume that we still value some things we recognize as good. Such concerns as health, freedom, equality and so forth are values universal to the human experience, and there is no reason to believe that future generation will not also strive for such goods. Therefore, creating toxic disposal sites for future generation to clean up is not in their interest, regardless of how we might view these civilizations. Our concern for future generations is a concern of our own. The concern for nature for its own sake is best described as an environmental ethic. This concern is a far stronger and a potent force in the environmental ethic and environmental movement.

The environmental ethic is a totally new concept, perhaps the most important new idea to develop in philosophy. This is the recognition that all people deserve our moral attention. The environmental ethic broadens this moral community to include all of nature. Environmental ethics hold that we, humans, have a moral responsibility to our fellow humans, animals, plants, and perhaps even inanimate objects even though they cannot return such moral responsibility. The argument that environmental ethics does not make much sense since non-humans are unable to reciprocate is not a strong one. For, we do care for weaklings like babies and physically and mentally challenged though they cannot reciprocate. Why not include whales, squirrels, or even pine trees? The environmental ethic is not site specific. No particular forest is of more concern than the others. It is not similar to the "NIMBY" (Not In My Backyard) syndrome. It is including every thing in nature into the, moral community.

Such a concept is wonderful. If we give some thought it seems simply natural and meaningful. Concern for the endangered species is not only because of their instrumental value to humans but rather due to our sense that these species have a right to exist. They have an intrinsic value in addition to their possible instrumental value. The belief in the intrinsic value of nature represents a faith-one has to feel it is right. This feeling has been understood and explained most notably by C.D. Stone. The question we face is whether nature exists for the welfare of the people, or whether it has an independent existence. This is further complicated by the question as to what is "nature"? People may be upset about senseless killing of whales or baby seals. Will there be a comparable outcry against the destruction of the poliovirus? Do these species also have a right to be left alone and not be destroyed?

So the issue is complicated. But this does not freeze the interest in the issue of environmental

ethics. We will have to strive and develop and foster this idea. Many widely accepted principles, such as the slavery, have fallen. Albert Schweitzer noted that Europeans have considered people with darker skins to be sub-human. He expands this development to all of nature: "Today it is thought an exaggeration to state that reasonable ethic demands constant consideration for all living things down to the lowest manifestations of life. The time is coming, however, when people will be amazed that it took so long for mankind to recognize that thoughtless injury to life was incompatible with ethics."

Rene Dubos argues further in a thoughtful article entitled, "The Theology of the Earth," that everything has its place and reason for being. He suggests that there is a genius of the place, oneness between people and uniqueness of each locality, be it a city or a grove of trees.

The intrinsic value of nature is obviously on a higher ethical plane than the instrumental view of nature. But this is much more difficult idea for the humanity to accept. How is that many of our fellow human beings have never heard of this concept or considered the concept? What are the roots of this behaviour?

Why is the most intelligent being in the world-the human being-so incompatible with nature? There are three basic lines of argument in attempting to answer this question. One view is that humans created religion with dogmas that had the basic seeds of incompatibility. The second is that, the social structure makes it inherently impossible to attain equilibrium. The third argument is that the growth of science and technology is responsible for degradation.

Lynn White, in his essay, "The Historical Roots of Our Ecological Crisis" argues that people embracing the ludaeo-Christian religion are taught to treat nature as an enemy. The religious dogmas prescribe that nature and natural resources are to be used only to meet the goals of survival and propagation. The religion of Western civilization, according to. White, is responsible for environmental degradation. The assertion that religion moulds moral is oversimplified, and blaming one religious tradition for our problems seems to be unfair.

Our ecological crisis is rooted in our social structures. Probably, the most damning piece yet written that takes this view is Garrett Hardin's "Tragedy of the Commons." Hardin illustrates his point by a story of a village that has a common green for the grazing of cattle surrounded by individual farmhouses. In the beginning, each farmer has one cow, and the green-is able to support the herd. It becomes apparent to each farmer that when he gets another cow, the cost is negligible to him personally (it is shared by everyone) but the profits are his own. So he gets more cows, reaping greater profits until the commons are no longer able to support the herd, and the system collapses. Hardin used this parable to illustrate the problem of overpopulation, but it equally applies to other environmental problems. The social structure in the parable is of coarse capitalism, the individual ownership of property and the use of wealth for furthering one's own interests.

The only types of socio-political system that seemed at first glance to have developed a quasisteady state condition are primitive societies, such as the American Indians, the Finno-Ugric people of North Europe (Finland and Estonia) and the Maoris of New Zealand. To all these people nature holds within it spirits that are both powerful and friendly. The spirits in nature do not take human forms. Yet it is possible in these systems to converse freely with the spirits. The old Estonians and Finns, for example, always explained to the spirit of the tree why it was necessary to cut it down. Such a reverence and closeness is unknown in most modem societies. Imagine the difficulty in the clearing of a forest for an artificial lake if every tree required a special explanation and apology?

There was, in these primitive societies a friendship with all life forms. For example, old Estonians would begin the wheat harvest by cutting a shaft of wheat and placing it aside for a field mouse. There did not seem to be any religious significance to this mouse-shaft (hirevihk) and the only explanation handed down through the generations is that the mice deserve their share of the harvest.

In the same primitive societies there are also examples of shift of residence in search of meat, which was the sole source of meat. It is difficult to argue that primitive societies should be reestablished. The society is, after all, a reflection of the needs and aspirations of the people. People establish societies, and thus it cannot be argued that the social systems are the root cause of all our environmental ills.

It has become fashionable to blame our increased knowledge of nature and our related ability to put that knowledge to work for our environmental ills. The popularity of back to communes programs, and villages seems to suggest that somewhere we have made a wrong turn in the road to technological capability. Numerous authors have jumped on this bandwagon and blamed technology for everything from athlete's foot to nuclear bombs.

If technology is to be blamed, then we must show that the other less developed societies are better off environmentally than the technologically advanced societies. Overgrazing in Africa and the destruction of forests by the early Greeks are other examples. There are instances when technology has been used extensively to control. The distrust of technological advancement is not new. During the Industrial Revolution in England, the Luddities were people who violently resisted the change from cottage industries to centralized factories. Because the large machines threatened their way of life, they smashed a few factories to make their point and were hanged for their trouble. Strong arguments have been used to defend both views.

#### 6.7 ENVIRONMENT AND TECHNOLOGY

The major difficulty with the present discussion of technology is the fact that we focus our attention on what we call technology in its everyday sense and we ignore technology in its essence. In this situation, it matters little whether we embrace technology or condemns it since both, due to our misunderstanding of what technology actually means, equally enslaves us. To be free of misunderstandings, and relate to technology intelligently, we must find its central meaning and this is possible only when we discover its essence. In the present context, we see technology as a complex of contrivances and technical skills, put forth by human activity and developed as means to our ends.

Technology, in this view, is an object, or a complex of objects and techniques, that seems passive

itself; indeed, we conceive of it as activated by us only. Viewed from a different angle, the essence of technology reveals it as something far from neutral or merely as an instrument of human control; it is an autonomous organizing activity within which humans are organized. On viewing technology as a means to an end, we realize that everything depends on how we manipulate technology. However, suppose that technology was no mere means, how would it stand with the will to master it? How, indeed, can we cope with it if it encompasses us in its organizational activity?

In summary, the problem with our critique of technology lies at two levels. First, while we argue and take sides on the issue of technology, none of us is really free to deal with it constructively because none of us really understands it in its essence, i.e., in its entirety and in its central sense. Second, our limited understanding of technology is so misguided that little of value can be salvaged from it. This is because all discussions are prefaced on the view that technology is an object, which we manipulate as a means to our own ends. In fact, the essence of technology reveals it as a vast system of organization that encompasses us rather than something that stands objectively and is passively ready for our direction and control.

#### 6.7.1 ESSENCE OF TECHNOLOGY

Technology (in its essence) is a mode of revealing. From this, we see that technology's essence is to be found in the most basic realm of experience. That realm is the realm of "truths happening."

The problem remains, then: to understand how modern technology has evolved within this essential nature as a mode of revealing. Technology has evolved through the intervening three millennia since the time of the Greeks and has separated into different modes of revealing. What we understand as modem technology can scarcely be recognized as having a common origin with the fine arts or crafts three millennia back. Indeed, modern technology is distinguished in having made its alliance with modern physical science rather than with the arts and crafts. Therefore, to understand technology as it is today and in its complete essence, we must understand the course of that separate and unique evolution. It is in this process of understanding the evolution of technology as different from that of the arts and crafts that major differences occur.

One view (as held by Martin Heidegger, who after World War II, directed much of his thinking to technology and to the impact of technology on our perceptions of human life) holds that modern technology sets upon nature and tries 10 redirect and challenge its energies, in contrast to developments in arts and crafts that were always in harmony with nature. The essence of technology originally was a revealing of life and nature in which human intervention deflected the natural course while still regarding nature as the teacher and, for that matter, the keeper.

The essence of modern technology is a revealing of phenomena, often far removed from anything that resembles "life and nature," in which human intrusion not only diverts nature but also fundamentally changes it. As a mode of revealing, technology today is a challenging-forth of nature so that it changes the nature of things. It is a situation in which nature and objects wait, standing as reserve for our use. We pump crude oil from the ground and we ship it to refineries where it is fractionally distilled into volatile substances and we ship these to gas stations around the world where they reside in huge underground tanks, standing ready to power our automobiles or aero planes. Technology has intruded upon nature in a far more active mode that represents a consistent direction of domination. Everything is viewed as "standing reserve" and, in that, loses its natural objective identity. The river, for instance, is not seen as a river; it is seen as a source of hydroelectric power, as a water supply, or as an avenue of navigation through which to contact inland markets. In the past, humans were relationally involved with other objects in the coming to presence. In the era of modern technology, humans challenge-forth the Subjectively valued elements of the universe so that, within this new form of revealing, objects lose their significance to anything but their subjective status of standing-ready for human design.

Heidegger held to a consistent and well-developed picture of art, especially the art of poetry. In this picture, art is a mode in which life is experienced, in which truth happens for us. It is similar to technology in that regard; indeed, art was originally conceived of within the total framework, out of which technology, too, developed. While technology became the thematic pattern of Western development, being destined by the epoch-grounding process Heidegger called "enflaming", art remained merely another mode of revealing and, like all else, took on characteristics that were shaped by the prevailing destiny of various cultures. In its essence, however, art is a mode of revealing, a setting-forth, in which humans and other object-beings come to presence in an organization that is far closer to the essential nature of human life on this earth.

As truth is revealed through art, the artist is drawn into an awareness of the fundamental objects of the universe and the primal tensions that arise from them. Art carries us into the essential tension between earth and world and to the essential need of humans to find a joyous home within. In order to fully understand this concept and, hence, art's role as the saving power, it is essential to understand Heidegger's conception of the essence of human life. For, just as technology in the epoch of enflaming has affected the greatest threat to us by carrying us away from our essential nature, art possesses the capacity to become the mastering theme of a new epoch in which we are healed by coming back

into our own essence.

# 6.8 HUMAN LIFE AND ITS ENVIRONMENT- THE ART OF ETHICS AND AN ETHICAL DILEMMA

The threat of nuclear annihilation is, currently, the most dramatic and ironic sign of technology's "success" and of its overwhelming and overarching power; mass itself has been grasped as a standing-reserve of enormous energy. On the one hand, we consider ourselves, rightfully, as the most advanced humans that have peopled the earth but, on the other hand, we can see, when we care to, that our way of life has also become the most profound threat to life that the earth has ever witnessed. Medical science and technology have even begun to suggest that we may learn enough about disease and the processes of ageing in the human body that we might extend individual human lives indefinitely. In this respect, we have not only usurped God's rights of creation and destruction of species, but we may even usurp the most sacred and terrifying of God's rights: the determination of mortality or immortality. The gods, it is true, have been set aside in our time; to many, they are merely antiquated conceptions.

The "withdrawal of the gods" is a sign of our pervasive power and our progressive "ego-

centralism." The human ego stands at the centre of everything and, indeed, sees no other thing or object with which it must consider on equal footing. We see only ourselves insofar as we see objects as 'standing-in-reserve' for our dispositions. It is no wonder that we have "ethical problems" with our environment because the whole concept of the environment has been profoundly transformed. A major portion of the environment in which modem Westerners live, today, is the product of human fabrication, and this makes it ever more difficult for us to discover a correct relationship with that portion of the environment which is still given to us. It is all there to be taken, to be manipulated, to be used and consumed, it seems. But what is that conception that limits us or hinders us from using it in any way that we wish? There is nothing that we can see today that really hinders us from doing anything with the environmental ethics, the challenge of finding a way to convince us that there are limits of acceptable human action where the environment is involved. But where can we look for the concepts that we need to fabricate .convincing arguments?

The contemporary critique of technology has taken the form of attacking these and other sensitive issues. Both the creative and destructive powers of technology have begun to frighten us because we can begin to see our real limitations as knowledgeable managers and organizers of the world. And the concept of a human fabricated immortality staggers us because it places us, now, in the position of having to make the fundamental decision of whether we humans are better off as mortals or as immortals. These are matters that nature once dictated and that demanded no human consideration. We have to ask whether human intelligence is really capable of addressing them and whether we can trust our judgment in matters of such scope and profundity.

The human presence is crucial to other beings coming-to-presence, to truth revealing. What this concept claims is that the human essence is fundamentally involved in all revealing, in all objects coming for open display. Technology as a mode of revealing is one path within many possible paths that open up within the essential nature of that human role; each of these paths develops a specific aspect of our relations to beings. That relationship is always reciprocated in the sense that, insofar as "being-there" is our essential nature, the way that we are there, the way that we relate, is the way that we ourselves come into being during that period. This is the key to Heidegger's insight that the way we treat other things is .the determinant of the way we ourselves will be treated. The danger of technology is that it treats other beings in an aggressive, utilitarian way so that, ultimately, we ourselves are carried away within the overarching themes of aggression and utility. In the epoch of technology, we come to see ourselves exclusively within the limited sense of agency within this unfolding structure of being.

The real turning point of the whole issue rests on our consciousness, how we see ourselves in relation to other beings and, hence, how we come into being. The lesson of art that seems possible is that through art, even art as we presently possess it, we may secure an understanding of a different kind of consciousness and a way into our own being. Even today's art, dominated as it is by the technological mentality, still stands faithful to the consciousness of humans that listen. But that itself might be thought of as a problem. The engineer who build dams does not listen. It's not that he fails to listen to environmentalists; in fact, he clearly listens to those who order the dam to be built. It is that, as a being whose very essence is to be there, to witness the

whole of what is, the engineer fails in that essential task of human fulfillment. The engineer fails to see that the river, as well as he, is sacred and deserves to be heard.

The question then is whether we can truly listen and still go on building dams. At this point there is no answer to this question. After the turning point and within the new epoch of an "artistic civilization," it may be quite possible to build dams. The problem of technology is not just the problem of how we come into being through 'technology. The problem lies in understanding whether we come home to ourselves through our technology or do we still journey outward away from home. Heidegger's belief was clearly that technology carries us outward from ourselves. The essential nature of art, however, is homecoming, that is, discovering the essence of us on earth and within our environment in the world.

#### 6.9 THE CHALLENGE OF A WORLD ENVIRONMENTAL ETHICS

An environmental ethic that takes into account the impact of human actions directly upon nonhuman natural entities and nature as a whole is called an *eco. Centric environmental ethic.* It is supported by the evolutionary, ecological, foundational, and cosmological dimensions of the presently evolving post. modern, scientific worldview. Among human beings and other social mammals, moral sentiments are evolved to enable the formation of communities. From an evolutionary point of view, *Homo sapiens* is part of nature, not set apart from it. We share the Earth with other forms of life, which we now know to be a small but precious planet, like a tropical island paradise in an otherwise desert ocean. Further, ecology presently portrays nature as a group of societies or biotic communities. From the subatomic to the biological realms, all reality is interconnected, internally related, and mutually defining. But relationship, kinship, and community membership traditionally imply strong moral obligations.

Aldo Leopold rested his seminal and now classic land ethic upon these new post modern, scientific foundations. Most indigenous and traditional environmental ethics also fit the ecocentric mould. Indeed, Western philosophers looked initially to traditional Eastern wisdom in their search, begun in the late 1960s, for an environmental ethic located in a deeply ecological consciousness. And in fact, Eastern philosophy has historically shaped the gradually emerging environmental consciousness in the West. The American Transcendentalism of Ralph Waldo Emerson and Henry David Thoreau-who were among the first American thinkers to look upon nature as something more than an obstacle to progress and a pool of natural resources was inspired by Hindu thought. Further, the distinguished Norwegian philosopher, Arne Naess was inspired by the Vedantic doctrine of non-duality to make cultivation of the experience of oneness with nature-the core practice of his eco centric environmental ethic, now known as *Deep Ecology*.

In the twentieth century, Japanese Zen Buddhism profoundly influenced the emerging contemporary environmental movement. D.T. Suzuki had powerfully and persuasively represented Zen in the West in the early twentieth century. Alan Watts expanded Suzuki's somewhat more academic representation. The American nature poet, Gary Snyder, inspired by Watts, studied Zen Buddhism in Kyoto. In his eventual work, a raw and uncultivated American love of and sensitivity to nature was integrated with the very advanced natural aesthetic

cultivated for centuries in Japan. Snyder was a charter member of the Mid-Century American counter-culture that called itself the Beat Generation-romanticized by the enormously popular novelist, Jack Kerouac, in the book *Dharma Bums*. Thus, when Americans awakened to the environmental crisis in the late 19605, they turned for philosophical guidance to the cultural alternatives then popular, and Zen Buddhism was by far the most in evidence.

Since then, the attention of Western environmental philosophers has gravitated more to Taoism. The concept of living in accordance with the Tao of nature complements the evolutionary and ecological axiom that human beings are part of nature and must conform human ways of living to natural processes and cycles. Especially in the Taoist concept of wu-wed, Western environmental ethicists have found a traditional Eastern analogue of what they call *appropriate technologies-technologies* that blend with and har'less natural forces as opposed to technologies that resist and attempt to dominate and reorganize nature.

With the current and more ominous second wave of the twentieth century's environmental crisis now upon us, environmental philosophy must strive to facilitate the *emergence* of a global environmental consciousness that spans natural and and cultural boundaries. In part, this requires a more sophisticated cross-cultural and' contemporary concepts of the relationship between people and nature than have so far characterized the discussion. The intellectual foundations of the industrial epoch in world history are an aberration; a new paradigm is emerging, which will sooner or later replace ~he obsolete mechanical world view and its associated values and technological esprit.

The emerging twenty first century paradigm has many conceptual affinities with pre-industrial natural attitudes and values,. Especially those of the East. Thus, detailed, cross-cultural comparison of traditional concepts of the relationship between people and nature with the ideas emerging in ecology and the new physics should be mutually reinforcing. On the one hand, traditional environmental ethics can be thus revived, and just as importantly, validated or verified by the affinity of their foundational ideas with the most exciting new ideas in contemporary science. On the other hand, the otherwise abstract and arcane concepts of nature, human nature, and the relationship between people and nature implied in ecology and the new physics can be expressed and articulated in the rich vocabulary of metaphor, simile, and analogy developed in the traditional sacred and philosophical literature of the world's many and diverse cultures.

