Environment Analysis and Management

Dr. C.V. Raman University
Kargi Road, Kota, BILASPUR, (C. G.),
Ph. : +07753-253801, +07753-253872
E-mail : info@cvru.ac.in | Website : www.cvru.ac.in

Institute of **Open** and **Distance Education**

Faculty of Management

Environment Analysis and Management

1MBA4

DR. C.V. RAMAN UNIVERSITY

Chhattisgarh, Bilaspur

A STATUTORY UNIVERSITY UNDER SECTION 2(F) OF THE UGC ACT

1MBA4

Environment Analysis and Management

1MBA

Environment Analysis and Management

Credit-2

Subject Expert Team

Dr. Vivek Bajpai, *Dr. C.V. Raman* University, Kota, Bilaspur, Chhattisgarh

Dr. Rajeev H. Peters, *Dr. C.V.* Raman University, Kota, Bilaspur, Chhattisgarh

Dr. Niket Shukla, *Dr. C.V. Raman* University, Kota, Bilaspur, Chhattisgarh

Dr. Satish Sahu, *Dr. C.V.* Raman University, Kota, Bilaspur, Chhattisgarh

Dr. Archana Agrawal, *Dr. C.V. Raman* University, Kota, Bilaspur, Chhattisgarh

Dr. Vikas Kumar Tiwari, *Dr. C.V. Raman* University, Kota, Bilaspur, Chhattisgarh

Course Editor:

- **Dr. Preeti Shrivastava, Associate Professor**
  Ravindra Nath Taigore University, Bhopal (M.P.)

Unit Written By:

1 **Dr. Archana Agrawal**
Associate Professor, Dr. C. V. Raman University, Bilaspur, Chhattisgarh

2 **Dr. Preeti Shukla**
Associate Professor, Dr. C. V. Raman University, Bilaspur, Chhattisgarh

3 **Dr. Satish Kumar Sahu**
Assistant Professor, Dr. C. V. Raman University, Bilaspur, Chhattisgarh

Published by: Dr. C.V. Raman University Kargi Road, Kota, Bilaspur, (C. G.), Ph. +07753-253801,07753-253872 E-mail: inf o@cvru.ac.in Website: www.cvru.ac.in

CONTENTS

BLOCK – I

UNIT

1

Introduction

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ❒ 1.1Sustainable Development
- ❒ 1.2Other Fundamentals of Environment and Development
- ❒ 1.3Study of Environmental Management In Management Schools

1.1 SUSTAINABLE DEVELOPMENT*

Environmental management is most important, yet it is most neglected discipline. It is closely linked with national development and economic growth in fact it relates to life support system. At times the two (development and environmental management) become irreconcilable. Today, we stand at the crossroads in choosing between environment and development. The industrial countries have achieved high level of development and decent standard of living at the cost of environment and depletion of natural resources. The question is how long this kind of development will be sustainable? The developing countries on the other hand are still struggling to attain a minimum standard of living though they are also contributing to environmental damage.

Thus both the industrialized countries and underdeveloped or developing countries, damage, deplete and pollute the environment; former out of greed and luxury, and the latter out of need. The developing countries need growth to fulfil the basic needs of their people, but should they repeat the mistakes of the industrial countries? It is a fact that life-style of people has relevance to environmental problems; therefore living habits and attitudinal and ethical questions have now entered into the environmental management area. These issues sometimes, become controversial and need a deeper study to help us in understanding the environmental problems.

The basic question that haunts us is what is the pattern of growth and development we must follow? What is the kind of model of development and the business model we ~~should follow so that we~~ don't ignore the principles underlying sustainability? For this,

* Ecology means relationship of living beings (plants, animals including human) among themselves and with their surroundings)

we need changes at local, national, regional and global levels together with an economic and social transformation at the level of individuals and communities.

Sustainable development is a concept. It underscores that rate of consumption or use of natural resources should approximate the rate at which these resources can be substituted or replaced. It further requires that a nation or society is able to satisfy its requirements - social, economic and others - without jeopardizing the interest of future generations. It is believed, that countries of North (developed countries) use too many of natural resources and such practice cannot continue long. Nature has been offering its resources and services and also serving as a receptacle for absorbing wastes for too long a time. Realization must come to us that nature today is fragile. Nature is finite. The experts have evidence to prove that we have almost reached a critical threshold beyond which ecological decline would lead to disaster. But these experts do not always have a say in policy matters. They may advocate "limit to growth" philosophy but they are standing against those who believe that modern economy, with market regulation and backed by technological innovations will be panacea for worsening ecological situation* .

Developing this concept of sustainable development further, we must include in its ambit what is called the principle of justice and equity (equal distribution) between the peoples of North and South. This means that both the national leaders and international institutions have responsibility for sound developmental, economic and environmental issues, keeping in view the principle of equity, and those principles that determine the intergenerational inequities.

Another aspect of sustainability is that it is about systems analysis i.e. how economic, social and environmental systems interact at various scales of operation in a way that would lead to sustainable development that strikes optimal balance among the three sub-systems. In essence objective of sustainable development is to reduce poverty of people in developing countries by means that minimize resource depletion, environmental damage and social instability.

To sum up, sustainable Development thus means concerns for protecting environment and avoiding depletion of non-renewable resources. It requires shifting from reliance on one resource to another. Secondly, it refers to equity i.e. equal access to resources. Accordingly it is futile to talk about environmental problems and sustainable development if the problems of inequality and poverty are ignored and the principle of intergenerational distribution of resources is not observed. Finally systems thinking cannot be ignored.

1.2 Other Fundamentals of Environment and Development

Population and Its Implications

Ir is known that population growth and economic development are affecting the environment. The interplay between population growth, resource depletion/

environmental damage has been debated much. There are those who think that high population growth causes stress on environment, and there are those who put more blame on economic development, industrial and agricultural practices resulting in environmental damage. The fact is that both population growth and unsustainable economic development are cause for concern especially in developing countries.

There is relationship between population growth and environmental damage but it is very difficult to prove a disprove the effect of population on the environmental damage. We may recall famous Eirlich Equation:

I = P x A x T

I = Impact on environment.

P = Population

A = Affluence (consumption)

T = Technology coefficient.

As mentioned above, sustainable development is about integrational equity. But if future equity is of great concern, it is not legitimate to ignore the equity occurring during the present generations in different parts of the globe. Sustainability should, therefore, reflect equity, environmental concerns and social responsibilities regardless of time or location.

India's population is going to touch one billion mark. We are adding more than one Australia in terms of population each year. Have we devised developmental programmes that commensurate with this increase? If not, population factor alone would have significant contribution toward degradation of environment and resource depletion. More people mean more pressure on resources, more consumption of energy, more production of wastes, including greenhouse gases-all having adverse effects on environment. Though population growth has slowed down, it has to be stabilized at still lower level.

Population, Development and Ecosystem – India

• World population reached		• It is expected to reach	
One	Billion in 1804.	Seven	Billion in 2013.
Two	Billion in 1927.	Eight	Billion in 2028.
Three	Billion in 1960.	*Nine	Billion In 2028.
Four	Billion in 1974.	• India's population may reach	
Five	Billion in 1987.	1.2	Billion in 2016 increasing by 16-17 million each year.
Six	Billion in 2000.		

* There is also high projection of 11 billion by 2050 and low projection of 7.5 billion in 2040.

Limits to Growth

It is a fact that we will not be able to 'manage' the environmental crisis unless people change their attitude, consumption patterns, manufacturing, marketing and get into a technological world that is less intensive in its use of materials and energy. It is also a fact that improvements in efficiency alone will not be enough. The economies till recently are following a policy that assumes growth as an infinite variable. They are not mindful of what is called carrying capacity concept. The world now is desperately trying to keep pace with the environmental problems it has been creating as a result of above policy.

Take the case of climate change (global warming). It can only be combated if the world can make a rapid transition to a non-carbon energy economy because then the limitations of environmental concerns posed by a carbon energy economy would have lessened. The nations of the world would then have almost unlimited environmental space in the foreseeable future to use alternate source of energy for their economic growth. Therefore, the world needs an international mechanism that not only provides incentives to all nations to live within their entitled amounts but also helps to promote a rapid transition to a non-carbon energy economy.

Continuing this concept further, one can argue that there is considerable 'scope for dematerialization' and 'de-energisation' without a decrease in living standards. But this will not happen unless it is promoted through changes in the fiscal system which supports appropriate technological improvements. Also, it will not happen if principle of sufficiency is ignored. We have to set a level of sufficiency i.e. this much and not beyond it.

As Sachs, a German scientist puts it, "I would like to make a difference between an ecology of means and an ecology of ends. There is so much leeway in the ecology of means that many people are singing praises of the efficiency revolution. Of course, we can save nature by using our resources more efficiently. But only for a certain time. It is obvious that in the last 20 years, the fuel efficiency of cars has grown enormously. Nevertheless, the problem of cars is far from being solved. Because while efficiency grew, the number of cars and the power of cars also grew. The conclusion ? An ecology of means has to be accompanied by an ecology of ends...the efficiency revolution will remain counterproductive if it is not accompanied by a sufficiency revolution. Nothing is as irrational as running with high speed and with utmost efficiency but in the wrong direction."

The problem with the issue of sufficiency is that its concept is very different from the issue of efficiency. The goal of efficiency will be easy for governments of developing countries to accept especially if industrialized countries are prepared to provide financial assistance and technology transfer to achieve the goal. But for the latter to accept sufficiency – in other words, a limit on growth – will not at all be easy because they will not be able to sell the idea to their populations who are constantly being fed the dream that they will all live in prosperity. The idea of sufficiency may become saleable only if there is a global agreement that all societies will strive towards a common convergence

point on a per capita basis. In other words, sufficiency will be possible only if , one day, the world is prepared to reach an international agreement on limits to growth and so to say, that we have fixed our a level of greed and no more. While an agreement on global limits to growth may take a long time to come, the use of economic and political policies if adopted by all the nations of the world, can definitely help them to move towards greater sustainability within a globalized economy.

For ensuring the sustainable use of global common systems, a separate set of policies would have to be adopted. It has to be a system that provides for the establishment of equitable entitlements or property rights to provide economic incentives to those who use this environment space in a sustainable manner and disincentives to those who use it in an unsustainable manner. Within a globalised economy, those who consume more than their fair share of the world's environmental space would thus have to pay for the extra space they want to use from those who do not consume their full share. In this way, the world will begin to 'value the unvalued commons'. In the case of the global warming problem, the answer would be in establishing equitable entitlements to the common space and carbon emissions trading mechanism which helps to penalize those who want to consume more than their entitlements and reward those who do not use the full share of their entitlements.

The world's knowledge system does not protect the biological knowledge of the local communities which reduces their interest in their local biodiversity resources. If this knowledge was protected and, thus, valued, then the interest of these communities and biodiversity-rich nations in their biological resources would also increase.

The world faces an enormous challenge in the coming years. But the world's civil society and changing social system will have the capacity to turn around to convince all the stakeholders that nature has its own rules and it will take its revenge if its capacity is stretched too much.

Energy Production Balance and Trade

Energy crisis is familiar to everyone. It was a great shock, especially to narions like USA when Arab Countries in response to their war with Israel cut off supplies of oil to United States. This was in early 1970's. Developed countries are highly energy consuming nations and had to face a situation that never occurred before; there were long lines at petrol stations, something like what is experienced for CNG vehicles in Delhi in 2002. Whether or not the non OPEC (Organization of Petroleum Exporting Countries) realize that their energy resources are controlled by others is an important question to probe. Whatever, the answer, the perceptions about energy have changed since 1970's. In fact not only perception, but very foundation of industrial society is being questioned. Although very important, the other problem about the consequences of too much of utilization of energy, namely the emissions in the form of noxious gases was not addressed in 1970's – the problem of pollution and global warming.

The crisis of 1970's ended when some of the OPEC members lifted the ban to gain a greater share of US market. The crisis did end but people in the developed world did

realize that the depletion of fossil fuels is a reality. It was thought that crisis can reoccur at anytime and that there is no one solution to energy crisis because the problem is multi-dimensional involving not only innovations in technology but also political and social issues.

Energy Production and Balance

Energy is derived from non-renewable and renewable resources and the former are in the process of depletion. These are fossil fuels – oil, coal and natural gas. It took millions of years to build up these resources. Renewable resources are solar energy, wind energy, water energy and biomass. Approximately 80% of the world's energy is produced by fossil fuels. However, in France, the French Atomic Energy Commission established nuclear reactors which produced enough energy to meet 70% of country's energy requirement. How much energy was available, how much is available and how much will be available? To answer these question is not an easy task. Change in energy balance of earth is based on activities of human specially emission of Carbon dioxide (CO2) from fossil fuels. Today, concentration of CO2 and other greenhouse gases is increasing. It is estimated that CO2 is increasing at the rate of 0.5 percent per year. This rate would be twice if there were not large tracts of vegetation which absorb CO2. Further, there is still uncertainty about how much of CO2 we produce in future will be absorbed by vegetation. It is quite possible that we have under estimated the capacity of earth to absorb excess carbon.

Estimating fossil fuel resources or fuel resources in general is difficult. The most abundant sources of oil reserves and production are in middle East especially, South Arabia. This region has nearly half of the world's recoverable resources. All fossil fuel resources are in the process of depletion because of great demand both by developed and developing countries. The trade pattern of these fuels would be determined by the demand and supply factors. World demand for oil according to UN reports rose from 436 million tons in 1960 to 2189 mill. tons in 1970 and to 3200 mill. ton in 1999. The corresponding figures for coal are 1043, 1635 and 2146 and for Natural Gas the figures are 187, 1022 and 2301. The demand will continue to grow in developing as well as in developed countries. Of the developing countries China has the highest per capita consumption of energy which, of course, is much lower than per capita consumption in USA. For India, per capita consumption is lower than that of China. It may be mentioned that consumption figures represent commercial energy and does not take into account the non-commercial energy used by developing countries where poor people use wood that is acquired by gathering without any payment. So far as the supply is concerned, it may be noted that oil is the dominant fossil fuel for energy supply. It is only fuel for all kind of transports. Supply comes from OPEC countries and among these South Arabia supplies a major chunk. It is the OPEC countries which became rich by their exports. The money earned by them is termed as petrodollars. The importing developing countries always would feel the impact of oil shortage and rising prices with the result that their oil bills would soar very high leading to drain on foreign exchange reserves.

Although OPEC countries do not control the market today they are indispensable so far as trade of crude oil is concerned. As long as world has a need for energy, OPEC still hold the key for trade and balance.

Renewable Energy Resources : (Non conventional)

As mentioned above, renewable energy resources are solar, wind, biomass (specially wood) and hydropower. The developed countries are interested to use and explore the possibility of increase in non conventional resources especially for environmental reasons. The developing countries do so for economic reasons.

Among non-conventional resources, hydropower is the largest. Hydropower projects are in operation both in developed and developing countries - notable among the latter are China, India and Brazil. Hydropower potential is huge and at present only 15 per cent of the potential in the developing world is being utilized.

Wind power has also a great potential. Wind mills and sails have been in use since ancient times. It is a fast-growing resource. In 1980's, wind energy generation of the world was 10 megawatts in the year 2000 it was 14000 megawatts. According to World Watch reports, wind turbines installed in 1999 were worth over 3 billion US dollars all over the world and it supported 86000 jobs. Germany dominated wind installations in 1999 providing in windy regions upto 10% of country's electricity. Greenpeace International estimates that if the present trend continues, wind power could supply 10% of worlds electricity by 2020.

Solar Power mostly come from Photovoltaic Cells. The Photovoltaic News reported that World's Photovoltaic production climbed from 0.1 megawatts to 200 megawatts in 1999. Exports to increase the use of Solar Power in developing countries are being made by the governments helped by International agencies.

The biomass resources are various types of cultivated or uncultivated vegetation. Wood form the chief resource and is the primary fuel for the poor people in Africa and Asia. Excessive use of wood has led to depletion of forests, harvesting is exceeding the annual growth.

Energy Production and Fossil Fuels

Any attempt to tackle environmental, developmental and economic issues must take into account the various aspects of energy resource. At Rio Conference (1992) a clear message came that a new approach to energy management was required. So far as the demand side is concerned there is growing recognition that some of the most cost effective methods for sustainable energy development involve improving end-use efficiency by providing same energy service with less energy inputs or achieving more energy services for the same energy output. There is an urgent need to improve energy efficiency especially in industries like iron and steel, refineries, paper and pulp, cement and chemicals; because these constitute 45% of industrial energy consumption. So far as supply side of energy is concerned, attention is to be paid to energy production from primary sources, and reduction in harmful emissions.

Some important developments in energy management are:

- The contribution of natural gas to energy management is a significant step.
- Similarly advanced technologies for electric power generation has resulted in energy efficiency gains.
- Fuel cells that combine hydrogen and oxygen electrochemically to produce electricity, water and heat with ineligible emission.
- Biomass is another source of energy. It has environmental implications and its use is being examined after taking into consideration the biodiversity and pollution effects aspects.
- Photo Voltaic power is another source of energy which is used in many small scale industries and domestic sector. Photo Voltaic (PV) cells trap solar energy to produce electricity.

Energy conservation and efficiency is matter of concern for the industry and therefore, becomes an important environmental issue. Energy management involves not only conservation and efficiency but also involves search for alternative sources. Energy management is now an important career option too.

Energy Scenario and Environment — India

Energy is an essential need for human existence. There is shortage of energy due to fast depletion of fossil fuels and the increase in demand for energy due to the increase in population and the growth of industry. The energy demands are increasing while conventional energy sources are diminishing at a much faster rate.

Take for example the generation of electricity. The present mode of electricity generation all over the world is largely dependent on fossil fuels. The consumption of fossil fuels for power production is expected to continue rising steadily in India. Experts have estimated that the availability of coal will be only enough for another 100-200 years while the oil sources at the present rate of consumption are only expected to last for another three decades or so. Energy shortages are expected to double in the next decade. A shortfall of 50,000 MW by the year 2004 has been estimated. It is estimated that a capacity of 6500 MW per year will be required to be added until 2010 to meet the shortfall. Against a planned addition of 30,000 MW during the Eighth Five Year Plan, the actual capacity addition was a dismal 19,000 MW for the country.

The rising energy demand has resulted in the setting up of more power plants which are based on primarily fossil fuel (coal, oil or gas). The fossil fuel based plants not only emit Green House Gases like Carbon Dioxide (CO_2) but also generate Fly-Ash-which is dangerous to human health. The emission of CO_2, the main Green House Gas, is expected to surpass that of the OECD Countries by the year 2015. Hydro plants have also been installed to generate energy but these plants also create problems like Human Displacement and are damaging the ecosystem.

At Rio Summit, an agreement committed governments to prepare national strategies to attain CO_2 targets set at the conference. The Framework Convention on Climate Change (FCCC), which was

Contd...

drafted at the Summit in Rio, has now been ratified by almost all the countries involved. These countries have committed themselves to achieve stabilization of Green House Gases concentrations in the atmosphere at a level which would prevent dangerous interference with the Climate System. The stabilization requires long term measures to lower the emission of Green House Gases in particular that of CO2 from energy use.

Kyoto conference on Climate change, held in 1997, has achieved the world's first climate protection protocol containing legally binding targets for Green House Gas reduction by the industrialized countries. If implemented seriously, this would reduce fossil fuel consumption for the industrialised nations. In the first phase between 2008 and 2012, the industrialised nations are to reduce Green House Gas emissions by an average of 5.2% from 1990 levels. For the European Union and several Eastern European countries the target is 8 percent, for USA 7% from 1990 levels; for Japan, Canada, Hungary and Poland is 6%.

If the fossil fuels are to be minimized alternative sources of energy have to be found. The option that could be pursued is that of using Renewable Energy which is expected to contribute as much as 6-10% of the World's Primary energy requirement in the year 2020. However, the potentials are much greater. Most renewable energies substitute for conventional fossil fuels. Renewables, help to reduce emissions. Another way in which renewables protect the environment is through the utilization of waste.

India is a leader in the Renewable energy Sector operating world's largest programme. In this Energy sector, 925 MW capacity has already been installed in the country.

Rate of Gross National Product (GNP) is considered to be an indicator of economic performance of any nation. Increase in GNP indicates that economic health of the country is good. But such increase in the ultimate analysis, is based on high rate of consumption of natural resources of which environmental degradation is the result. In such a situation, economic growth comes in conflict with issues of environmental concerns.

India since early 1990's opted for a major economic transition towards free market economy. Major economic advantages are expected to follow this transition. However, economists would have to take into account the idea of ecological disadvantages inherent in such an economic shift. In order to ensure the success of such an economic transition, it is imperative that the economists take into account short and long-term ecological costs so that in our effort to increase GNP, we may not liquidate ecological assets.

High economic growth means high rate of extraction, transformation and utilization of non-renewable resources. We must realize that though higher rate of GNP is important, equally important is the rate of regeneration of natural resources.

Concept of sustainable development which was brought into focus by Brundtland Report, (It is the report of Brundtland Commission – 'Our Common future', 1987) states that economic growth has to be environmentally sustainable. There is no economic growth without ecological costs. The GNP in the Annual Budget must be accompanied by Ecological Budget. Taken together the two will give a real picture of our economy.

The National Accounting System should reflect the state of both our economy and environment. There is one more issue. As mentioned above the, developing countries have yet to undertake more developmental programmes and yet to attain reasonable standards of living. Therefore, GNP must increase for these countries. But one must realize that increased development and higher GNP are related to environmental damage and resource depletion. Therefore, an element of resource regeneration and positive approach to environment have to be incorporated in developmental programmes.

Poverty

Poverty is a multidimensional problem and is a major challenge all over the globe. In relation to development and environmental issues solutions to poverty are country specific. While managing environment and resources, due consideration has to be given to the fact that poor people directly depend upon natural resources for their livelihood. Therefore, an effective strategy for tackling the problems of environment, development and poverty is to begin with the economic conditions of people, their resources and productivity. Development must address the issue of eradication of poverty which is linked with employment both of women and youth and other income generation programmes.

Human Settlement Issues

Human settlement conditions especially in developing countries are deteriorating mainly as a result of low investment in sectors like housing and social welfare. The environmental implications of urban development and other human habitations (slums) must be recognized, giving priority to the needs of urban as well as rural poor. The thrust of human settlement programmes should be to:

(i) Providing shelter to all;

(ii) Investing in infrastructure for providing water and managing sewage, and solid waste;

(iii) Promoting sustainable energy and transport system in human settlement;

(iv) Promoting sustainable land-use management.

Land Resources

Planning and management of land resources constitute another area of concern for environmenr. Land not only includes a physical entity in terms of topography but it also includes natural resources, soil, minerals and biota. These components of land provide variety of services essential for life-support system. Land is a finite resource. The integrated approach for management of land requires sectorial planning concerned with various aspects of land use and its resources.

Forests

The Rio declaration on Environment and Development has a separate appendage on Forest Principles. The details about deforestation and afforestation are given elsewhere in this book. Here it is relevant to mention that rational approach for the management of forest and forest lands is a major issue in so far as environmental problems are concerned. Sustainable forest development, production of forest products and forest services require an institutional approach at governmental level. Management of forests calls for specialized managerial skills.

Mountains

About 10% of World's population depend directly on mountain resources but the Mountain ecosystem is undergoing degradation with the result that inhabitants of hills are facing resource crunch and poverty. In the process of degradation, there is rapid loss of genetic diversity too. Therefore proper management of mountain resources, and socioeconomic conditions of inhabitants must be a priority area.

Agriculture

Agriculture has to meet the challenge of growing population mainly by increasing production on land already under use and by preventing further encroachment on land. Major adjustments are required in agricultural policy vis-a-vis environment both in developed and developing countries for increasing food production and farm products Agricultural output is dependent upon fertilizers (natural or artificial) and pesticides; both of these have environmenral implications. An increased understanding of interaction between agriculture and ecosystem is required especially when modern technologies are used.

Biodiversity

Biodiversity or biological diversity means variety of plant and animal species, presence, absence or richness of which determines the state of biological wealth. Decline in biodiversity due to human activities is a threat to our environment. Biodiversity is dealt with in a separare chapter.

Protection of Oceans

Management of marine resources of seas and islands is crucial. The coastal areas contain diverse and productive habitats for human settlements. Many of the world's poor are crowded in coastal areas and these areas are under constant threat and erosion. The marine environment is being constantly polluted by sewage, plastic, metals and other organic compounds especially oil both by accident or illegal spills. Management of these wastes has to be carried out in such a manner that would not affect the productive capacity of the oceans.

Business and Industry

Business and Industry are closely linked with environment and resource utilization. Production process and strategy for eco-friendly technologies throughout the product life cycle and minimization of waste play major role in protecting the environment and conservation of resources. Business, Industry and multinational corporations have to recognize the environmental management as the priority area and a key determinant to sustainable development. Some enlightened leaders of industry and transnational corporations are implementing certain policies that show environmental concern – viz. Environment Impact Assessment (EIA) and Environmental Audits. Besides legal compliance, some of them are voluntarily taking innovative initiatives in this regard.

Business and Industry both have a major role in environmental degradation and resource depletion. In developing countries most of the industries are not fully sensitive to the damage to the environment. This attitude has to change. A few businesses have realized that environment can provide competitive advantage like TQM did in 1980's and 1990's. Twenty first century markets shall be driven by the requirements of sustainable environments. Markets of new millennium will be able to create wealth if they respond to sustainable development. Sustainability will become the ultimate end of business. Unsustainable products will become obsolete. The 'Earth Summit' did suggest programmes that would promote environmental protection and resource conservation. These are discussed elsewhere.

Ecological Deficit

Whenever there is budgetary deficit and economic crisis the economists try to offset it by taking loans from various agencies including International Institutions like World Bank and International Monetary Fund. They even mortgage the gold reserves. All these are to be returned when the economy improves. So far as environment is concerned, we are creating a deficit of our non-renewable resources on account of production and other direct and indirect developmental programmes. This is 'ecological deficit'. What are efforts in reducing this deficit?

To reduce the ecological deficit some projects were taken up during the early part of eighties like Ganga Action Plan, Watershed Rehabiliration and Wasteland Development Programme. We have yet to develop strategies to ensure that there is no addition to the ecological deficit on account of economic growth. Unlike economic discipline imposed through the Annual Budget, no ecological discipline has been imposed to prevent future decline of our environment. One strategy should be to make the environmental management a statutory obligation of all developmental projects. History of ecology gives us a clear lesson. Over 6000 years ago, flourishing civilizations of Mediterranean, Babylonian, Nile Valley, Indus Valley, Hang Ho Valley and Mayan crumbled because these civilizations were not concerned with the importance of environment, though they advanced our knowledge about Science, Technology, Agriculture, Literature, Culture, Music, Art etc. The Indian civilization did had respect for environment but this has now been forgotten by us.

Village and Community Involvement

So far as India is concerned, no development is possible without village and village community's involvement. Before modernization the village grazing lands, forests, streams and ponds were common property and villagers played an important role in their management. The British nationalized these resources and brought them under the management of government agencies e.g. planting of trees (social forestry). This alienated the villagers. Without village's support survival rate for the tree would be poor. The same is true of village ponds and streams which can be taken care of by the villagers themselves. This is to underscore that ecologically vital village resources cannot be maintained by bureaucracy alone. It can be done by the village community (see the case study of Project Aravalli) in the next unit.

1.3 Study of Environmental Management in Management Schools

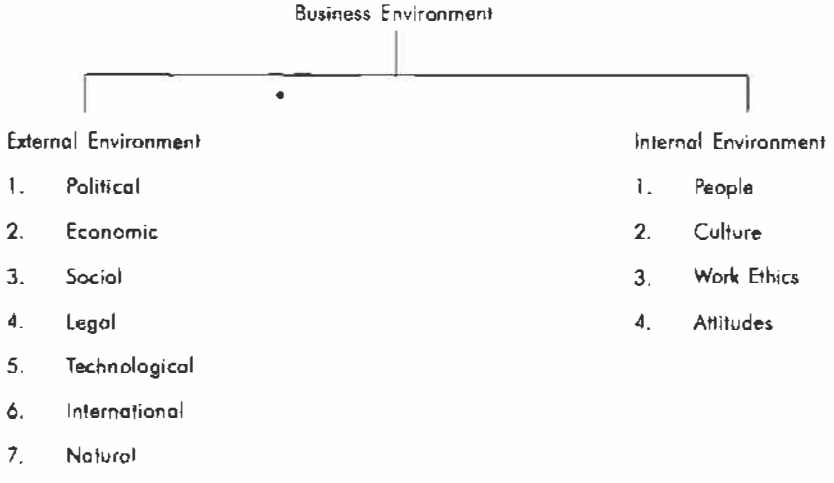


Chart: Business Environment's Classification

The above chart on Business environment, has a slot for Natural or Physical Environment. How much attention is paid to the study of natural environment in management/business schools in India? Very little. The situation however, is fast changing. While discussing the environmental management in management school, one cannot miss the role of Corporate Conservation Council (CCC) of USA. It felt thar student-managers in business schools should be sensitized to environmental issues as well as be aware of environmental consequences of managerial actions. ICC noticed that schools of Architecture, Engineering, Public Administration and even Law schools teach environment but the Business Schools are lagging behind. Thus under the auspices of CCC, Boston Management School, College of Business Administration, New Orleans and Management School at Minnesota developed curriculum and started courses in environmental management.

There is another reason for need of environmental management education in management school. Managers deal with industry directly or indirectly. A knowledge of latest Environmental Protection Services; environmental legislation and rules and regulations for setting up new industry or trade; production processes; handling of wastes, especially chemical and hazardous; packaging and eco-labelling and environmental protection equipments is essential. Environmental protection equipment industry is sector which is expanding especially water treatment, air cleaning, waste utilization and recycling equipments which are providing solution to some of the major environmental problems. Then, we have Environmental Consultancy services which are likely to grow more quickly than the equipment market. Environment Audit is another programme which is becoming popular. A Manager is likely to feel lost if he/she is not in know of these aspects. The corporate world in India under new economic order of liberalization and globalization has to increase its share of world trade and in this effort one major impact of rising trades would be on natural environment and resources. The business world internationally has begun to acknowledge that environment is playing an important role in all facets of business. A survey by McKinsey and Company; revealed that: (i) 92% of CEO's believe that environment should be top management priority; (ii) 35% CEO's say that their companies have adopted strategies to anticipated impacts of environment on business. The executives/corporate leaders may have good intentions to tackle complex environmental problems arising out of their activities but the question is whether today's managers have capabilities that will allow them to turn the intentions into reality. Though a number of Chief Executives are attempting to do their best in this regard and are trying to meet the requirements of environmental sustainability, they need a new breed of managers equipped with skills to handle environmental issues. In fact they should be trained to deal with the complex demands of business and environment that almost arise daily. As we shall see later, there is enough evidence to suggest that the corporations which adopt effective environmental management system have a competitive advantage. The executives and the managers therefore, need appropriate guidelines in matters concerning environment. Many corporations are willing to do away the traditional approach of viewing environment as a separate issue and want to adopt functional approach of integrating it with business to the extent of having a senior executive or Vice President for Environment.

Business Strategy and Managers

We should be clear about strategy viz-a-viz environment. Do the managers know that environmental consideration have become a part of corporate strategy, which means incorporating environmental issues in the process of developing a product, in new investments and in the organizational set up. Is environment a part of Total Quality Management or something more? As we shall see later, a good environmental practice improves corporate performance. In many industries it has been found that environmental friendly/eco-friendly practices have enabled companies to do more savings as for example

the process of recycling the waste by use of new technologies. Also, a good corporate strategy means that environmental problems are not to be stored for future.

The management schools, have an obligation to train managers or at least sensitize the student-managers through a well designed course to the issues of environmental concerns and strategy.

REVIEW QUESTIONS

1. What is sustainable development?
2. Describe the important steps required in attaining sustainable development.
3. What are the responsibilities of human beings to preserve, conserve and protect the environment? Review the relationship between development and environment.
4. Why do the managers need to study Environmental Management?

REFERENCES

•Gunningham, N., & Sinclair, D. (2018). Regulating for a sustainable future: Environmental law and policy. Cambridge University Press. https://doi.org/10.1017/9781108650921

•Lehtonen, P., &Sairinen, R. (2020). Integrating environmental and social assessments: Lessons from practice. Environmental Impact Assessment Review, 80, 106348. https://doi.org/10.1016/j.eiar.2019.106348

•Renaud, J., &D'Amour, J. (2021). Sustainable environmental management: A systematic review of the literature. Journal of Cleaner Production, 279, 123678. https://doi.org/10.1016/j.jclepro.2020.123678

UNIT

2

Realm of Ecology

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ❒ 2.1 Ecology
- ❒ 2.2 Definitions
- ❒ 2.3 Selected Concepts of Ecology
- ❒ 2.4 Industrial Ecology

2.1 ECOLOGY

It is essential to grasp the fundamentals of ecology in order to understand environmental management. The word ecology comes from the Greek Oikos, meaning 'house' or 'place to live'. Taken literally, ecology refers to the study of organisms in their natural habitat. Ecology is concerned with the study of organisms in various habitats viz. land, oceans, fresh water, and air. Ecology can also be defined as the study of the structure and function of nature. Ecologists try to predict what will happen to organisms, populations, or communities under a particular set of habitat.

For all practical purposes, we can consider ecology as the study of organisms and their environment. In other words, it is the study of the interrelations between living organisms and their environment. Ecology proceeds at three levels: (1) the individual organism, (2) the population (consisting of individuals of the same species), and (3) the community (consisting of number of populations).

At the level of the organism, ecology deals with how individuals are affected by and how they affect their environment? Is the greenhouse effect a real danger, and what are the implications for human life as the earth heats up further? At the level of population, ecology deals with the presence or absence of particular species and with trends and fluctuations in their numbers. To understand population fluctuations, the changes happening to individuals making up the population must be analyzed. Community ecology deals with the composition or structure of communities, and with the natural resources effected by them. Communities are not constant but are continually changing because of interactions among the populations and because of disturbances caused by climatic and geological events as well as by human activities.

2.2 DEFINITIONS

Living Organism	Any form of life; it includes all plants, bacteria and animals.
Ecosystem	The community of organisms and populations interacting with one another and with the chemical and physical factors of their environment constitute an ecosystem.
Population	Group of individual organisms of the same species living within an area.
Cycles	The circulation of the chemical elements in the biosphere from the environment to organisms and back to the environment.
Food Chain	The transfer of food energy from its source in plants through a series of organisms where eating and being eaten is repeated a number of times.
Community	Any assemblage of populations living in a prescribed area or physical habitat that has characteristics in addition to its individual and population components.
Carrying Capacity	Maximum population of a particular species that a given habitat can support over a given period of time.
Limiting Factor	Any factor that limits the growth, abundance, and distribution of the population of a particular organism in an ecosystem.
Habitat	The place where an organism lives. The four major habitats are the biosphere, and marine and estuarine, freshwater, and terrestrial.
Biological Clock	Natural rhythms or cycles that constitute mechanisms within the organism for measuring time and events in some fashion.

- Ecosystem is the fundamental concept of ecology. It is the basic functional unit in ecology, and includes populations, and communities, each influencing the other. The ecosystem emphasizes relationships and interdependence. The parts of an ecosystem are operationally inseparable from the whole. A pond, lake, or a tract of forest are examples of ecosystem unit. All human beings are dependent upon the ecosystems of our planet. Ecosystem supports our lives. Without the resources and services provided by ecosystems, human life would not be possible.

- An ecosystem is not a static system. Ecosystem is in a constant state of change and homeostasis. The changes involve changes of structures and processes of living beings over time. Changes also take place in the physical environmental due to the actions of living being. These changes lead to the formation of different or another ecosystem. Thus a state of constant change and equilibrium are the natural process occurring in an ecosystem.

- A most remarkable aspect of ecosystem is that it is capable of self-maintenance and self-regulation. There is a natural tendency for ecosystems to remain in a state of equilibrium. Since human activities tend to disrupt the natural functioning of mechanisms operating within ecosystem it is important to know as to how the balance in an ecosystem is disturbed by human hand.

- Human intervention sometimes produces changes in ecosystem that result in imbalance. Since the industrial revolution, humans have been preoccupied with obtaining as much production from the nature as possible. Intensive farming and

forestry, green revolution and similar activities at the cost of ecosystem have been practised to achieve high rates of production. This goal of maximum production often conflicts with balance in ecosystem.

- Our country has a variety of ecosystems. We have ecosystem like Indo-gangetic plains which have a very high productivity potential. We have deserts which have very high temperature and those with very low temperature (Ladakh). We have some areas with very low rainfall and other with extremely high rainfall. We have mountains of Himalayas and that of Nilgiris and then deltas and wetlands. If high productivity is to be attained in these ecosystems on sustainable basis, then dynamics of each of these ecosystem has to be understood. We find that our ecosystem has been affected to a dismissal state due to numerous activities. Nearly one third of land is wasteland. Our rivers are polluted due to intrusive technologies. According to eminent experts, our rivers are not only polluted but they have been turned, twisted and blocked. Our green revolution, no doubt brought prosperity but the extensive use of fertilizers and pesticides has its own impact on ecosystem. A detailed study of ecosystem therefore, is of paramount importance for understanding the environmental management.

2.3 Selected Concepts of Ecology

Cycles

The concept of cycles in ecology refers to circulation of certain elements like water or carbon in the atmosphere. The circulation is from the environment to organisms and ultimately back to the environment. The carbon cycle can be illustrated by taking the case of carbon dioxide. The carbon dioxide gas is released as waste product into the atmosphere by humans and other organisms as they take in oxygen. This carbon dioxide is used by plants in the process of manufacture of their food (photosynthesis) and in this process plants release oxygen into the atmosphere. Thus a balance is maintained between the two gases. Human activities can upset this balance and interfere with the recycling process. Release of carbon dioxide through the increased burning of fossil fuels and a subsequent decrease in its removal capacity through the destruction of the forest cover can have an effect on global climate.

Manufacturers must understand the nature of these cyclical processes in order to evaluate the effect of industrial processes on the ecosystem. Environmental problems such as the greenhouse effect, and depletion of the ozone layer of the atmosphere as a result of industrial activity cause disturbance in cyclicity.

There is another aspect to the concept of cycle. It relates to recycle and recycling process for conservation of natural resources in production process.

In fact, recycling of natural elements and resources has now become a practice in many production activities. In nature, recycling is key to conservation and safeguarding of air, water and land from pollution. In industry, it is the raw materials that need to be

recycled. Use of raw material should be permitted only if a part of it is recycled. Take for example, the case of batteries. They are used in numerous consumer products and represent good examples of recycling process. Traditional batteries contain mercury and cadmium; both these substances are toxic and should not be allowed to be dumped as wastes. Duracel uses 50% of recycled material in their batteries. Both in India and other countries the garages take old batteries of cars for recycling. Varta in UK was the first company to introduce free scheme for recycling rechargeable batteries and first to launch mercury free batteries in England.

Community

The concept of a community has also to be understood by the corporate world. A community is defined as any assemblage of populations living in a habitat that has characteristics in addition to its individual and population components.

Diversity is the characteristics of a community. In any community organisms of different species live together in harmonious way and not as independent beings. There is an interdependence built into the concept of community. Changes brought about in environment due to industrial or any other activity can disrupt communities and may lead to extinction of organisms if they can't adapt to the changes; as for example the Dinosaurs.

Organisms are not self-contained units that are independent of their environment. Interdependence is the principle of existence. The natural method to control a particular organism which is harmful to human or plants is not to kill it directly but by modifying the community in which it lives. The noted ecologist, Odum gives the classical example of control of Mosquitoes. He says that mosquitoes can be controlled by modifying the aquatic community in which they develop, such as lowering water levels in marshes and swamps, than by attempting to kill them by insecticides.

Experts are of the opinion that industrial processes and products that alter essential elements of ecosystem and community are ultimately going to affect us. We need to have some idea of how humans are affected by various production procedures via their linkage with ecosystem.

Food Chain

The concept of the food chain is an important ecological concept. The transfer of food energy initially from plants through a series of organisms where eating and being eaten occurs is referred to as the food chain. Each member of a food chain feeds on the one below. Human beings occupy a position at or near the end of most food chains. For example, man eats big fish that eats little fish, that eats plants or microorganisms.

The concept of a food chain is important for another reason besides understanding how energy gets transferred from one organism to another. Pollutants also are transferred in this process from one organism to another and become more concentrated as they progress through the food chain. Thus pesticides that wash off soil into water come to

reside in fish, and as smaller fish are eaten by larger fish, these enter the latter. When humans eat larger fish, these pollutants reach human system producing harmful effects. DDT has been detected in the human system including mother's milk.

Carrying Capacity

It is another important concept to understand. Every ecosystem has limits in terms of various populations it can support. Every organism has sustenance needs that the community must provide in order for it to survive. If however any population gets too large, the ecosystem becomes overloaded and cannot meet its needs; just as when rhe human population becomes large in a particular habitat, country or region the carrying capacity of that environment gets exhausred leading to adverse effects.

The same concept is applicable to air and water. These elements have a certain ability to absorb waste material without serious harm to their quality. But if the air's carrying capacity is exceeded by pollutants its quality is affected.

Limiting Factors

Organisms depend for their existence, on a complex set of factors. Any factor that is in short supply or oversupply may be a limiting factor. Factors such as temperature, light, and water in greater amounts rhan required can inhibit organism's development. Organisms with a wide range of tolerance for essential factors are likely to be most successful and widely distributed while others may not be so.

Most important limiting factors are those that are critical to the development of organism, population and community. The Government or the Industry while determining the environmental impact of a project, should focus on those environmental factors which are critical or limiting and will be affected by the proposed project. Focusing on these factor gives a better chance of predicting the environmental effects of proposed environmental alternations.

Habitat

Habitat refers to place where an organism, population or community lives. The major habitats are land (terrestrial including subterranian), water (both fresh water and marine) and the aerial (chiefly the trees and plants where birds, insects and some mammals, reptiles and amphibians live).

Freshwater habitats are the source of water for domestic and industrial purpose. Also freshwater bodies provide the most convenient waste disposal systems for most of human and industrial activity. The scarcity of fresh water and its pollution have become very difficult management problem. They are discussed elsewhere.

The terrestrial ecosystem (land) is the system that supports a rich diversity of plant and animal life. Our resources for the production of goods come from the land. The terrestrial habitat is essential for the survival of species, and yet we adopt irrational management pattern to land and land resources.

Biological Clock

It is the system which controls natural rhythms in living organisms including human by measuring time through an internal mechanism (internal clock). The internal clock operates through signals arising within the organisms or from the environment like temperature, light or other seasonal changes. For example in certain mammals duration of light would regulate the reproductive cycle of the female (not human). If they are exposed to constant light, the reproductive processes fail and animals become sterile. Birds as it is well known migrate long distance sometimes crossing continents. It is believed that migration is controlled by biological clock. (In human, melatonin secreted by pineal gland situated in the brain regulates the internal clock). It is very important to understand that the changing environmental conditions can disturb the biological clock which in turn affect the organism's existence or behavior.

Ecological Services

Ecosystem, as evident from the foregoing account constitutes life-support system. It provides:

A. Resources
   (i) Oxygen
   (ii) Water
   (iii) Food
   (iv) Other materials

B. Cyclic Mechanisms
   (i) Water cycle
   (ii) Nutrient cycle
   (iii) Carbon cycle

C. Regulatory and other controlling services. For example :
   (i) Flood control
   (ii) Disease control
   (iii) Temperature regulation
   (iv) Pollination
   (v) Climate control

2.4 Industrial Ecology

Frosch and Gallopoulas observe that it should be possible to develop industrial production methods that would have considerably less impact on the environment. This observation

led them to introduce the notion of industrial ecosystem. Projections regarding resources and population trends "lead to the recognition that the traditional model of industrial activity in which individual manufacturing processes take in raw materials and generate products to be sold and waste to be disposed of should be transformed into a more integrated model: an industrial ecosystem. The industrial ecosystem would function analogous to biological ecosystems. Plants synthesize nutrients that feed herbivores, which in turn feed a chain of carnivores whose wastes and bodies eventually feed plants. An ideal industrial ecosystem may never be attained in practice, but both manufacturers and consumers must change their practice to approach it more closely to biological ecosystem if the industrialized world is to maintain its standard of living and the developing nations are to raise theirs to adequate level without adversely affecting the environment".

The industrial system can be seen as a certain kind of ecosystem concerned with distribution of materials and energy in a cyclical rather than linear manner. Industrial Ecology relates to understanding how industrial system works and is regulated on the basis of what we know about ecosystem; it could be designed to conform as far as possible with the natural system. There are three elements of the industrial ecology, according ro Erkman.

(a) It is comprehensive and integrated view of all the components of the industrial economy and their relations with the biosphere.

(b) It emphasizes the complex patterns of material flows within and outside the industrial system, in contrast with current approaches which mostly consider the industrial economy in terms of monetary units.

(c) It considers long term evolution of key technologies as a crucial element for the transition from the actual unsustainable industrial system to a viable industrial ecosystem.

Industrial ecology represents one of the paths that could provide real solutions to sustainable development.

In simple terms industrial ecology means application of ecosystem concept to industry which means linking the activities of one enterprise to that of another. Industrial ecosystem as mentioned above, is based on minimization of raw material use, waste production and optimization of energy. It would still produce some wastes and need energy but at a lower rates and at sustainable level if the principles of natural ecosystem are applied deeply. The concepts of closed loop manufacturing system which is the operational aspect of industrial ecology must be adopted for sustainable results. This system involves decreasing supplies of raw materials as mentioned above. Here every output of manufacturing should either be remanufactured i.e. recycled for further production or sent back to ecosystem. This means redesigning production according to biological models. Du Pont gets most of its polyester films back from the customers after use and recycles it into new films. In Germany, under law manufacturers have to use their products forever. The case of Interface, that is world's largest American company

in manufacturing carpets and other flooring materials is a typical example of industrial ecology. This company has found a new floor covering material called Selenium which can be completely remanufactured into identical new product. In this way the company has been able to prevent the resource depletion. Selenium lasts longer than ordinary carpets. According to reports most important aspect of Interface's innovation is that Selenium is chlorine free. We know that in many industries, chlorine is one of the toxic and damaging elements for the environment. One of the great challenges facing both the industry and the environment is making the production process free of chlorine element. Interface claims that Selenium can be maintained and cleaned up much easier than ordinary carpets. Fungus which grows on ordinary carpets does not grow on Selenium. Interface considers all inputs to be waste if not proved otherwise. This is a strong message. The company has kept the input constant and in this process not only made savings and increased shareholder's value but also reduced landfill wastes. Interface has recently started a factory where they don't use fossil fuels for energy. It is solar-powered. Industrial ecology, thus not only conserves the resources, prevents damage to the environment but also is a successful business strategy.

Conservation, recycling and preventing environmental damage are the lessons we learn from any ecosystem. An ecosystem like the rain forests operate in a manner in which nutrients are recycled and rich growth is maintained. It is possible to imitate the working of ecosystems like rain forests in our industrial system that is sustainable.

Reaping Rewards

A Case Study of Project Aravalli*

The Aravalli hill system is one of the oldest in India. Aravalli literally means "wall of stones or rocks." This name was probably given to signify its role as a stronghold against the onslaught of the desert lying towards the north-west of the hills.

Starting from the south-eastern part of Gujarat traversing through Rajasthan, it extends to Haryana and border of Delhi, the Capital of India. Delhi Ridge is considered as an extension of the Aravalli system. The width of the Aravalli hill system varies from about 10 km to 100 km and its height generally varies between 300 and 900m. The highest peak, Garu Sikhar on Mount Abu, is more than 1,700m.

The Aravalli hill system serves as an important watershed for the area and rivers like the Chambal, Banas and Luni.

The Aravalli hill system has always played an important role in shaping the ecology and environment of the surrounding areas.

Deforestation

Till about the middle of this century, the Aravalli and its adjoining areas were thickly forested and home to a variety of wild animals and birds. Subsequently large-scale felling of trees took place in the area mainly for charcoal, timber and fuelwood.

Another major factor responsible for the loss of forest cover in the area was the sudden increase in the number of people inhabiting the area and the livestock they maintained. On the one hand, large areas

Contd...

of forests were cleared for agricultural purposes and, on the other hand, the grazing pressure did not allow the remaining forests to survive and regenerate. As a result, one could find pockets where not even 10 per cent of the land was under forest cover.

Deforestation led to overall degradation of the environment in the Aravalli region. Water scarcity, a falling water table, soil erosion, and floods, became common. By 1980's, it became evident that the Aravalli ecosystem was degrading fast. Life became difficult for people living in the area and the worst-affected were women. Traditionally, in the Aravalli region, it has been the responsibility of the women to procure fuelwood, fodder, water, etc., for the family. Women had to toil hard to meet these daily requirements.

In Rajasthan most of the land in the Aravalli region belonged to the Forest Department. In Haryana, however, most of the land of the Aravalli region belonged to the community. (As per the Punjab Village Common Land Act of the Thirties, subsequently amended in 1972 and applicable in Haryana, the ownership of land in the Aravalli region vests with the village communities). The local population has full control not only of the land but also over the produce and the way the land is used. A project was launched to restore/regenerate the ecosystem and a project authority was constituted.

The project authorities encouraged the village women to start nurseries to raise saplings/ seedlings. By selling the saplings, the women augmented their income. The European Union offered financial help for the project to the extent of 82 per cent. The rest was to be borne by the Government of Haryana. Thus, from 1990, Project Aravalli started functioning through community participation in five districts of Haryana. A beginning was made by constituting Village Forest Committees (VFCs) in the chosen villages and preparing plans for the project. The VFCs consisted of nine to thirteen members with the sarpanch as the chairman and a Forest Department official as member-secretary.

It was mandatory for at least three women residing in the village and representatives of Scheduled Castes/Tribes to be members of each VFC. The VFCs were to report to the general councils of the concerned villages. The general council of a village consisted of all the men and women of the village who were eligible to be members of the Panchayat. In this way the VFCs could become legal organizations under the provisions of the Panchayat Act.

The VFCs and the village communities participated in the preparation of plans for each village.

The plan described the details of available land and the requirements of fuelwood, fodder, etc. for the village communities.

About 10.5 million seedlings were raised by 207 mahila nurseries and over Rs. 55 lakhs were paid by the project as cost of the seedlings. By village standards this amount is substantial. To encourage savings by the women the project authorities even helped the women to start saving accounts in banks and post offices. Since 1993, about 3,400 such accounts have been started.

The nurseries run by women's groups and the Forest Department produced saplings in adequate number. The project authorities used their own resources and local labour in all the five districts under the Aravalli Project.

Incentive provided

Since it was not possible for the authorities to take care of such large areas on their own, the VFCs were given this responsibility. The exercise proved successful. The Aravalli Project authorities introduced

Contd...

cash incentive schemes to sustain the interest of the villagers. So far, more than Rs. 41 lakhs have been disbursed to 184 VFCs as incentive money in the area.