What we envision for the twenty-first century is a single, univocal, international environmental ethic based on ecology and the new physics and expressed in the cognitive lingua-franca of contemporary science. Complementing such an international, scientifically grounded and expressed environmental ethic-global in scope as well as focus-we also envision the revival of a multiplicity of traditional, cultural environmental ethics that resonate with it and that help to articulate it. Thus we may have one global view, and one associated environmental ethic corresponding to the contemporary reality that we inhabit one planet and that we are one species, and that our deepening environmental crisis is common and global. And we may also have a plurality of revived and renewed traditional world views and associated environmental ethics corresponding to the historical reality that we are many people inhabiting many diverse bioregions apprehended through many and diverse cultural lenses. But all these views are not at odds. Each of the many worldviews and associated ethics may crystallize the international

ecological environmental ethic in the vernacular of a particular and local cultural tradition. Let us by all means think globally and act locally. But let us also think locally as well as globally and try to tune our global and local thinking as the several notes of a single and common chord.

#### 6.10 CONCLUSION

Funding for environmental protection is the best way for a nation to avoid the need for costly environmental regulations. The government has a role in encouraging environmental protection for several reasons.

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*First,* an environmental protection technology often benefits each of the many industries only a little bit, so no industry has an incentive to spend the necessary money by itself. *Second,* environmental protection has many societal benefits: it reduces energy and other resource consumption and improves the environment, among other advantages. *Third,* and most important, pollution prevention and resource efficiency help companies to shift money from consuming energy and resources to investing in technology and capital equipment, thus creating jobs and economic growth. Indeed, a shift from consumption to investment may be the single most important transformation that nations must undergo in order to remain prosperous in. the next century.

As Michael Porter wrote in the *Harvard Business Review*, "We are now in a transitional phase of industrial history in which companies are still inexperienced in handling environmental issues creatively" The early movers-the companies that can see the opportunity first and embrace innovation-based solutions-will reap major competitive benefits, just as the German and Japanese carmakers did (with fuel-efficient cars in the early 1970s). That's why foreign governments are forming partnerships with their nations' companies to develop clean technologies: to overcome inexperience and ensure that they reap the benefits of early strength in the field.

The Japanese government is betting heavily on clean technologies and renewable energy. It is vigorously pursuing the Asian environmental market through the Green Aid Plan, which is designed to help Asian countries prevent water and air pollution, recycle waste, conserve energy, and develop alternative energy sources. In 1993, Japan quadrupled funding for the Green Aid Plan, to U5\$120 million.

Germany, too, is moving in this direction, with regulations that increasingly push industry toward prevention, recycling, and life-cycle analysis. Proposed or pending regulations throughout Western Europe have implications for US companies, as noted in a 1993 report prepared for the Saturn Corporation by the University of Tennessee's Centre for Clean Products and Clean Technologies: "European auto manufacturers are the' current world leaders in car recycling and the use of life-cycle assessment to design environmentally superior cars."

One of the countries most attentive to prevention is the Netherlands, which spends about \$500 million a year on environmental technologies-equivalent on a per capita basis to \$9 billion in the United States. More than a third of that money is spent on pollution prevention. The Netherlands

also uses its tax code to promote clean technologies by allowing firms that practice innovative pollution prevention to depreciate their investment in one year instead of over ten years.

The environmental ethic is very new and, like all the vital issues, it will undergo transformation as new data are made available and we are able to interpret rationally and live with nature. Education of the public to environmental problems and solutions is of prime importance. It is necessary for people to be critical and knowledgeable about the scientific, technological, economical and legal aspects of controlling pollution. Recognizing that environmental ethic alone is not enough, we must all live the environmental ethical way. We must also recognize the power of nature and feel humble in the realization that we are just a very small part in a wonderful and still mysterious system.

#### 6.11 REVIEW QUESTIONS

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1.Am I a green and ethical person?

*Green consumerism* is a special concern in the 21st century. Consumerism across the world express varying levels of anxiety for environmental issues/problems, and the preferences for item for cleaner technology. These issues are no longer the privilege of the developed nations. With the increase in literacy and awareness, the Indian consumer is not far behind in his awareness about the green products. However, the issue of affording green products if he has to pay a premium is to be looked into separately.

- 2. Draw a character sketch of a green consumer. Here is an example. Use this as a guide to see if you can make a profile of yourself as a green consumer. I am a mother. I am a homemaker. I take my role as a "family caretaker" seriously. I have a professional career to attend, too. I most certainly do not hold the view of the traditional women in society. I am keenly interested in what's happening around me. I try to be active in the community. I am not reluctant to express my opinion, sometimes by writing letters to newspapers. I like to cook and clean, and think it is important to do so. I as well as my family are cleanliness conscious and prefer to adopt my eating habits with a motto "Prevention is Better Than Cure". I feel guilty about serving my family convenience foods. I prepare a detailed shopping list and check each and every item for comparative ve product information. In advertising, I look for useful information. I don't like sex in advertising. I believe a lot of advertising, especially that's on TV, condescending women. Insult me and I wont buy your product. I think pollution is a serious threat to our health. Even if it means reducing the standard of our living, we should toughen our pollution standards. I believe the individual can make a difference in cleaning up the environment.
- 3. Ethics-animals
  - (a) Do animals have rights too?
  - (b) How do vegetarianism, hunting, and animal testing, vivisection, etc., relate to animal rights?
  - (c) Chemical tests on animals.

The cosmetics we use contain many different types of chemicals. In the long run, they will harm our skin. But the alarming fact is that much before we use them, they are tested on rabbits, rats, monkeys and pigs. Is it ethical to use animals and disable them for our benefits and cause pain to the animals?

#### WTO AND ENVIRONMENTAL ISSUES

#### Structure

7 1 Introduction 7.2 Trade and Environment 7.3 The World Trade Organization (WTO) 7.3.1 The Structure of WTO 7.3.2 WTO/GATT Principles 7.4 General Agreement on Trade in Services (GATS) 7.4.1 Intellectual Property Rights 7.4.2 Non-Tariff Barriers 7.4.3 Subsidies and Countervailing Measures 7.4.4 Imposing Trade Restrictions 7.4.5 Trade without Discrimination 7.5 Trade and Environmental Milestones 7.6 Reconciling Trade with Environment 7.7 Environmental Concerns and WTO 7.8 Public Participation 7.9 Conclusion 7.10 Review Questions

#### 7.1 INTRODUCTION

Green trade wars have raised important issues of sovereignty. Does a country have the right to demand that its domestic standards on environmental protection be applicable to all countries in the world?

The difference in environmental standards across borders could lead to distortions in international competition. Higher standards could discourage imports and protect domestic producers. Denmark's rule which allow selling beverages only in returnable bottles, for instance, would make it difficult for exporters to compete. High standards in industrialized countries would make it difficult for manufacturers of developing countries to compete. Northern manufacturers demand a "level playing field", but Southern manufacturers see stringent domestic standards as a form of protectionism.

#### 7.2 TRADE AND ENVIRONMENT

With the adoption of the Uruguay Round final declaration, governments adopted a decision on Trade and Environment, which called for the establishment of a WTO Committee on Trade and Environment. The Committee has been asked to explore the link between trade and environmental policies, notably how tighter environmental protection measures are compatible

with WTO rights and obligations. Mandated to analyze the relationship between trade and environmental measures, it can make recommendations should any modifications of the multilateral trading system be required. The Committee's' work, however, is restricted by two parameters. One is that WTO competence for policy coordination is limited to trade, and the second is that problems of policy coordination must be resolved in a way that upholds the principles of the multilateral trading system. The Committee held its first meeting in February 1995. The Committee is mandated to report to the December 1996 Ministerial Meeting in Singapore. It is generally expected that the report wil\ focus on the impact on trade of so-called "eco-labeling" schemes and the relationship between multilateral environmental agreements (MEAs) and WTO trade disputes.

The establishment of WTO as a parent body to control and govern international trade has been looked upon as an attempt to prevent entry of the developing countries into international trade. Even the insistence of higher standards of environmental governance is said to be in support of vested interests of developed countries.

The adverse effects of international regulations on developing countries and their trade relations have been a matter of great concern for policy makers and administrators. The following issues demand special attention and further deliberation.

Some of these issues are

- CITIES convention
- The prevention of developing countries from entering into international trade
- Dumping of hazardous waste into developing countries
- Environmental ethical issues
- Multinational operations i~ developing countries
- Antidumping issues
- Pressure tactics of developed countries
- The deficiencies in the command and control mechanisms
- Trade related Intellectual Property issues
- Eco labeling

In the present context, there is a strong need to look into the interrelationship between WTO agreements and impact on environmental issues. Trade and environmental protection have been dealt with as diagonally opposite to each other. The developing countries have struggled for more than a decade to establish them with the stand that in the name of development, environmental protection shouldn't be compromised. There have been remarkable judgments in the recent past highlighting the instances of direct conflict between industrial development and environmental deterioration. In such instances, the verdict has been clear that our overall aim should be towards achieving sustainable development.

#### 7.3 THE WORLD TRADE ORGANIZATION (WTO)

The World Trade Organization is the principal international body concerned with solving trade problems between countries and with negotiating trade liberalizing agreements. WTO takes the place of the former General Agreement on Tariffs and Trade (GATT), and is the embodiment of the results of the 1986-1994 Uruguay Round of trade negotiations conducted under the GAIT. A new international organization, WTO has a cooperative relationship with the United Nations but is not a UN specialized agency. It was established on January I, 1995 as a result of the implementation of the Uruguay Round results. The WTO encompasses previous GAIT legal instruments as they existed when the Uruguay Round was completed (known as GATT 1994), but also extends new disciplines to economic and trade sectors not covered in the past. Whereas the GATT's scope was limited to trade in goods, the WTO also covers trade in services, including such sectors as banking, insurance, transport, tourism, and telecommunications sectors as well as the provision of labor. In addition, the WTO covers all aspects of trade-related intellectual property rights (copyrights, patents, trademarks, etc.). Furthermore, while the GATT had a relatively ambiguous status as a multilateral agreement without any institutional provisions, the WTO is an international organization with a stature commensurate with that of the World Bank or International Monetary Fund (IMF).

WTO's precursor, the GATT, was established on a provisional basis after World War II. When the agreement took effect in 1948, it was expected to be the forerunner of the International Trade Organization (ITO) that would have been a UN specialized agency. But plans *for* the ITO were abandoned when they failed to get US congressional approval, and the GAIT remained the only international instrument laying down rules accepted by nations carrying out most of the world's trade.

For 47 years the GATT provided the main international framework in which countries could discuss trade problems and, if need be, use the General Agreement's dispute settlement provisions to solve trade disputes. The basic principles and rules of WTO are much the same as *those* for the GAIT. WTO has a broader scope, a *more* solid legal and institutional basis, and enhanced decision-making provisions that preserve individual members' national sovereignty while precluding the damaging single-country blockages which plagued GATT's dispute settlement system.

#### 7.3.1 THE STRUCTURE OF THE WTO

One of the main results of the Uruguay Round negotiations was the decision to establish the World Trade Organization. The WTO brings together disciplines affecting trade in goods and services and the protection of intellectual property rights under a single institutional umbrella. In addition, the WTO will help resolve the *"free* rider" problem in the world trading system since membership is only available to countries which were contracting parties to the GATT, and they agree to adhere to the Uruguay Round Agreements, and, submit schedules of market access commitments *for* goods and services. This eliminates the shortcomings of the GATT system in which, for example, only a handful of countries voluntarily adhered to disciplines on subsidies under the 1979 Tokyo Round Agreement.
Since the General Agreement on Tariffs and Trade (GATT) was established in 1948 to liberalize international trade, the impact of free trade on environment has become an issue of debate.

## 7.3.2 WTO/GATT PRINCIPLES

Like the GATT, WTO embodies many reciprocal rights and obligations for trading countries, and its core principle is the Most-Favored-Nation (MFN) clause. Under this, trade must be conducted on the basis of nondiscrimination all members are bound to accord each other treatment in tariffs and trade as favorable as they give to any other member-country.

The "Uruguay Round" of Multilateral Trade Negotiations was, therefore, launched at Punta del Este, Uruguay in September 1986. Originally expected to be a four-year trade negotiation, it took over seven years to complete, and was finally concluded on December 15, 1993. Unlike previous trade negotiations, the Uruguay Round produced a new agreement intended to replace the old GATT with the World Trade Organization.

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# 7.4 GENERAL AGREEMENT ON TRADE IN SERVICES (GATS)

One of the most important accomplishments of the Uruguay Round was the establishment (for the first time) of a set of rules governing trade in services. GATT economists estimated in 1990 that services-such as banking, insurance, tourism, construction, or telecommunications-accounted for as much as 20 per cent of total goods-and-services world *trade:* The GATS agreement establishes a multilateral framework for trade in services and provides a specific legal basis for future negotiations aimed at eliminating barriers that discriminate against foreign services providers and deny them market access. The principal elements of the GATS framework agreement include the most favored nation (MFN) treatment, national treatment, market access, and free flow of payments and transfers. The GATS' strong provision on national treatment specifically requires GATS countries to ensure that domestic laws and regulations do not tilt competitive conditions against foreign firms. Complementing the GATS rules are binding commitments to market access and national treatment in service sectors that countries schedule as a result of bilateral negotiations. These commitments became effective upon entry into force of the WTO.

The GATS agreement provides for the progressive liberalization of trade in services through a series of successive rounds that may be commenced at fiveyear intervals to allow governments to work towards improving their national commitments and to gradually reduce MFN exemptions. In addition, governments decided to set up special working parties on Trade in Services and the Environment and on Professional Services. The working party on Professional Services will work to ensure that technical standards and licensing requirements do not constitute unnecessary barriers to trade. It has been agreed that the group will give priority to the development of multilateral disciplines in the accountancy sector.

## 7.4.1 INTELLECTUAL PROPERTY RIGHTS

The Final Act contains the most extensive agreement on intellectual property ever negotiated. The Trade Related Aspects of Intellectual Property Rights (TRIPs) agreement covers patents, copyright, the rights of performers and producers of sound recordings, trademarks, and geographical indications, including appellations of origin, industrial designs, layout designs of integrated circuits (semiconductor chips) and trade secrets. TRIPs establishes improved standards for the protection of intellectual property and sets out for the first time in international law, the procedures and remedies that governments must provide under their domestic law so that rights can be effectively enforced.

#### 7.4.2 NON-TARIFF BARRIERS

The Uruguay Round package includes a number of agreements aimed at reducing or eliminating non-tariff barriers to trade. These include specific agreements on safeguards, anti-dumping, and subsidies and countervailing measures, import licensing procedures, technical barriers to trade and customs valuation. The agreements strengthen existing GAIT rules, and for the first time extend GATT disciplines to non-tariff barriers in the areas of investment, rules of origin and reshipment inspection.

#### 7.4.3 SUBSIDIES AND COUNTERVAILING MEASURES

Countries often counter subsidized exports by imposing special duties (countervailing measures) on the subsidized product or other exports from the subsidizing country. The new agreement establishes clearer rules in this area by defining which subsidies are legal and which are not. It creates different categories of subsidies and remedies. Prohibited subsidies. Permissible subsidies against which action can be taken only if they cause adverse trade impact; and non-auction subsidies which cannot be countered by duties, and which include certain types of government assistance for industrial research, regional development, or adaptation of existing plant and equipment to new environmental requirements.

## 7.4.4 IMPOSING TRADE RESTRICTIONS

The current multilateral trading framework allows countries to take protective measures for the environment in international trade so long as the measures are not a guise for trade barriers. There has been a growing reconciliation between trade and environment in the WTO forum. The question of whether a country can impose trade restrictions unilaterally on another country, for the purpose of protecting the environment, plagues WTO negotiations. In the case of environment in trade negotiations, WTO had initially taken the position that important countries had the freedom to choose their own standards in order to protect their own people's health and their own country's environmental practices of exporting countries. This would amount to a kind of a "Trade Tyranny", and could be easily used for economic protectionism. The open issue was whether such standards could be imposed on exporting countries if a multilateral environmental treaty had been signed to this effect.

Trade remains an instrument that rich countries use as a lever to influence poorer countries. Developing countries view environment concerns with distrust. For them, access to markets in the North remains priority, and they are wary that environmental linkages in trade will take away benefits of free trade and competitive advantage. Developing countries claim that they are losing competitive advantage in trade because their goods are denied access to markets in industrialized countries. This fear is confirmed by the 1999 Trade and Development Report of the United Nations Conference on Trade and Development (UNCTED), which stated that developing countries have striven hard, and often at considerable cost, to integrate more closely into the

world economy, but have had few gains, because of the deep-seated imbalances in economic power and systemic biases in the international trading and financial system.

Environment is becoming WTO's battlefield. Environmentalists, particularly from North America, are incensed with WTO decisions, which they see as a threat to the environment. At the WTO Ministerial meeting in May 1999 held in Geneva, Director General Rennato Ruggiero called for "renewed political impetus" for the Committee on Trade and Environment (CTE), and increased dialogue between the trade body and environmental groups. The US President, Bill Clinton called for a high level meeting of trade and environmental efforts. The EU concurred with the British Prime Minister, Tony Blair, saying that environmental protection-perhaps the most major challenge we face as we head towards the next century-should be incorporated into trade rules.

Environmental and labor standards are seen as a form of new protectionism that will limit their competitive advantage in the international market. "There can be no refusal to discuss matters such as labor standards, social issues and the environment, but equally all must be prepared to listen carefully before judgments are made", warned the former South African president, Nelson Mandela, while addressing the May meeting in Geneva. "If developing countries feel that there is nothing to gain except further burdens, and then it will prove difficult to deal with these critical matters, he said."

There is a reason why these two groups cannot agree on trade. They are fighting a new kind of trade dispute-not conventional and explicitly like import tariffs or quotas but over sensitive issues of food safety and environmental protection. These trade disputes are about domestic regulations that have international effects. For instance, the European Union has banned hormone-treated beef from all countries and not just from the US alone. The ban could end up protecting inefficient European farmers but its main motive is to respond to public fears about food safety. And while the cost of the ban-higher beef prices and loss of markets for the exporters-is easy to establish, the value of safer food is hard to quantify. The issue becomes even more complicated as both sides tangle over whose science is right. The EU maintains that its ban is based on "formal, scientific proof that hormone-treated-beef is dangerous". The United States and WTO dispute panels disagree saying that the scientific proof is inadequate. The EU has lost the case twice, but refuses to step back, saying the issue "is about more than dollars and cents".

#### 7.4.5 TRADE WITHOUT DISCRIMINATION

The most favored nation (MFN) clause (Article I of GATT) states that members are bound to grant to the products of other members the treatment no less favorable than that accorded to the products of any other country. The 'national treatment' clause (Article III of GATT) requires that once goods have entered a market, they must be treated no less favorably than the equivalent domestically produced goods

For the multilateral trading system, green concerns are not new. In 1972, it set up the Group on Environmental Measures and International Trade (EMIT), but the group remained without a constituency till almost 1990 when demands to intensify negotiations on trade and environment grew.

The crux of many trade disputes is with the definition of 'like product', a term that has not been specifically defined and is evolving with time. For instance, the issue of *sake-a* local Japanese beverage--came under dispute because Japan had introduced a tax policy that would have benefited its local liquour industry and restricted foreign beverages. WTO's dispute panel accepted that locally brewed *sake* was like certain imported alcoholic beverages such as whisky and Japan could not have a differential taxation policy. In the tuna and dolphin case, where the US banned imports from countries where measures were not taken to protect dolphins while fishing for tuna, the issue of like products was key to the dispute panel's ruling. The panel ruled that it was not permissible to distinguish tuna on the manner in which it was produced, with or without high levels of incidental dolphin mortality.