Stall feeding adopted

The plantations on community lands, deprived the villagers of their grazing areas. Traditionally, the villagers had no restrictions on grazing their livestock on community lands. With plantations on these lands, grazing could not be allowed or otherwise the saplings would not survive. Here again, the concept of sustainable and equitable management of common lands with the participation of village institutions and local communities came to the rescue. The issue was discussed at length and the consensus between village communities, VFCs and project officials was that instead of open grazing, stall feeding would be followed. It was also agreed that instead of keeping smaller animals like goats and sheep, farmers would switch to larger animals like buffaloes. Large quantities of fodder are required to stall feed livestock. Natural production of grasses could not meet the requirements. So, another experiment was tried. Different types of grasses and legumes were sown in the plantation areas. Open areas available between tree saplings were utilized for the purpose and at times the saplings were planted at larger distances so as to leave sufficient areas for grasses and legumes to grow. The fodder so grown was made available to the villagers and they were free to harvest as per their requirements. Within two years the fodder availability increased substantially and the villagers were encouraged to raise the size of their livestock population.

Initially, grass seeds were procured from the market. Later the villagers were encouraged to collect grass seeds from community lands and the project authorities purchased these seeds.

This scheme proved helpful in several ways. With the villagers interested in seed collection as well, they did not harvest grass till it was fully mature. This practice led to greater harvest of bio-mass and better protection of soil against erosion. So far, grasses and legumes have been sown on about 20,000 hectares in the five districts of Haryana and the yield of fodder per annum is estimated to exceed 30,000 tonnes.

Women, who are traditionally responsible for collecting fodder, have benefited substantially. Now, they do not have to walk miles in search of fodder. They collect it from their own village community lands, saving time and energy.

The Aravalli Project in Haryana was launched in 1990 in five districts of Haryana. The Project was to continue till 1998-99. The estimates were that by the time the project come to a close, the Aravalli region would have regained its lost ecosystem and glory.

Objectives achieved

The Aravalli Project has already achieved most of its objectives and in several areas even exceeded expectations. For example, about 34,600 hectares of land have been rehabilitated and supply of fuel, fodder, etc., from the community lands has increased substantially. On an average, the annual fodder supply from the common lands of a Project village has increased from about 750 quintals to 1,400 quintals. Improved availability of fuel and fodder has saved time for villagers, especially women who now spend less time to collect a headload of fuel and fodder as compared to the past.

Employment of more than one crore labour days has so far been generated by the Aravalli Project in the area. The share of women in the employment has been 38 per cent. In addition there are the benefits

Contd...

in the form of incentive money, price paid for grass seeds, increased yield of milk and other livestock products.

The use of improved varieties of wood stoves has become common in the area. Initially, these stoves called "Van Jyoti Chulhas" were supplied to the villagers. Soon, the women learnt to make such stoves on their own, using mud, brick, etc., in place of the steel used in conventional chulhas supplied by the Project. Now the area has more efficient chulhas in use than the 9,000 supplied in 1993.

Questions relating to case study

1. Identify the environmental aspects and describe the impacts.
2. What measures would you suggest to restore the differing ecosystems of Aravalli land in Rajasthan and Haryana?
3. The process of restoration is not one time action but requires sustained action in the initial years. What indications are available from the text of case study to achieve the objectives of sustained actions.
4. We find significant role of women in environment protection, even women-employment. Which global effort advocate such line of action? Give a few comments on this issue.

Review Questions

1. What is the science of ecology?
2. Define ecosystem, community and population.
3. Why is it important for a manager to have knowledge about the functioning of ecosystem?
4. Describe the concept of cycle keeping in view carbon dioxide.
5. What is the concept of food chain?
6. What is a habitat? Describe major habitats.
7. Describe the concept of biological clock.

REFERENCES

•Kumar, P., &Ghosh, R. (2022). Innovations in environmental management: A comprehensive overview. Environmental Science & Policy, 127, 166-174. https://doi.org/10.1016/j.envsci.2021.11.012

•Zhao, Y., & Zhang, Q. (2023). The role of stakeholder engagement in effective environmental governance. Ecological Economics, 205, 107588. https://doi.org/10.1016/j.ecolecon.2022.107588

UNIT

3

Background to International Efforts for Environmental Protection

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ☐ 3.1 Introduction
- ☐ 3.2 United Nation's Conference on Human Environment, 1972
- ☐ 3.3 General Assembly's Resolution of December, 1972
- ☐ 3.4 Charter of Economic Rights and Duties of States, 1974
- ☐ 3.5 UN-Habitat Conference on Human Settlement of 1976, World Water Conference of 1977 and other Conferences
- ☐ 3.6 Environmental Education Conference
- ☐ 3.7 World Commission on Environment and Development
- ☐ 3.8 Regional Efforts
- ☐ 3.9 Earth Summit 1992

3.1 INTRODUCTION

Man's concern for natural environment has always been there but his serious concern about the issues of resource depletion and degrading environment/ecosystem began after World War II. However, nothing tangible was done to control damage afflicted to environment till 1960's.

The governments in 1960's especially in developed countries were undergoing a social change; later such change also started in developing countries. The social change, raised aspirations and hopes of people for improvement in quality of human life and living standards which in turn opened up numerous issues relating to development, sustainable development, economic growth and consumerism; all issues being linked to environment. Soon people recognized that environment was deteriorating and the natural resources were depleting due to developmental activities. Literature appeared that aimed at educating not only the public but more so the policy-makers and the politicians about matters of environmental concerns. Protection of environment and

conservation of natural resources came to be realized at national and International levels and a concern for ecology became a watchword. As the concern for environmental problems increased, the governments institutionalized the environmental issues through new legislations and regulations. International agencies swung into action. More comphrensive laws were enacted at national and local levels and new agencies established to make sure the compliance aspects by public in general and business and industry in particular.

In the early decades industry, trade and business resisted efforts aimed at environmental protection and resource conservation because money spent on such efforts would diminish profit. However, the attitude is changing, not because of legal action only but also due to realization that cutting down on raw material and generating less waste could be a financial gain. Also, there was an International angle to environment which could not be ignored.It became clear that problems like Ozone Depletion or Global Warming cannot be tackled at national level alone. Leaders, politicians and people in general, therefore, started looking up organizations like UN for environmental issues.

3.2 United Nation's Conference On Human Environment, 1972

It was in the light of above mentioned scenario that the United Nation's Conference on Human Environment was held in 1972 at Stockholm. The following two strategies emerged in this confe rence.

1. The principles and action plan were evolved for controlling and regulating human environment.

2. Institutional and financial artangements were proposed for achieving the goal for regulating human environment. This has been called the Magna Carta on environment. It declared:

   (a) Human have the fundamental right to freedom, equality and adequate conditions of life in an environment of quality that permits a life of dignity and well being.

   (b) Human beings have responsibility to protect and improve the environment for present and future generations.

3.3 General Assembly's Resolution of December. 1972

Stockhom conference was followed by the United Nation's General Assembly resolution on December 15, 1972 emphasizing the need of active co-operation among the States in the sphere of human environment. The Resolution designated June 5 as the World Environment Day and urged governments and organizations in the United Nations system to undertake on that day every year worldwide activities reaffirming their concern

for the protection of the environment. Another resolution was passed which provided for institutional and financial arrangements for international co-operation for environment. Amongst other decisions, provisions were made for estahlishing a Governing Council for Environmental Programme with headquarter at Narobi leading to establishment of Environment Secretariat and Environment Fund.

The Governing Council formulated long-term and short-term plans for the protection of environment particularly relating to development.

Charter of Economic Rights and Duties of States. 1974

The Charter of Economic Rights and Duties of States 1974 is a document of UN. One of its articles states that:

"The protection, preservation and the enhancement of the environment for the present and future generations is the responsibility of all States. All States have the responsibility to ensure that the 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. All States should co-operate in evolving international norms and regulations in the field of the environment".

UN-Habitat Conference on Human Settlement of 1976, World Water Conference of 1977 and Other Conferences

The International efforts at the protection and preservation of environment became vigorous in 1970's and 1980's. Most important efforts are the following:

1. U.N. Habitat Conference on Human Settlements in Vancouver, Canada in 1976.
2. World Water Conference in Mardel Plata, Argentina in 1977. The World Water Conference called upon the U.N. to establish a programme with a goal of providing clean drinking water and sanitation to all.
3. The U.N. Desertification Conference held in Nairobi in 1977.
4. Paris Conference, held in 1986 called for "saving trees and forests". The Conference was attended by Heads of States and Government officials from 36 countries.

Environmental Education Conference

In 1977, United Nation Environment Programme (UNEP) and United Nation Educational, Scientific and Cultural Organization (UNESCO) organized an Intergovernmental Education Conference at Georgia. The conference was attended

by over 400 delegates from 74 countries. The UNEP, Executive Director underscored that environmental education was a matter of life and death and that problems of environment were jeopardizing the development of mankind.

37 World Commission on Environment and Development

U.N. General Assembly in 1985 formed World Commission on Environment and Development (WCED), also known as Brundland Commission, after the name of its Chairman, the Prime Minister G. Harlem Brundland of Norway. The commission published its report in 1987, under the title 'Our Common Future'. Its theme was sustainable development. It recognized the magnitude of problem arising from meeting the urgent needs of about 6 billion people and possibility of satisfying 10-12 billion people expected to live by middle of next country.

38 Regional Efforts

In addition to National and International efforts, one finds certain regions of the world making joint efforts for environmental protection in their respective regions. Fifteen nations surrounding the Mediterranean Ocean signed a "Save the Mediterranean" Agreement. The US and Canada are co-operating to revive the great lakes in their region.

Earth Summit 1992*

Introduction

U.N. convened a United Nation Conference on Environment and Development (UNCED) at Rio de Janerio in 1992. It is called Earth Summit. An eight hundred page document, called Agenda 21 was issued at this conference. It contains comprehensive blueprint for governments on everything from population strategy, management of hazardous wastes, recycling, energy conservation, renewable energy, business strategies to role of women in environment.

While the guidelines and the Principles proclaimed at Rio Conference are not legally binding, they carry a strong moral force to ensure their adoption. The underlying idea of Agenda 21 is that humanity has reached a point where present policies on development and economic growth have not been able to tackle the problems of poverty, hunger and living conditions. They continue to cause continuing resource depletion and deterioration of ecosystem on which life on this planet depends. If human beings have to be provided with decent living conditions specially in developing countries, the management of ecosystem at local, national and global levels have to be undertaken on priority basis.

* Adopted from UN Publications

Secretary General of UNCED in his Foreword to the Agenda 21 document states "that hunger and poverty are both a cause and an effect of environmental degradation..... Industrial countries continue to be addicted to the patterns of production and consumption which have so largely produced the major risk to the global environment".

Rio Declaration

Having met at Rio de Janeiro from 3 to 14 June, 1992;

- ***Reaffirming*** the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June, 1972, and seeking to build upon it;
- ***With the goal*** of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people;
- ***Working towards*** international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system;
- ***Recognizing*** the integral and interdependent nature of the Earth, our home.

Proclaims that:

Principle 1

Human beings are at the centre of concerns of 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 better 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 Earth's ecosystem. In view of the different 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 the technologies and financial resources they command.

Principle 8

To achieve sustainable development and a higher quality of life for all people, States 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 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 transboundary or global environmental problems should, as far as possible, be based on an 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 internalization 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 transboundary 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 by 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.

Earth Summit +5*

Earth Summit of 1992 (Agenda 21) was a milestone in the promotion of sustainable development and environment. The nations of the world committed themselves to protect the environment and resource conservation for sustainable development both at national and global level. In 1997 UN convened a conference to assess the progress made in five years since Earth Summit of 1992; this conference being called as Earth Summit +5. The final document of Earth Summit +5 is a result of several rounds of negotiations among the representatives of various governments. The highlights of Summit +5 are:

- The government acknowledged that global environment has continued to deteriorate since Earth Summit 1992 with increasing emissions of greenhouse gases and generating of more solid wastes. Also pollution and effluent treatment continue to be major problems.
- Renewable resources like fresh water, forests, fish continue to be used at an unsustainable rate.

On the positive side it is noted that:

- World population is slowing.
- Food protection is rising.
- Life span has increased.

At the same time, the number of poor is increasing and the gap between poor and rich has grown both within and between countries.

Earth Summit +5 addressed itself the above concerns and the participating Governments took action on several fronts and agreed to the following:

- Reconfirm the political commitment to sustainable development from all members of the international community, as well as from all major groups of civil society;
- Reconfirm the financial commitments and targets for official development assistance (ODA) made by industrialized countries at the Earth Summit, and call for intensified efforts to reverse the downward trend in ODA;
- Establish an Intergovernmental Forum on Forests under the Commission on Sustainable Development to continue policy dialogue on this issue, including more focused consideration of elements for a possible legal instrument;
- Open high-level Intergovernmental dialogues on fresh water, and on energy and transport, which will be taken up by the Commission on Sustainable Development at upcoming sessions;
- Make a stronger commitment at the global level of such issues as tourism, changing production and consumption patterns, and eco-efficiency; and

* Source: United Nation

- Set a more focused work programme for the Commission on sustainable Development through the year 2002, when the next General Assembly review will be held.

Summit +5 was a step further in the direction of environmental protection, resource conservation and sustainable development. For the first time statements were heard at this summit by representatives of various governments, of 'Civil Society' as defined in Agenda 21 – this being women, children, youth, indigenous people, NGO's working on environment and development, government officials, trade unions, scientists, farmers and business and industry.

Summit +5 carried out in-depth assessment of progress achieved since Rio Conference and laid further ground for future work. While there are broad areas of agreement about various environmental and development issues arrived as a result of intensive negotiations, there are areas of disagreement still remaining.

Summary of Assessment of Progress since Rio Summit and Recommendations

- The state of the global environment has continued to deteriorate.
- The major groups have demonstrated committed action, reflecting grass-roots concern and involvement.
- Regrettably, official development assistance as a percentage of GNP has drastically declined.
- The five years since the Rio conference have witnessed an increase in the number of people living in absolute poverty.
- Trade liberalization should be accompanied by environmental and resource management policies. Decisions on further liberalization of trade should take into account effects on sustainable development.
- Despite progress, the decline of many fish stocks and rising marine pollution continue.
- It is decided to continue the policy dialogue on forests through establishment of an Intergovernmental Forum. In developing countries, sharp increases in energy services are required to improve the standard of living of their growing populations. There is a need to encourage the reduction and gradual elimination of subsidies for energy production and consumption.
- There is a need to accelerate the phasing-out of the use of leaded gasoline as soon as possible.
- All financial commitments of Agenda 21 need to be urgently fulfilled.
- Further studies should be undertaken for facilitating foreign private investment in developing countries and enhancing its contribution to sustainable development.

- There is an urgent need for developing countries to acquire greater access to environmentally sound technologies.
- The role of UNEP, as the principal United Nations body in the field of the environment, should be further enhanced.
- Commission on Sustainable Development will continue to provide a central forum for urging further implementation of Agenda 21 and for high-level policy debate on sustainable development.

UNDP Support to Environment Protection for India*

The United Nations Development Programme (UNDP) plays a significant role in shaping an effective and unified UN response to today's development challenges. This role, which has been reiterated by Agenda 21 - the Programme of Action adopted by Rio World Conference on Environment and Development in 1992, calls for a focus on problems of natural resource management and use through field level interventions, and will facilitate informed decision-making at all levels in accordance with the UNDP mandate of sustainable human development.

Environment Support Programme

The Environment Support Programme for India under the UNDP/GOICCF-I was signed on 5 September, 1997, broadly committing UNDP grant assistance worth US $ 9 million. Several initiatives are already operational, covering a wide range of issues from "Green Rating" of Indian industry to environment management systems in the electronics sector; from small grants in the water sector in support of community level solutions which address chronic or acute water stress, safe disposal of human and industrial wastes and inadequate irrigation facilities or environmental degradation to manufacture and use of natural dyes and the establishment of a common effluent treatment plant in the Calcutta Leather Complex.

Other initiatives are from setting up of a Centre for Marine Environmental Education to providing management support to wildlife 'Protected Areas', development of environment-friendly 'Neem' based pesticides and conservation of medicinal plants. Other efforts will 'rate' municipal services; address areas such as the recycling of marble slurry, solid waste management and sustainable management of hospital waste; support protection of the endangered Olive Ridley turtles; explore wetland inventory using modern spatial technologies; and implement agro-forestry packages through women and youth North Eastern States and in the desert regions of Rajasthan, Ladakh and Sundar Spits. In all these places the programme will seek to demonstrate decentralized renewable energy systems

The focus of the programme is the provision of energy for sustainable people centred development in the chosen areas. In addition to pilot testing energy systems, the programme will also aim to providing energy services to support education, health and income generating activities. Community ownership as well as the active participation of women and women's groups will be key features.

Global Environment Facility

UNDP's environment mission in India, as in other countries, is heightened by its role as joint implementing agency in the Global Environment Facility (GEF), and in managing the GEF Small Grants Programme. The GEF is a tripartite partnership of UNDP, the World Bank and the UN Environment Programme (UNEP) to help protect four crucial areas of the global environment – bio-diversity, climate change, oceans and international waters and ozone depletion.

Within the GEF, the particular emphasis of UNDP is ensuring the development and management of capacity building programmes, and technical assistance projects. In addition, UNDP manages the Small Grants Programme on behalf of the GEF. India is eligible for funding under all GEF focal areas except the ozone depletion as these are addressed through the Montreal Protocol. As of May, 1999, under the UNDP-GEF portfolio, a total of US$ 40 million has been programmed for India. In addition, the Government of India and other participating institutions have contributed about US$ 40 million in-kind to these projects, which makes the total UNDP-GEF portfolio in India worth around US$ 80 million. India is the second largest recipient of GEF funding, and there have so far been seven operational projects, five medium scale projects, six preparatory phase projects, twenty four small grant projects. Several projects are in the pipeline covering the focal areas of bio-diversity, climate change and international waters.

The UNDP-GEF programme in India is a diverse and varied portfolio comprising projects that are environmentally, socially, and financially sustainable. The projects are country driven, based on national priorities and are designed to support the efforts of the Government to promote sustainable development. One effort is helping to optimize small hydel resources in the hilly regions of India. Another one has successfully used the high rate bio-methanation process to extract energy from waste. Two concrete projects will strengthen the management of the Gulf of Mannar marine biosphere reserve and the Andaman and Nicobar coral reef ecosystems. Other initiatives are addressing coal bed methane capture and utilization, fuel cell bus development, biomass energy for rural areas and the conservation and sustainable management of dryland and wetland bio-diversity.

The UNDP-GEF programme in India also has a grassroots out-reach through its funding of initiatives by non-governmental organizations (NGOs), community-based organizations and local community groups for grassroots based environment programmes. Under the UNDP-GEF — Small Grants Programme (SGP-Phase I), twenty four projects across the country have been funded to the tune of US$ 300,000. Encouraged by the success and response to the first phase of this programme, a second phase has been approved in which thirteen projects have already been identified for support to the tune of US$ 200,000. The second phase is set to mobilize resources from bilateral development partners, US$ 500,000 from GEF and US$ 700,000 from UNDP/India CCF-I resources.

Montreal Protocol – India

The details of Montreal Protocol are discussed in Chapter V of this book.

Contd...

Realizing the dangers of ozone layer depletion, governments adopted the Vienna Convention on Protection of the Ozone Layer (1985); the Montreal Protocol on Substances that Deplete the Ozone Layer (1987); the amendments to the Montreal Protocol in London (1990), Copenhagen (1992) and Vienna (1995). By 31 March, 1996, 155 countries had ratified the Montreal Protocol. India ratified the Montreal Protocol in June 1992. The Protocol sets out the time schedule for freeze and reduction of Ozone Depleting Substances (ODS) or "controlled substances". The protocol requires all Parties to ban exports and imports of controlled substances from and to non-Parties. Developed countries eliminated halons consumption as of 1 January, 1994 and chloro-fluoro-carbon (CFC) consumption as of 1 January, 1996. Developing countries have a grace period and must complete their phase out by 1 January, 2010, though several countries will have reached the target much before this date.

A Multilateral Fund was established by the Parties to the Montreal Protocol to assist developing countries in meeting the control measures as specified in the Protocol. UNDP is assisting several developing countries to access funds under the Protocol and implement national programmes to phase out CFCs, halons and other ODS. The main areas of UNDP support are : (a) national country programme formulation; (b) technical training and demonstration projects; (c) institutional strengthening and national capacity building; and (d) technology transfer investment projects.

The Ministry of Environment & Forests (MEF) is the coordinating agency in India for all matters relating to the Montreal Protocol. The MEF Ozone Cell, as the lead national agency, prepared the Country Programme with UNDP assistance. In early June, 1993, the Ozone Cell constituted six industry groups representing the aerosol, foams, halons, refrigeration & air-conditioning, solvents and chemical producer sectors. These sectoral groups generated data, action plans, strategies and estimated cost for phasing out ODS in their respective sectors. The net incremental cost for the total phase out of ODS in the India Country Programme has been estimated at $1,964 million. In addition to these costs which could be covered by the Fund, there are other costs that will have to be covered by the country or by the industries themselves.

UNDP has been assigned primary responsibility for the foam sector in India as well as technical assistance in halons. It has also been asked to help design and implement smaller aerosol and umbrella commercial refrigeration projects for the small-scale sector.

As of May, 1999, UNDP/India has received assistance worth US$ 13.1 million (76 projects) to phase out 1628 tons of CFCs in the field of foam, halons and aerosol sectors. Out of 76 projects, 18 projects have already been commissioned.

The Government of India has taken the following policy initiatives for the implementation of the Montreal Protocol in India :

1. Full exemption from payment of customs/excise duties on goods required to implement ODS phaseout projects funded by the Multilateral Fund and on similar goods required for setting up of new capacities with a non-ODS technologies;

2. Ban on finance/re-finance from financial institutions and commercial banks for investments involving ODS technologies.

3. Ban on imports/exports of ODS from/to countries not party to the Montreal Protocol;

Contd...

4. Compulsory licensing of imports/exports of ODS from/to countries party to the MontrealProtocol;
5. Ban on exports of CFCs to developed countries;

Regulations on ODS phaseout are in an advanced stage of being finalized.

"Capacity 21" Initiative

The "Capacity 21" initiative of UNDP – a small fund set up post Rio to support capacity-building initiative under Agenda 21, places considerable emphasis on the need for sustainable development to be a central component of national development practices. India's ongoing Capacity 21 exercise in natural resources accounting, rooted in the Indira Gandhi Institute of Development Research, Mumbai is a good example of the imaginative way in which capacity strengthening projects can be approached in four major areas – air quality, water quality, community land regeneration and bio-diversity conservation.

Review Questions

1. Give salient features of UN conference on Human Environment.
2. What was the emphasis of the UN General Assembly Resolution of 1972?
3. State the objectives of Earth Summit 1992.
4. Write a note on Earth Summit +5.
5. Give a brief account of UNDP support to Environment Protection to India.

REFERENCES

•Roberts, D., & Wu, H. (2024). Climate change adaptation and urban planning: Strategies for resilient cities. Sustainable Cities and Society, 83, 104016. https://doi.org/10.1016/j.scs.2022.104016

•Brown, C., & Smith, T. (2020). Climate change adaptation in urban environments: Strategies for sustainable development. Environmental Management Review, 42(3), 215-230. https://doi.org/10.1007/s00267-020-01342-9

UNIT

4

India's Efforts for Environmental Protection and Public Policy

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ❒ 4.1 Introduction
- ❒ 4.2 Constitutional Provision
- ❒ 4.3 National Committee on Environment Planning and Coordination
- ❒ 4.4 Tiwari Committee on Environment
- ❒ 4.5 National Committee on Environment Planning
- ❒ 4.6Environment Protection Act
- ❒ 4.7 The Seventh and the Eighth Plan
- ❒ 4.8 Policy Statement on Environment and Development
- ❒ 4.9 Certain Specific directions Towards Sustainable Development and Environment
- ❒ 4.1❒ Vehicle Exhaust
- ❒ 4.11 Thermal Plants
- ❒ 4.12 Measure for Abatement of Pollution in Rivers
- ❒ 4.13 Project Tiger
- ❒ 4.14 Public Policy and PILS

4.1 INTRODUCTION

Besides being historically and culturally respectful to environment, India did recognize and visualize the significance of environmental protection and resource conservation before the first International meet on Environment. The Stockholm Conference on Human Environment was convened by UN in 1972 whereas India's

Fourth Plan (1969-74) document clearly lays down the following:

"Planning for harmonious development recognizes the unity of nature and man. Such planning is possible only on the basis of a comprehensive appraisal of environmental issues. There are instances in which timely, specialized advice on environmental aspects could have helped in project-design and in averting subsequent adverse effect on the environment leading to loss of invested resources. It is necessary, therefore, to introduce the environmental aspect into our planning and development".

4.2 Constitutional Provision

Within five years of the Stockholm Conference, India amended its Constitution (The 42nd Constitutional amendment 1976) to include "Environment Protection" as a constitutional obligation. Article 48A lays down:

"The State shall endeavour to protect and improve the environment and to safeguard the forest and wildlife of the country".

Article 51A relates to fundamental duty. This article runs:

"It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures."

4.3 National Committee on Environment Planning and Coordination

Soon after the Stockholm conference, India set up a National Committee on Environment Planning and Coordination (NCEPC). This commirtee was concerned with issues relating to appraisal of development projects, human settlements planning, survey of eco-systems, like wetland, and sprea d of environment education.

4.4Tiwari Committee on Environment

In 1980, Government of India appointed Tiwari Committee, to make recommendation on environmental issues. The committee recommended the following:

(a) Comprehensive reviews and reformation of some Central and State Acts (such as the Insecticides Act, 1968; the Water (Prevention and Control of Pollution) Act, 1974; and the India Forest Act, (1927)

(b) New legislation for areas of action not covered by the present laws (such as those concerning toxic substances).

(c) The introduction of "Environment Protection" in the Concurrent List of the Seventh Schedule.

The Committee, inter alia, recommended for the establishment of a separate Department of Environment. Accepting the recommendations, Department of Environment was set up on November 1, 1980 by the Government, assigning it the following functions:

(a) To act as nodal agency for environmental protection and eco-development in the country.

(b) To carry out environmental appraisal of development projects through other ministries/agencies as well as directly.

(c) To have administrative responsibility for:

1. Pollution monitoring and regulation.
2. Conservation of critical eco-systems designated as Biosphere Reserves.
3. Conservation of marine eco-system

4.5 National Committee on Environment Planning

The NCEPC was replaced by a National Committee on Environment Planning, with the following functions:

(a) Preparation of an annual "State of Environment Report" for the country.

(b) Establishing an Environmental Information and Communication System to propagate environmental awareness through the mass media.

(c) To sponsor environmental research.

(d) Arranging public-hearings or conferences on issues of environmental concerns.

The word "Environment" is used in its widest sense. It means all the external environmental conditions and factors affecting human, animal and plants. (External factors include, climate, water, noise, temperature, soil, etc.) And the State is empowered to take effective steps to improve environmental factors.

4.6 Environment Protection Act

At the Stockholm Conference, the then Prime Minister, Mrs. Indira Gandhi said:

"..... extreme forms in which questions of population or environmental pollution are posed, obscure the total view of political, economic and social situations..... It is sad that in country after country, progress should become synonymous with an assault on nature..... Among the rest of mankind, we in India - inspite of Ashoka - have been guilty of wanton disregard for the courses of our sustenance".

India also embarked on several legislative measures for the protection of environment and for maintaining ecological balance. These were: The Water (Prevention and Control of Pollution) Act, 1974, Forest (Conservation) Act, 1980, Air (Prevention and Control of Pollution) Act, 1981. These enactments were amended from time to time to make them more effective.

Another significant step was setting up of independent Ministry of Environment and Forest at the Central Government level in 1985.

4.6 Environment Protection Act 1986

Till 1980's, emphasis seems to have been chiefly to prevent and control pollution. In 1986 the Government of India passed a comprehensive Environment Protection, Act, (1986) as an aftermath of Bhopal tragedy of 1984 to cover many aspects other than prevention and control of pollution given below.

The Environment Protection Act (1986) was passed for the protection of environment, regulation of discharge of pollutants, handling of hazardous substances, speedy response in the event of accidents threatening environment and deterrent punishment to those who endanger human environment, safety and health.

It has been claimed that:

(a) This Act is not only for protection of environment but it is also more effective and bold measure to tackle the problem of pollution as compared to all the previous laws in this regard. Under this Act, the Central Government has been empowered to take all appropriate measures to establish an effective machinery to achieve the objectives of Act.

(b) The Act enables the Central Government 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 abetting environmental pollution. The Central Government is also empowered to constitute an authority for exercising the power vested in it and to frame rules for that purpose.

(c) The Act has adopted a new position with regard to the question of locus standi so that now even a citizen has the right to approach a Court, provided he has given notice of not less than 60 days of the alleged environmental offence and his intention to make a complaint to the Central Government or the competent authority.

(d) The Act strengthens the penal provisions. The maximum penalties for contravention of the Act has been increased to imprisonment upto five years or fine upto one lakh rupees or both. If, the failure or contravention continues beyond a period of one year after the date of conviction, the offender shall be punishable with imprisonment for a term which may extend to seven years.

(e) The Government has been given the powers to collect samples of air, water, soil or other substances as evidence at the offences under the Act.

(f) The Act applies to the pollution generated by the Government agencies as well and where an offence under this Act has been committed by any department of Government, the Head of the Department shall be deemed to be guilty of the offence and liable for action under the Act unless he proves that the offence was committed without his knowledge to the commission of such offence.

(g) A special procedure can be prescribed for handling hazardous substances and no person can handle such substances except in accordance with procedure.

(h) The Central Government has been vested with powers of entering and inspecting any place through any person or agency authorized by it.

(i) The Act also authorizes the Central Government to issue direction for the closure, prohibition or regulation of any industry, operation or process. It also authorises the Central government to stop or regulate the supply of electricity or water or any other service directly without obtaining a Court order.

Some people are critical of the Act as they feel that:

"The present Act was enacted to bridge the gaps in the existing legislation on this subject, since the existing laws generally focus on specific types of pollution or on specific categories of hazardous substances. Yet some major areas of environmental hazards are not covered. There are uncovered gaps in areas of major environmental hazards. There are inadequate linkages in handling matters of industrial and environmental safety. Control mechanisms to guard against build up of hazardous substances, especially new chemicals, in the environment, are weak. Because of a multiplicity of regulatory agencies, there is a need for an authority which can assume the lead role for studying, planning and implementing long-term requirements of environmental safety and to give direction to, and coordinate, a system of speedy and adequate response to emergency situation threatening the environment."

If the authority contemplated by the Central Government continues to be the existing Pollution Control Boards then it is feared that the entire exercise may not yield results. This is so because the Pollution Control Boards (CPCB) till now seem to have adopted a soft line vis-a-vis the industry and prefer to be persuasive rather than punitive.

It may be pointed out that of late various agencies including CPCBs have become more stringent and have recommended strong actions against those who violate the act.

4.7 The Seventh and the Eighth Plan

The seventh Plan lays down well defined strategy for environment protection. This strategy is the result of realization that environment and natural resources, represent the most fundamental building blocks for national development and social well-being. The strategies that are laid down in the Seventh Plan, to achieve substantial development in harmony with environment are:

(a) The nation's planning for economic growth and social well-being in each sector must always take note of the need to protect environmental resources, and wherever possible, must work to secure improvement in environment quality.

(b) The primary responsibility for environmental protection must rest with each sectoral authority (Ministry, Department, Development Agency, Corporate Body, Municipal Council, Village Panchayat, etc.) which would have to take account

of environmental concerns in policies, plans, programmes, projects and legislation that come under their purview.

(c) Environmental management must be integral to all development activities. It should form an important element in the criteria for setting development targets and assessing plan performance in all sectors.

(d) The Department of Environment at the centre, and its counterparts at the state level would essentially serve as catalysts to promote environmentally sound national development through provision of management information, technical expertise, monitoring, research and administrative support, and wherever possible limited financial assistance.

(e) The prime responsibility with regard to the environment would rest with the various implementing authorities for development programmes and with the community. For this, environmental education and awareness building is crucial.

(f) Environmental planning, protection and improvement requires a coordinated, highly decentralized approach involving the cooperation and active participation of every segment of the society.

The Seventh Five Year Plan's main component in regard to environment protection are:

(a) Pollution monitoring and control.

(b) Environmental impact assessment.

(c) Resource conservation.

(d) Eco-development.

(e) Environmental research promotion.

(f) Environmental education, training and awareness.

(g) Environmental information.

(h) Coordination and liaison with State Government/Union Territories.

(i) Environmental policy and law.

(j) International cooperation.

(k) Strengthening of the organisation structure.

(Seventh Five Year Plan Draft, 387).

Eighth Plan

Eighth Year Plan further strengthened the Environmental policies. In the Eighth Plan allocation of funds for the protection of environment were increased and a state-wise allocation was formulated.

The Government of India set up a cell to ensure effective implementation of anti-pollution measures and measures for the protection of environment. India embarked in a big way in the direction of protection of environment in launching new programmes. Noteworthy are the project for cleaning rivers, of which biggest project relate to cleaning of Ganga and Jamuna. India has also embarked on the project of afforestation. India became signatory to Earth Summit 1992.

4.8 Policy Statement on Environment and Development

Policy Statement

Immediately after the Earth Summit (1992) India has taken several steps in the direction of conservation of environment and development in harmony with environment. The National Conservation Strategy and Policy Statement on Environment and Development is a step in that direction. It envisages the need for laying down the guidelines that will help to weave environmental considerations into the fabric of national life and development process. It is an expression of commitment for reorienting policies and action in unison with the environmental perspective.

The Preamble

The Preamble of National Conservation Strategy and Policy Statement states "that the survival and well-being of a nation depend on sustainable development. It is a process of social and economic betterment that satisfies the needs and values of all interest groups without foreclosing future options. To this end, we must ensure that the demand on the environment from which we derive our sustenance, does not exceed its carrying capacity for the present as well as future generations. Over the years, there has been progressive pressure on the environment and the natural resources, the alarming consequences of which are becoming evident in increasing proportions. These consequences detract from the gains of development and worsen the standard of living of the poor who are directly dependent on natural resources. It is in this context that we need to give a new thrust towards conservation and sustainable development."

The key words are conservation and sustainable development.

Laws

The Policy Statement notes that in the direction of framing legal and institutional framework adequate responses have been made. Thus, the following enactments/ amendments/regulations to existing Acts have been made.

- The Wildlife (Protection) Act, 1972, amended in 1983, 1986 and 1991.
- The Water (Prevention and Control of Pollution) Act, 1974, amended in 1988.

- The Water (Prevention and Control of Pollution) Cess Act, 1977, amended in 1991.
- The Forest (Conservation) Act, 1980, amended in 1988.
- The Air (Prevention and Control of Pollution) Act, 1981, amended in 1988.
- The Environment (Protection) Act, 1986.
- The Motor Vehicle Act, 1938, amended in 1988.
- The Public Liability Insurance Act, 1991.
- A notification on Coastal Regulation Zone, 1991, amended in 1994 & 1997.
- Environmental Impact Assessment Notification in 1994.
- Eco Mark Notification, 1994.
- Environmental Audit Notification.
- Public Hearing Notification, 1997.
- National Environmental Appellate Authority, 1997.
- Coastal Zone Management Authority, 1998.

Important Institutions Related to Environmental Issues

The following institutions have been created:

- Ministry of Environment and Forests.
- Department of Science and Technology.
- Department of Agriculture and Cooperation.
- Department of Biotechnology.
- Department of Ocean Development.
- Department of Space.
- Department of Non-Conventional Energy Sources.
- Energy Management Centre.

In addition, following Agencies have been created:

- Central Pollution Control Board and State Pollution Control Boards.
- Indian Council of Forestry Research and Education with specialised institutions for research in arid zone, forestry, moist and deciduous forests, wood technology, genetics and tree breeding.
- Forest Research Institute (FRI).

- Forest Survey of India (FSI) and the Wildlife Institute of India (WII) in addition to the existing organizations like Botanical Survey of India (BSI) and Zoological Survey of India (ZSI).
- National Environmental Engineering Research Institute (NEERI).
- National Wastelands Development Board.
- National Museum of Natural History.
- Centre for Environmental Education.
- Wadia Institute of Himalayan Geology.

The Patents and Intellectual Property Right (IPR)

Under patent law, which is developing rapidly, plant tissues, plasmid, cytoplasm, enzyme, or protein can be patented and, thus, reserved for exclusive use. Patent law acknowledges neither the farmer's privilege nor free access to patented inventions for the purpose of creation. Multinational corporations in the chemical, petroleum and pharmaceutical sector, which have a prime interest in the development of biotechnologies, have organized themselves within the International Chamber of Commerce to draw up their demands in legal form. They claim that rights under the UPOV Convention do not guarantee sufficient remuneration for biotechnological innovations and ask that patents should be permitted for all forms of living matter, from the gene fragment to species and genera.

Countries like the US which are under enormous pressure from commercial interests are modifying their existing patent laws through regulatory, administrative and judicial decisions. Cary Fowler points out to the dangers ahead: "New microorganisms are being redefined so that they are not longer considered products of nature (and thus excludable from many patent laws), but as products of human inventiveness".

The overall result is that genetic resources of the South are normally freely available without charge, while those based on Southern genetic resources but developed in the North are becoming subject to monopoly control by private companies. Northern countries are not only putting enormous political pressure on developing countries to accept uniform patent laws through GATT and other mechanisms, they are also refusing to make clear commitments to developing countries on access to biotechnology and other associated technologies.

UNEP's executive director Mostafa Tolba was constrained to point out at the second session of the ad hoc working group of legal and technical experts on biological diversity. He stated, "there is a continuous argument in international fora that because technology patents are held by private firms, governments cannot, in view of current international treaties, dictate to the private sector policies regarding transfer of patented technologies.

"By the same token, areas rich in biodiversity are mostly in private hands. If governments of developing countries are expected to convince land owners to participate in the

implementation of provisions of the (proposed biodiversity) convention that requires access to biological resources, then it is certainly not asking the impossible of industrialised countries to persuade their private sector to act in a similar way.

Not surprisingly, in the UNEP - sponsored biodiversity convention negotiations, many Third World governments which have signed the International Undertaking on Plant Genetic Resources are beginning to reject the common heritage and free access system altogether. Nowadays, there is free access to genetic resources, without payment, all over the world, except in the case of private collections. But in a recent meeting in Nairobi, the working group of legal and technical experts concluded "that the heritage of mankind should not be included in the convention", and that "it was largely agreed that accessibility to biological diversity should be based on mutual agreement between countries. Several countries objected to the concept of free access as such ....." The Malaysians, for instance, insist on the 'user pays principle'.

Other Efforts

The task before us would be daunting if it were not for the many positive factors that are emerging in respect of environmental protection. These include (i) people's movements to conserve their own environment, (ii) role of judiciary, (iii) greater efforts of media for environmental issues and (iv) spread of environmental awareness among children and youth.

To sum up, it is up to us, as State and Citizens, to undertake development process in keeping with our heritage and the traditional conservation ethos in harmony with the environmental imperatives of this land.

4.9 Certain Specific Directions Towards Sustainable Development and Environment

Many other programmes have been undertaken by the Government to prevent damage to environment. These are:

Afforestation

National Afforestation and Eco-development Board has been set up to promote afforestation. During 1993, it is claimed that two million hectares of land was brought under afforestation.

The Eco Task Force has been constituted to work in environmentally degraded areas. This scheme has been specially conceived to use the services of ex-servicemen. The Government is also hoping that once global funds become available to implement Agenda 21, new afforestation schemes can be initiated.

Regulation for Polluting Industries

The Ministry of Environment and Forests has identified 17 most polluting industries and asked them to install pollution control equipment or face punitive action including

closure. The 17 industries declared as most polluting are: sugar, fertilizer, cement, distillery, aluminum, petrochemicals, thermal power, caustic soda, oil refineries, ranneries, copper smelters, zinc smelters, Iron and steel, pulp and paper, dye and dye intermediates, pesticides and pharmaceuticals.

Public Liability Insurance Act 1991 and Environment Relief Fund

In the wake of the Oleum Gas leak case in which the Supreme Court awarded compensation to the victims of the Oleum Gas leak from a Delhi plant of the Delhi Cloth Mills, the Public Liability Insurance Act, 1991 was passed. The Act provides for public liability insurance for the purpose of providing immediate relief to persons affected by accident occurring while handling any hazardous substance. The Act was amended in 1992 to enlarge the meaning of the accident. Accordingly, accident means an accident involving a fortuitous, or sudden or unintended occurrence while handling any hazardous substance resulting in continuous or intermittent or repeared exposure to death of, or injury to, any person or damage to any property but does not include an accident by reason only of war or radiation activity. The insurance policy to be taken by the owner dealing with hazardous substance shall not be less than the amount of the paid up capital of the undertaking.

The most importanr aspect of the amendment is the establishmenr of Environment Relief Fund by the Central Government.

Water Cess

The increase in the Cess of those industries which consume excess water for discharge of those effluents which are in access of standards, has been stipulated.

4.10 Vehicle Exhaust

Automobiles are responsible for the greatest air and noise pollution in big cities. Now lead free petrol is used in vehicles plying in big cities. The manufactures of automobiles have been told to stop manufacturing two stroke engines. The compulsory pollution check on vehicles has been introduced in Delhi and other big cities. The public buses would soon run on CNG which is eco-friendly.

4.11 Thermal Plants

Our thermal power plants are great source of pollution. They produce fly ash and other particulate material in the surrounding areas.. We have been talking of making bricks out of fly ash for almost a decade bur not much success has been achieved. Most plants have been asked to install treatment plants but only some have adopted system for collection of dry fly ash for its utilization.

4.12 Measure for Abatement of Pollution in Rivers

The Government has come out with schemes for cleaning the Ganga, Yamuna and Gomti. For Ganga this is stipulated as the second phase of the Ganga Action Plan. Under the Scheme, sewage and industrial effluent treatment plants are to be installed in 15 towns long these rivers. The Damodar river is yet another highly polluted river. A project for cleaning that river is also in offing. The Government of India is visualizing a plan for making pollution free 18 major rivers under a comprehensive National River Action Plan.

4.13 Project Tiger

Human interference and habitat loss are the major causes for the fate of vanishing tiger. The largest number of living tigers are in India and the whole world looks upon India for the preservation of this animal. Under the Wild Life Protection Act hunting of all wild life species other than vermin and those damaging the habitat of wild animals has been prohibited and a Central Zoo Authority has been created.

A review of Project Tiger was launched in 1972. It revealed that in 1972, there were about 268 tigers in reserves. In mid-eighties number rose to 1121 in 17 reserves and in 1993 the number was 1327 tigers in 79 reserves.

According to a review of the "Project Tiger 1993", what has happened is that on account of shortage of prey and harsh environment conditions the tiger would disappear and unless suitable measures are taken urgently it might disappear for ever from the Sundarban, which are ideal habitat for tiger. Disappearance of tiger would disturb the delicate ecosystem. Excessive felling of trees along the banks of the rivers has resulted in the shortage of food for tiger.

4.14 Public Policy and Pils

Present system of decision making in many countries tends to separate economic, social and environmental matters at policy level and planning. This is not desirable practice and can be hindrance for sustainable development. Environmental policies have to be placed at the centre of economic and political decision making if sustainable development is to be achieved. In recent years government has begun to make changes in the institutional structure for incorporating environmental considerations in decisions relating to economic, social, agricultural, trade, transport and other policies. New forms of dialogues are being developed for formulating better public policies for protecting environment and resources. The responsibility for developing a sound public policy for environment protection and resource conservation lies however, with the Government.

How is public policy formed?

In a democratic country (India, USA, UK, etc.) public policy is determined through political process in which there is direct or indirect participation of citizens. Thus

environmental protection can be achieved through public policies. Public policies also determine many other activities. Public policies for example can alter the market behaviour.

Public policy is a specific course of action taken collectively for specific problems of public concern that reflect interest of society or a particular segment of society. The manner in which any problem of the society gets into the agenda of public policy is not simple. The methods by which a public policy is formulated are:

(i) through legislation;

(ii) through ordinance issued by the President of India;

(iii) through the decisions handed down by the Supreme Court or High Courts.

A legislation arises from the decision of elected bodies like Parliament or State Assemblies. Invariably, the public opinion often gets translated into legislation/ regulations. Also, the pressure groups play important part in the enactment of laws. It is therefore important to underscore the point that in a democratic setup citizens can express their concerns about their living conditions – health, safety – both at work place and at home that are affected by environment. It is possible that different citizen groups may have different interests but sound public policy takes into consideration those which are of common concern. These may even clash with individual interests. The environmental issues like the need for clean air and water are above personal interests. It must be born in mind that in democracy no single group or person gets everything of what it wants and yet everyone gets something of what they want. Another point to be born in mind is that in a democratic set up a group or groups can achieve what an individual may not be able to do. Further, once a common objective has been accepted as a part of public policy, then its implementation becomes easy.

In our country, a significant step was undertaken when environmental litigation was permitted by the courts as a fundamental right of citizens. Also, the concept of Public Interest Litigation (PIL) was introduced for the first time in a Supreme Court judgement against a municipality. The judgement recognized PIL as a constitutional obligation of the courts. In another judgement the Apex court went a step further stating that "procedure being merely handmaiden of justice, it should not stand in the way of access to justice to the weaker sections of Indian humanity and therefore where the poor and disadvantaged are concerned ..... this court will not insist on regular writ petition and even letter addressed by a public spirited individual or a social action group acting pro bono publico would suffice to invite the jurisdiction of this court". As a result the courts have been admitting large number of environmental cases. Some of the judges hearing such cases have given landmark judgements and have been called as green judges. Also, some of the lawyers have been called as Environment activists. The first landmark judgement of Supreme Court was delivered in 1985 when on the basis of PIL, the court directed the U.P. Government to stop limestone quarrying in the sub-Himalayan hills of Dehradun district. It is not only in India that PIL have brought many environmental issues before the courts and got them settled but in many other

countries courts have been acting against the complaints of individual, or groups on issues of environmental concerns.

The citizens all over the world are becoming concerned about their rights for clean air and water. Environmental Pressure Groups exist all over the world. They adopt peaceful as well as agitational methods. Chipko movement in India is a proof of people's concern about balance in ecosystem when in 1973 they embraced the trees to prevent their felling by the government.

PIL

Supreme Court on case of vehicular emission

A very significant judgement was delivered by the Supreme Court of India on April 24, 1999. The court ordered a ban on registration of private, non commercial vehicles without Euro-II emission norms in the National Capital region (NCR) from April 1, 2000 to check vehicular pollution. The three judge bench headed by the Honourable Chief Justice, A.S. Anand, however, permitted the registration of only 1500 diesel and petrol vehicles a month from June 1, 1999 till March 31, 2000 if these conformed to Euro-I emission norms. As reported in Times of India of April 30, 1999, this judgement would force the auto industry in India to adopt Euro-II norms in the next eleven months as against 2005 as notified earlier by the Central Government. The counsel for Mercedes and Toyota claimed in the court that their cars conform to Euro-II emission norms while TELCO said that its new car, Indica would be able to meet these standards by the end of year. The judgement says that 1500 vehicles (250 diesel + 1250 petrol driven) which shall conform to Euro-I standard may be registered till June 1, 1999 on first come first serve basis. After 2000 no vehicle will be registered unless it conforms to Euro-II norms. The counsel for Maruti Udyog Ltd. (MUL) which produces 80% of vehicles pleaded that the orders of the court should only be passed after hearing views of MUL. The court permitted that Union government may seek modifications or variation of April 29, 1999 order on the basis of data which would be filed on an affidavit of a responsible officer.

Review Questions

1. What are the provisions for the protection of environment in the Indian Constitution?
2. What were the suggestions of Tiwari Committee on pollution control measures and agencies?
3. What are main Indian enactments for the protection of environment?
4. Give objectives of the Environment (Protection) Act, 1986?
5. What are the Seventh Plan recommendations on Environmental Protection?
6. India's new policy directions are that development should be in conformity with environment. Outline briefly this policy.
7. What is policy direction on afforestation?

BLOCK – II

UNIT

5

Environment Problems – Global

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ☐ 5.1 Introduction
- ☐ 5.2 Global Warming
- ☐ 5.3 Effects of Global Warming
- ☐ 5.La How to Combat G lobal Warming
- ☐ 5.5 Ozone Depletion
- ☐ 5.6 The Montreal Protocol
- ☐ 5.7 Montreal Protocol Amended
- ☐ 5.8 Implementation Problems
- ☐ 5.9 The Developing Countries Scenario
- ☐ 5.10 Ind ia Faces Tough Negotiations on CFC

5.1 INTRODUCTION

Environmental problems like Air, Water and Land pollution or municipal waste disposal exist in every country. The nations have identified the causes for these problems and would continue to deal with them depending upon how sever these are and how serious is commitment for their abatement. A detailed discussion on these issues follows in subsequent units.

There are few problems that concern the entire world. They require International cooperation and have to be tackled at global level. They are:

(i) Global warming.

(ii) Ozone depletion.

(iii) Hazardous wastes.

5.2 GLOBAL WARMING

Global warming means gradual increase in world temperatures caused by greenhouse gases. The main greenhouse gas is carbondioxide (CO_2); others are nitrous oxide, CFCs (chloroflurocarbons), methane and some organochloride compounds like perflurocarbons (PFCs) and sulphuric fluoride - 6, which have replaced CFCs. Greenhouse gases come from various sources. These gases trap the sun's says in the earth's atmosphere causing the temperature to rise resulting in what is known as greenhouse effect or global warming. The Intergovernmental Panel on Climate Change (IPCC) has estimated that earth's temperature will rise from 1-3 degrees C in the next few decades. It is believed that global warming is leading to extreme weather changes. Hurricanes may be the result of such a change. The Insurance Companies in industrialised countries have stepped in to show their concern as it may be noted that a single hurricane in USA costs 50 billion dollars to global Insurance Companies.

In view of the serious effects of global warming, Rio conference in the convention on climate change pledged to stabiles greenhouse emissions at 1990 level by end of 20th century.

It may be mentioned that it is not only power generation, industries and other sources that are responsible for increase in atmospheric temperature. Deforestation also is responsible because the forest cover that existed earlier would have absorbed carbon dioxide.

The theory, according to scientists is that greenhouse gases which are present in trace amounts trap sun's heat more efficiently by absorbing longer wave length (infrared) radiation from the earth and as concentration of these gases increase, their heat trapping property also increases. Scientists have also indicated that there has been 25% increase in carbondioxide concentration during the last 100 years and it is expected that this will double in the next 50 years, the major source being burning of fossil fuels, especially coal. Of course, deforestation would have its own share in the increase of greenhouse gas and global warming.