This concept finds disagreement with environmentalists. "It is difficult to conceive of a trade regime that will contribute to the promotion of sustainability unless it can distinguish between like products on the basis of the sustainability of their production methods," says Kondrad Von Moltke, researcher on trade and environment policies. But over the years, categories of otherwise like products have also been given special status by WTO. For instance, under the TRIPS agreement, products with intellectual property rights, trademarks or brand names are distinguished from other like products. Consequently, even if goods are directly competitive or substitutable but are counterfeit, they are treated differently.

For Von Moltke, the paradox is worrying. While items with important' environmental implications, such as products from nature that have different characteristics can only be traded as like products, products that are physically identical e.g., pharmaceuticals or computer software but can only be distinguished by a trademark or payment of royalties, are treated as 'unlike'. "The result is that farms look like factory-made goods", he says again.

Green trade wars have also raised important issues of sovereignty. Does a country have the right to demand that its domestic standards on environmental protection be applicable to all countries in the world? The difference in environmental standards across borders could lead to distortions in international competition.

Does a country have the right to demand that it will enforce its own domestic legislation or policies in other countries by restricting trade in certain products? In other words, does any country have the right to use international trade to change the behavior or domestic policy of another country-called extra-jurisdictional impact in trade circles? For instance. by banning the import of tuna fish from Mexico, the US was forcing the former to comply with us domestic environmental legislation.

For trade managers and defenders of free trade the most important principle has been to establish a rule-bound system that makes clear that trade-related actions are justified for environmental protection.

# 7.4 TRADE AND ENVIRONMENTAL MILESTONES

- 1971: The General Agreement on Tariffs and Trade (GATT) secretariat prepares a study on Industrial Pollution Control and International Trade for the Stockholm Conference on Human Environment held in 1971.
- GATT sets up Group on Environmental Measures and International Trade to examine upon request from concerned nations any specific matters relevant to the trade policy aspects of measures to control pollution and protect the human environment....
- 1971-1990: No request is made to convene this group.
- December 1990: European Free Trade Association (EFT A) circulates a formal proposal at the ministerial meeting in Brussels for a statement on trade and environment to be made by ministers. They ask for a detailed'study on the interlink ages between trade and environment and also ask the minister to convene the Group on Environmental Measures and International Trade to provide a forum for these issues.
- March 1991: EFT A follows up its initiative at the meeting of the GATT council asking the Director-General Arthur Dunkel to convene the 1971 group. They also ask GATT to make a contribution to the forthcoming UN Conference on Environment and Development (UNCED)
- April 1991: Informational discussions are held and the GATT general council is told that a consensus had emerged to hold a structured debate on the subject.
- May 1991: A 'structured debate' is held and a number of issues are raised. Countries of the Association of Southeast Asian Nations (ASEAN) request the GATT secretariat to prepare a factual paper on trade and environment.
- July 1991: Agreement that the 1971 group, now called EMIT group with ambassador H. Ukawa from Japan as its Chairman, should be reconvened is reached. The group is asked to examine three items: (i) trade provisions in the current multilateral environment agreements, (ii) multilateral transparency of national environmental regulations which are likely to have trade effects, and (iii) corresponding new packaging and labeling requirements
- July 1992: GATT Director General informs the council that there are a number of recommendations in Agenda 21, which are directly relevant to the work of GATT in the field of trade, environment and sustainable development. He asks countries how GATT should proceed
- December 1991: The 48th session of the contracting parties to GATT ask the Committee on Trade and Development and EMIT Group to focus on the relevant sections of Agenda 21 and to report to the council.

- November 1991 to January 1994: The EMIT group meets and there is no agreement but a general understanding that both environment rules and trade rules are important.
- February 1994: Council reviews report of EMIT, but decide that the future work programme would be agreed upon at the meeting in Marrakech in April 1994.
- April 14, 1994: Ministers adopt the Marrakesh Declaration in which they note that it should not be contradictory to safeguard the multilateral trading system on the one hand, and act for the protection of the environment on the other. They ask the general council of WTO to establish the Committee on Trade and Environment (CTE). They also list the 10 items that should form the work plan of the Committee.
- January 1995: CTE is established. It is agreed that it will be open to all members and would report to the first biennial WTO ministerial conference. Ambassador J.C. Sanchez Arnau from Argentina is chosen as chairman.
- January 1995 to November 1996: CTE report is adopted by the Singapore conference with the understanding that it does not modify the rights and obligations of any WTO member under the WTO agreement. Trade ministers endorse the report and ask CTE to continue work under its current mandate. CTE continues deliberations under the chair of ambassador B. Ekblom of Finland and ambassador C. M. See of Singapore. Its work plan is reorganized under different clusters to better reflect the issues, but consensus is difficult as yet.

By 1990s, trade became an important lever for Western environmental groups to intervene in the management of global resources. On one hand, the increasing international character of trade led to the emergence of the global consumer, and the birth of a selective global conscience. Environmental groups in industrialized. countries began to use consumer power to intervene in how other countries managed their environment.

Liberalization of trade also led to the birth of the global trader. With this, the dividing line between actions motivated by genuine environmental concerns, and those that are a guise for protectionism in trade narrowed. Since rules for this game do not exist, flash points increased.

Japan faced pressure as an ecological outlaw for making jewellery and other ornaments out of the shell of the hawksbill sea turtle. After the US administration threatened to restrict imports of all wildlife products, including pearls, Japan agreed to stop the production of jewellery and ornaments. Botswana faced pressure from Northern conservationist groups for plans to dredge channels through the Okavango swamps to supply drinking water to a neighboring town and diamond mines. The international NGO, Green Peace threatened to start a 'diamonds are for death' campaign and boycott Botswana's diamonds. In January 1991, the besieged government suspended work and invited Green Peace to assess the project. In 1991, Mauritius gave in to pressure from South African environmentalists, who threatened to boycott its tourism industry unless the country stopped using driftnets, which the groups called 'walls of death', in commercial fishing. But Japan and Taiwan, for the same issue, *refused* to give in to the pressure from Australia and New Zeeland accusing it of knowing only about "sheep and cows".

Denmark's 1981 domestic law, allowing beverages to be sold only in returnable bottles so as to promote recycling, was seen as protectionism by outside manufacturers. Similarly, Sweden's ban on bleaching paper products and import of bleached paper came under fire. Norway, Iceland and Japan faced international sanctions for whale hunting. The countries wanted the right to harvest whales scientifically, under a quota system. But in 1990, the International Whaling Commission (IWC) decided, under tremendous international pressure, to continue a moratorium on commercial whaling. Japan argued, in vain, that it was part of its culture to hunt and eat whales and that the opposition was a kind of cultural imperialism. "Anglo-Saxon nations seem to think their values are the centre of the world," the Japanese said. When Iceland threatened to ban all exports of fish from the country in the early 1990s, The US placed an embargo on imports of tuna from Mexico, Venezuela, and Vanuatu in South Pacific, because dolphins were killed during tuna fishing. The ban came after years of campaigning by conservationist groups, asking consumers to buy only 'dolphin-safe' tuna. Mexico claimed that the US government was being more protectionist-than the US law itself which certified that Mexican tuna as dolphin-friendly. Mexico took the US to GATT in 1991, where the Trade Committee ruled against the US embargo, and fearing public outcry, Mexico decided not to press for formal ratification of this decision. Only after almost 10 years, in April 1999, did the US adhere to the ruling and lifted the embargo after a compromise was reached on the definition of 'dolphin-safe', which stipulates onboard international observers, while fishing for tuna. During this period, exporting countries lost millions of dollars in revenue, and their fishing community faced hardships.

Tropical timber faced trade embargoes in many countries of Western Europe and North America as environmental groups campaigned that it carne from unsustainable harvested forests.

Botswana, Zimbabwe and South Africa faced a virulent campaign against elephant culling, and conservationists called for a worldwide ban on ivory trade. In 1989, the Convention on International Trade on Endangered Species of Wild Flora and Fauna (CITES) agreed to a complete ban on ivory trade despite the insistence of Southern African nations that selective culling was an effective way of managing elephants. The proceeds from subsequent sales were shared among local communities to win their support against poachers. These nations argued that with the ban, the elephant will become valueless, and no farmer will tolerate elephants that trample fields and destroy crops and homes. Angry about being told how to manage their own natural resources, Zimbabweans remarked that there were "not a lot of elephants in people's backyards in Kent or Connecticut".

# 7. 6 RECONCILING TRADE WITH ENVIRONMENT

**Completion of Uruguay Round, April 15, 1994, Marrakesh.** The trade ministers met in Marrakesh to sign the final agreement of the Uruguay Round of Multilateral Trade Negotiations. They were under tremendous pressure to address the potentially explosive connection between environment and free trade. At this meting, which saw the birth of WTO, ministers were optimistic in their observation that-there should not be any policy contradiction between upholding and safeguarding an open, non-discriminatory and equitable multilateral trading system on one hand, and acting for the protection of the environment, and the promotion of sustainable development on the other.

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The agreement adopted at Marrakesh allowed exemptions of environment related issues from trade regulations under Article XX, so long as they are not discriminatory between countries where the same conditions prevail, or are a disguised restriction on international trade to be exempt from basic trade regulations. Such exceptions can be made when it is necessary to protect human, animal or plant life or health (item b); necessary to secure compliance with laws or regulations which are not inconsistent with the provisions of this agreement (item d); and relates to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption. In other words, the measures must relate to conservation, the natural resource must be exhaustible, and the action must be applied domestically as well (item g).

On health and environmental issues there are two agreements within GATT-The agreement on SPS and the agreement on Technical Barriers to Trade (TBT) 28. Under TBT, a national government can lay down technical regulations on products for security, health or environmental reasons. The agreement covers all mandatory and voluntary requirements, and governments are encouraged to adopt international standards wherever available and to participate in the standard setting exercise.

The agreement on SPS, meanwhile, allows members to use trade restrictions for the protection of human life or health. It calls for no discrimination between domestic and imported goods, sound scientific evidence to govern decisions, and standard setting by Codex Alimentarius, an institution based in Rome and charged with setting food standards by the World Health Organization (WHO) and the Food and Agriculture Organization (FAO). Before the SPS agreement was adopted, governments were allowed domestic standards for food, animal and plant products. Under SPS, however, they have to adhere to global standards set by Codex. At Marrakesh, participants agreed to set up a committee on trade and environment (CTE) to continue discussion on linkages between trade and environment, and work towards global consensus.

Trade skirmishes over green issues are sweeping the WTO forum, demanding the confounded body to deliver a satisfactory sentence for all concerned. Between 1982 and 1997, eight disputes on environmental issues have made their way to the multilateral trading system. The US was involved in all cases. The dispute panels and the appellate body, set up to hear appeal filed by a party, have made laws through their interpretations of the different provisions of the General Agreement on Tariffs and Trade (GATT) law.

The trade disputes include:. Prohibition of imports of tuna and tuna products from Canada, adopted on February 22, 1982: Canada seized 19 US fishing boats for fishing the albacore tuna in what the Canadian government considered its waters. The US did not recognize this jurisdiction, and imposed import restrictions under its Fisheries Conservation and Management Act in retaliation. The GATT panel did not agree that the action was justified under Article XX (g).

**Restrictions on Import of and Internal Taxes on Cigarettes, Adopted on November 7, 1990** Under its 1966 Tobacco Act, Thailand prohibits the import of cigarettes and other tobacco preparations-but authorizes the sale of domestic cigarettes-on the claim that chemicals and other additives in US cigarettes made them more harmful than Thai cigarettes. The US complained that these restrictions were inconsistent with Article XX (b) of GATT. The panel concluded that the import restrictions were not "necessary" within the meaning of Article XX (b).

#### **Restrictions on Import of Tuna, not Adopted but Circulated on September 3, 1991**

The US had prohibited import of yellow fin tuna from certain countries which did not have conservation measures in place that satisfied the US. Such an embargo is known as a primary nation embargo. Additionally, in an intermediary nation embargo, the US government also prohibited imports of tuna from countries purchasing tuna from any country that is subject to the primary nation embargo. For instance, tuna imports from any European chased Mexican tuna. The US argued that its case was justified under Article XX, but the GATT panel found that this was not the case. This ruling was not accepted by the US.

## Restrictions on Imports of Tuna, not Adopted but Circulated on June 16, 1994

In a follow-up to the US intermediary nation embargo, the EU and the Netherlands filed a complaint against the US trade restrictions imposed on their tuna exports since they purchased Mexican tuna. The panel again ruled against the US saying that this was not covered by the exceptions in Article XX.

# Measures Affecting Exports of Unprocessed Herring and Salmon, Adopted on March 22, 1998

Canada prohibited the export of unprocessed herring and salmon as part of a system of fisheries resource management to protect fish stocks. The US contended that this was simply a measure to protect Canadian processors and domestic industry. The panel ruled that measures by Canada were not justified under Article XX (g).

#### Taxes on Automobiles, not Adopted but Circulated on October 11, 1994

The US had imposed three taxes on automobiles-luxury tax, gas guzzler tax, and the corporate average fuel economy regulation (CAFE)-all aimed to cut fuel use in vehicles. However, it was felt that these measures could not be justified under Article XX. The panel found that the luxury tax and gas-guzzler tax which are applied to both domestic and foreign vehicles were consistent with GATT rules. The panel, however, found that GAPE regulation differentiated in calculating domestic fuel efficiency and fuel efficiency in imported cars-could not be justified under GAIT rules, including Article XX.

#### Standards for Reformulated and Conventional Gasoline, Adopted on May 20, 1996

Following a 1990 amendment to the Clean Air Act, the Environment Protection Authority (EP A) issued a gasoline rule on the composition of gasoline. The rule permitted reformulated gasoline of a specified quality to be sold in the most polluted areas of the US. Gasoline, with the minimum quality sold in 1990, could be distributed in the rest of the country. The procedure established for setting the 1990 baseline for the sale of conventional gasoline, however, gave domestic producers an advantage over foreign oil exporters. Venezuela and Brazil claimed that the rule was not covered by Article XX. The dispute panel *ruled* against the US on all counts, but the appellate body found the gasoline rule in conformity with Article XX (g), that is, the action that was taken 'related' to the conservation of exhaustible natural resources. But it ruled against the US because its actions went against Article XX, which relates. to the need for any action not

to be trade discriminatory.

**Import Prohibition of Certain Shrimp and Shrimp Products, Adopted on October 12, 1998** The US banned the import of shrimp from some countries that had not been certified by it for harvesting shrimp in a manner that was harmful to sea turtles, and were higher than that of US fishermen. India, Malaysia, Pakistan and Thailand took the matter to WTO. They won in the first round with the dispute panel, but the appeals body, while holding the US accountable for trade discrimination, ruled that the US ban was in compliance with Article XX.

The Third Ministerial Conference of World Trade Organization was held in Seattle during November 29 to December 4, 1999. It hosted about 3,000 official delegates from 134 member countries and 34 observer nations of WTO. Issues that were to be discussed included removing national tariffs and subsidies of agricultural products, removing non-tariff trade barriers such as environmental requirements established by nations that keep other national products out of their countries, liberalized trade between the north and south countries dealing with national cultures in the context of trade.

# 7. 7 ENVIRONMENTAL CONCERNS AND WTO

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The concerns about the environment were sparked by actual setbacks to environmental protection imposed by the GATTIWTO, and by other free trade agreements such as NAFTA (see Chapter 11). National laws to protect the environment are now being challenged under WTO by other countries as being non-tariff trade barriers. As a result, countries that have signed the WTO agreement have voluntarily stuck down the national laws. The environmental groups are seeing a secondary trend under the rubric of free trade that involves neutralizing the many national environmental laws and multinational environmental agreements (MEA's). Let us take a look at some of the concerns.

Canada has been one of the leading advocates in asking other nations to rethink their environmental laws under WTO and expressing concern about the negative trade impacts of multi-lateral environmental agreements such as the Kyoto Climate Change Protocol. Canada's Department of Foreign Affairs and

International Trade (DFAIT) has seen a number of important environmental laws implemented by other countries as non-tariff trade barriers aimed at restricting the sales of Canada's natural resources. Issues that concern DFAIT are for instance:

- 1. England and France's decision restricting the use of asbestos in construction; DF AIT is challenging this decision since Canada is a major exporter of asbestos.
- 2. Europe has decided to restrict consumption of seal pelts and restrict the purchases of furs from animals trapped in inhumane ways.
- 3. Canada wants to continue and expand the sales of sealskins and wild animal furs trapped in the north.
- 4. European countries' decisions to restrict purchases of lumber and paper products that are clear-cut or come from old growth forests.

DFAIT is challenging these environmental decisions under WTO, which try to force the countries to buy Canada's wood and paper clear cut from Canada's last stands of old growth forests.

The purchasing with Canada's provinces reducing their own environmental protection budgets by more than 40 per cent and making decisions to get environment out of the way of economic progress, Canada may become a nation that must meet environmental requirements imposed by other nations' environmentally friendly purchasing -decisions or by Multilateral Environmental Agreements (MEAs).

## Venezuela Wins Trade Challenges to Sell Dirty Gasoline in the United State

Venezuela launched a challenge under GATT against a decision by the US Environmental Protection Agency (EP A), under the US Clean Air Act, to reduce emissions from reformulated gasoline. Venezuela successfully challenged the amendment to the US Clean Air Act that required foreign gasoline refiners to make the same improvements to gas quality "as the average US refinery. The Venezuelan government faced the challenge, but the real pressure to challenge the regulation came from the subsidiaries of the same multinational oil and gas companies that had failed to keep the US EP A from passing tougher environmental laws in Washington, DC. Now foreign importers like Venezuela and Canada can choose to export to the US gasoline that is dirtier than refineries in the US are required to make, resulting in imported gasoline damaging air quality and human health in major US cities.

While California has been a world leader in legislating cleaner auto emissions, Japan is considering revolutionary legislation that would substantially reduce the amount of pollutants that cars can emit in Japan. The legislation would virtually require most people to drive small cars with small engines and more mileage. None of the mid to large size cars manufactured in the US and Canada could meet -the proposed new stringent requirements. The US government has told Japan this could violate WTO rules because the requirements would fall mainly on medium sized cars, which is the class of the cars US exports to Japan. While the new Japanese legislation may be interpreted as a non-tariff trade barrier, it is also a potential new leader for other countries to follow its lead in actually cleaning up urban air pollution.

# GAIT IWTO Decision" Stopped Dolphin Protection

The United States, under its Marine Mammal Protection Act, attempted to stop the practice of tuna fishermen following pods of dolphin that were chasing tuna and scooping up both tuna and dolphins in their nets. The dead and dying dolphins were thrown out and the tuna harvest sent to market. The US stopped its own tuna fleets from harvesting tuna in this manner. But the Mexico

tuna fleets challenged at the GATTIWTO the decision by the US not to import tuna that was caught using the environmentally harmful method. Surprisingly,

Mexico won the challenge and the US was forced to allow import of tuna into the United States, which were caught by the old method. Environmental groups cooperated with grocers in the US and started labeling cans of tuna as "dolphin safe" for those tuna that were caught without harming dolphins, But that labeling may also be subjected to a WTO challenge as an impediment to free trade. It is possible that US laws such as these will no longer be implemented and eco-Labeling may not be applicable at all under WTO. That is why the environmental groups are calling for "safe trade" measures that include rules for environmental protection.