It is simple to assume that rate of concentration of greenhouse gases, particularly CO2 will depend upon the rate at which consumption of fossil fuels and deforestation proceeds. The developing countries burn fossil fuels at lower rate than industrial world but when the former reach a higher level of development they would also use higher amount of fossil fuels and also their deforestation process would increase, resulting in higher concentration of CO2 in the atmosphere. Brazil, according to World Watch Institute, is already contributing billions of tons of CO2 each year through process of deforestation

5.3 EFFECTS OF GLOBAL WARMING

It is the domain of scientists to predict the effects of greenhouse gases. They do it by constructing computer models to assess climate changes. Reliability of conclusions from these models can be questioned and thus the entire theory on climate change due to

global warming may not be valid. However, scientists agree that: (i) actual warming has been taking place during the last 100 years; (ii) warming would further raise the temperature of earth by 3-50C if increase in CO_2 doubles; (iii) if warming continues, coastal areas would see a rise in sea level. If temperature rises further by 3-50C, sea levels may rise by 0.5 ft. to 5.0 ft. because of melting of mountain glaciers and expansion of oceans. This would result in islands like Maldives getting submerged and many coastal cities getting flooded, forcing the people to leave their original homes. They would be environmental refugees looking for new habitats. Not only rising water levels but there would be other changes due to global warming. These include hot summers for many parts of world which would mean more consumprion of electricity. It would also affect agricultural production and ecological balance.

As mentioned, some experts have questioned the theory of global warming and its effects. Butthere is unanimity for the theory in so far as rising levels of CO_2 is concerned and this rise will have some kind of effect on the climate. Some believe that relationship between global warming and rise in CO_2 may be circumstantial. The warming process could be due to natural causes like atmospheric cycles recurring 1000-3000 year cycles in which temperatures oscillate between cold and warm. IPCC, however, believes that warming is due to man made activities and not due to natural phenomena.

5.4 How to Combat Global Warming

At the Earth Summit held at Rio de Janeiro (1992) 153 nations signed the convention on climate change and committed themselves to reduce emissions of CO_2 and other greenhouse gases. Thus there is already agreement among nations that global warming is serious problem and rather than to wait and watch attitude, steps may be taken towards reducing consumption of fossil fuels by finding out alternative sources of renewable energy, better energy management system and to reverse deforestation. It is a documented fact that burning coal produces twice as much CO_2 per unit of heat as natural gas. It is therefore, important to control CO_2 production from burning of coal which can be possible by use of alternative source of energy like solar and wind power. USA with 6% of world population contributes 25% of world CO_2 emissions; it has therefore, a greater responsibility in reducing this gas and to evolve new energy strategies.

There is another aspect to the issue of greenhouse gases. Even if effects of CO_2 on global warming are not too great, less use of fossil fuels and alternative sources of energy would not only reduce CO_2 emission but also lessen pollution. It is true that all the strategies to reduce world wide reduction in CO_2 emission would incur astronomical costs, not billions but trillions of currency, but steps in this direction need to be taken in phased manner. Following steps have been suggested by experts;

1. Cleaning up coal for which technology exists. This can lead to lesser pollution. Also conversion of coal to gas is possible. This would further reduce pollution.

2. More use of natural gas than coal because natural gas contains only half the carbon of coal and no sulphur.

3. Renewable sources of energy would ultimately tackle the problem of CO_2 emission and pollution. Wind power and solar energy are obvious choices. But there are other renewable sources like photo voltaic (photo voltaics convert sunlight directly into electricity). These sources produce little or no pollution and involve no safety risks.

4. Manufacturing fuel efficient vehicles is another step.

5. Deforestation Reversal. This is a major step to reduce CO_2 concentration. It is possible to reclaim more land to plant more trees but requires help from social, political and financial institutions.

Greenhouse Gases

Carbon Dioxide (CO_2)

- Main greenhouse gas.
- Arises from burning of fossil fuels.
- Levels increase as a consequence of deforestation.

Methane (CH_4)

- About 20% of greenhouse effect is due to methane.
- Arises from
  - (i) rice paddies;
  - (ii) wetlands;
  - (iii) cattle;
  - (iv) burning of wood;
  - (v) Landfills

Chloroflurocarbons (CFC_s)

- Responsible for about 15% of the greenhouse effect.
- Thousand times more effective (heat absorbing) than CO_2.
- Reach the atmosphere from
  - (i) refrigeration;
  - (ii) air conditioning industry;
  - (iii) foam packing industries.

Nitrous Oxide (NO_2)

- Responsible for 5% of greenhouse effect.

Contd...

- Arises from
  - (i) coal burning;
  - (ii) biomass burning;
  - (iii) breakdown of chemical fertilizers.

Table 5.1: Fifteen Countries with Highest Industrial Emission of Carbon Dioxide

Country	Total CO_2 Emissions (000 metric tons)
South Africa	305,805
Poland, Rep.	338,044
France	340,085
Mexico	357,834
Korea, Rep.	373,592
Italy	409,983
Canada	435,749
Ukraine	438,211
United Kingdom	542,140
Germany	835,099
India	908,734
Japan	1,126,753
Russian Federation	1,818,011
China	3,192,484
United States	5,468,564

5.5 Ozone Depletion

Ozone depletion is another global problem. Ozone layer in the stratosphere forms a shield for earth against harmful ultraviolet radiation (UV-B) from outer space. Depletion of ozone results in the formation of holes in its shield. UV-B arising from sun would reach the earth if there are ozone holes.

Harmful Effects

The sun emits light rays of varying wavelengths. These rays have varying effects on earth's surface, on its living beings, on its ecosystem. The shorter the wavelength of

rays, more damage these can do to plants and animals. Ultra Violet (UV) rays are of short wave length. Ozone layer/shield as mentioned above acts as a barrier to UV; without this shield, the ecological balance of earth would change, and life would be paralysed. Though most of the plants and animals have some kind of protective mechanism from UV, a longer exposure to these rays result in their penetration to lower layers of body. This leads to skin cancer and damage to eyes in human beings. In plants, the process of photosynthesis – the process by which plants manufacture their food – is effected.

The Issue

The first of recent conventions on Environmental issues was the convention on ozone layer protection. Vienna convention as it is called, was held in Vienna in 1985. This was followed by Montreal Protocol. (1987) on substances that deplete ozone layer. It was signed by 24 countries and by 1988 signatories rose to 35. In 1990 delegates from 75 countries met in London to sign an accord that strengthened the provisions of Montreal Treaty.

The Ozone Depleting Substances

It was in 1974 that Mario Molina and Sherwood Rowland of University of California found that chlorofluorocarbons (CFCs) destroy the ozone in the stratosphere. CFCs are inert substances and can remain intact for years. The result is that CFCs can rise through atmosphere to reach stratosphere to do the damage. CFCs are a whole family of chemicals and contain chlorine and fluorine. The most common are CFC11, CFC12, CFC22, and CFC113.

There is another family of compounds, called Halons, which contain bromine. These compounds are 100 times more potent in destroying ozone than CFCs. It may be worth mentioning that CFCs when first discovered proved useful substances especially to refrigeration industry because these are neither inflammable nor toxic. Besides refrigeration industry, these compounds are used as aerosol propellant, as solvents for grease or glues, as a component of foam packaging, etc.

Ozone Hole

Ozone hole was first discovered by British Antarctic Survey in 1983 over Antarctica. It was found that levels of ozone were dropping very fast, though a small percentage was being replenished during fall season. But, by 1987 ozone had dropped by 50 percent. It was also found that ozone levels were dropping in other parts of the world too. Alarmed over such declining levels of ozone, United Nation Environment Programme (UNEP) called a meeting of few developed nations to consider the issue of ozone depletion vis-a-vis CFCs and phasing out use of ozone depleting compounds. Initially USA resisted but later agreed to 50% reduction in the use of these compounds. This formed the basis of Montreal Protocol (1987) on substances that deplete the ozone layer.

5.6 THE MONTREAL PROTOCOL

The discovery of ozone hole became a matter of great concern because trade and industrial interests of many countries were involved. European and Japanese were afraid that if there would be a total ban on the use of CFCs, their refrigeration industry would suffer but Americans were now keen for elimination of CFCs and other ozone depleting substances, probably they had developed some substitutes for CFCs.

Finally a solution was found when in 1987, twenty four countries and later by 1990 most of the nations signed an agreement, the Montreal Protocol, committing themselves to phasing out the production and use of ozone depleting substances mainly CFCs. The agreement stipulated freeze on CFCs production to 1986 level by 1989 and 50% reduction by 1998. The developing countries were given 10 years grace period over the deadline of the industrial countries.

In fact it was in the year 1989 that situation changed because of Margaret Thatcher, the former British Prime Minister. In March 1989, she called an international conference in UK to discuss the ozone problem. A month later, in May 1989, environmental leaders met again, this time in Helsinki, to discuss ozone issue. The meeting made environmental history as 80 nations agreed to ban CFCs totally by the end of the century.

India* and China, did not agree to sign the protocol. An article in "Christian Science Monitor" published from the US even called these countries' refusal, a form of "international blackmail". As these countries could not conceivably be blamed for what had happened in the past – using just 2 per cent of the world's CFCs – they were being blamed for what could happen in the future. It was pointed out that their huge populations and their eagerness to modernisation was creating a growing demand for appliances and consumer products which could undermine the Montreal Protocol. If India and China achieve their modernisation and electrification goals for the next decade, all CFC abatement efforts by the industrialised nations would be mullified. The British Journal, New Scientist reported growing Western fears about China's plan to put a refrigerator in every house by the end of the country.

What was the problem in the Montreal Protocol when, according to UNEP, the biggest concessions in the protocol were given to developing countries?

A detailed look at the protocol makes it clear that its provisions were indeed discriminatory and extremely unfair to developing countries. As a forerunner of the many international conventions which are on the cards, the anti-third world provisions of the Montreal Protocol will but naturally lead to distrust and deep suspicion among developing countries of international environmental action.

The first problem was that of quotas for further consumption. The Montreal Protocol categorized developing countries as those with an annual per capita consumption of CFCs less than 0.3 kg. In contrast, the US per capita consumption in 1986 was 1.7 kg.

---

* India will use during the entire 1990s less than four per cent of CFCs already emitted by the US by 1985.

The developing countries were allowed to increase their production to bring it up to 0.3 kg per capita or an average of each country's estimated annual consumption between 1995 and 1997, whichever is lower, before reducing them to half by 2010. This "biggest concession", is clearly not so fair as it freezes current global inequality. The US, for instance, with its stipulated 50 per cent reduction over the 1986 level would still be consuming 0.85 kg per capita in 2000. Even if developing countries took full advantage and expanded their production to the limit of 0.3 kg in 2010, their consumption would be halved to 0.15 kg per capita – five times less than the permitted consumption of the US.

The Montreal Protocol sets dangerous precedent, especially for the poor nations. Instead of the treaty setting out a system in which a global common resource is shared and managed equitably, with equal rights for every citizen, the treaty operates within the context of existing inequities, creating a legal framework to institutionalize and perpetuate the gap between rich and poor.

The second problem is that of historical emissions. As the Chinese delegation at the London 1989 conference said, "Developed countries have produced problems of grave magnitude. They took advantage of cheap energy in the past to accumulate wealth, which they can now use to manage the environment." They should turn over the limited quotas of emissions available to developing countries – as any fair treaty would have done. If the prospect of a refrigerator in every Chinese home was giving Western leaders and the public nightmares then they should have given up their own refrigerators in the interest of the globe.

The global inequities in CFC use are enormous. Between 1960 and 1984, USA alone put in an estimated five million tonnes of just CFC-11 and CFC-12 into the atmosphere. India's total use of CFCs and halons in 1990 was estimated, by some authors, at 5,000 tonnes per year and, by others, at 10,000 tonnes. At current growth rates in CFC use, even after taking higher figures, India will be using about 25,000 tonnes per year by the end of the century. In other words, India will use during the entire 1990s less than four per cent of all CFCs already emitted by the US by 1985 and less than two-thirds of USA's CFC and halon use in just one year, 1985. It is obvious that when past emissions are taken into account and focus shifts to actual quantities used rather than growth rates in CFC use, the problem lies entirely with the consumption of the Western countries.

This also raises moral questions. A large part of the CFCs, almost 50 per cent, were used for packaging of what cannot under any circumstances, be called survival items like hairsprays, paints, deodorants or styrofoam cartons for hamburgers. On the other hand, the projected use in developing countries is for food refrigeration and air conditioning – crucial in hot temperate climates. If there are limits to growth, then these factors ought to be taken into account and fair quotas assigned.

Thirdly, various trade clauses in the treaty seek to safeguard the interests of industries in the West while openly discriminating against interests of developing countries. The protocol stipulated following:

1. Within one year, there ought to be a ban on import of controlled substances from nations not members of the protocol;

2. Within three years, a ban on imports of products which contain controlled substances from nations not members of the protocol;

3. Within five years, a ban on imports of products produced with, but not containing, controlled substances from nations not members of the protocol; and,

4. Parties signatory to the protocol are expected to discourage the export of technologies used for controlled substances to nations not members of the protocol.

The above provisions explicitly disallow the developing nations as well as nations not members of the protocol to export products or substances. The justification being that this would, on one hand, serve as an incentive for non-parties to become members and, on the other, dissuade developing nations from taking advantage of the concessions given to them and delay their count down by trading. But what the provisions leave out is these total freedom to developed countries to export both products and substances to hoth developing countries as well as to those countries not party to the protocol.

The implications are clear. With total protection and monopoly, Western nations can, on one hand, switch to so-called alternative technologies while using their quotas to export and increase trade. This is unfair trade practice. Friends of the Earth from Australia reports that in 1988, taking advantage of these clauses, Australia passed the Ozone Protection Bill which allows for an export quota of 3,800 tonnes of CFCs in 1989, an increase of 80 per cent over 1986 exports.

Under the treaty, developed countries could withdraw from the protocol but developing countries were explicitly forbidden to do so, making them unequal 'partners'.

It may be noted that key powers for decision making under the protocol were handed over to the largest polluters. It stated that in case parties were unable to arrive at a consensus regarding crucial issues like further reductions in CFC use, then the decisions could be adopted by a two thirds majority vote of the parties present and "representing at least 50 per cent of the total consumption of the controlled substances". US alone consumes roughly 30 per cent.

Further, the protocol made no real provisions to assist developing countries to find alternatives to a problem which was not their creation or responsibility. The main fear of countries like India and China, expressed by the former Indian minister for environment, Mr. Z.R. Ansari at the 1989 London conference was, "the technology of substitutes, conservation, recycling and equipment modification will be the monopoly of a few countries in the developed world ..... the question that haunts us is the extent of resources required to get the technology as well as the products from the companies in the developed world." Without funds to buy the technology, the developing countries faced the prospect of becoming captive markets for the new chemical products.

The protocol only called upon parties to "facilitate" access to such alternative technology and make bilateral and multilateral provisions for subsidies. Mr. Ansari aptly called

these provisions "delightfully vague", while provisions for restrictions were clear and specific.

5.7 Montreal Protocol Amended

Obviously a lot needed to be done to change the protocol. Indian teams recall the enormous hostility they faced from the existing members when they first raised the issue of modifications of the protocol. The discussions which started in mid 1988 took over two years to reach some consensus. In June 1990, at the meeting hosted by the British government, it was decided to propose amendments to the Montreal Protocol. It was at the same meeting that the Indian delegation, led by Ms. Maneka Gandhi, the then minister of state for environment, agreed in principle to sign the protocol, but only once the ratification of the amendments was completed by the existing members.

The amendments incorporated several of the objections raised by developing countries. For instance, the discriminatory clauses for withdrawal and veto were removed; and, not just imports but exports were also banned to nations not party to the protocol. This trade barrier was apparently retained to enforce nations to comply with the protocol. The Western nations also pledged to double their commitment to the problem by greatly advancing the timetable for phasing out CFCs and other substances. This meant a changed pace for developing countries also.

5.8 Implementation Problems

New Timetable

The post-London timetable states that CFCs are to be totally phased out by 2000 by the developed countries and by 2010 by developing countries. Halons have also been included now and have the same timetable as CFCs. Two new chemicals, carbon tetrachloride and methyl chloroform, used primarily as solvents in metal cleaning industry, have been included with a phase-out schedule by 2000. Both these synthetic compounds were found responsible for releasing ozone depleting chlorine in the atmosphere.

Not Satisfied

But Friends of the Earth (FOE), an international environmental pressure group, remains very critical of these measures which it finds inadequate and weak. According to FOE, the cuts are not deep or rapid enough as the amount of CFCs produced before the final phase-out would be enough to increase the peak chlorine load in the atmosphere by another 50 per cent and would greatly increase the risk of severe ozone depletion also in the Arctic. The Antarctic ozone hole would nor get a chance to heal and would remain until at least 2080 and the chlorine levels would remain above four parts per billion (ppb), exposing the world to an extended period of severe ozone loss.

FOE instead suggested a complete phase-out by 1992. This would reduce the peak chlorine load and chlorine levels will drop below 4 ppb by 2015. But the Antarctic hole

will still take until 2070 to disappear. In the case of halons, FOE points out that the agreed phase-out will allow an additional production of over 50 per cent of the total amount of halons which have been produced till date in the world. It is "unacceptable for governments to sanction the intolerable added burden on the fragile ozone layer", says FOE.

Alternatives

A major impetus for sealing the ozone hole has come through the development of alternative chemicals and products which could substitute CFC use. The alternatives have mainly been developed by the same chemical companies which earlier manufactured CFCs. Du Pont, for instance, which makes a quarter of the world's CFCs, is now also the world's largest producer of alternative chemicals. The British firm, ICI, is running only a few paces behind.

The substitutes are mainly hydrofluorocarbons such as HFC which contain hydrogen, fluorine and carbon, and hydrochloro fluorocarbons (HCFCs) such as HCFC 123, which also contain chlorine, though in smaller quantities than CFCs.

Refrigerators need urgent solutions particularly as these are the fastest growing and have large market in developing countries. The main alternatives in this case is HCFC 22, which is already in use, and HCF 134a which ICI put on to the market in early 1991 from two new production plants, one in Chesire, UK and another in USA.

High Costs

The new chemicals are expected ro cost rhree to five times as much as CFCs. For instance, while CFC refrigerants cost UK £5 per kg, HFC 134a, its proposed replacement, will cost around UK £30 per kg. Refrigerant substitutes are the most expensive. 'New Scientist' reports that the extra cost per kg. of chemicals used as substitutes will be six to 15 times higher for domestic refrigeration and automobile air conditioning as for other CFC applications. Du Pont estimates that it will cost the whole chemical industry USA $ 4 billion over the next 10 years to replace CFCs with safer compounds. It also estimates that equipment worth over US $ 385 billion will soon become obsolete, mosr of this is for refrigerarion.

In the case of refrigerators, scientists are drawing attention to some cheaper alternatives like using propane or ammonia as coolants. Scientists working in Britain claim that previously refrigerators used large quantities of coolants which makes the flammable propane a dangerous option and that is why the industry switched to inert CFCs. But modern refrigerators use only 100 gm of propane almost the same as in a tahle rop cigarette lighter, and as a result propane can become viable again. The scientists also claim that, while it is possible for a standard refrigerator to run on propane, a refrigerator especially designed for propane needs half the coolant and uses 10 per cent less energy than one using CFCs. Others are exploring options of using ammonia and even water in a new generation of absorprion refrigerators instead of the standard refrigerators with compressors.

A Caution

Even before the proposed alternatives have hit the market, a controversy is raging about their non-environment friendly nature. According to FOE, "more than just name changing will be needed to disguise their chlorine content. The HCFCs still contain chlorine and their ozone depletion potential ranges from two to 10 per cent of that of benchmark CFC-11. Another alternative, HCFC-22, increasingly used in refrigeration and some foam blowing applications, contributes three per cent of the ozone destroying chlorine in the atmosphere, says FOE.

But more importantly, the new chemicals too have been found to cause global warming. Both HCFCs and HFCs are potent greenhouse gases. In April 1990, studies published in 'Nature' confirmed that these gases may make the same contribution to global warming as the banned CFCs. According to data published by FOE, HFC 143a, the suggested alternative for foams, has a global warming potential between 72 to 76 per cent of that of CFC-11, while HFC-134a, the favourite for refrigeration replacement, has a global warming potential of 24 to 29 per cent of CFC-11.

The scientific assessment report of the World Meteorological Organisation states that the only scenario in which the chlorine level in the atmosphere not only stabilizes hut also reduces, is one in which all CFCs, halons, carbon tetrachloride, methyl chloroform and all HCFCs are phased out by 2000. Only then would the chlorine level in the atmosphere will decrease to 1.9 ppbv – less than today, and close to the volumes needed to return Antarctica to levels approaching its natural state. But this would mean drastic changes in the West, their philosophy and policies.

5.9 The Developing Countries Scenario

For the developing countries the main issues remain technology and money Developing countries like India and China wanted clear assurances for transfer of technology as well as additional finances to cover the costs of the switch-over. The Americans, consistently blocked efforts on such aid. In May 1990 when the US suggested a contribution of US $ 20 million for three years to a fund to pay for ozone friendly technology, it made the UNEP's Executive Director, Mostafa Tolba, remark that the "contribution was very little compared with revenues of more than US $ one billion it has made from taxes on chemicals which deplete the ozone layer.

The major reservation of the US was that any commitment on the issue of ozone would create a precedent for the proposed climate convention. As late as March 1991, the US almost jeopardized the entire negotiations when it withdrew from its earlier commitment to provide funds. Pressure from other Western allies like the Scandinavian countries forced it to agree. The modifications include directives on financial mechanisms for establishing a fund for technical cooperation and transfer of technology.

The fund would be largely multilateral with 20 per cent bilateral and regional aid included - against the 10 per cent preferred by developing countries - and would be financed by developed countries. The basis of assessment of each country's contribution

would be the UN scale of assessments. The European Community which consumes less than the US complained, unsuccessfully, that this was no equitable burden sharing. The meeting did not accept the "polluter pays" principle as a basis for assessment. FOE also reports that the meeting refused to consider the proposal made by various environmental groups for a consumption tax which would make the funding flows more visible and enable alternatives to compete more effectively.

The fund was established with commitments of US $ 160 million which would be raised to US $ 240 million when India and China became parties to the Protocol with each getting US $ 40 million. This amount to be spread over three years is clearly inadequate. There no mention in the amendments of how the remaining amount of money needed for the switch-over will be collected.

Disbursement of the money will involve a tremendous amount of bargaining and haggling. To make matters worse, there is no definite state of the art technology for alternatives to estimate the costs. The Indian government then, funded by the British Overseas Development Administration, hired a British Consultant, Touche Ross, to assess switch-over costs – the figure arrived at was US $ 1.2 billion.

Doubts about actual transfer of alternative technology and not just of manufactured chemicals and products also persist. The chemical giant which makes a quarter of the world's CFCs, Du Pont and which has developed the substitutes, has consistently argued that developing countries are incapable of handling these technologies and are best off buying the products from the West. Du Pont, reports FOE, had produced policy papers outlining their view that developing countries should be funded to use new chemicals, not to produce them. It is thus up to the leaders of the developed world to purchase the technology for the developing world. Thus the means of implementing the obligations of poorer countries under the Protocol, and their very access to the technologies essential to their development will remain in the control of the leaders of the developed world creating an unhealthy dependency and perpetuating the role of 'aid' and patronage, instead of rights and responsibilities.

Indian negotiators, however, believe that the financial provisions will work. They point to the clause in the modified protocol which relates developing countries ability to fulfill obligations to the effective implementation of financial and technological transfer.

5.10 India Faces Tough Negotiations on CFC*

India faces a tough round of negotiations in Geneva over the closure of its chlorofluorocarbon (CFC) production facilities under the Montreal Protocol on ozone depleting substances.

The negotiations will be conducted during a four-day meeting of the Open Ended Working Group that has been constituted under the Montreal Protocol. The group has

* Reported by Hindustan Times, New Delhi, Dated June 16, 1999.

a wide-ranging agenda for discussions, including assessment reports prepared by the panels on scientific and environmental effects as well as technology and economic assessment, recording the progress made in combating ozone depletion in 1998.

Other important issues for discussion, are the replenishment of the multilateral fund for the period 2000-2002 and the remaining phase out of ozone deplering substances (ODS) in developed countries.

The mulrilateral fund was ser up under the Montreal Protocol to help countries phase out the production and consumption of ODS. The first, interim, tranche of the fund was $160 million for the period 1991-93. The first full fund was of $500 million for the period 1994-96 and the second of the same amount for 1997-99.

Observers expect a round of hard bargaining over the size of the third fund as developing countries, chiefly India, China, Brazil and Mexico, are likely to seek a sizeable enhancement to meet their costs of phasing out ODS.

It is here that India will face the real test. India is among the largest producers of CFCs in Asia. It produced a total of 24,000 tonnes of CFCs during 1997, of which only 7,000 tonnes was used domestically and the rest was exported. India has a commitment to close down these plants in the next six years. It wants to advance the dates for closing down but has not been able to reach an agreement with the global community on the amount of money it needs as compensation for the closure. Experts say the Indian government has been demanding more than $250 million. That would cover loss of profit, loss of employment as well as dismantling and destruction of the existing machinery, which is one of the crucial conditions of the Montreal Protocol to insure that the plants which have been closed down and paid for by the multilateral fund are not restarted.

India has justified its demand for the seemingly high sum by pointing to the high cost of capital in the country, the high cost of replacement of the old plants and the "difficulty in accessing alternative technology".

However, experts say the Indian demand seems excessive, especially when compared to the fact that China, which produces more than 55,000 tonnes or more than two-and-a-half rimes the Indian production, received $150 million in the last fund.

"Hence a realistic figure that Indian can expect as compensation is about $75 million. This is what we will see in the next few days whether the Indians can manage to get anything more than this amount and whether they will agree to an amount that is almost a third of their asking price", said an observer.

But India has a few things going for ir. It has so far kept ro its commitments for production and consumption of CFCs. In less rhan three weeks the first control measure for developing countries under the Montreal Protocol will come inro force. Under it, development countries have to freeze their consumption and production of CFCs at a level which is the average of their levels for 1995, 1996 and 1997. While China may

miss the target, India is well on its way to meeting the level and can use that to its advantage in the upcoming negotiations.