#### Why Are All the Protestors Wearing Turtle Shells?

The protestors are concerned about a recent WTO decision against the US in its decision not to purchase shrimp from regions that are destroying turtle habitat and incidentally capturing endangered species of turtles in their shrimp nets. The WTO decision will require the US to voluntarily continue to purchase shrimp from process and production methods (PPMs) that are resulting in the decimation of endangered turtle species.

The Sierra Club, National Audubon Society and others wrote that "United State Administration must also reject as a solution to the dispute (proposed by the WTO) the use of "shipment-by-shipment certifications" of shrimp caught with turtle excluder devices. Due to the nature of the industry, the certification of individual shrimp shipments cannot be verified, and will not adequately protect sea turtles. Such a solution will also not immunize US law from future WTO challenges. Put simply, a shipment-by-shipment solution to this decision is both substantively and politically unworkable." The major US environmental groups continued in their letter to President Clinton, "the WTO Shrimpffurtle case is a critical opportunity for the Administration to reestablish its former leadership role in trade and environmental exceptions in Article XX and contorts the language of the WTO's own charter in order to maintain a uniform ban on policies targeted at preventing environmental damage from the way a product is produced ("process and production methods"). It also fails to respect an international consensus, reflected in legitimate multilateral environmental agreements, concerning the importance of protecting endangered species."

#### WTO Strikes Down Effort by Europe to Keep Hormones Out of Beef

Canada and the United States use hormones and other chemicals in cattle to enhance their growth, milk' and meat production. New health studies show that the hormones are suspected of increasing cancer cases and other diseases in the populations that consume huge amounts of milk, milk products and meat. European countries have taken the lead in trying to get hormones out of beef and milk. However, Europe lost a challenge at the WTO in their attempts to ban the import of beef from Canada and the United States loaded with artificial hormones. The action by Europe was interpreted as an attempt to protect its beef industry by establishing a non-tariff trade barrier using environmental and health concerns to better their economic sales of meat.

#### **Genetically Modified Foods Ban Challenged Under WTO**

Canada and the United States plan to use the WTO to challenge Europe's decision not to continue food items that contain genetically modified organisms (GMO's). Europe is concerned

that GMO food production and consumption can harm the environment and health. Canada and the United States want to challenge Europe's plan not to produce or import GMO food such as soyabean and potatoes. A draft Seattle WTO Ministerial Declaration contains a proposal by the US and Canada that the WTO establish a working party on biotechnology to look at the "adequacy and effectiveness" of existing rules on GMOs.

#### **Eco-Labeling and Green Procurement Threatened by WTO**

Eco-Labels provide consumers with information that a product was made with minimal impacts on me environment. Some governments have argued that eco label programs may violate WTO rules on product standards. Canada has an excellent program called the "Environmental Choice Program (ECP) that provides the three doves entwined eco- label to products that meet environmental guidelines. The programme was started by environment Canada and has been privatized and is run by Terra choice.

There are other ecological Label programmes including Blue Angel in Germany, Dutch Ecolabel in the Netherlands, and Green Seal in the United States. The Green Seal programme is the independent, non profit organization dedicated to protecting the environment by promoting the manufacture and sale of environmentally responsible consumer products. It sets environmental standards and awards a Green seal of Approval to products which are less harmful to the environment than other similar products, Green Seal seeks to (i) Reduce air and water pollution, (ij) cut the waste of energy and natural resources, (iii) slow ozone depletion .and the risk of global warming, (iv) prevent toxic contamination, and (v) protect fish and wildlife and their habitats.

How to achieve the necessary coordination in the light of the fact that it is not a matter of negotiating a single and separate new undertaking? Should there be an enhanced role of NGOs, independently from national or EC shaping of negotiating positions? How to represent the interests of the global commons?

The following two examples are of paramount importance to the handling of environmental concerns in WTO law.

**1. The Scope of national Treatment**: The interpretation of like products in Article III, GATT amounts to what perhaps is the most important issue defining the scope of environmental policies within GATT. It is submitted that the ruling, narrow doctrine and purely textual interpretation of like products in Article III paragraph 2, GATT, essentially relying upon physical characteristics and consumer preferences 5, strongly limits the scope of governments to use product differentiation for environmental protection purposes.

It should be reexamined in the light of the emerging constitutional function of the WTO. In effect, assessment and product differentiation by national governments made for regulatory purposes are today fully supplanted by a *de novo* assessment of panels on the basis of the mentioned criteria, whether or not the product differentiation in case has projectionist and welfare reducing effects.

**2. Environmental exceptions.** The interpretation of Article XX (g), GATT is yet another key area defining the scope of environmental policies of governments. Unlike the interpretation of like products, case law has moved towards a broader interpretation of the provision. While

formerly measures inconsistent with national treatment themselves had to be primarily aiming at conservation of natural resources, it is now accepted in result that the policies, of which these measures are part, need to meet this requirement. This is a good example of constitutional interpretation in light of interfacing trade and other policies within the existing text of the GAIT and WTO rules.

A fundamental aspect of a GEO, and one implicitly evident throughout this commentary, is scientific information. Different types of environmental stress have varying 'thresholds' when such stress can no longer be assimilated by ecosystems, or the magnitude of environmental degradation greatly increases when a critical threshold is reached. Environmental agreements would require built-in flexibility to respond to new scientific information as it became available. Agreements would need to be dynamic, rather than static. A GEO has to develop a credible and sound scientific footing on such issues as fisheries. Climate change and forestry. This would be of great use to less economically wealthy countries, as few countries have the resources to develop the technical and scientific expertise on every global environmental issue. A GEO structured in this manner would help ensure that countries would be working from the same data set. A multilateral agency providing such data could reduce the likelihood that those, countries would resort to their own potentially skewed studies to develop positions. It would also be politically more difficult for a country to allege that the GEO data are intentionally biased in another country's favour. Moreover, objective scientific research conducted or scrutinized by a GEO and that served to underpin multilateral agreements would work against domestic pressure or temptation to use environmental concerns as protectionist tools.

# 7. 8 PUBLIC PARTICIPATION

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Another element of the paradigm is more direct public participation in the multilateral policy process. One lesson from UNCED, demonstrated by the participation of environmental and other non-governmental organizations in the Global Forum that accompanied UNCED is that a wide array of non-state actors take great interest in, and have much to contribute to, understanding environmental issues. Indeed, Agenda 21 identifies *nine major groups* of stakeholders whose participation in the decision-making process is essential. These are:

- 1. Women
- 2. Youth
- 3. Environment/development non-governmental
- 4. Indigenous people
- 5. Workers and their trade unions
- 6. Local government
- 7. Business
- 8. The scientific community
- 9. Farmers.

How to formalize and institutionalize participation and accommodate views from such interest groups would be a difficult task for a GEO. Care needs to be taken to prevent special interest groups from slowing or hindering negotiations, or participating in a manner that could give rise to accusations of favoring to particular groups or views. To have adequate representation of

different groups would be a major concern, requiring careful further consideration.

The simplest method for including stakeholders in the process might be the establishment of a non-governmental advisory body with broad and diverse representation. Such a group would not have a vote in the treaty-making process. While this group would not likely present consensual opinions, it would give non-governmental bodies a multilateral forum to raise and discuss issues. This could be particularly useful for non-governmental organizations. that have little access to national mechanisms to make their views known or to influence national or international decision-making.

The creation of an effective and relevant GEO is, at best, a long shot and long-term prospect. There is a need to establish an international environmental institution with a strong mandate and dispute settlement mechanism, but it is just a dream to imagine that such an institution could be created in the current or foreseeable political climate. NCED provided an agenda for promoting sustainable development, but it did not establish an effective institutional structure to manage the agenda.

# 7.9 CONCLUSION

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The issues raised in this chapter indicate the importance of bringing the respective communities together into a fruitful dialogue and to build appropriate structures. Trade lawyers and economists need to borrow from the traditions of constitutional law in coping with the enhanced responsibilities of the world trading systems. In particular, they need to work with environmentalists, with a view to deepen insights into the relationship of tariffs, trade in services, and the environment.

Finally, the communities of trade, intellectual property, agriculture, environment, biology and anthropology should cooperate in bringing about a balance between' regulations of genetic engineering and of traditional uses of genetic resources. Environmentalists need to interface their concerns with basic requirements of an open trading system. And the trade community had to bring its instruments in line with the overall goals of sustainable relations in light of the needs of present and future generations.

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# 7.10 REVIEW QUESTIONS

- - Give an account on WTO
    Give the principles of GATT
  - 3 Give the structure of WTO
  - 3. Give the structure of W10
  - 4. Discuss on the Environmental concerns and WTO
  - 5. Describe the trade and Environmental Milestones

# WASTE MANAGEMENT

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# Structure

- 8.1 Introduction
- 8.2 Disposal Methods
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- 8.10 Toxic Waste
- 8.11 Goals of waste management
- 8.12 Review Questions

# **8.1 INTRODUCTION**



# WASTE MANAGEMENT

A blue wheelie bin in Berkshire, England



Waste management in Katmandu (Nepal)

Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each.

Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator.

# **8.2 DISPOSAL METHODS**

# 8.2.1 LANDFILL



Landfill operation in Hawaii.

Disposing of waste in a landfill involves burying waste, and this remains a common practice in most countries. Landfills were often established in abandoned or unused quarries, mining voids or borrow pits. A properly-designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials. Older, poorly-designed or poorly-managed landfills can create a number of adverse environmental impacts such as wind-blown litter, attraction of vermin, and generation of liquid leachate. Another common byproduct of landfills is gas (mostly composed of methane and carbon dioxide), which is produced as organic waste breaks down anaerobically. This gas can create odor problems, kill surface vegetation, and is a greenhouse gas.



A landfill compaction vehicle in action.

Design characteristics of a modern landfill include methods to contain leachate such as clay or plastic lining material. Deposited waste is normally compacted to increase its density and stability, and covered to prevent attracting vermin (such as mice or rats). Many landfills also have landfill gas extraction systems installed to extract the landfill gas. Gas is pumped out of the landfill using perforated pipes and flared off or burnt in a gas engine to generate electricity.

## **8.2.2 INCINERATION**

Incineration is a disposal method that involves combustion of waste material. Incineration and other high temperature waste treatment systems are sometimes described as "thermal treatment". Incinerators convert waste materials into heat, gas, steam, and ash.

Incineration is carried out both on a small scale by individuals and on a large scale by industry. It is used to dispose of solid, liquid and gaseous waste. It is recognized as a practical method of disposing of certain hazardous waste materials (such as biological medical waste). Incineration is a controversial method of waste disposal, due to issues such as emission of gaseous pollutants.

Incineration is common in countries such as Japan where land is more scarce, as these facilities generally do not require as much area as landfills. Waste-to-energy (WtE) or energy-from-waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam and/or electricity. Combustion in an incinerator is not always perfect and there have been concerns about micro-pollutants in gaseous emissions from incinerator stacks. Particular concern has focused on some very persistent organics such as dioxins which may be created within the incinerator and which may have serious environmental consequences in the area immediately around the incinerator. On the other hand this method produces heat that can be used as energy.

# **8.2.3 RECYCLING METHODS**

PVC, LDPE, PP, and PS (see resin identification code) are also recyclable, although these are not as commonly collected. These items are usually composed of a single type of material, making them relatively easy to recycle into new products. The recycling of complex products (such as computers and electronic equipment) is more difficult, due to the additional dismantling and separation required.

# **8.2.4 BIOLOGICAL REPROCESSING**

Composting, Home Composting, and Anaerobic Digestion



An active compost heap.

Waste materials that are organic in nature, such as plant material, food scraps, and paper products, can be recycled using biological composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity. The intention of biological processing in waste management is to control and accelerate the natural process of decomposition of organic matter.

There are a large variety of composting and digestion methods and technologies varying in complexity from simple home compost heaps, to industrial-scale enclosed-vessel digestion of mixed domestic waste (see Mechanical biological treatment). Methods of biological decomposition are differentiated as being aerobic or anaerobic methods, though hybrids of the two methods also exist.

An example of waste management through composting is the Green Bin Program in Toronto, Canada, where household organic waste (such as kitchen scraps and plant cuttings) are collected in a dedicated container and then composted.

# 8.2.5 ENERGY RECOVERY



Anaerobic digestion component of Lübeck mechanical biological treatment plant in Germany, 2007

The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel, recycling through thermal treatment ranges from using waste as a fuel source for cooking or heating, to fuel for boilers to generate steam and electricity in a turbine. Pyrolysis and gasification are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process typically occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid and gas products. The liquid and gas can be burnt to produce energy or refined into other products. The solid residue (char) can be further refined into products such as activated carbon. Gasification and advanced Plasma arc gasification are used to convert organic materials directly into a synthetic gas (syn-gas) composed of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam.

# 8.3 AVOIDANCE AND REDUCTION METHODS

An important method of waste management is the prevention of waste material being created, also known as waste reduction. Methods of avoidance include reuse of second-hand products, repairing broken items instead of buying new, designing products to be refillable or reusable (such as cotton instead of plastic shopping bags), encouraging consumers to avoid using disposable products (such as disposable cutlery), removing any food/liquid remains from cans, packaging, and designing products that use less material to achieve the same purpose (for example, light-weighting of beverage cans).

# 8.4 WASTE HANDLING AND TRANSPORT



A typical front loading garbage truck in North America.

Waste collection methods vary widely between different countries and regions. Domestic waste collection services are often provided by local government authorities, or by private industry. Some areas, especially those in less developed countries, do not have a formal waste-collection system. Examples of waste handling systems include:

- In Australia, curbside collection is the method of disposal of waste. Every urban domestic household is provided with three bins: one for recyclables, another for general waste and another for garden materials - this bin is provided by the municipality if requested. Also, many households have compost bins; but this is not provided by the municipality. To encourage recycling, municipalities provide large recycle bins, which are larger than general waste bins. Municipal, commercial and industrial, construction and demolition waste is dumped at landfills and some is recycled. Household waste is segregated: recyclables sorted and made into new products, and general waste is dumped in landfill areas. According to the ABS, the recycling rate is high and is 'increasing, with 99% of households reporting that they had recycled or reused some of their waste within the past year (2003 survey), up from 85% in 1992'. This suggests that Australians are in favour of reduced or no land-filling and the recycling of waste. Of the total waste produced in 2002-03, '30% of municipal waste, 44% of commercial and industrial waste and 57% of construction and demolition waste' was recycled. Energy is produced from waste as well: some landfill gas is captured for fuel or electricity generation. Households and industries are not charged for the volume of waste they produce.
- In Europe and a few other places around the world, a few communities use a proprietary collection system known as Envac, which conveys refuse via underground conduits using a vacuum system.
- In Canadian urban centers curbside collection is the most common method of disposal, whereby the city collects waste and/or recyclables and/or organics on a scheduled basis. In rural areas people often dispose of their waste by hauling it to a transfer station. Waste collected is then transported to a regional landfill.
- In Taipei the city government charges its households and industries for the volume of rubbish they produce. Waste will only be collected by the city council if waste is disposed in government issued rubbish bags. This policy has successfully reduced the amount of waste the city produces and increased the recycling rate.

# **8.5 WASTE MANAGEMET CONCEPTS**

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of the most general, widely-used concepts include:

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- Waste hierarchy The waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste.
- Extended producer responsibility Extended Producer Responsibility (EPR) is a strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product. Extended producer responsibility is meant to impose accountability over the entire lifecycle of products and packaging introduced to the market. This means that firms which manufacture, import and/or sell products are required to be responsible for the products after their useful life as well as during manufacture.
- Polluter pays principle the Polluter Pays Principle is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste.

# **8.6 EDUCATION AND AWARENESS**

Education and awareness in the area of waste and waste management is increasingly important from a global perspective of resource management. The Talloires Declaration is a declaration for sustainability concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources. Local, regional, and global air pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. Several universities have implemented the Talloires Declaration by establishing environmental management and waste management programs, e.g. the waste management university project. University and vocational education are promoted by various organizations, e.g. WAMITAB and Chartered Institution of Wastes Management. Many supermarkets encourage customers to use their reverse vending machines to deposit used purchased containers and receive a refund from the recycling fees. Brands that manufacture such machines include Tomra and Envipco.

# **8.7 BIOMEDICAL WASTE**

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Biomedical waste consists of solids, liquids, sharps, and laboratory waste that are potentially infectious or dangerous. It must be properly managed to protect the general public, specifically healthcare and sanitation workers who are regularly exposed to biomedical waste as an occupational hazard.

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Biomedical waste differs from other types of hazardous waste, such as industrial waste, in that it comes from biological sources or is used in the diagnosis, prevention, or treatment of diseases. Common producers of biomedical waste include hospitals, health clinics, nursing homes, medical research laboratories, offices of physicians, dentists, and veterinarians, home health care, and funeral homes.

# 8.7.1 COMPONENTS

The following is a list of materials that are generally considered biomedical waste:

# Solids

- Catheters and tubes
- Disposable gowns, masks, and scrubs
- Disposable tools, such as some scalpels and surgical staplers
- Medical gloves
- Surgical sutures and staples
- Wound dressings

# Liquids

- Blood
- Body fluids and tissues
- Cell, organ, and tissue cultures

# Sharps

- Blades, such as razor or scalpel blades
- Lancets<sup>[3][1]</sup>
- Materials made of glass, such as curettes and slides
- Metal sty lets
- Needles
- Plastic pipettes and tips
- Syringes

# Laboratory Waste

• Animal carcasses

- Hazardous chemicals with biological components
- Media
- Medicinal plants
- Radioactive material with biological components
- Supernatants

#### Exceptions

Cadavers, urine, feces, and cytotoxic drugs are not considered biomedical waste.

## 8.7.2 MANAGEMENT



Sorting Of Medical Wastes In Hospital

At the site where it is generated, biomedical waste is placed in specially-labelled bags and containers for removal by biomedical waste transporters. Other forms of waste should not be mixed with biomedical waste as different rules apply to the treatment of different types of waste. Biomedical waste is treated by any or a combination of the following methods: incineration; discharge through a sewer or septic system; and steam, chemical, or microwave sterilization. Any tools or equipment that come into contact with potentially infectious material and are not disposable or designed for single-use are sterilized in an autoclave.

Household biomedical waste usually consists of needles and syringes from drugs administered at home (such as insulin), soiled wound dressings, disposable gloves, and bedsheets or other cloths that have come into contact with bodily fluids. Disposing of these materials with regular household garbage puts waste collectors at risk for injury and infection, especially from sharps as they can easily puncture a standard household garbage bag. Many communities have programs in place for the disposal of household biomedical waste. Some waste treatment facilities also have mail-in disposal programs.

Biomedical waste treatment facilities are licensed by the local governing body which maintains laws regarding the operation of these facilities. The laws ensure that the general public is protected from contamination of air, soil, groundwater, or municipal water supply.

# **8.7.3 HOSPITAL WASTE MANAGEMENT AND BIOMEDICAL WASTE MANAGEMENT RULES**

In November 1992, a document entitled Warning to Humanity was released. One thousand five

hundred scientists from around the world, including 99 Nobel laureates, a dozen national academies of science, the Pontifical Academy of Science, and the Director General of the United Nations Educational, Scientific and Cultural Organization (UNESCO), signed this document. The document was bold and clear, stating, "human beings and the natural world are on a collision course," which "may so alter the living world that it will be unable to sustain life in the manner that we know." The problems facing the environment are vast and diverse. Destruction of the world's rain forests, global warming, and the depletion of the ozone layer are just some of the problems that will reach critical proportions in the coming decades. Their rates will be directly affected by the size of the human population.