Rajendra Shende, chief of the energy and Ozone Action Unit of the United Nations Environment Program (UNEP), the nodal agency for monitoring the Montrel Protocol, told India Abroad News Service: "India has made serious efforts and there are good sings that it may meet the target of the first control measure. However, it needs to utilize this momentum to do more and hence should be able to get more benefits from the multilateral fund to access substitute technologies".

The other important issue on the agenda of the Geneva meeting is the continued production of CFCs in developed countries to meet the exempted categories of uses, notably for the inhalers for asthma patients. Holland, Spain and Greece have a plant each to meet these exempted uses. However, in 1997, the three plants produced more than 30,000 tonnes or three times as much as the consumption allowed for these exempted uses.

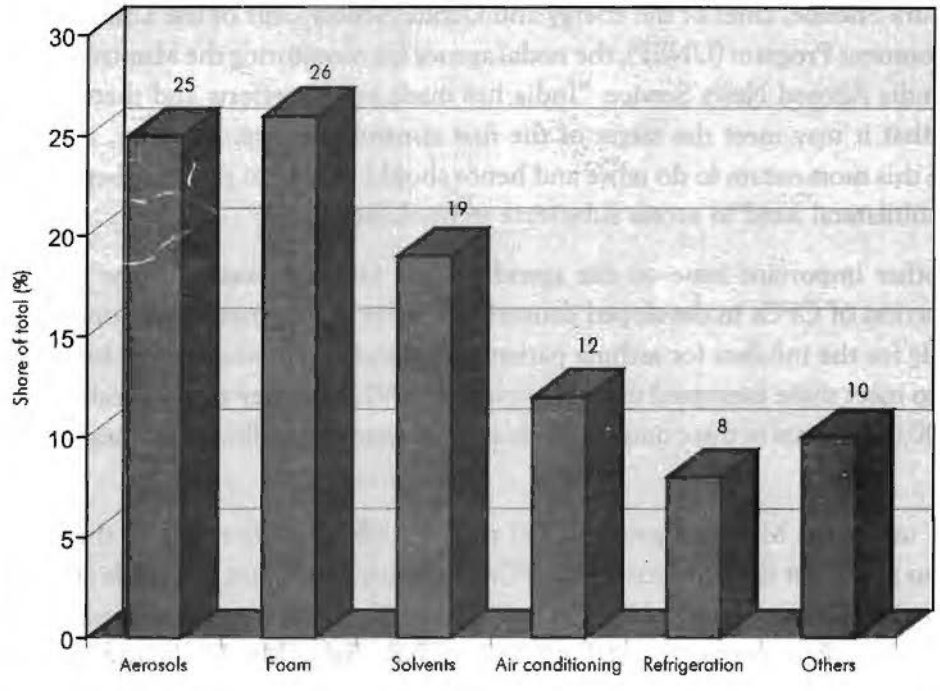
India, under the Montreal protocol will receive US$ 82 million during the next ten years to phase out the production of CFCs. This announcement was made at the 29th meeting of Montreal Protocol held in Beijing recently. India was represented by Union Minister for Environment and Forests, Mr. T.R. Balu, Mr. V. Anand, Secretary Environment and Mr. Atul Bagai, Director Ozone Cell. In India, the beneficiaries would be CFC producers, SRF Ltd., Navin Fluorine Industries, Gujrat Fluorochemicals and Chemplast Ltd. Initially, India requested for US$ 250 million but the World Bank, according to its own assessment came to a figure of $ 179 million for India to develop alternatives to CFC. At Beijing meeting it was decided to give $ 82 million to India.

Compared to china, India got a good deal at this meeting. China produces 50000 tonnes of CFC and got $150 million while India which produces 23000 tonnes got $82 million. The grant of $82 million will be given to India in installments.

Review Questions

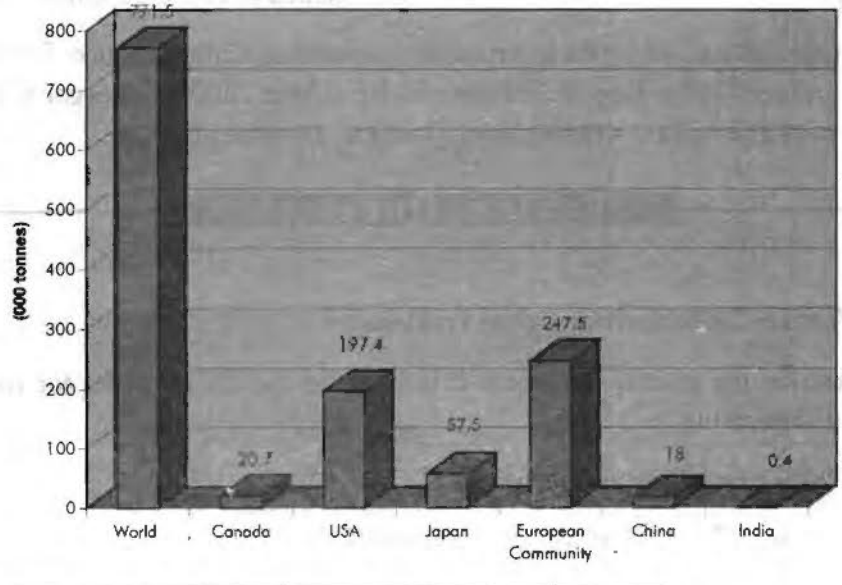
1. What are Global Environmental Problems?
2. Describe the greenhouse effect. Prioritize the specific measures for combating global warming.
3. What is ozone layer and its function?
4. What are CFCs? What uses do they have?
5. What is Montreal Treaty? What impacts it has on industry?
6. Describe the events that led to the Montreal Treaty.

Global CFC use by Category (1985)



Source: CSE

Consumption of CFC-11 and CFC-12 in 1986

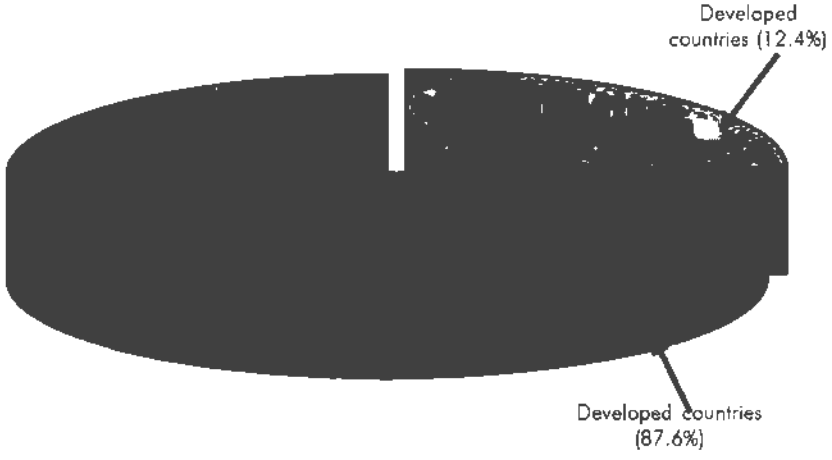


Source: CSE

The above data on CFC use published by the World Resources Institute is based primarily on reports on CFC-11 and CFC-12 that were submitted to a UNEP workshop on CFC production in Rome, 1986. Estimates of CFC production by country are difficult to obtain. They are held in confidence by UNEP. Major manufacturers of CFCs hold their production and sales data as proprietary

Consumption of CFCs and Halons (1986)

	Consumption (million tonnes)
Developed countries	1,028,438
Developing countries	145,560
	1,73,998



Source: CSE

Du Pont Case

DU Pont was the world's largest manufacturer of CFCs and almost all its revenue (600 million dollars in 1987) came from sale of CFCs.

In 1985 DU Pont produced 882 million pounds of CFCs, 706 in USA and rest in Europe and Japan.

The ozone battle started in the mid 1970s. At this stage, action to stop or reduce the manufacture of CFCs was inconvenient to Du Pont which for the last 40 years had held near monopoly position in many CFC products. Its sales accounted for half the US market, and more than one-fourth the world market in these products.

At each stage, when the question of regulation of these chemicals was raised, Du Pont immediately called for further studies saying conclusive evidence was missing. The company adopted delaying tactics.

But the picture soon changed. Western leaders were under heavy public pressure to undertake fast corrective action. In all this, the role of Du Pont is even more interesting. It first did a complete turnabout on its own position. It had by the mid 1970s realized that it was fighting a losing battle and had started to undertake R&D on CFC substitutes. By the end of the 1980s, there were public voices calling for a fast phase out of these ozone-depleting chemicals. Du Pont was now armed with CFC substitutes with which it could hit the market especially as the global convention would make these substitutes mandatory.

As a result, allegedly under its pressure, the Montreal Protocol redefined the entire group of chemicals, chorofluorocarbons/ fluorocarbons into three new chemical categories – categories which became the basis of differentiating which chemicals would be phased out and which would become the "officially sanctioned" substitutes. This was in spite of the fact that the alternatives are also known culprits in depleting the ozone layer, though in lesser measure, and have also been found to cause global warming.

Beyond the public rhetoric about saving future generations, Du Pont was doing all it could to ensure that change should come only at its own pace and convenience. As a result, the public facade was maintained.

Du Pont continued to resist any U.S. Senate measures in calling for a faster phase-out of CFCs. In 1990, when Western leaders were heading with success in calling for complete phase-out within a decade, Du Pont produced 460 million pounds of the banned chemicals. In the same year, Du Pont was given the stratospheric ozone protection award from the US Environment Protection Agency.

Another strategy of Du Pont which will be of interest to developing countries was to convert the ozone issue from one which demanded only national action to one of global regulation and enforcement. Du Pont consistently argued with Western politicians that "unilateral" US action could not solve the ozone problem.

At first, this strategy brought into the fold other industrialised countries which were unarmed with their own substitutes. But later, this ploy brought pressure on the hapless developing world and soon homed on to India and China who were refusing to sign the Montreal Protocol.

UNIT

6

Environmental Management System

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ❒ 6.1 Introduction
- ❒ 6.2 Terminology
- ❒ 6.3 Why to have an Environmental Management System?
- ❒ 6.4 ISO 14000 (Series) – The Basic Principles
- ❒ 6.5 Actual Conduct of Audit for Certification
- ❒ 6.6 The Indian Scene

6.1 INTRODUCTION

Environmental issues are too important to remain at a level of academic thinking or discussion. We have described that growing recognition about these issues now exists at every level in public, governments and corporate world. We have referred to new environmental legislation being passed, implemented, though these may not be implemented satisfactorily. All this came about as a consequence of forces arising out of political, social, health, economic, cultural scientific and other such reasons. The environmental problems, have already affected the living conditions of many people, specially those living in developing countries.

We have earlier stated that environment provides services as well as physical habitat to live. The environment also provides resources which are used for producing goods chiefly by industrial sector. Some of the resources are not renewable and those which are renewable do not get renewed at the same pace as they are consumed. We have also seen that production processes result in producting not only the desired products but also the wastes. How are we to tackle these problems?

It has become imperarive that resource conservation and environmental protection must now become a part of overall management as Environmental Management System (EMS) to be adopted as a strategy by the enterprise for meeting the expectations of the society as well as for sustainable growth. Not only this but EMS must take congnizance

of nature, not infinitum but nature finitum. The nature has been providing sustenance and protection to living creatures including human but now nature is in need for protection from human. It is our hope that our relationship with nature and its resources would be perceived at every level, especially political and corporate, with a sense of urgency and acute sensitivity. EMS must take into consideration the fact that world is now moving towards innovations in technology which often denies legitimacy of environmental themes. To bring these under the ambit of environmental considerations, the structure of organizations will need to be changed to understand the ecological reality.

It would be fair to say that we have only begun to think EMS in a responsible way both in national and global perspectives.

Till 1970's environmental management was confined to resource conservation at local, community or national level". During 1980's and 1990's the situation changed. The environmental issues became global, though they originate at local or national level.

It may be pointed out that there is a school of thought according to which environmental and resource management is more a problem of efficiency in energy use, substitution of non renewables or recycling technology. In this way more could be produced. But the question is whether more production is achieved without increase in raw materials or resource base. If the resource base/raw material is finite, can we increase production?

6.2 TERMINOLOGY

Certain terms and definitions used in EMS need to be elaborated.

Environment

It means surrounding in which any organisation or living system operates. It includes natural physical entities like air, water, land and its resources, human being, plants (flora) animals (fauna) and their interrelationship.

Environmental Aspect

It means organisation's activities, services and products which interact with the environment. For example, packaging process of manufacturing unit is an environmental aspect.

Environmental Impact

A change in environment, wholly or partially resulting from an organisation's activities, services or products (Aspect) is referred to as Environmental Impact. As stated above packaging is an aspect but the wastes produced in this process is an impact. Usually impacts are harmful; sometimes impacts can be beneficial as for example conservation programmes protect wildlife.

Those responsible for EMS, must be able to identify both existing as well as potential impacts. For identifying impacts, following environmental aspects must be known:

(i) emissions.

(ii) effluent discharges.

(iii) consumption or reuse of material.

(iv) noise.

For example :

Aspects for plying of vehicles include:

(a) use of engine oil.

(b) emissions to air.

The impact for: (a) is used oil and its disposal.

The impact for: (b) is pollution of air and its control.

Environmental Management System (EMS)

It refers to system for managing an organisation's environmental programmes in a comprehensives systematic, planned and documented manner. It embraces organizational structure, planning, and resources for developing, implementing and maintaining the policy for protection of environment. Thus it has to have:

- Written objectives for EMS.
- Documented or written procedures involving processes/procedures so that those officers/employees who are involved in the EMS follow the standard procedures.
- Assigning responsibilities to employees to ensure that everyone knows who is to do what.
- Environmental Audit to know the environmental aspect and impacts of company's activities and to have EMS assessed and certified by an independent certifier to demonstrate rhat system conforms to relevant standard, in other words ro obtain ISO 14001.

Environmental Policy

It is a written statement that defines an organisation's mission, attitude and framewotk of actions towatds environment. An Environmental Policy includes vision and core values of the organisation, compliance with legal and other requirements and commitment to environmental protection through actions like.

(a) resource/raw material utilization.

(b) prevention of pollution at source.

(c) reduction of wastes.

(d) appropriate design and operational management.

(e) minimum use of energy.

(f) creating awareness and training for employees.

Environmental Impact Assessment (EIA)

EIA refers to review of potential impact of a project to be launched by an organisation. It includes:

(i) assessment of existing environmental status.

(ii) analysis of various factors of ecosystem like trees, ponds, wildlife.

(iii) analysis of adverse impacts of the project to be started.

(iv) impact on people in the neighbourhood.

Certification Body

It is an independent organisation which verifies that a company's EMS conforms to specific standard such as ISO 14001. Such a body is called certifier. If the system conforms to standard, the company will be awarded certificate. It is advisable to select a certification body which has been accredited by government agency or other impartial organisation with credibility.

What Is Environmental Audit?

It is an objective and documented verification of process to obtain evidence to determine whether EMS of an organisation conforms to the criteria laid down by the organisation. It is a detailed periodic evaluation of organisation's performance against set objectives. The key words for EMS audit are: Documented, Periodic and Objectives.

The report of audit has to be conveyed to the management. If an audit for ISO 14001 certification is carried out, it would provide the proof of following objectives.

- evidence of conformity of EMS.
- evidence of fulfilling legal/regulatory requirements.
- provide opportunity for further improvements of EMS.

Eco Management and Audit Scheme (EMAS)

It is an environmental audit scheme launched by the European Union. It differs from ISO 14001 in following respects:

- It requires an organisation to provide the audit report to the public.
- It applies to manufacturers.

Organizations can upgrade from ISO 14001 to EMAS through CEN*. Very few organizations, so far have registered for EMAS.

ISO 9000 and ISO 14000

For good performance organizations adopt effective and efficient systems which should result in continued improvement in quality. ISO 9000 is quality management standard. ISO 14000 is based on ISO 9000 philosophy.

Environmental Standards

1. ***BS 7750:*** BS 7750 was introduced as a British Standard for developing an environmental management system, including as guidance on its implementation and assessment. It was the first environmental standard and influenced the development of ISO 14001. The British companies have been using BS 7750 as the standard for EMS since 1996 to establish their credibility vis-a-vis environment. It was withdrawn when ISO 14001 was recognized as an international standard by European Committee for standardization (CEN). BS 7750 was derived from ISO 9000. It gave a lead to UK in developing EMS Standard.
2. ***ISO 14000:*** The International Standard Organisation (ISO) took up the responsibility for drawing up a new Environmental Standard series ISO 14000 with the help of Technical Committee, TC 207. This committee works through sub-committees each on:
   - Environmental Management System.
   - Environmental Auditing.
   - Environmental Labelling.
   - Environmental Evaluation.
   - Life Cycle Assessment.
   - Definitions and Terminology.

Progress in the development of environmental management and environmental auditing has been very rapid. ISO 14001 – EMS specifications was published in Sept., 1996, three years after the establishment of TC 207. Most governments have enacted legislation for protecting the environment and natural resources but Environmental auditing is yet not mandatory. Environmental audit though voluntary can go long way towards ensuring compliances and environmental protection.

6.3 Why to have an Environmental Management System?

Why should Industry/Corporations have EMS? Having EMS would:

(i) Lead to maintaining and improving the quality of environment.

(ii) Lead to resource conservation.

---

* See Acronyms

(iii) Protect both human health and the environment.

(iv) Meet environmental expectations of the customer.

(v) Satisfy investors.

(vi) Lessen interference from regulatory authorities.

(vii) Lead to good public relations.

(viii) Provide confidence to stakeholders in ensuring that regulatory compliances are carried out.

(ix) Lead to enhanced image and market share.

(x) Lessen liabilities.

(xi) Provide incentive for technology development and its transfer.

6.4 ISO 14000 (Series) – The Basic Principles

ISO 14000 was approved by European Commission through the recommendation of CEN (Comite European de Normalization) which is European Union's Standardization Body. ISO 4001 is derived from ISO 9000 but it is broader in scope than quality standards because environmental issues are larger issues affecting the nations and the worlds resources and living conditions. Further, it requires organizations to be concerned with everything from raw materials to end product as it reaches the consumer and its final disposal – a life cycle analysis approach. ISO 14001 is not a guarantee of excellence in environmental performance but it is an assurance that organisation has an EMS that manages its environmental issues. An organisation may like to upgrade from ISO 14001 to EMAS which is open to public. ISO 14000 enables an organisation's EMS to:

(i) formulate and define policy and objectives in this regard.

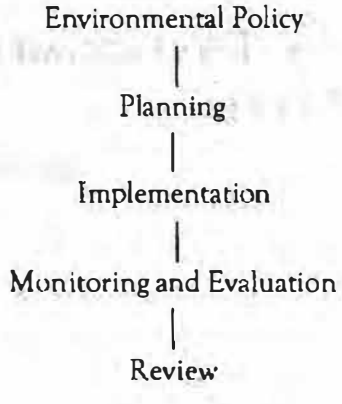
(ii) to formulate a plan to implement the policy and objectives.

(iii) to develop the capabilities and support system to achieve the implementation of policy objectives.

(iv) to monitor and evaluate environmental performance.

(v) to review the EMS for continued improvement.

Five components of ISO 14001:



Environmental Policy

As mentioned above first component of ISO 14001 is Environmental Policy. A sound environmental policy reflects the commitment of management in matters relating to environmental issues. The Policy has to be written as a document to be available to the concerned employees as well as to the external parties.

The policy is formulated by the top management who are signatories of the policy document. Environmental Policy in addition to what has been described above should:

1. be realistic taking into consideration the constraints and resources of the company as well the extent of impacts that the organisation has on the environment. While discussing impacts the document should embody life-cycle analysis, resource conservation, waste reduction and product design. In fact, the concept of sustainable development should be the part of the document. Rhetorics would not serve any purpose in the process of documenting the policy.
2. be documented and available to all the concerned employees and the external parties – stakeholders and public.
3. be clear about commitment for continued improvement of EMS.
4. be in conformity with the laws and rules and regulations and must make a statement in regard to compliance.
5. lay down a framework of environmental objectives.

The objectives take into consideration the vision, mission and core values of the organisation. The objectives are in fact indicators of performance. The indicators are measurable. Examples of indicators are quantity of (i) raw material used, (ii) emissions, (iii) other wastes, (iv) energy, (v) recycling of wastes.

The EMS Auditor would be taking into consideration the objectives and all the above listed requirements while conducting the audit.

Planning

Planning of EMS for audit requires that the system should be in the form of written plan or manual giving details of work and procedures. When the work involves handling of hazardous materials or any other procedure involving safety measures, it has to be carefully written as a plan document. Planning for EMS is an important function of an organisation in the sense that it takes into consideration a proper schedule, resources, targets, successes as well as likely failures, contingencies and alternatives to mitigate the crisis if it occurs. The plan includes environmental aspects and impact, though there may be an overlap in policy and planning in this regard.

Planning takes into consideration the processes, resources, responsibilities, skills authority and coordination.

Implementation

The next element of EMS specifications, ISO 14001 is it implementation. An organisation should have support and capabilities for achieving objectives and targets set out in policy and plan. The process of implementation implies management skills. Implementation for ISO 14001 means:

- Management of Human, Financial and Natural resources.
- Motivation for action.
- Responsibilities.
- Documentation.
- Communication within the organisation.
- Operational control.
- Preparedness for emergency.
- Records and management of information.

Successful implementation of EMS would need commitment of all the employees. EMS, in fact encompasses many other areas of management; particularly organizational change is one area that is key to successful implementation of EMS. It is important that the traditional management culture is changed to environmental-organisation culture which means discarding old practices and beliefs and learning new ones. Education and training provide the members of organisation with requisite environmental skills and knowledge. Environmental awareness of the staff in general and environmental training for those involved in EMS brings benefits to the organisation and help in implementation of the EMS. Of course for this to happen, commitment has to begin at the highest level of management. The top management has also to ensure that sufficient resources are provided for the implementation of EMS.

Monitoring and Evaluation

EMS demands a mechanism for measuring performance and evaluation for which a process has to be evolved that involves testing, and verification. Such a process must be an ongoing process to identify environmental performance indicators that are verifiable. Also for regular monitoring, the companies must establish a system and procedure for determining compliance and conformance with law and rules and regulations. For conformance to all the above regulations a periodic audit of EMS should be conducted either by internal or external auditors who are trained and qualified the job.

Review

An organisation which has initiated the process of formulating Policy, Planning, Implementation and Monitoring of EMS has to adopt the last step namely, the Review

of the system. At Review stage, the organisation has to think in terms of continual improvements of environmental performance. Review is very important because it undertakes an in-depth analysis of all the issues of environmental concern. Reviews must go beyond the stage of compliance. It must pay full attention to implementation of objectives set out by the organisation. If the objectives have not been achieved or not achievable, these must be changed or modified. Issues to be discussed in the process of review are :

(i) Suitability of environmental policy;

(ii) Recommendations of audit report;

(iii) New regulations;

(iv) Interest of stakeholders;

(v) Public awareness and pressures.

The review findings must be documented especially its recommendations in regard to safety measures, preventive measures and impacts on public health and living conditions. Accidents and incidents may occur suddenly. They result from failures of equipment, human error or flaws in EMS itself. These have to be identified and compliances be restored. Human error is most significant because it is something that can be corrected/ minimized on the basis of deep analysis as to why a particular person makes a particular mistake. Anyway, it is the management which is blamed if the machine fails or processes become haphazard or when people make mistake. The responsible management reviews the EMS in the light of what is stated in the last sentence.

Who Can Adopt ISO 14001 Standard

This standard is tailored for an organisation of any size. It is applicable to any organisation that would like to:

- maintain and implement EMS.
- be sure that it conforms to stated environmental policy.
- obtain certification/registration of EMS.
- demonstrate conformance to EMS to others.

6.5 Actual Conduct of Audit for Certification

Certification Bodies offer certification of EMS provided the latter meets the criteria of ISO 14000 standards. These bodies are accredited by an Accreditation Body set up by the governments of each country. The Accreditation Body follows strict norms and controls the activities of certification bodies. For a new company wanting to go in for certification, the certification body requires that:

(i) It has EMS which is operational at least for three months;

(ii) Internal auditing is possible in the company;

(iii) Training of the staff has taken place;

(iv) Documents are maintained;

(v) Management review has been conducted.

Procedure for Audit

Usually there are two stages of conducting audit:

1. Pre-audit stage.
2. Certification stage (Certification Audit).

Stage-I – Pre-audit stage

Various steps of Pre-audit Stage are:

(i) Lead auditor obtains preliminary information about company's EMS, usually through a questionnaire.

(ii) Lead auditor, based on the information received from the company, appoints audit team.

(iii) Lead auditor and possibly members of audit team make a pre-audit visit of the site

(iv) After the formation of audit team, the Lead auditor writes to the company about the date, and duration of audit and the composition of the team. Also the company is informed about requirements like availability of company's staff, conference room, and guides for taking round the audit team.

(v) The company is asked to send its EMS manual, so that team knows what to check?

(vi) The audit team examines the documents sent by company including the previous audit reports if any. Also, the diagrams of the plant and other characteristics of the site like stores, water supply etc. are examined as a pre audit exercise.

(vii) The audit team, then prepares the audit plan on the basis of the available documentation and site details. Audit plan includes : (i) a time schedule for areas to be visited; (ii) more documents to be examined; (iii) missing documents if any; (iv) persons to be interviewed; (v) preparing a check list. The check list is based on:

(a) EMS of the company;

(b) Legislations/regulations;

(c) Requirements of the standard.

For example if the team wants to ensure whether legal requirements for effluent treatment have been carried out, the checklist would include questions like:

(a) Whether Water Act of 1974 as amended in 1979 or 1988 has been covered.

(b) Whether BOD levels have been monitored and so on.