The biggest impetus for developing a worldwide effort to monitor and restrict global pollution is the fact that most forms of pollution do not respect national boundaries. The first major international conference on environmental issues was held in Stockholm, Sweden, in 1972 and was sponsored by the United Nations.

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# 8.8 HAZARDOUS WASTE

Hazardous wastes comprise solid, liquid, or gas wastes that can cause death, illness, or injury to people or destruction of the environment if improperly treated, stored, transported, or discarded. Substances are considered hazardous wastes if they are *ignitable* (capable of burning or causing a fire), *corrosive* (able to corrode steel or harm organisms because of extreme acidic or basic properties), *reactive* (able to explode or produce toxic cyanide or sulfide gas), or *toxic* (containing substances that are poisonous). Mixtures, residues, or materials containing hazardous wastes are also considered hazardous wastes.

Many dangerous substances can be used only with special precautions that decrease their risks. When discarded, these substances are no longer under the direct control of the user and may pose special hazards to people or other organisms that come in contact with them. Because of such potential risks, hazardous wastes are processed separately from ordinary wastes.

## 8.8.1 SOURCES OF HAZARDOUS WASTES

Industrial Wastes: Hazardous wastes are generated by nearly every industry; those industries that themselves generate few hazardous wastes nonetheless use products from hazardous waste generating industries. For example, in the computer software industry, writing software generates little hazardous waste, but the manufacture of computers involves many industrial processes. Making a computer circuit board involves electroplating baths that contain metal salts, and the production of computer chips uses acids, other caustic chemicals, and solvents. Other hazardous wastes are generated in the manufacture of fiber optics and copper wire used in electronic transmission, as well as magnetic disks, paper for technical manuals, photographs for packaging and publicity, and trucks for transportation of the finished product.

Agricultural Wastes: Industry is not alone in generating hazardous wastes. Agriculture produces such wastes as pesticides and herbicides, and the materials used in their application. Fluoride wastes are by-products of phosphate fertilizer production. Even soluble nitrates from manure may dissolve into groundwater and contaminate drinking-water wells; high levels of nitrates may cause health problems.

Household Wastes: Household sources of hazardous wastes include toxic paints, flammable solvents, caustic cleaners, toxic batteries, pesticides, drugs, and mercury from broken thermometers. Local waste-disposal systems may refuse these items. If they are accepted, careful monitoring may be required to make sure soil or groundwater is not contaminated. The householder may be asked to recycle or dispose of these items separately. Renovations of older homes may cause toxic' lead paint to flake off from walls. Insulation material on furnace pipes may contain asbestos particles, which can break off and hang suspended in air; when inhaled, they can cause lung disease and cancer.

Medical Wastes: Hospitals use special care in disposing of wastes contaminated with blood and tissue, separating these hazardous wastes from ordinary waste. Hospitals and doctors' clinics must be especially careful with needles, scalpels, and glassware, called "sharps." Pharmacies discard outdated and unused drugs; testing laboratories dispose of chemical wastes. Medicine also makes use of significant amounts of radioactive isotopes for diagnosis and treatment, and these substances must be tracked and disposed of carefully.

The hospital is where the ailing come to get a healing touch, but often what they get is infection. Hospital acquired infections are turning out to be big killers. A study published by the office of Health Economics in England estimates that approximately 10 per cent of all the patients suffer from hospital acquired infection. The report further states that hospital acquired infection causes 5000 deaths per year and contributes significantly to further 15,000, making them a bigger killer than road accidents or suicides.

Hospitals generate tons of medical wastes each year. This waste may take the form of disposable products used in the care and treatment of patients (such as disposable diapers, needles and other medical supplies). Hospital waste may also contain by-products of treatments and laboratory tests (such as radioactive wastes and chemicals used in the laboratories).

Medical waste has been a growing concern because of recent incidents of public exposure to discarded blood vials, needles, empty prescription bottles and syringes. One estimate suggests that the total number of syringes and needles in the market in India are approximately 2-3 times the total quantity produced in India plus those that are imported. This is mainly due to the improper hospital waste management, which is recycled by the unscrupulous operators who resell the syringes, which are infected.

Medical waste includes all types of wastes generated by health care organizations such as hospitals, clinics, physicians' clinics, dental clinics, veterinary facilities and other medical laboratories, and research facilities. This waste should be handled properly and disposed of by using safe methods. Due to the lack of epidemiological evidence, identifying wastes for which special precautions are necessary is largely a matter of judgment about the relative risk of disease transmission. Hospital wastes, for which special precautions appear prudent, are microbiology laboratory wastes, pathological wastes, bulk blood and blood products, and sharp items.

Classification Of Medical Wastes: Medical waste can typically include the following types of wastes.

. Human blood and blood products

- . Cultures and stocks of infectious agents, and associated biological wastes
- . Contaminated and unused sharps items
- . Laboratory animal carcasses and body parts used in experiments
- . Pathological wastes (samples, tissues and organs)

Put simply, a hazardous waste is waste that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:

- ignitable (i.e., flammable)
- oxidizing
- corrosive
- toxic
- radioactive
- explosive

U.S. environmental laws (see Resource Conservation and Recovery Act) additionally describe a "hazardous waste" as a waste (usually a solid waste) that has the potential to:

- cause, or significantly contribute to an increase in mortality (death) or an increase in serious irreversible, or incapacitating reversible illness; or
- pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

The term "hazardous waste" comprises all toxic chemicals, radioactive materials, and biologic or infectious waste. These materials threaten workers through occupational exposure and the general public in their homes, communities, and general environment. Exposure to these materials can occur near the site of generation, along the path of its transportation, and near their ultimate disposal sites. Most hazardous waste results from industrial processes that yield unwanted byproducts, defective products, and spilled materials. The generation and disposal of hazardous wastes is controlled through a variety of international and national regulations.

Hazardous waste was formerly known as 'special' waste.

## **8.8.2 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)**

Modern hazardous waste regulations in the U.S. began with the Resource Conservation and Recovery Act (RCRA) which was enacted in 1976. The primary contribution of RCRA was to create a "cradle to grave" system of record keeping for hazardous wastes. Hazardous wastes must be tracked from the time they are generated until their final disposition.

RCRA's record keeping system helps to track the life cycle of hazardous waste and reduces the amount of hazardous waste illegally disposed.

# **8.8.3COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), was enacted in 1980. The primary contribution of CERCLA was to create a "Superfund" and provided for the clean-up and remediation of closed and abandoned hazardous waste sites.

Many types of businesses generate hazardous waste. Some are small areas that may be located in a community. For example, dry cleaners, automobile repair shops, hospitals, exterminators, and photo processing centers all generate hazardous waste. Some hazardous waste generators are larger companies like chemical manufacturers, electroplating companies, and oil refineries.

A US facility that treats, stores or disposes of hazardous waste must obtain a permit for doing so under the Resource Conservation and Recovery Act. Generators of and transporters of hazardous waste must meet specific requirements for handling, managing, and tracking waste. Through the RCRA, Congress directed the United States Environmental Protection Agency (EPA) to create regulations to manage hazardous waste. Under this mandate, the EPA developed strict requirements for all aspects of hazardous waste management including the treatment, storage, and disposal of hazardous waste. In addition to these federal requirements, states may develop more stringent requirements or requirements that are broader in scope than the federal regulations.

In the United States, hazardous wastes generated by commercial or industrial activities may be classified as "listed" hazardous wastes or "characteristic" hazardous wastes by the EPA.

In regulatory terms, a Resource Conservation and Recovery Act (RCRA) hazardous waste is a waste that either a "characteristic waste" or a "listed waste":

- Characteristic Waste exhibits at least one of the four "characteristics" of hazardous waste (ignitability, corrosivity, reactivity, or toxicity)
- Listed Waste appears on one of the four hazardous wastes lists (F-list, K-list, P-list, or U-list), or

Individual states may regulate particular wastes more stringently than mandated by federal regulation. This is because the U.S. EPA is authorized to delegate primary rulemaking authorization to individual states. Most states take advantage of this authority and form their own state regulatory agencies that are monitored by the U.S. EPA.

#### **Characteristic Wastes**

Characteristic Hazardous Wastes are defined as wastes that exhibit the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

## Ignitability:

Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents. For more

details, see 40 CFR §261.21. Test methods that may be used to determine ignitability include the Pensky-Martens Closed-Cup Method for Determining Ignitability, the *Setaflash Closed-Cup Method for Determining Ignitability*, and the *Ignitability of Solids*.

## **Corrosivity:**

Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example. For more details, see 40 CFR §261.22. The test method that may be used to determine corrosivity is the Corrosivity towards Steel (Method 1110A) (PDF).

# **Reactivity:**

Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulfur batteries and explosives. For more details, see *40 CFR §261.23*. There are currently no test methods available.

# **Toxicity:**

Toxic wastes are harmful or fatal when ingested, absorbed or inhaled (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the *Toxicity Characteristic Leaching Procedure (TCLP)*. The TCLP helps identify wastes likely to leach concentrations of contaminants that may be harmful to human health or the environment. For more details, see 40 CFR §261.24.

Listed wastes: Listed hazardous wastes are generated by specific industries and processes and are automatically considered hazardous, based solely on the process that generates them and irrespective of whether a test of the waste shows any of the "characteristics" of hazardous waste. Examples of listed wastes include:

- Much sludge leftover from electroplating processes.
- Certain waste from iron and steel manufacturing
- Wastes from certain cleaning and/or degreasing processes

Hazardous wastes are incorporated into lists published by the Environmental Protection Agency. These lists are organized into three categories:

## The F-list (non-specific source wastes):

This list identifies wastes from common manufacturing and industrial processes, such as solvents, that have been used in cleaning or degreasing operations. Because the processes producing these wastes can occur in different sectors of industry, the F-listed wastes are known as wastes from non-specific sources.

#### The K-list (source-specific wastes):

This list includes certain wastes from specific industries, such as petroleum refining or pesticide manufacturing. Certain sludge and wastewaters from treatment and production processes in these industries are examples of source-specific wastes.

#### **Discarded wastes (P-List and U-List):**

P-List and U-List wastes are actually sub-lists of the same major list applying to discarded wastes. These wastes apply to commercial chemical products that are considered hazardous when discarded and are regulated under the following U.S. Federal Regulation: 40 C.F.R. 261.33(e) and 261.33(f). P-List wastes are wastes that are considered "acutely hazardous" when discarded and are subject to more stringent regulation. Nitric oxide is an example of a P-list waste and carries the number P076. U-Listed wastes are considered "hazardous" when discarded and are regulated in a somewhat less stringent manner than P-Listed wastes.

#### Universal Wastes

Universal wastes are hazardous wastes that (in the U.S.):

- generally pose a lower threat relative to other hazardous wastes
- are ubiquitous and produced in very large quantities by a large number of generators.

Some of the most common "universal wastes" are: fluorescent light bulbs, some specialty batteries (e.g. lithium or lead containing batteries), cathode ray tubes, and mercury-containing devices.

Universal wastes are subject to somewhat less stringent regulatory requirements and small quantity generators of universal wastes may be classified as "conditionally-exempt small quantity generators" (CESQGs) which releases them from some of the regulatory requirements for the handling and storage hazardous wastes.

Universal wastes must still be disposed of properly. (For more information, see Fact Sheet: Conditionally Exempt Small Quantity Generator)

## Other Hazardous Wastes

The U.S. Environmental Protection Agency has other ways of regulating hazardous waste. These "rules" include:

- The "Mixture Rule" 400 CFR Section 261-23 (incorrect citation) applies to a mixture of a listed hazardous waste and a solid waste and states that the result of a mixture of these two wastes is regulated as a hazardous waste. Exemptions may apply in some cases.
- The "Derived-from Rule" 40 CFR Section 261.3(b) applies to a waste that is generated from the treatment, storage or disposal of a hazardous waste (for example, the ash from the incineration of hazardous waste). Wastes "derived" in this manner may be regulated as hazardous wastes.

• The "Contained-in Rule" - - 40 CFR Section 261.3(f) applies to soil, groundwater, surface water and debris that are contaminated with a listed hazardous waste.

# **Exempted Hazardous Wastes**

USEPA regulations automatically exempt certain solid wastes from being regulated as "hazardous wastes". This does not necessarily mean the wastes are not hazardous nor that they are not regulated. An exempted hazardous waste simply means that the waste is not regulated by the primary hazardous waste regulations. Many of these wastes may by regulated by different statutes and/or regulations and/or by different regulatory agencies. For example, many hazardous mining wastes are regulated via mining statutes and regulations. "Exempted" hazardous wastes include:

- Household hazardous waste (HHW); (see below)
- Agricultural wastes which are returned to the ground as fertilizer;
- Mining overburden returned to the mine site;
- Utility wastes from [coal] combustion to produce electricity;
- Oil and natural gas exploration drilling waste;
- Wastes from the extraction of beneficiation, and processing of ores and minerals, including coal;
- Cement kiln wastes;
- Wood treated with arsenic preservatives.
- Certain chromium-containing wastes (See Code of Federal Regulations Section 261.4(b))
- Recycled hazardous wastes: Some hazardous wastes that are recycled may also be exempted from hazardous waste regulations.

## Household Hazardous Waste

Household Hazardous Waste (HHW) (also referred to as domestic hazardous waste) is waste that is generated from residential households. HHW only applies to wastes that are the result of the use of materials that are labeled for and sold for "home use".

The following list includes categories often applied to HHW. It is important to note that many of these categories overlap and that many household wastes can fall into multiple categories:

- Paints and solvents
- Automotive wastes (used motor oil, antifreeze, etc.)
- Pesticides (insecticides, herbicides, fungicides, etc.)
- Mercury-containing wastes (thermometers, switches, fluorescent lighting, etc)
- Electronics (computers, televisions, cell phones)
- Aerosols / Propane cylinders
- Caustics / Cleaning agents
- Refrigerant-containing appliances
- Some specialty Batteries (e.g. lithium, nickel cadmium, or button cell batteries)
- Ammunition

• Radioactive waste (some home smoke detectors are classified as radioactive waste because they contain very small amounts of a radioactive isotope of americium (see: Disposing of Smoke Detectors).

Because of the expense associated with the disposal of HHW, it is still legal for most homeowners in the U.S. to dispose of most types of household hazardous wastes as municipal solid waste (MSW) and these wastes can be put in your trash. Laws vary by state and municipality and they are changing every day. Be sure to check with your local environmental regulatory agency, solid waste authority, or health department to find out how HHW is managed in your area.

Modern landfills are designed to handle normal amounts of HHW and minimize the environmental impacts. However, there are still going to be some impacts and there are many ways that homeowners can keep these wastes out of landfills.<sup>[1]</sup>

Laws regulating HHW in the U.S. are gradually becoming more strict. As of 2007, radioactive smoke detectors are the only HHW that are managed nationally. While it is still legal in the United States to dispose of smoke detectors in your trash in most places, manufacturers of smoke detectors must accept returned units for disposal as mandated by the Nuclear Regulatory law 10 CFR 32.27. If you send your detector back to a manufacturer then it will be disposed in a nuclear waste facility.

In the U.S., states are regulating various HHW waste disposal in MSW landfills on a state by state basis. Some commonly regulated wastes in some (but not all) states include restrictions on the disposal of:

- Recyclables (especially "source-separated" recyclables or recyclables that have already been separated from solid waste). In this case this would only apply to household hazardous wastes that have been separated for recycling.
- Lead-acid batteries
- Mercury-containing wastes
- Rechargeable batteries
- Cathode ray tubes (CRTs) from older computer monitors and televisions
- Cell phones and computers
- Refrigerant containing appliances such as a refrigerator, air conditioner or dehumidifier.

(Note: Yard waste or "green waste" (particularly "source-separated" yard waste such as from a city leaf collection program) is not hazardous but may be a regulated household waste)

Local solid waste authorities and health departments may also have specific bans on wastes that apply to their service area.

Solid Waste Haulers and HHW - One "catch-22" that residents often encounter is that while it may be legal to dispose of some HHW in their regular trash, the waste hauler that collects the trash can choose not to haul the waste. It is not uncommon for a waste hauler to refuse to pick up municipal solid waste that contains things like paint and fluorescent light bulbs. There is often

little recourse for residents in this case. In these cases the resident may have to make their own arrangements to dispose of the waste by taking it directly to a landfill or solid waste transfer station.

# 8.8.4 FINAL DISPOSITION OF HAZARDOUS WASTE

Hazardous wastes (HWs) are typically dealt with in five different ways:

# Recycling

Many HWs can be recycled into new products. Examples might include lead-acid batteries or electronic circuit boards where the heavy metals can be recovered and used in new products.

# Neutralization

Some HW can be processed so that the hazardous component of the waste is eliminated. making it a non-hazardous waste. An example of this might include a corrosive acid that is neutralized with a basic substance so that it is no-longer corrosive. (see acid-base reactions.)

# Incineration, Destruction And Waste-To-Energy

A HW may be "destroyed" for example by incinerating it at a high temperature. Flammable wastes can sometimes be burned as energy sources. For example many cement kilns burn HWs like used oils or solvents.

## Hazardous Waste Landfill (Sequestering, Isolation, Etc.)

A HW may be sequestered in a HW landfill or permanent disposal facility. "In terms of hazardous waste, a landfill is defined as a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit (40 CFR 260.10)."<sup>[2][3]</sup>

# Pyrolysis

Some hazardous waste types may be eliminated using pyrolisis in an ultra high temperature electrical arc, in inert conditions to avoid combustion. This treatment method may be preferable to high temperature incineration in some circumstances such as in the destruction of concentrated organic waste types, including PCBs, pesticides and other persistent organic pollutants.

# 8.9 MIXED WASTE (RADIOACTIVE/HAZARDOUS)

According to the United States Environmental Protection Agency, mixed waste (MW) is a waste type defined as follows; "MW contains both hazardous waste (as defined by RCRA and its amendments) and radioactive waste (as defined by AEA and its amendments). It is jointly regulated by NRC or NRC's Agreement States and EPA or EPA's RCRA Authorized States. The fundamental and most comprehensive statutory definition is found in the Federal Facilities Compliance Act (FFCA) where Section 1004(41) was added to RCRA: "The term 'mixed waste' means waste that contains both hazardous waste and source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954."

Mixed waste is much more expensive to manage and dispose of than waste that is solely radioactive. Waste generators can avoid higher chargeback costs by eliminating or minimizing the volume of mixed waste generated.

# US EPA Hazardous Waste Definition

The EPA defines hazardous waste as the following: A subset of solid wastes that pose substantial or potential threats to public health or the environment and meet any of the following criteria identified 40 CFR 260 and 261:

- It is specifically listed as a hazardous waste by EPA
- It exhibits one or more of the characteristics of hazardous waste (ignitability, corrosivity, reactivity, and/or toxicity);
- It is generated by the treatment of hazardous waste; or is contained in a hazardous waste.

## **Radioactive Waste**

Radioactive wastes are waste products containing radioactive materials. They are usually the products of nuclear processes, such as nuclear fission. However, industries not directly connected to the nuclear industry may produce large quantities of radioactive waste. The majority of radioactive waste is "low-level waste", meaning it contains low levels of radioactivity per mass or volume. This type of waste often consists of used protective clothing, which is only slightly contaminated but still dangerous in case of radioactive contamination of a human body through ingestion, inhalation, absorption, or injection.

The issue of disposal methods for nuclear waste was one of the most pressing current problems the international nuclear industry faced when trying to establish a long term energy production plan, yet there was hope it could be safely solved. A report giving the Nuclear Industry's perspective on this problem is presented in a document from the IAEA (The International Atomic Energy Agency) published in October 2007. It summarizes the current state of scientific knowledge on whether waste could find its way from a deep burial facility back to soil and drinking water and threaten the health of human beings and other forms of life. In the United States, DOE acknowledges progress in addressing the waste problems of the industry, and successful remediation of some contaminated sites, yet also major uncertainties and sometimes complications and setbacks in handling the issue properly, cost effectively, and in the projected time frame.<sup>[1]</sup> In other countries with lower ability or will to maintain environmental integrity the issue would be even more problematic.

In the United States alone, the Department of Energy states there are "millions of gallons of radioactive waste" as well as "thousands of tons of spent nuclear fuel and material" and also "huge quantities of contaminated soil and water." Despite copious quantities of waste, the DOE has stated a goal of cleaning all presently contaminated sites successfully by 2025. The Fernald, Ohio site for example had "31 million pounds of uranium product", "2.5 billion pounds of waste", "2.75 million cubic yards of contaminated soil and debris", and a "223 acre portion of the underlying Great Miami Aquifer had uranium levels above drinking standards."<sup>1</sup> The United States has at least 108 sites designated as areas that are contaminated and unusable, sometimes many thousands of acres. DOE wishes to clean or mitigate many or all by 2025, however the task can be difficult and it acknowledges that some will never be completely remediate. In just one of these 108 larger designations, Oak Ridge National Laboratory, there were for example at least "167 known contaminant release sites" in one of the three subdivisions of the 37,000-acre (150 km<sup>2</sup>) site. Some of the U.S. sites were smaller in nature, however, cleanup issues were simpler to address, and DOE has successfully completed cleanup, or at least closure, of several sites.

## The Nature and Significance Of Radioactive Waste

Radioactive waste typically comprises a number of radioisotopes: unstable configurations of elements that decay, emitting ionizing radiation which can be harmful to human health and to the environment. Those isotopes emit different types and levels of radiation, which last for different periods of time.

## Physics

The radioactivity of all nuclear waste diminishes with time. All radioisotopes contained in the waste have a half-life - the time it takes for any radionuclide to lose half of its radioactivity and eventually all radioactive waste decays into non-radioactive elements. Certain radioactive elements (such as plutonium-239) in "spent" fuel will remain hazardous to humans and other living beings for hundreds of thousands of years. Other radioisotopes will remain hazardous for millions of years. Thus, these wastes must be shielded for centuries and isolated from the living environment for hundreds of millennia.<sup>[3]</sup> Some elements, such as Iodine-131, have a short half-life (around 8 days in this case) and thus they will cease to be a problem much more quickly than other, longer-lived, decay products but their activity is much greater initially. The two tables show some of the major radioisotopes, their half-lives, and their radiation yield as a proportion of the yield of fission of Uranium-235.

The faster a radioisotope decays, the more radioactive it will be. The energy and the type of the ionizing radiation emitted by a pure radioactive substance are important factors in deciding how dangerous it will be. The chemical properties of the radioactive element will determine how mobile the substance is and how likely it is to spread into the environment and contaminate human bodies. This is further complicated by the fact that many radioisotopes do not decay immediately to a stable state but rather to a radioactive decay product leading to decay chains.

#### **Pharmacokinetics**

Exposure to high levels of radioactive waste may cause serious harm or death. Treatment of an adult animal with radiation or some other mutation-causing effect, such as a cytotoxic anticancer drug, may cause cancer in the animal. In humans it has been calculated that a 5 sievert dose is usually fatal, and the lifetime risk of dying from radiation induced cancer from a single dose of 0.1 sieverts is 0.8%, increasing by the same amount for each additional 0.1 sievert increment of dosage.<sup>[4]</sup> Ionizing radiation causes deletions in chromosomes.<sup>[5]</sup> If a developing organism such as an unborn child is irradiated, it is possible a birth defect may be induced, but it is unlikely this defect will be in a gamete or a gamete forming cell. The incidence of radiation-induced mutations in humans is undetermined, due to flaws in studies done to date.<sup>[6]</sup>

Depending on the decay mode and the pharmacokinetics of an element (how the body processes it and how quickly), the threat due to exposure to a given activity of a radioisotope will differ. For instance Iodine-131 is a short-lived beta and gamma emitter but because it concentrates in the thyroid gland, it is more able to cause injury than cesium-137 which, being water soluble, is rapidly excreted in urine. In a similar way, the alpha emitting actinides and radium are considered very harmful as they tend to have long biological half-lives and their radiation has a high linear energy transfer value. Because of such differences, the rules determining biological injury differ widely according to the radioisotope, and sometimes also the nature of the chemical compound which contains the radioisotope.

## Sources of Waste

Radioactive waste comes from a number of sources. The majority of waste originates from the nuclear fuel cycle and nuclear weapons reprocessing. However, other sources include medical and industrial wastes, as well as naturally occurring radioactive materials (NORM) that can be concentrated as a result of the processing or consumption of coal, oil and gas, and some minerals, as discussed below.

## Nuclear Fuel Cycle

Main articles: Nuclear fuel cycle and Spent nuclear fuel Front end: Waste from the front end of the nuclear fuel cycle is usually alpha emitting waste from the extraction of uranium. It often contains radium and its decay products.

Uranium dioxide (UO<sub>2</sub>) concentrate from mining is not very radioactive - only a thousand or so times as radioactive as the granite used in buildings. It is refined from yellowcake (U<sub>3</sub>O<sub>8</sub>), then converted to uranium hexafluoride gas (UF<sub>6</sub>). As a gas, it undergoes enrichment to increase the U-235 content from 0.7% to about 4.4% (LEU). It is then turned into a hard ceramic oxide (UO<sub>2</sub>) for assembly as reactor fuel elements.

The main by-product of enrichment is depleted uranium (DU), principally the U-238 isotope, with a U-235 content of ~0.3%. It is stored, either as  $UF_6$  or as  $U_3O_8$ . Some is used in applications where its extremely high density makes it valuable, such as the keels of yachts, and anti-tank shells.<sup>[7]</sup> It is also used (with recycled plutonium) for making mixed oxide fuel (MOX) and to dilute highly enriched uranium from weapons stockpiles which is now being redirected to
become reactor fuel. This dilution, also called downblending, means that any nation or group that acquired the finished fuel would have to repeat the (very expensive and complex) enrichment process before assembling a weapon.

#### Back end:

The back end of the nuclear fuel cycle, mostly spent fuel rods, contains fission products that emit beta and gamma radiation, and actinides that emit alpha particles, such as uranium-234, neptunium-237, plutonium-238 and americium-241, and even sometimes some neutron emitters such as californium (Cf). These isotopes are formed in nuclear reactors.

It is important to distinguish the processing of uranium to make fuel from the reprocessing of used fuel. Used fuel contains the highly radioactive products of fission (see high level waste below). Many of these are neutron absorbers, called neutron poisons in this context. These eventually build up to a level where they absorb so many neutrons that the chain reaction stops, even with the control rods completely removed. At that point the fuel has to be replaced in the reactor with fresh fuel, even though there is still a substantial quantity of uranium-235 and plutonium present. In the United States, this used fuel is stored, while in countries such as the United Kingdom, France, and Japan, the fuel is reprocessed to remove the fission products, and the fuel can then be re-used. This reprocessing involves handling highly radioactive materials, and the fission products removed from the fuel are a concentrated form of high-level waste as are the chemicals used in the process.

## 8.9.1 TYPES OF RADIOACTIVE WASTE



Removal of very low-level waste

Although not significantly radioactive, uranium mill tailings are waste. They are byproduct material from the rough processing of uranium-bearing ore. They are sometimes referred to as 11(e)2 wastes, from the section of the U.S. Atomic Energy Act that defines them. Uranium mill tailings typically also contain chemically-hazardous heavy metals such as lead and arsenic. Vast mounds of uranium mill tailings are left at many old mining sites, especially in Colorado, New Mexico, and Utah.

Low level waste (LLW) is generated from hospitals and industry, as well as the nuclear fuel cycle. It comprises paper, rags, tools, clothing, filters, etc., which contain small amounts of mostly short-lived radioactivity. Commonly, LLW is designated as such as a precautionary measure if it originated from any region of an 'Active Area', which frequently includes offices with only a remote possibility of being contaminated with radioactive materials. Such LLW

typically exhibits no higher radioactivity than one would expect from the same material disposed of in a non-active area, such as a normal office block. Some high activity LLW requires shielding during handling and transport but most LLW is suitable for shallow land burial. To reduce its volume, it is often compacted or incinerated before disposal. Low level waste is divided into four classes, class A, B, C and GTCC, which means "Greater Than Class C".

Intermediate level waste (ILW) contains higher amounts of radioactivity and in some cases requires shielding. ILW includes resins, chemical sludge and metal reactor fuel cladding, as well as contaminated materials from reactor decommissioning. It may be solidified in concrete or bitumen for disposal. As a general rule, short-lived waste (mainly non-fuel materials from reactors) is buried in shallow repositories, while long-lived waste (from fuel and fuel-reprocessing) is deposited in deep underground facilities. U.S. regulations do not define this category of waste; the term is used in Europe and elsewhere.



# High Level Waste flasks are transported by train in the United Kingdom. Each flask is constructed of 14 in (360 mm) thick solid steel and weighs in excess of 50 tons

High level waste (HLW) is produced by nuclear reactors. It contains fission products and transuranic elements generated in the reactor core. It is highly radioactive and often thermally hot. HLW accounts for over 95% of the total radioactivity produced in the process of nuclear electricity generation. The amount of HLW worldwide is currently increasing by about 12,000 metric tons every year, which is the equivalent to about 100 double-decker busses or a two-story structure built on top of a basketball court.<sup>[12]</sup>

Transuranic waste (TRUW) as defined by U.S. regulations is, without regard to form or origin, waste that is contaminated with alpha-emitting transuranic radionuclide with half-lives greater than 20 years, and concentrations greater than 100 nCi/g (3.7 MBq/kg), excluding High Level Waste. Elements that have an atomic number greater than uranium are called transuranic ("beyond uranium"). Because of their long half-lives, TRUW is disposed more cautiously than either low level or intermediate level waste. In the U.S. it arises mainly from weapons production, and consists of clothing, tools, rags, residues, debris and other items contaminated with small amounts of radioactive elements (mainly plutonium).

Under U.S. law, transuranic waste is further categorized into "contact-handled" (CH) and "remote-handled" (RH) on the basis of radiation dose measured at the surface of the waste container. CH TRUW has a surface dose rate not greater than 200 mrem per hour (2 mSv/h), whereas RH TRUW has a surface dose rate of 200 mrem per hour (2 mSv/h) or greater. CH

TRUW does not have the very high radioactivity of high level waste, nor its high heat generation, but RH TRUW can be highly radioactive, with surface dose rates up to 1000000 mrem per hour (10000 mSv/h). The United States currently permanently disposes of TRUW generated from nuclear power plants and military facilities at the Waste Isolation Pilot Plant.

#### 8.9.2 MANAGEMENT OF WASTE

#### High-level radioactive waste management

Of particular concern in nuclear waste management are two long-lived fission products, Tc-99 (half-life 220,000 years) and I-129 (half-life 17 million years), which dominate spent fuel radioactivity after a few thousand years. The most troublesome transuranic elements in spent fuel are Np-237 (half-life two million years) and Pu-239 (half life 24,000 years). Nuclear waste requires sophisticated treatment and management in order to successfully isolate it from interacting with the biosphere. This usually necessitates treatment, followed by a long-term management strategy involving storage, disposal or transformation of the waste into a non-toxic form. Governments around the world are considering a range of waste management and disposal options, though there has been limited progress toward long-term waste management solutions.

#### Vitrification

Long-term storage of radioactive waste requires the stabilization of the waste into a form which will not react, nor degrade, for extended periods of time. One way to do this is through vitrification. Currently at Sellafield the high-level waste (PUREX first cycle raffinate) is mixed with sugar and then calcined. Calcination involves passing the waste through a heated, rotating tube. The purposes of calcinations are to evaporate the water from the waste, and de-nitrate the fission products to assist the stability of the glass produced.<sup>[17]</sup>

The 'calcine' generated is fed continuously into an induction heated furnace with fragmented glass. The resulting glass is a new substance in which the waste products are bonded into the glass matrix when it solidifies. This product, as a molten fluid, is poured into stainless steel cylindrical containers ("cylinders") in a batch process. When cooled, the fluid solidifies ("vitrifies") into the glass. Such glass, after being formed, is very highly resistant to water.

After filling a cylinder, a seal is welded onto the cylinder. The cylinder is then washed. After being inspected for external contamination, the steel cylinder is stored, usually in an underground repository. In this form, the waste products are expected to be immobilized for a very long period of time (many thousands of years).

The glass inside a cylinder is usually a black glossy substance. All this work (in the United Kingdom) is done using hot cell systems. The sugar is added to control the ruthenium chemistry and to stop the formation of the volatile  $RuO_4$  containing radio ruthenium. In the west, the glass is normally a borosilicate glass (similar to Pyrex), while in the former Soviet bloc it is normal to use a phosphate glass. The amount of fission products in the glass must be limited because some (palladium, the other Pt group metals, and tellurium) tend to form metallic phases which separate from the glass. In Germany a vitrification plant is in use; this is treating the waste from a small demonstration reprocessing plant which has since been closed down.

# Ion Exchange

It is common for medium active wastes in the nuclear industry to be treated with ion exchange or other means to concentrate the radioactivity into a small volume. The much less radioactive bulk (after treatment) is often then discharged. For instance, it is possible to use a ferric hydroxide floc to remove radioactive metals from aqueous mixtures [3]. After the radioisotopes are absorbed onto the ferric hydroxide, the resulting sludge can be placed in a metal drum before being mixed with cement to form a solid waste form.<sup>[22]</sup> In order to get better long-term performance (mechanical stability) from such forms, they may be made from a mixture of fly ash, or blast furnace slag, and port-land cement, instead of normal concrete (made with port-land cement, gravel and sand).

#### Synroc

The Australian Synroc (synthetic rock) is a more sophisticated way to immobilize such waste, and this process may eventually come into commercial use for civil wastes (it is currently being developed for U.S. military wastes). Synroc was invented by the late Prof Ted Ringwood (a geochemist) at the Australian National University.<sup>[23]</sup> The Synroc contains pyrochlore and cryptomelane type minerals. The original form of Synroc (Synroc C) was designed for the liquid high level waste (PUREX raffinate) from a light water reactor. The main minerals in this Synroc are hollandite (BaAl<sub>2</sub>Ti<sub>6</sub>O<sub>16</sub>), zirconolite (CaZrTi<sub>2</sub>O<sub>7</sub>) and perovskite (CaTiO<sub>3</sub>). The zirconolite and perovskite are hosts for the actinides. The strontium and barium will be fixed in the perovskite. The caesium will be fixed in the hollandite.

#### Long Term Management Of Waste

The timeframe in question when dealing with radioactive waste ranges from 10,000 to 1,000,000 years, according to studies based on the effect of estimated radiation doses. Researchers suggest that forecasts of health detriment for such periods *should be examined critically*. Practical studies only consider up to 100 years as far as effective planning and cost evaluations are concerned. Long term behaviour of radioactive wastes remains a subject for ongoing research projects.

# **Geologic Disposal**

The process of selecting appropriate deep final repositories for high level waste and spent fuel is now under way in several countries (Schacht Asse II and the waste Isolation Pilot Plant) with the first expected to be commissioned some time after 2010. The basic concept is to locate a large, stable geologic formation and use mining technology to excavate a tunnel, or large-bore tunnel boring machines (similar to those used to drill the Chunnel from England to France) to drill a shaft 500–1,000 meters below the surface where rooms or vaults can be excavated for disposal of high-level radioactive waste. The goal is to permanently isolate nuclear waste from the human environment. However, many people remain uncomfortable with the immediate stewardship cessation of this disposal system, suggesting perpetual management and monitoring would be more prudent.

Because some radioactive species have half-lives longer than one million years, even very low container leakage and radionuclide migration rates must be taken into account. Moreover, it may require more than one half-life until some nuclear materials lose enough radioactivities to no longer be lethal to living things. A 1983 review of the Swedish radioactive waste disposal program by the National Academy of Sciences found that country's estimate of several hundred

thousand years—perhaps up to one million years—being necessary for waste isolation "fully justified."

Storing high level nuclear waste above ground for a century or so is considered appropriate by many scientists. This allows the material to be more easily observed and any problems detected and managed, while decay of radio-nuclides over this time period significantly reduces the level of radioactivity and associated harmful effects to the container material. It is also considered likely that over the next century newer materials will be developed which will not break down as quickly when exposed to a high neutron flux, thus increasing the longevity of the container once it is permanently buried.

Sea-based options for disposal of radioactive waste include burial beneath a stable abyssal plain, burial in a subduction zone that would slowly carry the waste downward into the Earth's mantle, and burial beneath a remote natural or human-made island. While these approaches all have merit and would facilitate an international solution to the vexing problem of disposal of radioactive waste, they are currently not being seriously considered because of the legal barrier of the Law of the Sea and because in North America and Europe sea-based burial has become taboo from fear that such a repository could leak and cause widespread damage. Dumping of radioactive waste from ships has reinforced this concern, as has contamination of islands in the Pacific Ocean. However, sea-based approaches might come under consideration in the future by individual countries or groups of countries that cannot find other acceptable solutions.

Article 1 (Definitions), 7., of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, (the London Dumping Convention) states:

"Sea" means all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof; it does not include sub-seabed repositories accessed only from land."

The proposed land-based subductive waste disposal method disposes of nuclear waste in a subduction zone accessed from land, and therefore is not prohibited by international agreement. This method has been described as the most viable means of disposing of radioactive waste, and as the state-of-the-art in nuclear waste disposal technology. Another approach termed Remix & Return would blend high-level waste with uranium mine and mill tailings down to the level of the original radioactivity of the uranium ore, then replace it in inactive uranium mines. This approach has the merits of providing jobs for miners who would double as disposal staff, and of facilitating a cradle-to-grave cycle for radioactive materials. However, this approach would be inappropriate for spent reactor fuel in the absence of reprocessing, due to the presence in it of highly toxic radioactive elements such as plutonium.

## Transmutation

There have been proposals for reactors that consume nuclear waste and transmute it to other, less-harmful nuclear waste. In particular, the Integral Fast Reactor was a proposed nuclear reactor with a nuclear fuel cycle that produced no transuranic waste and in fact, could consume transuranic waste. It proceeded as far as large-scale tests but was then canceled by the U.S.