Stage-II — certification audit

The team is now ready to go to the site to start the process of certification audit. The first step for the audit team is to hold "Opening Meeting" with the concerned staff of the auditee's company. In this meeting issues about the audit scope and audit plan are discussed. After this the team undertakes the process of verification of what exactly is happening at the site in regard to compliance of stated objectives. This is done through:

(i) examination of products or documents;

(ii) direct observations;

(iii) conducting interviews.

The team examines:

(i) all the aspects and impacts of the company;

(ii) whether all the regulatory requirements have been met;

(iii) the details of processes and identifies non conformance, if any and whether non conformances are of major or minor types.

The next step is holding an internal meeting of the audit team. The audit team after inspection verification, questioning, examination of documents and all others issues given in plan and check list, holds an internal meeting among its members. The lead auditor may also take part in this meeting. This meeting discusses all the findings of audit team and report is prepared. Also, the agenda for closing meeting is finalized. The last step at the site audit is closing meeting. The audit team and the management representatives participate at this meeting in which the report is discussed and clarifications are sought by both the parties before the report is finalized. Also errors and incorrect information is corrected.

It is a good practice if the auditor announces at closing meeting whether or not the company is getting certificate for ISO 14001.

6.6 The Indian Scene

In India, 80 companies have been certified for ISO 14001 as on March, 1999. Japan has maximum number of companies certified for ISO 14001 compared to any other country in the world.

Case of Indian Aluminium Company Ltd.* — Indal

The efficient and sustainable use of finite natural resources is today an integral part of our understanding of environment. Development must go on, but one must try to achieve it with minimum damage to eco-system and livelihoods of the people, says Mr. Tapan Mitra, the Managing Director of Indian Aluminium Company Limited, the first corporate house to achieve ISO 14001 Certification for three units simultaneously.

One of the first things that Indal realized was that besides satisfying regulatory provisions, proper environment management had to also focus on the host community. It is they who suffer if the environment is not properly managed or if eco-systems are damaged. Therefore it is important to keep in view the host community while setting up environmental management system.

Indal's environment policy clearly states that we shall abide by all rules and regulations pertaining to our businesses and strive for "the best internationally achieved performance" for similar technologies in areas of material, energy and water. We have institutionalized environment management. Even since, we have been trying to imbibe the "pro-active" approach in all aspects of our business. We have been getting fruits of this "changed attitude". Between 1991 and 1994, we have spent over Rs. 500 million in various environmental projects. Our focus now is on Resource Conservation and Pollution Prevention.

While we were institutionalizing environment management throughout the company with renewed focus as described above, and also adopting ISO 9000 to meet customer needs, we found that ISO 14001 would give us a good foundation to make our operations environmentally sound and make us globally competitive.

Environment management means much more, many more things; each of them uplifting. It means loving your own land and its natural gifts. It means paying attention to the lives and life-ways of the host people. It means placing the safety and health of your colleagues at top priority. So it proves profitable.

* Adapted from Green Business Opportunities.

Other Standards in ISO 14001 Series

The ISO 14000 Series comprises of standards on EMS. The organizations which want to improve their EMS use ISO 14000 guidance. So far we have discussed ISO 14001 which is certification or registration for EMS. There are other standards in this series that are concerned with specific areas of environmental audits. These are given below:

ISO 14000	:	General guidelines on Principles of EMS.
ISO 14001	:	Specifications and Guidance for EMS.
ISO 14010	:	Guidelines for Environmental Auditing – General Principles of Auditing.
ISO 14012	:	Guidelines for Environmental Auditing : Qualifications for Auditors.
ISO 14020	:	Environmental Labelling.
ISO 14040	:	Life Cycle Assessment.
ISO 14050	:	Terms and Definitions.

ISO 14001 for Asea Brown Boveri (ABB) in India

- ABB has fourteen facilities in India. The company has a goal of achieving ISO 14001certification for all its units by year 2000.
- Certification process for ISO 14001 for Nasik unit of ABB was started in Dec. 1996. It was certified in Oct., 1997. By March 1999, the units at Chennai, Mumbai (Panel) and Baroda (Maneja) had been certified.
- According to a report* the implementation of ISO 14001 resulted in improved performance, reduced risks and lower costs:

ABB's Policy for Environmental protection

- ABB is a signatory to ICC Business charter for sustainable development.
- The company has its policy to develop products which have reduced harmful environmental impacts.
- Its products would be recycled/reused or disposed of safely. This also includes products and services bought from ABB's suppliers or subcontractors.
- In R and D the company aims for environmentally sound technologies systems.
- The company will be involved in international activities aimed at solving global environmental problems.
- ABB will support policies aimed at increasing environmental awareness and will also train and motivate its employees for performing in environmentally friendly manner.
- ABB will transfer environmentally sound technologies to developing countries and cooperate with partners in these countries for capacity building.
- ABB will conduct environmental audits periodically.
- ABB will promote openness and dialogue with employees and the public on environmental matters and inform on its environmental performance.
- Each ABB manager is responsible for implementation of EMS.

* World Environment Foundation - Environment Management, 1999.

Review Questions

1. Define the following:
   (a) EMS
   (b) EMAS
   (c) EIA

(d) Environmental Aspect

(e) Environmental Impact.

2. What are EMS Standards?
3. What are the basic principles of ISO 14001?
4. What is the procedure for conducting audit for EMS 14001?
5. What is your assessment in regard to Indian enterprises having certification forISO 14001?

REFERENCES

•Johnson, K. A., & Thompson, P. (2022). The role of ecosystem services in environmental decision-making: A critical analysis. Journal of Environmental Analysis, 35(2), 140-158. https://doi.org/10.1177/1054584422111236

Davis, M. R., & Wang, Z. (2019). Environmental risk assessment for coastal areas: A case study of climate vulnerabilities. Journal of Coastal Research, 75(4), 785-797. https://doi.org/10.2112/JCOASTRES-D-19-00045.1

Annexure

1. Lead Auditor

The lead auditor is responsible for conduct and completion of the audit as per plan prepared in consultation with the client, auditee and audit team. He obtains documents and all other information about the site and previous audit. He ensures that the activities of the audit team proceed in accordance with the guidelines of ISO 14010. He communicates the final audit plan to the audit team, auditee and client. He is to resolve problems that may arise during the audit. The lead auditor is responsible for notifying the auditee of audit findings including non-conformities. Finally he makes recommendations for improvements to the EMS.

2. Client

The client performs following functions:

(i) determines need for the audit;

(ii) contacts the auditee and informs the auditee about initiating the audit process;

(iii) selects the lead auditor or auditing firm and may approve the composition of the audit team;

(iv) provides resources for audit to be conducted;

(v) approves the audit plan;

(vi) receives the audit report.

3. Auditor and Audit Team

Auditor's functions are:

(i) to follow the directions of the lead auditor and to carry out the job within the audit plan;

(ii) prepare documents under the direction of the lead auditor;

(iii) safeguard documents and return of documents as required;

(iv) write the audit report.

The Lead Auditor forms the audit team in accordance with qualifications as given in ISO 14012; and in accordance with requirements of clients, certification bodies and accreditation authority.

4. Auditee

The responsibilities of the auditee are:

(i) informing concerned employees about the objectives of the audit;

(ii) providing facilities for the audit team for smooth conduct of audit;

(iii) providing access to the facilities, relevant information and records as desired by the auditors;

(iv) appointing staff to accompany members of the audit team as guides.

UNIT

7

Environmental Clearance for Establishing and Operating Industries in India*

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ☐ 7.1 Environmental Management System in India
- ☐ 7.2 Key Functions of the Government Agencies
- ☐ 7.3 Procedure for Establishing and Operating an Industrial Unit in India
- ☐ 7.4 Environmental Compliance Status in India
- ☐ 7.5 The Prospects

7.1 Environmental Management System in India

As mentioned in earlier units environmental protection and sustainable use of resources received serious attention from various committees of the Government and Planning Commission in India during 1970's. In 1980, the Government of India formed a separate Department of Environment (DoE) for promoting and coordinating programmes for environment protection and related issues. In 1985, a separate Ministry of Environment and Forests (MEF) was formed for formulating policies and their implementation. MEF is responsible for protection, conservation and development of environment. MEF works in close collaboration with other Ministries, State Governments, Central Pollution Control Board, States Pollution Control Boards and a number of scientific and technical institutions, universities and non-governmental agencies. The Central Pollution Control Board (CPCB) which was already in existence since 1974 came under the preview of MEF as a statutory authority. The state governments constituted their own Environment Ministries/Departments and State Pollution Control Boards (SPCBs)

7.2 Key Functions of the Government Agencies

MEF is country's apex body for issues relating to environment. The State Departments of Environment and State Pollution Boards are the designated agencies to perform

*Environmental Clearance for Establishing and Operating Industries in India", Business Opportunity in India", C11, 1997, 1996.

their respective functions including the implementation of acts, rules and regulations. Key functions of various Government Agencies are listed below.

Name of the Agency	Key Functions
Ministry of Environment	• Environment Policy Planning. • Ensuring effective implementation of legislation. • Monitoring and Control of Pollution • Eco-Development. • Environmental Clearances for Industrial and Development Project. • Environmental Research. • Promotion of the Environmental Education, Training and Awareness. • Coordination with concerned agencies at the national and international levels. • Forest Conservation, Development and Wildlife Protection. • Biosphere Reserve Programme.
Central Pollution Control	• Advise the Central Government on the matters concerning prevention, control and abatement of Water and Air pollution. • Co-ordinate and provide technical and research assistance to State Boards. • Information dissemination, training and Awareness of environmental issues. • Lay down, modify or annul the standards for a stream or well, and for air quality. • Planning and execution of nation wide programmes for the prevention, control or abatement of Water and Air Pollution. • Ensure compliance with the provisions of various Environment (Protection) Acts, and regulations.
State Pollution Control Boards	• Planning and execution of state wide programmes for the prevention, control or abatement of Water and Air Pollution. • Advise the State Government on prevention, control and abatement of Water and Air Pollution and siting of industries. • Information dissemination, training and awareness of environmental issues. • Ensure compliance with the provisions of the relevant Acts. • Lay down, modify or annul the effluent and emission standards. • Ensure legal action against defaulters. • Evolve techno-economic methods for treatment, disposal and utilization of the effluent

7.3 Procedure for Establishing and Operating an Industrial Unit in India

As a result of adopting new Economic Policy of Liberalization, Government of India made major changes in licensing policy for industries. In 1991 industrial licensing was abolished for all industries except those in specified sectors. The policy also stipulated the need for integrating environmental issues for achieving sustainable development. The Policy states that:

"The major objectives of the new industrial policy package will be to build on the gains already made, correct the distortions or weakness that may have crept in, maintain sustained growth in productivity and gainful employment and attain international competitiveness. The pursuit of these objectives will be tempered by the need to preserve the environment and ensure the efficient use of available resources."

The procedure for establishing and operating an industry in accordance with regulations for environmental protection and pollution prevention and control is summarized below followed by grouping of various industries into Four Categories.

Step-by-step procedure for establishing and operating an industrial unit in India from the environmental view point:

1. If the product of the industry is reserved for Small Scale Industry and Investment is less than rupees One Crore, environmental clearance is not required.
2. For project under Category-I (the details of categories are given below), area specific notification is required.
3. For projects under Category-II, site clearance is required from MEF. After site clearance, environmental clearance is required by submitting the proposal to Impact Assessment Agency (IAA) of MEF. If site clearance is not granted, another site can be selected and again submitted for site clearance.
4. For projects under Categories-III and IV, environmental clearance is required by submitting the proposal to IAA.
5. If there are deficiencies in the proposal, IAA may ask the industry to resubmit the proposal or may reject the proposal.
6. If public hearing is required, it has to be arranged.
7. IAA may recommend the clearance after its expert committee has given its clearance.
8. If the proposal is accepted by IAA following permissions are required:
   (a) Obtain consent to establish for discharge of effluents/emissions prior to establishing the industry as provided under Water/Air Acts or other relevant Acts.

(b) Obtain consent to operate for discharge of effluents/emission prior to commencing operations.

(c) Obtain Authorization for Handling of Hazardous Wastes prior to handling of hazardous wastes.

(d) Obtain Site Clearance for specified industrial activities involving handling of hazardous chemicals prior to commencing industrial activity.

(e) Submit Safety Report for specified industrial activities involving handling of hazardous chemicals prior to commencing industrial activity.

Details of Categories

Category-I

Project type	Areas
Ports, Harbours, Airports, Tourism, Projects between 200-500 Metres of High Tide Line, Mining Projects	Doon valley, Coastal Regulation Zone, Dhanu Taluka, Maharashtra Maharashtra

Category-II

1. Mining more than 5 hectares.
2. Pit-head thermal power stations.
3. Hydro-power, major irrigation projects and/or their combination including flood control involving more than 50 crores.
4. Ports and harbours (excluding minor ports more than 50 crores).
5. Exploration of minerals (more than 500 hectares).

Category-III*

1. Nuclear power and related projects such as heavy water plants, nuclear fuel complex, rare earths.
2. Airports.
3. Petroleum refineries including crude and product pipelines.
4. Chemical fertilizers, (nitrogenous and phosphatic other than single superphosphate).
5. Petrochemicals complexes.
6. Exploration for oil and gas and their production, transportation and storage.
7. Synthetic rubber.
8. Hydrocyanic acid and its derivatives.

Contd...

* Investment > 50 Crores.

9. (a) Primary metallurgical industries (such as production of iron and steel, aluminium, copper, zinc, lead, and ferro alloys).
   (b) Electric arc furnaces (mini steel plants).
10. Chlor-alkali industry.
11. Viscose staple fibre and filament yarn.
12. Storage batteries integrated with manufacture of oxides of lead and antimony alloy.
13. Thermal power plants.
14. Pulp, paper and newsprint.
15. Cement.

Category-IV

1. Pesticides (Technical).
2. Bulk drugs and pharmaceuticals.
3. Asbestos and asbestos products.
4. Integrated paint complex including resins and basic raw materials required in the manufacture of paints.
5. Tourism projects.
6. Highway projects.
7. Tarred roads in the Himalayas and/or forest areas.
8. Distilleries.
9. Raw skins and hides.
10. Dyes.
11. Foundries (individual).
12. Electroplating.

Consent to Establishing for Discharging of Effluents Under the Water Act, 1974

If the proposed industrial unit (operation, process or any treatment and disposal system) is likely to discharge sewage or trade effluents into a stream, sewer or land, it is required to obtain 'Consent to Establish for Discharge of Effluents'. An application is to be submitted to the concerned State Pollution Control Board in the prescribed form alongwith the prescribed application fee for this purpose.

Trade effluents include any liquid, gaseous or solid substance which is discharged from any premises used for carrying on an industry, operation or process, or treatment and disposal system other than domestic sewage.

Consent to Establish for Emission Under the Air Act, 1981

If the proposed industrial unit (operation or process) is located in an air pollution control area declared by the concerned State Government, and is likely to emit any air pollutants in the atmosphere, it is required to obtain 'Consent to Establish for Emission' under the Air Act 1981 (amended in 1987). For obtaining the 'Consent to Establish', an application is to be submitted to the concerned State Pollution Control Board in the prescribed form alongwith the prescribed application fee.

Air Pollution Control Area

The State Pollution Control Boards have declared specific locations within the State, as air pollution control areas under the Air Act 1981. The 'Consent to Establish' is applicable only for these areas. Therefore, entrepreneurs are required to check with the concerned State Pollution Control Boards the status of the proposed location of the industrial unit, before applying for the 'Consent to Establish' for emission.

The provisions of 'Consent to Establish' under the Water and Air Acts have been made obligatory after amendments to the Acts made in 1988 and 1987 respectively. Prior to these amendments, the State Pollution Control Boards were issuing separate 'No Objection Certificates' (NOCs) for siting an industry and for adequacy and appropriateness of the pollution control equipment and related measures. The requirements of NOC's have been replaced by the 'Consent to Establish' through amendments in the Air and Water Acts. However, some State Governments have not yet notified the amended rules. In such cases, an entrepreneur is still required to obtain a NOC from the State Pollution Control Board and not the 'Consent to Establish'. For obtaining a NOC, an application is to be submitted to the State Pollution control Board.

Grant of Environmental Clearance by Central Government

If the industrial unit comes under the specified project categories as listed in the list of projects requiring clearance from the Central Government, then environmental clearance would be required form the Ministry of Environment and Forests, Government of India subject to specific conditions.

Selection of Right Location for an Industrial Unit

Industry is required to integrate environmental concerns in project planning, in addition to economic and social concerns. It is, therefore, essential to identify those sites which

manifest a balance between economic and environmental considerations. The following siting guidelines should be taken into account while identifying a suitable site for setting-up an industry to minimize regulatory interventions.

- No forest land should be converted for non-forest activity for the sustenance of an industry (Ref: Forest Act, 1980);
- No prime agricultural land shall be converted into an industrial site;
- Within the acquired site, the industry unit must be located at the lowest elevation to remain hidden from general vision;
- Land acquired shall be sufficiently large to provide space for appropriate treatment of waste water after maximizing possible reuse and recycling. Reclaimed waste water shall be used to raise a green belt and to create a water body for aesthetics, recreation, and if possible for aquaculture. The green belt shall be ½ km wide around the boundary limits of the industry. For an industry having an odour problem, it shall be a kilometer wide;
- The green belt between two adjoining large scale industries, shall be one kilometer;
- Enough space should be provided for storage of solid wastes, so that these would be available for possible reuse;
- Layout and the form of the industry coming-up in an area, must conform to the landscape of the area, without affecting the scenic features of that place;
- The associated township of the industry must be created at a place having some distance between the industry and the township;
- Each industry is required to maintain three ambient air quality measuring stations within 120 degrees angle, between the stations.

7.4 Environmental Compliance Status in India

India represents a wide cross-section of industries in terms of size, manufacturing processes and product range. The small scale industries are a special feature of Indian economy. India at present has over 3 million small scale units. Though they account for over 40 per cent of the industrial output in value terms from the organized and unogranized manufacturing sectors in India, according to CII, it is estimated that the pollution generated by them is more than their share of industrial production. The various initiatives of Government to improve environment in relation to small scale industries include preventive and promotional measures. For example, setting up of Common Effluent Treatment Plants (CETP) for clusters of Small Scale Industries is an attractive scheme. Also setting up of Environmental Pollution (Prevention and Control) Authority for the National Capital Region (NCR) is another step in this direction. Monetary incentives are provided by the government for installation of pollution abatement equipments. At the same time various punitive measures including legal action are

taken against the defaulters who are not able to carry out compliances in accordance with the standards laid down for the purpose.

The government made a Policy Statement for Abatement of Pollution, announced in 1992. The principal tenets of this policy are:

- Pollution prevention at source.
- Encouragement, development and application of best available practicable technical solutions.
- Recognition of "Polluter Pays' principle.
- Focus on heavily polluted areas.

As a follow-up to this policy, the Central Pollution Control Board (CPCB) has identified 17 categories of industry as highly polluting industries for priority action. These are listed in Table 7:1. The total number of large and medium units in the country under the 17 highly polluting industry sectors is 1551. The state-wise distribution of these industries has been provided at Table 7:2.

Table 7.1 : Category-wise Distribution of Industries

Category	Number of Industries
Aluminium Smelter	07
Caustic Soda	25
Cement	116
Copper Smelter	02
Distillery	177
Dyes & Dye Intermediate	64
Fertilizer	110
Integrated Iron & Steel	08
Leather	70
Oil Refinery	12
Pesticide	71
Petrochemical	49
Basic Drugs & Pharmaceutical	252
Pulp & Paper	96
Sugar	391
Thermal Power Plant	97
Zinc Smelter	04
Total	1,551

Table 7.2 : State-wise Distribution of Industries

Name of the State	Number of the Units
Andhra Pradesh	173
Arunachal Pradesh	00
Assam	15
Bihar	62
Goa	06
Gujarat	177
Haryana	43
Himachal Pradesh	09
Jammu & Kashmir	08
Karnataka	85
Kerala	28
Madhya Pradesh	78
Maharashtra	335
Manipur	00
Meghalaya	01
Mizoram	00
Nagaland	00
Orissa	23
Punjab	45
Rajasthan	49
Sikkim	01
Tamil Nadu	119
Tripura	00
UT-Andman & Nicobar	00
UT-Chandigarh	01
UT-Daman & Diu	00
UT-Dadra & Nagar Haveli	00
UT-Delhi	05
UT-Lakshadweep	00
UT-Pondicherry	06
Uttar Pradesh	224
West Bengal	58

The Data given in Tables 9:1 and 9:2 indicate that:

- The states of Maharastra, Uttar Pradesh, Gujarat and Tamil Nadu have substantially large number of industries in these identified sectors.
- Sugar sector has the maximum number of industries followed by pharmaceutical, distillery, cement and fertilizer sectors.
- Agro based and chemical industries have major shares of 47 per cent and 37 per cent respectively, in the total number of industries.
- About 77 per cent and 15 per cent of the industries are predominantly water polluting and air polluting respectively and 8 per cent are potentially both air and water polluting.

Although, Indian industry has become increasingly concerned about discharging its environmental obligations effectively, there are a number of constraints that limit the industry's ability to adopt sound environmental management practices. These according to CII include:

- ***Lack of awareness*** regarding the nature of pollution problems caused by particular processes and options for prevention and control of those problems. Larger firms are becoming more aware of their responsibilities and options, as well as the opportunities for enhancing profits through gains from pollution prevention measures.
- ***Limited access to know-how and technology*** in pollution prevention, control and remediation. A large number of technology gaps still persist in the environmental sector. However, appropriate technology and know-how is becoming increasingly available as the Indian environmental industry grows and develops, and as foreign companies introduce new technologies and approaches, either directly, or through alliances with Indian firms.
- ***Shortage of capital and underdeveloped infrastructure*** required for implementing environmental change, including the installation of clean technologies. This is more of a problem for smaller firms. Financing schemes generally apply to installation of new production facilities and not for the environmental upgradation of existing ones.
- ***Inadequate research and development*** mainly due to poor emphasis by Indian industry on the generation of innovative, cost-effective solutions to environmental problems.

The environmental management problems of smaller industries are more severe for a variety of reasons, including.

- ***Obsolete, Inefficient Production Process:*** The small industry sector in India has traditionally enjoyed considerable subsidies and protection. This has meant that entrepreneurs have little incentives to modernize their operations. Accordingly,

these industries are often more serious polluters per unit of output than many of their larger, technologically more up-to-date counterparts.

- ***Difficulties in Obtaining Financing for Modernisation:*** The World Bank and bilateral aid funds to help finance Pollution Prevention and Control measures prefer large companies.
- ***Human Resource Constraints:*** Generally, large firms use either in-house environmental managers or local consulting firms to help them improve environmental performance; these approaches are beyond the means of smaller firms.
- ***Lack of Access to Information:*** Many larger industrial firms have relatively good access to information on pollution prevention and control technologies available world-wide. Smaller firms usually have very limited, if any, access to such information.

Appendix-II gives the summary of major environmental problems associated with selected industry sectors in India.

Large and Medium Industries

In 1991, Ministry of Environment and Forests announced a fifteen point Action Plan to improve industrial pollution control in country. Under this Action Plan the status of pollution control in each of the large and medium units identified in the 17 categories of highly polluting industries is continuously monitored by Central Pollution Board.

The latest compliance status of these 17 categories of industries in India is shown in Table 9:3 and state-wise compliance in Table 9:4. An analysis of the data reveals:

- 1125 units out of 1551 units have requisite facilities to comply with the stipulated emission and effluent standards.
- Out of 319 non-complying industries only 61 are post 1981 and the remaining 258 are pre 1981. This indicates that one of the main reasons for non-compliance could be attributed to the use of obsolete manufacturing technology, as well as post-facto pollution control technology in respect of these 25% units established before 1991.

Table 7.3 : Status on Installation of Pollution Control Systems in the 17 Categories in Industries

Category		Status (Number of Units)			
			C		NC
	Total Number of Units	Closed		Pre 1981	Post 1981 Pre 1991
Aluminium Smelter	07	01	04	02	00
Caustic Soda	25	00	23	02	00

Contd...

Cement	116	03	96	12	05
Copper Smelter	02	00	00	02	00
Distillery	177	18	101	40	18
Dyes & Dye Intermediate	64	05	51	06	02
Fertilizer	110	08	94	08	00
Integrated Iron & Steel	08	00	02	06	00
Leather	70	07	41	17	05
Pesticide	71	07	62	02	00
Petrochemical	49	00	49	00	00
Basic Drugs & Pharmaceutical	252	24	215	10	03
Pulp & Paper	96	15	59	14	08
Oil Refinery	12	00	09	03	00
Sugar	391	17	256	103	15
Thermal Power Plant	97	02	60	30	05
Zinc Smelter	04	00	03	01	00
Total	1551	107	1125	258	61

C = Having facilities to comply.

NC = Not having facilities to comply.

Table 7.4 : State-wise Summary Status of Pollution Control in 7 Categories of Industries

	State (No. of Units)			
S.No. State/UT	Total Number of Units	Closed	C#	Defaulters ##
1. Andhra Pradesh	173	28	142	03
2. Arunachal Pradesh	00	00	00	00
3. Assam	15	00	11	04
4. Bihar	62	14	35	13
5. Goa	06	00	06	00
6. Gujarat	177	03	167	07
7. Haryana	43	03	32	08
8. Himachal Pradesh	09	00	09	00
9. Jammu & Kashmir	08	03	01	04
10. Karnataka	85	08	68	09
11. Kerala	28	05	20	03
12. Madhya Pradesh	78	05	59	14
13. Maharashtra	335	20	296	19
14. Manipur	00	00	00	00

Contd...