Government. Another approach, considered safer but requiring more development, is to dedicate sub-critical reactors to the transmutation of the left-over transuranic elements

Transmutation was banned in the United States on April 1977 by President Carter due to the danger of plutonium proliferation,<sup>[37]</sup> but President Reagan rescinded the ban in 1981.<sup>[38]</sup> Due to the economic losses and risks, construction of reprocessing plants during this time did not resume. Due to high energy demand, work on the method has continued in the EU. This has resulted in a practical nuclear research reactor called Myrrha in which transmutation is possible. Additionally, a new research program called ACTINET has been started in the EU to make transmutation possible on a large, industrial scale. According to President Bush's Global Nuclear Energy Partnership (GNEP) of 2007, the United States is now actively promoting research on transmutation technologies needed to markedly reduce the problem of nuclear waste treatment.<sup>[39]</sup>

There have also been theoretical studies involving the use of fusion reactors as so called "actinide burners" where a fusion reactor plasma such as in a tokomak, could be "doped" with a small amount of the "minor" transuranic atoms which would be transmuted (meaning fissioned in the actinide case) to lighter elements upon their successive bombardment by the very high energy neutrons produced by the fusion of deuterium and tritium in the reactor. It was recently found by a study done at MIT, that only 2 or 3 fusion reactors with parameters similar to that of the International Thermonuclear Experimental Reactor (ITER) could transmute the entire annual minor actinide production from all of the light water reactors presently operating in the United States fleet while simultaneously generating approximately 1 giga watt of power from each reactor.

# **Re-Use Of Waste**

Another option is to find applications of the isotopes in nuclear waste so as to re-use them. Already, caesium-137, strontium-90 and a few other isotopes are extracted for certain industrial applications such as food irradiation and radioisotope thermoelectric generators. While re-use does not eliminate the need to manage radioisotopes, it may reduce the quantity of waste produced.

The Nuclear Assisted Hydrocarbon Production Method, Canadian patent application 2,638,179, is a method for the temporary or permanent storage of nuclear waste materials comprising the placing of waste materials into one or more repositories or boreholes constructed into an unconventional oil formation. The thermal flux of the waste materials fracture the formation alters the chemical and/or physical properties of hydrocarbon material within the subterranean formation to allow removal of the altered material. A mixture of hydrocarbons, hydrogen, and/or other formation fluids is produced from the formation. The radioactivity of high-level radioactive waste affords proliferation resistance to plutonium placed in the periphery of the repository or the deepest portion of a borehole.

A 1990 proposed type of breeder reactor called a traveling wave reactor is claimed, if it were to be built, to be able to be fueled by depleted uranium, which is currently considered nuclear waste.

## **Space Disposal**

Space disposal is an attractive notion because it permanently removes nuclear waste from the environment. However, it has significant disadvantages, not least of which is the potential for catastrophic failure of a launch vehicle. Furthermore, the high number of launches that would be required — due to the fact that no individual rocket would be able to carry very much of the material relative to the material needed to be disposed of—makes the proposal impractical (for both economic and risk-based reasons). To further complicate matters, international agreements on the regulation of such a program would need to be established. This method would also be energy intensive and thus is not necessarily economically feasible.

It has been suggested that through the use of a stationary launch system many of the risks of catastrophic launch failure could be avoided. A promising concept is the use of high power lasers to launch "indestructible" containers from the ground into space. Such a system would require no rocket propellant, with the launch vehicle's payload making up a near entirety of the vehicle's mass. Without the use of rocket fuel on board there would be little chance of the vehicle exploding.

Another form of safe removal would possibly be the space elevator. Encasing the waste in glassified form inside a steel shell 9 inches (230 mm) thick, which in turn is tiled with shuttle tile to its exterior. If the launch vehicle fails just before reaching orbit, the waste ball will safely reenter the Earth's atmosphere. The steel shell would deform on impact, but would not rupture due to the density of the shell. Also, this would potentially allow the waste to be shot into the Sun.

## National Management Plans

Most countries are considerably behind the United States in developing plans for high-level radioactive waste disposal. Sweden and Finland are furthest along in committing to a particular disposal technology, while many others reprocess spent fuel or contract with France or Great Britain to do it, taking back the resulting plutonium and high-level waste. "An increasing backlog of plutonium from reprocessing is developing in many countries... It is doubtful that reprocessing makes economic sense in the present environment of cheap uranium."

In many European countries (e.g., Britain, Finland, the Netherlands, Sweden and Switzerland) the risk or dose limit for a member of the public exposed to radiation from a future high-level nuclear waste facility is considerably more stringent than that suggested by the International Commission on Radiation Protection or proposed in the United States. European limits are often more stringent than the standard suggested in 1990 by the International Commission on Radiation Protection of 20, and more stringent by a factor of ten than the standard proposed by the U.S. Environmental Protection Agency (EPA) for Yucca Mountain for the first 10,000 years after closure. Moreover, the U.S. EPA's proposed standard for greater than 10,000 years is 250 times more permissive than the European limit.

# Accidents Involving Radioactive Waste

A number of incidents have occurred when radioactive material was disposed of improperly, shielding during transport was defective, or when it was simply abandoned or even stolen from a waste store. In the Soviet Union, waste stored in Lake Karachay was blown over the area during a dust storm after the lake had partly dried out. At Maxey Flat, a low-level radioactive waste

facility located in Kentucky, containment trenches covered with dirt, instead of steel or cement, collapsed under heavy rainfall into the trenches and filled with water. The water that invaded the trenches became radioactive and had to be disposed of at the Maxey Flat facility itself. In other cases of radioactive waste accidents, lakes or ponds with radioactive waste accidentally overflowed into the rivers during exceptional storms.<sup>[</sup> In Italy, several radioactive waste deposits let material flow into river water, thus contaminating water fit for domestic use. In France, in the summer of 2008 numerous incidents happened; in one, at the Arena plant in Tricastin, it was reported that during a draining operation liquid containing untreated uranium overflowed out of a faulty tank and about 75kg of the radioactive material seeped into the ground and, from there, into two rivers nearby;<sup>[50]</sup>; in another case, over 100 staff were contaminated with low doses of radiation.

Scavenging of abandoned radioactive material has been the cause of several other cases of radiation exposure, mostly in developing nations, which may have less regulation of dangerous substances (and sometimes less general education about radioactivity and its hazards) and a market for scavenged goods and scrap metal. The scavengers and those who buy the material are almost always unaware that the material is radioactive and it is selected for its aesthetics or scrap value.<sup>[52]</sup> Irresponsibility on the part of the radioactive material's owners, usually a hospital, university or military, and the absence of regulation concerning radioactive waste, or a lack of enforcement of such regulations, have been significant factors in radiation exposures. For an example of an accident involving radioactive scrap originating from a hospital see the Goiânia accident.

Transportation accidents involving spent nuclear fuel from power plants are unlikely to have serious consequences due to the strength of the spent nuclear fuel shipping casks.

# 8.9.3 NUCLEAR WASTE POLICY ACT

During the first 40 years that nuclear waste was being created in the United States, no legislation was enacted to manage its disposal. Nuclear waste, some of which remains dangerously radioactive with a half-life of more than one million years, was kept in various types of, temporary storage. Of particular concern during nuclear waste disposal are two long-lived fission products, Tc-99 (half-life 220,000 years) and I-129 (half-life 17 million years), which dominate spent fuel radioactivity after a few thousand years. The most troublesome transuranic elements in spent fuel are Np-237 (half-life two million years) and Pu-239 (half life 24,000 years).<sup>[1]</sup>

Most existing nuclear waste came from production of nuclear weapons. About 77 million gallons of military nuclear waste in liquid form was stored in steel tanks, mostly in South Carolina, Washington and Idaho. In the private sector, 82 nuclear plants operating in 1982 used uranium fuel to produce electricity. Highly radioactive spent fuel rods were stored in pools of water at reactor sites, but many utilities were running out of storage space.

The Nuclear Waste Policy Act of 1982 created a timetable and procedure for establishing a permanent, underground repository for high-level radioactive waste by the mid-1990s, and provided for some temporary federal storage of waste, including spent fuel from civilian nuclear reactors. State governments were authorized to veto a national government decision to place a waste repository within their borders, and the veto would stand unless both houses of Congress

voted to override it. The Act also called for developing plans by 1985 to build monitored retrievable storage (MRS) facilities, where wastes could be kept for 50 to 100 years or more and then be removed for permanent disposal or for reprocessing.

Congress assigned responsibility to the U.S. Department of Energy (DOE) to site, construct, operate, and close a repository for the disposal of spent nuclear fuel and high-level radioactive waste. The U.S. Environmental Protection Agency (EPA) was directed to set public health and safety standards for releases of radioactive materials from a repository, and the U.S. Nuclear Regulatory Commission (NRC) was required to promulgate regulations governing construction, operation, and closure of a repository. Generators and owners of spent nuclear fuel and high-level radioactive waste were required to pay the costs of disposal of such radioactive materials. The waste program, which was expected to cost billions of dollars, would be funded through a fee paid by electric utilities on nuclear-generated electricity. An Office of Civilian Radioactive Waste Management was established in the U.S. Department of Energy (DOE) to implement the Act.

# **Permanent Repositories**

The Act required the Secretary of Energy to issue guidelines for selection of sites for construction of two permanent, underground nuclear waste repositories. DOE was to study five potential sites, and then recommend three to the president by January 1, 1985. Five additional sites were to be studied and three of them recommended to the president by July 1, 1989 as possible locations for a second repository. A full environmental impact statement was required for any site recommended to the President.

Locations considered to be leading contenders for a permanent repository were basalt formations at the government's Hanford Nuclear Reservation in Washington; volcanic tuff formations at its Nevada nuclear test site, and several salt formations in Utah, Texas, Louisiana and Mississippi. Salt and granite formations in other states from Maine to Georgia had also been surveyed, but not evaluated in great detail.<sup>[4]</sup>

The President was required to review site recommendations and submit to Congress by March 31, 1987 his recommendation of one site for the first repository, and by March 31, 1990, his recommendation for a second repository. The amount of high-level waste or spent fuel that could be placed in the first repository was limited to the equivalent of 70,000 metric tons of heavy metal until a second repository was built. The Act required the national government to take ownership of all nuclear waste or spent fuel at the reactor site, transport it to the repository, and thereafter be responsible for its containment.<sup>[5]</sup>

# **Temporary Spent Fuel Storage**

The Act authorized DOE to provide up to 1,900 metric tons of temporary storage capacity for spent fuel from civilian nuclear reactors. It required that spent fuel in temporary storage facilities be moved to permanent storage within three years after a permanent waste repository went into operation. Costs of temporary storage would be paid by fees collected from electric utilities using the storage.

## **Monitored Retrievable Storage**

The Act required the Secretary of Energy to report to Congress by June 1, 1985 on the need for and feasibility of a monitored retrievable storage facility (MRS) and specified that the report was to include five different combinations of proposed sites and facility designs, involving at least three different locations. Environmental assessments were required for the sites. It barred construction of an MRS facility in a state under consideration for a permanent waste repository.

#### **State Veto of Site Selected**

The Act required DOE to consult closely throughout the site selection process with states or Indian tribes that might be affected by the location of a waste facility, and allowed a state (governor or legislature) or Indian tribe to veto a federal decision to place within its borders a waste repository or temporary storage facility holding 300 tons or more of spent fuel, but provided that the veto could be overruled by a vote of both houses of Congress.

#### **Payment of Costs**

The Act established a Nuclear Waste Fund composed of fees levied against electric utilities to pay for the costs of constructing and operating a permanent repository, and set the fee at one mill per kilowatt-hour of nuclear electricity generated. Utilities were charged a one-time fee for storage of spent fuel created before enactment of the law. Nuclear waste from defense activities was exempted from most provisions of the Act, which required that if military waste were put into a civilian repository, the government would pay its pro rata share of the cost of development, construction and operation of the repository. The Act authorized impact assistance payments to states or Indian tribes to offset any costs resulting from location of a waste facility within their borders.<sup>[6]</sup>

## Yucca Mountain

In December 1987, Congress amended the Nuclear Waste Policy Act to designate Yucca Mountain, Nevada a permanent repository for all of the nation's nuclear waste.<sup>[7]</sup> The plan was added to the fiscal 1988 budget reconciliation bill signed on December 22, 1987. It set aside a decision Congress made in 1982 which declared selection of a site would be based purely on science and safety, not politics.

Working under the 1982 Act, DOE had narrowed down the search for the first nuclear-waste repository to three Western states: Nevada, Washington and Texas. The amendment repealed provisions in the 1982 law calling for a second repository in the eastern United States. No one from Nevada participated on the House-Senate conference committee on reconciliation.

The amendment explicitly named Yucca Mountain as the only site where DOE was to construct a permanent repository for the nation's highly radioactive waste. Although years of study and procedural steps remained, the investment of an estimated \$1-\$2 billion to test the geological suitability of the site was viewed as a virtual commitment to put the waste there. The amendment also authorized a monitored retrievable storage facility, but not until the permanent repository was licensed.<sup>[8]</sup>

Early in 2002 the Secretary of Energy recommended Yucca Mountain for the only repository and President Bush approved the recommendation. Nevada exercised its state veto in April 2002 but the veto was overridden by both houses of Congress by mid-July 2002.<sup>[9]</sup> In 2004, the U.S. Court of Appeals for the District of Columbia Circuit upheld a challenge by Nevada, ruling that EPA's 10,000-year compliance period for isolation of radioactive waste was not consistent with National Academy of Sciences (NAS) recommendations and was too short.<sup>[10][11]</sup> The NAS report had recommended standards be set for the time of peak risk, which might approach a period of one million years<sup>[12]</sup> By limiting the compliance time to 10,000 years, EPA did not respect a statutory requirement that it develop standards consistent with NAS recommendations.<sup>[13]</sup>

Subsequently it was revealed the volcanic tuff at Yucca Mountain is appreciably fractured and movement of water through an aquifer below the waste repository is primarily through fractures. Future water transport from the surface to waste containers is likely to be dominated by fractures. There is evidence that surface water has been transported through the 700 vertical feet of overburden to the exploratory tunnel at Yucca Mountain in less than 50 years.

The Obama Administration rejected use of the site in the 2009 United States Federal Budget proposal, which eliminated all funding except that needed to answer inquiries from the Nuclear Regulatory Commission, "while the Administration devises a new strategy toward nuclear waste disposal."<sup>[19]</sup> On March 5, 2009, Energy Secretary Steven Chu told a Senate hearing the Yucca Mountain site is no longer viewed as an option for storing reactor waste.<sup>[20]</sup>

# **8.9.4 REREQUISITES FOR RADIOACTIVE WASTE MANAGEMENT**

Hannes Alfvén, Nobel laureate in physics, described the as yet unresolved dilemma of permanent radioactive waste disposal:

"The problem is how to keep radioactive waste in storage until it decays after hundreds of thousands of years. The [geologic] deposit must be absolutely reliable as the quantities of poison are tremendous. It is very difficult to satisfy these requirements for the simple reason that we have had no practical experience with such a long term project. Moreover permanently guarded storage requires a society with unprecedented stability."

Thus, Alfvén identified two fundamental prerequisites for effective management of high-level radioactive waste: (1) stable geological formations, and (2) stable human institutions over hundreds of thousands of years. However, no known human civilization has ever endured for so long. Moreover, no geologic formation of adequate size for a permanent radioactive waste repository has yet been discovered that has been stable for so long a period.

Because some radioactive species have half-lives longer than one million years, even very low container leakage and radionuclide migration rates must be taken into account.<sup>[22]</sup> Moreover, it may require more than one half-life until some nuclear waste loses enough radioactivity so that it is no longer lethal to humans. Waste containers have a modeled lifetime of 12,000 to over 100,000 years<sup>[23]</sup> and it is assumed they will fail in about two million years. A 1983 review of the Swedish radioactive waste disposal program by the National Academy of Sciences found that country's estimate of about one million years being necessary for waste isolation "fully justified."

The Nuclear Waste Policy Act did not require anything approaching this standard for permanent deep-geologic disposal of high-level radioactive waste in the United States. U.S. Department of Energy guidelines for selecting locations for permanent deep-geologic high-level radioactive waste repositories required containment of waste within waste packages for only 300 years. A site would be disqualified from further consideration only if groundwater travel time from the "disturbed zone" of the underground facility to the "accessible environment" (atmosphere, land surface, surface water, oceans or lithosphere extending no more than 10 kilometers from the underground facility) was expected to be less than 1,000 years along any pathway of radionuclide travel. <sup>[26]</sup> Sites with groundwater travel time greater than 1,000 years from the original location to the human environment were considered potentially acceptable, even if the waste would be highly radioactive for 200,000 years or more.

Moreover, the term "disturbed zone" was defined in the regulations to exclude shafts drilled into geologic structures from the surface, so the standard applied to natural geologic pathways was more stringent than the standard applied to artificial pathways of radionuclide travel created during construction of the facility.

## **Repository Closure**

Current repository closure plans require backfilling of waste disposal rooms, tunnels and shafts with rubble from initial excavation and sealing openings at the surface, but do not require complete or perpetual isolation of radioactive waste from the human environment. Current policy relinquishes control over radioactive materials to geo-hydrologic processes at repository closure. Existing models of these processes are empirically underdetermined, meaning there is not much evidence they are accurate.<sup>[28]</sup>DOE guidelines contain no requirements for permanent offsite or onsite monitoring after closure.<sup>[29]</sup> This may seem imprudent considering repositories will contain millions of dollars worth of spent reactor fuel which might be reprocessed and used again either in reactors generating electricity, in weapons applications, or possibly in terrorist activities. Technology for permanently sealing large-bore hole walls against water infiltration or fracture does not currently exist. Previous experiences sealing mine tunnels and shafts have not been entirely successful, especially where there is any hydraulic pressure from groundwater infiltration into disturbed underground geologic structures. Historical attempts to seal smaller bore holes created during exploration for oil, gas and water are notorious for their high failure rates, often in periods less than 50 years.

# 8.10 TOXIC WASTES



Valley of the Drums, a toxic waste site in Kentucky, United States, 1980.

Toxic waste is waste material that can cause death or injury to living creatures. The term is often used interchangeably with "hazardous waste", or discarded material that can pose a long-term risk to health or environment.

As with most pollution problems, toxic waste began to be a significant issue during the revolution. It usually is the product of industry or commerce, but comes also from residential use (e.g. cleaning products, cosmetics, lawn care products), agriculture (e.g. chemical fertilizers, pesticides), the military (nuclear weapons testing, chemical warfare, medical facilities (e.g. pharmaceuticals), radioactive sources, and light industry, such as dry cleaning establishments.

## History

From 1946 to the 1990's, the United States dumped hundreds of thousands of drums in around 50 ocean sites, 50,000 of them near the Farallon Islands, 50km off the coast of San Francisco, where United States toxic waste dumping first took place, performed by the United States Navy, 55-gallon drums were literally thrown overboard, if the drums didn't sink, gunners would open fire on them to create holes, enabling them to sink and increasing the plutonium, uranium and strontium leakage. Other countries dumping waste during this time included; Russia, China, Japan, New Zealand and most European nations.

The main and much publicized goal, expressed by oceanographers during the International Geophysical Year 1957/58, was to study *"the use of ocean depths for the dumping of radioactive wastes."* 

# **Toxic Waste and Cancer**

Toxic wastes often contain carcinogens, and exposure to these by some route, such as leakage or evaporation from the storage, causes cancer to appear at increased frequency in exposed individuals. For example, a cluster of the rare blood cancer polycythemia vera was found around a toxic waste dump site in northeast Pennsylvania in 2008.

Toxic wastes containing organic carcinogens can be destroyed by incineration at high temperatures, which is unfortunately expensive. However, if the waste contains toxic metals or

radioactive toxins, these must be separated and stored, as they — as elements cannot be destroyed.

# **Toxic Waste And Birth Defects**

Children born near toxic waste sites such as factories, landfills, and industrial accidents are often physically deformed or have developmental disabilities. Children are often born with no eyes or teeth, have extra fingers and toes, underdeveloped brains, lesions on their skin, and numerous other serious physical ailments.

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# **8.11** GOALS OF WASTE MANAGEMENT

The main objective in managing and disposing or destruction of radioactive (or other) waste is to protect people and the environment. This means isolating, diluting, or destroying (transmutating) the waste so that the rate or concentration of any radionuclide returned to the biosphere is harmless. To achieve this preferred technology to date has been deep and secure burial for the more dangerous wastes; transmutation, long-term retrievable storage, and removal to space have also been suggested. Management options for waste are discussed below.

Radioactivity by definition reduces over time, so in principle the waste needs to be isolated for a particular period of time until its components have decayed such that it no longer poses a threat. In practice this can mean periods of hundreds of thousands of years, depending on the nature of the waste involved.

Though an affirmative answer is often taken for granted, the question as to whether or not we should endeavor to avoid causing harm to remote future generations, perhaps thousands upon thousands of years hence, is essentially one which must be dealt with by philosophy.

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# **8.12 REVIEW QUESTIONS**

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- 1. Why is waste management a major problem in cities? What factors contribute to the increase in waste management problems in the cities
- 2. What does the term waste treatment mean? Why is treatment important?
- 3. Differentiate between domestic waste and industrial waste?
- 4. Why does the use and disposal of thin plastic bags create problem in the waste management?
- 5. What is the role of the municipality in managing the domestic waste that is generated in this city?
- 6. Explain in what ways we can reduce waste generated in the city.
- 7. What are biodegradable and non-degradable wastes?
- 8. What is the need to regularize hospital waste?
- 9. What are the provisions of the biomedical waste management rules? C
- 10. CASE Familiarize yourself, through field work, with the local problems involved in controlling and regulating the hospital wastes and the problems faced by the hospitals.

# **CASE STUDIES**

#### Structure

- 9.1 Ashok Leyland's ISO 14001 Journey
- 9.2 Six Critical Skills needed to be a successful Environmental Professional in the Global " GREEN" Economy
- 9.3 Solid Waste Disposal
- 9.4 Karnataka Integrated Rural Water Supply and Environmental Sanitation Project, Mysore District

# 9.1 CASE STUDY: 1 ASHOK LEYLAND'S ISO 14001 JOURNEY

The case examines the initiatives taken by leading Indian M&HCV manufacturer Ashok Leyland, to achieve the ISO 14001 certification. The case discusses in detail the need for ISO 9000 and ISO 14000 standards, their components and benefits, and their adoption by organizations. It also explores Ashok Leyland's efforts to transform its manufacturing practices to achieve ISO standards.

#### **Issues:**

Explore the benefits reaped by Ashok Leyland through the modification. The leading Indian manufacturer of Medium and Heavy Commercial Vehicles (M&HCV) Ashok Leyland Limited (ALL) was formed in 1948 as Ashok Motors Limited (AML). The company initially assembled cars and manufactured diesel engines and vehicle chassis at its Ennore plant in the state of Tamilnadu. In 1950, AML entered into an agreement with British Leyland for assembling Leyland commercial vehicles through Land Rover Leyland International Holdings Limited (LRIHL). In 1954, British Leyland bought equity in AML. Subsequently AML's name was changed to Ashok Leyland Limited. From the same year, the company started using Leyland designs for its products. In 1966, ALL became the first company to introduce full air brakes in the country. The following year, it became the first company to introduce double-decker buses on Indian roads. Over the next few years, ALL went on to establish itself as a strong player in the Indian M&HCV markets. In 1980, ALL established a plant at Hosur (Tamilnadu) for manufacturing engines and assembling heavy duty and special vehicles.

#### All's ISO 14001 Experience:

The Geneva based International organization for standardization (ISO) was formed in 1947 as a non-government organization. It is a worldwide federation of national standards bodies from around 90 countries. The body promotes the development of standardization and related activities to facilitate the international exchange of goods and services and develop intellectual, scientific, technological and economic cooperation. Standardization at an international level was needed to reduce technological barriers.

Since the 1960s, ALL had shown strong commitment towards eco-friendly manufacturing practices. It had replaced the potentially harmful shot blasting technique used for surface

cleaning treatment of rough materials and heat treatment scaling at the Ennore unit with the sand blasting technique which resulted due to non-harmonized standards for similar technologies worldwide...

Heavy-duty dust collector machines were placed to collect the blasting dust from the machines, and this dust was sent to other companies for making firecrackers. In 1980, ALL stopped using harmful chemicals like sodium cyanide by modifying the processes involved. It thus eliminated the production of poisonous waste...

# Technology

ALL started a round-the-year awareness program for reducing emissions from engines by conducting pollution checks. Action programs were held at operators' meets and campaigns. It also launched a mobile emission clinic that operated on highways and at entry points to the national capital, New Delhi. This clinic carried out tests for emission levels, recommended remedies and offered tips on maintenance and care of the vehicle...

# Processes

ALL constantly reviewed its manufacturing processes and frequently modified/replaced the existing manufacturing processes with eco-friendly processes. Some of the modifications carried out to make its processes environment friendly were: Scrubbers collected paint particles on the paint shop floor to avoid exposure and adverse reactions.

ALL eliminated the use of certain chemical compounds at its Ennore plant after they were identified as ozone depleting substances...

# **Effluent Treatment**

The effluent treatment process at ALL aimed at treating the waste generated to produce usable by-products and safe disposal of unused water. ALL established effluent treatment plants at all its manufacturing units. At the Ennore plant, around 1.28 million liters of treated water was discharged everyday. Effluent plants at Hosur I was ranked on par with the most modern plants. These plants could perform primary, secondary and tertiary treatment operations.

# **Bottom of Form**

## Greening

ALL's management allotted a certain percentage of land on its campuses for greening purposes. Of the total 53.41 hectares ground area of the Ennore Unit, around 10% was used for planting trees, landscaping and maintaining lawns. In order to increase awareness about housekeeping and environmental activities among employees, the 'Ezhil Migu' (full beauty) project was initiated at the Ennore plant.

A contest was conducted every year to reward the best workplace environment. Around 15 zones were identified, and each zone was divided into areas. An area consisted of around 50 employees led by 2 coordinators and 4 Leaders.

# **Energy Conservation**

ALL undertook various measures for energy conservation. At the Ennore plant, the following energy conservation methods were adopted.

A control circuit modification was done on 265 machine tools that were used to switch on a coolant motor without switching on any other motor. This enabled energy c

## **Reaping the Benefits**

Conservation, as no other motors were required for running the coolant on holidays... Replacement of chemical fertilizers with the manure extracted from sludge resulted in savings of Rs. 1, 65,000 per annum for the Ennore plant. According to company sources, on an average, around 250,000 liters of recycled water was pumped into the garden and other greening initiatives, saving the company Rs 15 million per annum. The company's energy conservation efforts resulted in reduction in energy required for heat treatment by 70%. As a result of all these initiatives, ALL reportedly saved around Rs 70 million per year.

#### 9.2 CASE STUDY: 26 CRITICAL SKILLS NEEDED TO BE A SUCCESSFUL ENVIRONMENTAL PROFESSIONAL IN THE GLOBAL "GREEN" ECONOMY

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By Stephen Hinton

Courtesy of Hinton Human Capital, Originally Published MAR. 2009

The "Green" economy is on the way and America has a shortage of environmental professionals. As the stimulus package takes effect, companies will need these professionals to have well rounded skills and the ability to produce results. If you are looking to get hired early in the American economy's "Green" upswing, it is vitally important that your resume showcases your achievements, experience and skills in at least three of the following six skill areas:

- 1. The ability to create and manage business relationships: In the economy, money follows relationships. Top environmental professionals use their expertise and interpersonal skills to create beneficial relationships with the clients, stakeholders and sponsors of a project. While they may not always be the key person in the sales relationship, their ability to communicate technical information in layman's terms and management of expectations will play a critical role in delivering a successful and profitable product, service or solution.
- 2. Strong Technical skills: Top professionals will have to understand and execute basic and advanced skills required for their projects. The economics of the profession and a shortage of support staff are requiring that environmental professionals become "Seller/Doers" in a corporate setting or as an entrepreneur
- 3. Financial Management: The "Green" economy will attract investment from many new funding sources. Environmental professionals will need a better understanding the financial objectives of their managers, clients and stakeholders. They need to know how to manage budgets and can present their ideas using Return on Investment (ROI), Internal Rate of Return (IRR) and other financial calculations. These skills will be important since

many projects will require private investment and these investors will require higher level of financial transparency.

- 4. Management: Managing takes leadership, empathy, adaptability and diplomacy. Top environmental professionals will be concerned with managing people, processes and policy; efficient use of resources and ethical business practices. The "Green" economy will be global and these professionals will have to be adept at organizing tasks, managing people and interpreting the new domestic and international environmental regulations to deliver profitable projects. Their clients will implicitly trust their judgment to help them navigate the "Green" political landscape.
- 5. Strategic Leadership: Top environmental professionals anticipate new markets, customer needs and new applications for their product or service. For them, it is not enough to build the solution for today's problem but to develop the next generation of upgrades, patches and innovations before the market moves.
- 6. Foreign Language: The "Green" economy will be global. Those who can conduct business (Read, speak and write) in the native language of their clients will see great success. Particular languages to learn are Arabic, French, Mandarin, Russian and Portuguese and Spanish.

# 9.3 CASE STUDY: 3 SOLID WASTE DISPOSAL

Topic: Solid Waste Disposal Geographic Area: King County, Washington, USA Focal Question: Can economic incentives be successfully used to control solid waste disposal and promote recycling? Sources: The Environment Goes to Market, National Academy of Public Administration, Washington, DC. Pages. 113-138. July 1994. <u>http://www.wa.gov/ecology/swfa/5thannualintro.html 5/1/97</u> <u>http://www.metrokc.gov/dur/swd/swdinfo/swdsvsg.htm 5/1/97</u> Reviewer: Robert T. Doak, Colby College '97

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# Review

The issue of solid waste disposal has plagued many communities throughout the United States. In King County, Washington, this was the case in the 70's and early 80's when landfills were being filled at an alarming rate with little attention paid to the environmental consequences. As many of the landfills were closed due to full capacity, or closed due to environmental problems, more pressure was placed on the few remaining landfills. The largest and most frequently used of these was the facility in Cedar Hills, a small community in the northern part of the county. In 1986 the county, whose population is comprised by Seattle and surrounding communities, was forced to immediately rethink its solid waste policies due to the closing of several disposal sites and the resulting shorter expected life of the remaining sites. Initially the idea of building incinerators was viewed as the best possible solution to the mounting problem of excessive sold waste.

In 1987 when the proposal was released, along with a list of possible incineration sites, citizen groups quickly formed to combat the proposed locations with a common "Not in my backyard" approach. By 1987 public sentiment caused local administrators to back away from their plan to build incinerators at four sites attempting to remedy the landfill dilemma. In 1989 the state legislature passed the "Waste Not Washington Act" that established waste reduction and recycling programs as the first two priorities of the solid waste program with incinerators as a back-up plan. To make this happen King County had to prepare a new local solid waste management plans to include waste reduction and recycling activities. Financial assistance was granted by the state to the county to aid in preparation for implementation of the new solid waste plans.

Immediately the county began to institute waste reduction programs and recycling efforts with a goal of 50% of all solid wasted being recycled by 1995. In the city of Seattle the goal was 65%. By 2000 the county as a whole set 65% recycling of solid waste as its goal. In order to accomplish this goal King County used a few different devices to reduce the flow of solid waste into the landfill.

The first and possibly the biggest economic incentive implemented was variable rate curbside pick-up. In this system a higher fee is charged for the second trash bin collected as opposed to a flat rate. The standard rate for King County is rates to be 40% higher for a two bin pick-up than a one bin pick-up. In the city of Seattle the mark-up for two bins is much higher at around 100%. Besides variable curb side pick-up, higher tipping fees provided similar incentive to increase recycling and reduce waste.

Tipping fees have risen four-fold in some sites since the early 1980's. The revenue collected at the landfills from the higher tipping fees were primarily used to clean-up existing landfills and create a reserve fund for incinerators. Revenues collected from the variable cost collection system went into the hands of the county or private firms who contracted out for waste disposal. The revenue collected by the county was used positively for expanding the administrative and field staff of the waste department along with new educational and research programs to reduce waste and promote recycling.

Another incentive arose from the dramatic increase in the amount of materials recycled. Unfortunately, markets for recyclables, such as green glass and newspapers, quickly became glutted making prices drop sharply. As a result, the county and state began efforts to develop markets for recycled goods. The future success solid waste disposal program in large part depends on whether or not markets can be developed.

One of the anticipated initial barriers to King County's campaign to promote recycling and reduce solid waste was the market to support recyclables was not large enough to handle the inflow of recyclable materials. Another barrier to the county was the lack of control over 40% of the waste stream because businesses could not be forced to participate in the program. The last concern was over the scarcity of information in regards to the steps taken by the waste reduction and recycling programs, dramatic differences in opinion exist in respect to their effectiveness.

The results of the new policies have been quite successful. In the span of 5 years between 1987 and 1992 the amount recycled increased from 18.3% to 35%. The tonnage of solid waste generated is expected to continue increasing as population increases, but this will be counteracted by an expected increase in recycling so that the total tonnage of solid waste disposal will decrease after 1992 and continue to do so for the next decade.

YEAR	TONS	TONS	TONS	PERCENT
	GENERATED	DISPOSED	REDUCED/RECYCLED	REDUCED/RECYCLED
1987	989,500	808,000	181,000	18.3
1988	1,038,500	813,000	225,500	21.7
1989	1,138,500	838,500	305,000	26.4
1990	1,258,500	890,500	368,000	32.1
1991	1,346,500	914,000	432,500	32.1
1992	1,410,000	916,500	493,500	35
1993	1,491,500	895,000	596,500	40
1994	1,578,000	868,000	710,000	45
1995	1,669,500	834,500	834,500	50
1996	1,766,000	830,000	936,000	53
italicized years indicate predicted				
figures				

KING COUNTY MIXED MUNICIPAL SOLID WASTE FIGURES AND PROJECTIONS

The 1995 goals of the county to achieve a 50% recycling rate was not reached, but the 43.5% recycling rate was by no means a disappointment for King County. In fact, many commodities are exceeding the 50% solid waste overall target recycling rate showing a broad base to the recycling effort. Some of the commodities include: ferrous metals 74%, newspapers 65%, and corrugated paper 62%. Commodities not achieving the 50% recycling rate goal included aluminum cans 47%, yard waste 49%, and non-ferrous metals 43%.

The types of solid waste entering the landfills of King County are changing as well. Previous to the "Waste Not Washington Act," moderate risk waste (MRW) constituted about 1% of the waste stream, which had potentially toxic effects on groundwater when disposed in landfills and on air when incinerated. Increased planning efforts, educational efforts, collection efforts, and fixed handling facilities for MRW as a result of the Waste Not Act have been successful in reducing the amount entering landfills. In 1995 almost 17 million pounds collected by the 39 fixed MRW facilities throughout the state.

The use of economic incentives has proven to be effective in the reduction of solid waste and the increase in recycling. Higher collection and tipping fees can be an effective way of raising revenues to financially support waste reduction plans and higher waste management budgets.

# 9.4 CASE STUDY: 4 KARNATAKA INTEGRATED RURAL WATER SUPPLY AND ENVIRONMENTALSANITATION PROJECT, MYSORE DISTRICT

By P. Sivaram and M.J. Mohan Rao

#### Objectives

- To analyze the planning and management aspects of integrated Rural Water Supply and Environmental Sanitation project (IRWS & ES)
- To examine the problems and constraints of management and distil management lessons for understanding the performance of IRWS & ES project.
- To analyze the extent and quality of community participation in the project.

#### Methodology

Participatory Rural Appraisal (PRA) tools such as semi structured interviews transect and focus group discussions were used to gather information and insights into the project. In the process, discussions were held with key project officials at different levels, representatives of NG0s involved, non-official functionaries and beneficiaries of the project. The project details were also collected from the District Project Management (DPM), DPMU of IRWS & ES project, and the key functionaries of NG0s like Symbiosis of Technology Environmental Management (STEM, Mysore Resettlement and Development Agency (MYRADA) and Jagadguru Sivatriswara Swamy (JSS) at Mysore.

Discussions were held with 18 presidents of VWSCs, 40 project beneficiaries having piped water household connection, street taps/stand posts, 16 project co-coordinators, engineers and maintenance staff. The main purpose of contacting officials, non-officials and beneficiaries was to understand their role in the planning and implementation of the project. Secondary data relating to the project were also collected from the concerned offices. The findings were analyzed through Strengths, Weaknesses, Opportunities, and Threats (SWOT) -analysis to understand the major characteristics of the project, and their implications for effective management and sustainability both in the present context and that of the future.

## **Study Area**

Mysore, one of the 12 IRWS & ES project districts in Karnataka, was selected for the study as all project components are said to have been implemented and that the process of handing over of the village drinking water systems has begun. Field work was done in seven project villages, namely, (1) Kadakola, (2) Sindhuvalli, (3) Antharasanthe, (4) Masahally, (5) Bachegowadanahally, (6) Sathekala and (7) Doddakavalande between August and December 1999.

## Findings

- Water Supply, Environmental Sanitation and Health Communication has been integrated in one investment package for the first time in the state of Karnataka.
- Women's participation was greater in the project activities. This was one of the project strengths, which was stressed by the World Bank on gender oriented approach for effective O&M.
- Government collaborated with NG0s and private consultants/agencies which was an innovative experiment.
- Community actively participated in the project activities.
- Stand-post committees are formed in the project villages. Most of the committee members are women from nearby houses who are utilizing the stand-post but also economic use of water.
- Street-level committees were also formed in the project villages for monitoring and upkeep/cleaning of drainage system on a regular basis.
- The Information, Education and Communication (IEC) components are strong in the project villages. As part of IEC, pamphlets folders distributed and messages on the walls regarding safe water, sanitation and hygiene practices were written. Regular house visits, street corner group meetings, video film shows and folk media programmers were also organized.
- To make the people own the project, it was made mandatory for them to share 30 per cent of the drainage cost and to execute the system.
- Nominal charges of around Rs. 30 to Rs. 50 per month for individual private house connections and Rs. 10 for households who use the facility of public tap are being collected.
- There was a gradual increase in the overall health status of the villagers after providing quality water through the project.
- NG0s like MYRADA, JSS and STEM which have wide experience in the drinking water and sanitation related projects were involved in the implementation of the project.
- Rainwater harvesting was included in the project to maintain constant ground water recharge at source for sustainable water supply.
- Training of local youth for O&M not only provided employment but also helped to run the local IRWS & ES systems better.
- Assured supply of safe drinking water saved a number of family man days for women and children in terms of fetching water from distance places which resulted in augmenting employment opportunities and family income.
- Through subsidy people were encouraged to adopt individual sanitary latrines. (Subsidy Rs. 1200 for general category: Rs. 2000 for BPL category).

#### **Policy Implications**

- The Innovative components of this project would help in replicating the project in other uncovered problem villages/districts within and outside the state.
- The project and its attendant benefits (e.g. time saving through piped water supply) would help reduce the absence/school dropout rate and thereby increase the literacy levels in the long run, especially of girl children. More schools can be started.
- The project helped in saving family labour and enhancing of family incomes. This would help the Government to take up more rural development projects and provision of infrastructure facilities.
- A good example in encouraging NG0s in any rural development related projects.
- Also an experience to make mandatory to adopt water conservation/harvesting strategies for sustainability in all drinking water related projects.

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