15.	Meghalaya	01	00	00	01
16.	Mizoram	00	00	00	00
17.	Nagaland	00	00	00	00
18.	Orissa	23	01	13	09
19.	Punjab	45	03	25	17
20.	Rajasthan	49	05	42	02
21.	Sikkim	01	00	00	01
22.	Tamil Nadu	119	02	114	03
23.	Tripura	00	00	00	00
24.	UT-Andman & Nicobar	00	00	00	00
25.	UT-Chandigarh	01	00	01	00
26.	UT-Daman & Diu, Dadra & Nagar Haveli	00	00	00	00
27.	UT-Delhi	05	00	02	03
28.	UT-Lakshadweep	00	00	00	00
29.	UT-Pondicherry	06	01	04	01
30.	Uttar Pradesh	224	15	187	22
31.	West Bengal	58	14	32	12
	Total:	1551	130	1266	155

Having adequate facilities to comply with the standards.

Not having adequate facilities to comply with the standards.

Source: Annual Report, 1998-99 MEF.

The industries in Gujarat appear to be more concerned about pollution control, and nearly 94% of the industries have installed adequate emission and effluent treatment systems. It is followed by Tamil Nadu, Maharashtra and Rajasthan having adequate control facilities in 91%, 87% and 85% of the industries respectively. In other states, the scenario is not good particularly in West Bengal, Karnataka, Orissa and Uttar Pradesh, and UT of Pondicherry and Delhi.

- 100% of the industries in the petrochemical sector have adopted pollution control measures.
- The compliance status in caustic soda, pesticides, fertilizer, pharmaceutical, cement and dyes & dye intermediates sectors is quite encouraging while the situation is poor in the case of copper smelter, integrated iron and steel and aluminium smelter units.
- The compliance status in the remaining industrial sectors is between 50 to 60% and indicates significant scope for improvement.

Depending upon the type of ownership, it has been estimated that about 43% of the non-complying units belong to private sector, 9% to Central Public Sector and the

remaining 48% to State Government owned Public Sector and Cooperative Units. In other words, Central Public Sector undertakings seem more committed for compliance.

Small Scale Industries

It has been estimated that India, today has more than 3 million small scale units (SSIs) and over 2000 industrial estates/clusters. A large number of these industries (about 60%) are in the unorganized sector thus making it difficult for regulatory agencies to collect and collate pollution control and compliance related data about this sector. From the industrial estates surveys of different cities/cluster locations carried out by the Central Pollution Control Board, it can be ascertained that about 25 to 30% of total SSI units in the country are of polluting nature. For example the state of Delhi is having around 20,000 polluting units out of a total 80,000 units according to Delhi Pollution Control Committee. Compliance to environmental regulations in general in SSI sector has been poor and can be roughly worked out as between 20 to 25%.

7.5 THE PROSPECTS

As per the latest figures, though available unofficially, the compliance with respect to prescribed environmental regulations at the national level is to the order of 45 per cent for all sectors of industries including large, medium and small. According to CII, the compliance record of large and medium industries in 17 categories of highly polluting industries is for better than the national average. Over 70% of these units are now complying in comparison to only 24% three years ago. Obviously, the thrust of State Pollution Control Boards all over the country has also been on these highly polluting industry sectors.

From the above, it is evident that Indian Industry has still a long way to go in adoption of pollution control measures, given the backlog especially in the small scale sector and the projected growth rate in industrial production.

SIDBI Fund to Help SSI Units get ISO Certification*

Small Industries Development Bank of India (SIDBI) will step up assistance to Small Scale Industry (SSI) units for acquiring the ISO-9000 certification through its Rs. 200 Crores Technology and Modernization Fund (TDMF). The assistance for getting ISO certification, which is already being provided, by the bank at prime lending rate and without upfront fee, would be given to more SSIs through the TDMF scheme. The scheme provides for meeting 75% of the cost of acquisition of the certificate, subject to the maximum of Rs. 75000 to the first 200 units acquiring the certification with Bank's loan.

For motivating the SSI units to acquire the quality certification, the bank has tied up with the Small Industries Development Organisation (SIDO) for channelising the Government subsidy for ISO certification.

Exim Bank Scheme

To help Indian companies enhance their international competitiveness and to ensure adherence to international quality systems and standards for environment, Exim Bank provides grant upto 50% of the cost to be incurred by the companies in obtaining ISO-14400 certification.

Contd...

Apart from the financial support, the companies can also seek guidance on the details of certification procedures and in identifying suitable consultancy or certifying agencies for implementation of the chosen certification programme.

Indian promoters requiring additional information or clarifications may contact any of Exim Bank's offices in India.

Source: GBO (1998)

REVIEW QUESTIONS

1. Define the following:
   (a) EMS
   (b) Environmental Standards.
2. Name the government agencies that regulate Environmental compliance. Describe their functions.
3. Describe the procedure for establishing an industrial unit in India giving details of four categories of industries.
4. Write an account of compliance status of important industries in India.
5. What are the major environmental problems associated with the following industries:
   (a) Food Processing
   (b) Sugar
   (c) Textile
   (d) Thermal Power Plants.
   (e) Tannaries

Appendix-I

Who requires environmental clearance?

The following project categories are required to obtain environmental clearance, prior to establishing an industrial unit.

New Projects

For industrial units in the following project categories, if investment is more than Rs. 50 crores:

- Nuclear power plant and related projects, such as heavy water plants, nuclear fuel complex, rare earths;
- River valley projects including hydel power, major irrigation projects and a combinations;
- Ports, harbours, airports (except minor ports and harbours);
- Petroleum refineries including crude and product pipelines;
- Chemical fertilizers (nitrogenous and phosphoric other than single superphosphate);
- Petrochemical complexes (both Olefinic and Aromatic) and Petrochemical intermediates;
- Exploration for oil and gas and their production, transportation and storage;
- Synthetic rubber;
- Hydrocyanic acid and its derivatives;
- Primary metallurgical industries (such as production of Iron and Steel, Aluminium, Copper, Zinc, Lead and Ferro Alloys).
- Electric Arc Furnaces (Mini Steel Plants);
- Chlor alkali industry;
- Viscose staple fibre and filament yarn;
- Storage batteries integrated with the manufacture of oxides of lead and lead antimony alloy;
- Thermal power plants;
- Pulp, paper and newsprint;
- Cement.

For industrial units in the following project categories, irrespective of the investment:

- Pesticides.
- Bulk drugs and pharmaceuticals;
- Asbestos and asbestos products;
- All tourism projects between 200-500 meters of a High Tide Line and at locations with an elevation of more than 1,000 meters with investments of more than Rs. 5 crores;

- Mining projects (with leases of more than 5 hectares);
- Highway projects;
- Tarred roads in the Himalayas and forest areas;
- Distilleries;
- Raw skins and hides;
- Dyes;
- Foundries;
- Electroplating.

Note: Small scale industrial units intending to manufacture any item of the project categories mentioned above, with investments less than Rs. 1 crore and which is on the reserved list, are exempted from environmental clearance.

Expansion or Modernisation

All expansion or modernisation projects mentioned above would require environmental clearance, if the pollution load is expected to exceed the present level. For exemption, the SPCB would certify no increase in pollution load from existing level.

Who Requires Site Clearance?

Site clearance from the Ministry of Environment and Forests is to be obtained, in case of following projects:

- Mining;
- Pit-head thermal power stations;
- Hydro power, major irrigation projects and/or their combination including flood control;
- Ports and harbours (excluding minor ports);
- Prospecting and exploration of major minerals in areas more than 500 hectares.

For obtaining site clearance, application is to be submitted giving the location of the project along with requisite details, to the Ministry of Environment and Forests. The Ministry of Environment and Forests will convey its decision about the suitability of the proposed site within a maximum period of 30 days.

How to Obtain Environmental Clearance?

Submission of Project Proposal

For grant of environmental clearance, an application is to be submitted to the Ministry of Environment and Forests, with the following particulars:

- Filled-in Application Form;
- NOC from the State Pollution Control Board.
- Summary Project Report;

- Environmental Impact Assessment (EIA) / Environmental Management Plan (EMP) (20 copies);
- Risk Analysis Report (20 copies) – if required by Impact Assessment Agency.
- Comprehensive Rehabilitation Plan – if more than 1,000 people plan;
- Commitment regarding availability of water and electricity from competent authorities.

The EIA/EM Report should be prepared in accordance with the guidelines issued by the Ministry of Environment and Forests.

Procedures for Project Evaluation

(a) The Impact Assessment Agency (IAA), i.e. the Ministry of Environment and Forests, in consultation with a Committee of Experts of a specific composition, shall evaluate the requisite documents, and convey their decision within four months from the date of receipt of the proposal. If no comments from the IAA are received within the specified time limit, the proposal would be deemed to have been granted as 'environmental clearance' unconditionally.

(b) The IAA upon evaluation would specify an insufficiency or inadequacy to the project proponent within 30 days from the date of submission of the proposal. The project would be reviewed as and when submitted alongwith the requisite data.

It should be noted that submission of inadequate data for the second time would mean rejection of the project summarily.

(c) The IAA may also recommend the need for a public hearing within 30 days, from the date of receipt of the proposal. However, at least one month's notice, in at least two newspapers, would be required for such a public hearing.

After obtaining the 'Consent to Establish' and then the Environmental Clearance, the project authorities can begin work related to the setting-up of the project.

The project proponent is required to submit a half yearly compliance report indicating effective implementation of the recommendations and conditions, subject to which the 'Environmental Clearance' has been granted by the IAA.

Procedures for Operating an Industrial Unit

After establishing an industrial unit, but prior to the commencement of production, the project proponent is required to obtain the following from the concerned State Pollution Control Board, if these are applicable:

Consent to Operate for Discharge of Effluents under the Water Act, 1974

An entrepreneur has to apply to the State Pollution Control Board for the grant of 'Consent to Operate for Discharge of Effluents' in the prescribed form and alongwith the prescribed application fee. This consent to operate is required, if the industrial unit is likely to discharge any trade or domestic effluent into a stream, sewer or on land.

Consent to Operate for Emission Under the Air Act, 1981

An entrepreneur has to apply for the grant of 'Consent to Operate for Emission' in the prescribed form alongwith the prescribed application fee. This consent to operate is required, if the industrial unit is located

in an Air Pollution Control Area, declared by the State Government and likely to emit air pollutant(s) into the atmosphere.

Authorization for Handling of Hazardous Wastes Under the Hazardous Wastes (Management and Handling) Rules, 1989.

This authorization is required if the industrial unit is likely to generate hazardous wastes as listed in the prescribed schedule of categories of hazardous wastes.

An entrepreneur may submit applications simultaneously for the grant of 'Consent to Operate' under the Water and Air Acts and 'Authorisation' under the Hazardous Wastes (Management and Handling), rules. Any person who intends to operate a facility for the collection, reception, treatment, transport, storage and disposal of hazardous wastes, is also required to obtain 'Authorisation' for any of these activities.

Industry sectors which require both 'Environmental clearance' from the Ministry of Environment and Forests, and 'Industrial Licence' from the Department of Industrial Development, Ministry of Industry, are as follows:

- Coal, Lignite (Mining);
- Petrochemical Complex;*
- Distilleries;
- Asbestos and Asbestos Products;
- Raw Skins and Hides;*
- Paper and News Print;**
- Hydrocyanic Acid and its Derivatives;
- Hydroxide (Caustic Soda);

It is advisable to obtain Environmental Clearance prior to obtaining an Industrial Licence, in case of the above project categories.

Procedural Requirements While the Unit is In Operation

The following procedural requirements need to be complied with while the unit is in operation;

- Apply to the SPCB for renewal of 'Consent to Operate' for discharge of effluents before the expiry of the specified time.
- Apply to the SPCB for renewal of 'Consent to Operate' for emissions before the expiry of the specified time.
- Submit to the SPCB 'Water Cess Return' at the specified intervals.
- Apply to the SPCB for renewal of 'Authorisation for Handling of Hazardous Waste' before the expiry of the specified time.

---

* Other than crude.
* Other than crude.
** Except basasse based unit

- Submit to the SPCB 'Environmental Statement' every year before 30th September, for the previous financial year.
- Comply with the consent/authorisation conditions as specified.
- Comply with the prescribed effluent/emission standards.
- Ensure proper handling of hazardous wastes.
- Ensure packaging, labelling and transportation of hazardous wastes in accordance with the provision of the Motor Vehicles Act, 1988.
- Maintain records of hazardous wastes generated at the facility in the prescribed form.
- Submit returns regarding disposal of hazardous wastes to the SPCB in the prescribed form.
- Report accidents occurring while handling hazardous wastes to the SPCB in the prescribed form.
- Furnish information regarding notification of a major accident occurred at the site or in a pipeline involving specified hazardous chemicals to the concerned authorities in the prescribed form.
- Ensure transportation of specified hazardous chemicals as per the provisions of the Motor Vehicles Act, 1988.
- Draw insurance policies for the liability to provide relief under the Public Liability Insurance Act, 1991.

Procedure for Clearance from the Forest Angle

It should be noted that all projects which involve:

- Dereservation of forests;
- Diversion of forest land, even if privately owned, for non-forest purposes;
- Transfer of forest land by way of lease or otherwise;
- Clearing of trees for the purpose of reforestation would require prior approval from the Ministry of Environment and Forests, Government of India.

Submission of Project Proposal

All proposals relating to diversion of forests lands upto 20 hectares, and proposals for clearing of naturally growing trees for reafforestation, shall be sent directly to the concerned regional office of the Ministry of Environment and Forests. All other proposals shall be sent to the Secretary, Ministry of Environment and Forests.

Appendix-II

Major Environmental problems associated with selected Industry sector*

Industry	Environmental Problems and Requirements
Chemicals	Product-specific pollutants, with particular problems related to hazardous materials is the problem. In many companies, pollution treatment systems remain non-existent. Pollution prevention expertise is also required, particularly in small and medium sizes operations.
Metal Finishing,	There are 50,000 operation units in India. The most serious pollution
including Electroplating	problems consist of effluents poured into the local water supply from rinsing operations. Almost all small operations discharge wastewater without treatment. Effluents contain heavy metals such as zinc, nickel, chromium and toxic substance like cyanide. Air discharges are also a problem. Upstream pollution prevention services are the greatest single requirements, as end of pipe treatment systems will be prohibitively expensive for most firms in this industry. In larger firms, where treatment facilities now exist or can be installed economically, provision of know-how in sludge management is required due to the toxic nature of the sludge and the lax sludge management practices that currently prevail.
Food and Food Processing	Oil, suspended solids and BOD in effluent water is the problem. Need for expertise in pollution prevention, as well as cost-effective wastewater treatment technologies, including anaerobic systems are also serious problems.
Brick Klins	Air pollution from chimney exhaust containing particulates, SO_2, and CO and land-degradation are problems. There is a need for simple, inexpensive treatment technologies.
Drugs	There are 16,000 plants, of which 96% are small scale. Discharge of toxic materials in partially treated liquid wastes is a major concern. Organic solid wastes disposed in land fills without adequate characterization, pre-treatment or control are also a problem.
Pesticides	Release of toxic substances in air and water from this industry pose serious problems related to the disposal of hazardous wastes. Inadequacy of local process control instrumentation, limited technical and financial capabilities to handle toxic wastes and sludges are also serious problems. Need for incineration, de-watering, ozonation, measuring and control technology for pesticide plants are also the problems.

* ***Source:*** CII - Indian Environmental Regulation

Contd...

Hazardous Waste Disposal	Serious problems in this area related to the relative newness of standards for storage of hazardous waste and other matters exit. Measuring, control and dosing technologies are the weakest technology links. There is a need for know-how in all areas pertaining to hazardous waste management, up to and including the design and installation of adequate disposal facilities and treatment plants. Most incineration technologies currently in use are not in line with international standards. There is also a need for know-how related to maintenance and control of plants as well as environmentally compatible management of landfill sites.
Integrated Iron and Steel	One of the most important sectors in India. There are 7 large plants.
Plants/Mini Steel Plant/Small Foundries	170 mini plants and over 5000 small foundries. Raw materials are highly variable in quality. This, combined with obsolete cupola-based production technology, results in serious air and water problems, as well as slag and ash management problems. There is need for a wide range expertise and technologies, the later would include semi-automatic moulding technology for small foundries, sand regeneration technologies, coated electrodes for electric arc furnaces, efficient sand coolers, improved sand mixers, metal filters, spectrometers, and full mould casting processes.
Thermal Power Plants	The electrical power supply in India is based primarily on the burning of domestic coal with a high ash content (38% on average). Ash content of power plant coal can vary between 20% and 60% in a single day. Installed electrostatic precipitators are out of date, for the most part. Ash removal carried out by the wet method and fly ash suspension is dumped without measures for the protection of soil and groundwater. Fly ash sludge is one of the most serious environmental problems. Wastewater from wet ash removal is the main source of emissions, in addition to wastewater from feed water, condense and cooling water treatment. SO_2 emissions are contributing to 'critical' air pollution levels in some places. There is a need for expertise and technology in fly ash utilization, coal benefaction, upgradition and retrofitting of existing plants, fluidized bed firing, nitrogen oxide removal, flue gas desulphurization, fabirc filters and continuous waste gas measuring devices.
Sugar	There are over 400 Sugar Mills. Main concern relates to high BOD effluent containing high oil and grease content. Intense odour nuisance due to waste water streams, need for enhancing expertise in pollution prevention and waste-water treatment technologies particularly anaerobic treatment technologies are needed.

Contd...

Fermentation Industries	In Maltry and Brewery, the suspended solids content in waste-water is relatively high creating odour problem. Main problem associated with excessively high BOD waste water (spent wash) contributes to odour nuisance. There is need to evolve treatment technologies particularly anaerobic and biological low-cost intensive treatment method.
Textile	Mainly Water Pollution from heavy metals, colour and organics and high content of dissolved solids are problems. There are serious gaps in control technology, available treatment technologies; is quite expensive.
Dye & Dye Intermediate	There are over 64 major units and rest around 1000 units, (out of which more than 700 units are in small scale sector). Main pollutants are heavy metals acids, organics phenolic compounds supported with high BOD and COD. High TDS and deep colour of different shades with high content of chlorides and sulphides are problems. There is need for expertise in waste water minimization and in-plant measures for pollution prevention. Available treatment technologies are quite expensive, need to evolve low-cost treatment methods.
Pulp & Paper	Over 96 major units as a large scale units and around 500 are small scale units.
— Large	— Large scale units contribute to Air Pollution by emitting particulate matter, gaseous pollutant and mists, apart from high BOD and COD content in waste water including high suspended, dissolved solids and high content of lignin and other toxic chemicals.
— Small	— Small Pulp & Paper units discharges have high BOD and high COD including high concentration of lignin, Chlorine and suspended solids pose environmental problems through water sources contamination. Fibre and chemical recovery is only carried out in large units as they are highly cost intensive. Waste Water Treatment Technologies are quite expensive. Need to evolve cost-effective waste minimization and waste treatment technologies.
Tanneries	There are about 2500 Tanneries in the country. Major problems are through waste water which contains heavy metals, toxic chemicals, chlorides, lime with high dissolved and suspended salts and other pollutants.
Man-made Fibre	Around 74 units are there in India, which includes 56 units of synthetic fibre, 15 units of Semi-synthetic and 3 units of Glass Fibre.

Contd...

— Synthetic Fibre Plant	— Environmental problems could be posed by high COD, high dissolved and suspended solids in waste-water including content of Caprolactem, Dimethyl Terephathalate (DMT), Ethylene Glycol, Acrylonitrile and Polypropylene used as raw materials in Synthetic Fibre.
— Semi-Synthetic Fibre Plant	— Waste water from Semi-synthetic Fibre Plant which includes high COD, high suspended solids and most importantly Zinc. These could pose environmental problems.
	The Waste Water Treatment technologies particularly in synthetic Plants which include raw materials recovery and chemical recovery/ reuse technologies are highly expensive. Need to evolve cost effective Chemical Recovery technologies and waste minimization technologies. There is need to evolve low cost treatment technologies which could be affordable to small units
Paint Industry	Around 1400 units, both in organised and small scale sector are spread over the country. The waste water from Paint Industry contains high COD and BOD, oil and grease and heavy metals pose Environmental Problems. The cost of waste-water Treatment is quite high keeping the complexity of waste water in view. There is need to evolve waste water minimization technologies and cost-effective waste water treatment technologies. Air pollution from these units need to be controlled through low-cost technologies.
Caustic Soda Industry	There are total 25 major units excluding some units in unorganised sector.
— Mercury Cell	— Mercury Cell, Caustic Soda Industry pose Environmental problems as the waste water contains salts, acids, calcium, chlorine, sulphate, also most importantly mercury and high suspended solids. The treatment cost is quite high as mercury recovery/reuse technologies are not easily available at low cost. Waste water poses environmental problems because of high Mercury Content. There is need to evolve waste minimization Mercury Recovery/Reuse and treatment technologies which are less expensive and cost effective.
Inorganic Chemicals	There are about 60 units are all over India producing chemical compounds of Cr, Mn, Ni, Cu, Zn, Cd, Hg, Pb etc.
	These units pose severe environmental problems as the waste water streams contains all the above said heavy metals compounds, cyanide, sulphate, high dissolved solids and high suspended solids with high COD.
	The Treatment Technologies are very expensive as the waste water composition is quite complex. There is a need to evolve cost effective waste-minimization, Metal Recovery and Treatment Technologies

BLOCK – III

UNIT

8

Business - Accounting - Economy

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ❒ 8.1 Introduction
- ❒ 8.2 Promotion of Sustainable Development
- ❒ 8.3 Globalization
- ❒ 8.4 Environmental Accounting
- ❒ 8.5 Use of Economic Instruments/Price Mechanisms
- ❒ 8.6 Environmental Taxes
- ❒ 8.7 Cleaner Production
- ❒ 8.8 Promotion of Responsible Entrepreneurship
- ❒ 8.9 Is It Possible
- ❒ 8.10 Debt and Environment
- ❒ 8.11 Environmentally Sound Business Embraces all Disciplines
- ❒ 8.12 Environment: Trade GATT - WTO
- ❒ 8.13 Eco-labelling
- ❒ 8.14 Green Funds
- ❒ 8.15 Summary and Conclusions

8.1 INTRODUCTION

Business and industry including Multinational Corporations (MNCs) play a crucial role in economic and social development of a country. All economic activities either affect or effected by natural environmental resources -- extraction, processing, manufacture, transport, consumption and final disposal of the product are related to environmental sustainability. Moreover, economic activities affect the natural resources for future generations too. Study of economic system therefore is crucial in so far as quantity and quality of natural resources is concerned. There are two important aspects of economic and environment linkage:

(a) Promotion of sustainable development;

(b) Implications of globalized economy.

8.2 Promotion of Sustainable Development

The simplest way to understand the concept of sustainability is as under. There are two categories of natural resources - exhaustible or non-renewable and renewable. The first category includes those which are of geological origin and any amount consumed is gone for ever for all practical purposes. The renewable are used or harvested and are replaced/replenished by natural forces. Sustainability means that the rate of harvest does not exceed the rate of increment/regeneration. It is clear, then that if a society uses too many natural resources that cannot be regenerated, the situation will lead to degradation of environment and this practice cannot continue infinitum.

The annual Economic Survey Report of Government of India publishes one major economic issue in each year. This year's major issue is 'Promoting Sustainable Development': Challanges for Environmental Policy. This document discusses 'State of India's Environment'. It says that a country's environmental problems vary with its stage of development, technology and environmental policies. While some problems are associated with the lack of economic development, others are aggravated by economic activities. It further gives glimpses of various factors that affect the environment and resources adversely. For example, while discussing the soil degradation, it says that most of the land in the country shows evidence of degradation, affecting the productive source of economy (out of the total geographical area of 329 million hectares, 175 million hectares are degraded) and the government's strategy towards preventing such degradation includes such measures as:

(i) Watershed development;

(ii) Treatment of affected areas;

(iii) Transfer of technology;

(iv) Biomass production;

(v) Remote sensing for surveying affected areas.

Likewise, the document discusses about deforestation, biodiversity, solid waste disposal and their relationship with economy and environment. The purpose of quoting this report and discussing relationship between economy and environment is firstly to underscore the point that today the country needs to be on a strong economic as well as ecological footing. Secondly, it is to point out that Governments till recently have been dealing with ecological sustainability and economic development as two separate entities whereas these are interrelated. The ecosystem supports the economic growth and if former is ignored, economic growth cannot continue.

There is another aspect to sustainability. Sustainable development has to take into consideration not only intergenerational equity i.e. interest of future generation, but

also equity among the nations of North and South. It may be reiterated that economic capital mostly consists of natural environmental resources but for last few decades the developing countries in particular, have been facing depletion of this capital, thus landing themselves into economic crisis.

8.3 GLOBALIZATION

India opened up its economy in early 1990's. Globalized economy not only deals with movement of elements like physical capital, (machinery and equipment) technology and labour but also financial capital (foreign direct investment).

There is more international trade today and this trend is rising. One major impact of global economy is on environment and resources. The international trade alters the volume of production and consumption. As it is known, the consumption patterns of Western countries are imitated by the developing countries (e.g. fast foods) and if this trend continues, its impacts on resources would be significant. Another trend is that poor countries are cash starved. They would tend to sell natural resources to earn foreign exchange.

The issues that need immediate attention is whether liberalized trade leads to damage to environment. As mentioned above, global trade and environmental issues were kept separate and even in the initial rounds of talks and negotiations of Uruguay Round of General Agreement on Tariffs and Trade (GATT) there was no attempt to resolve the issue of environment and trade. (Uruguay round led to setting up of WTO in 1995 to administer the agreements on International Trade). However, the final Uruguay round agreement did take into account the environmental issues and ensured that WTO takes up these issues on priority basis.

India as explained above liberalized its economy in early 1990's but the economic benefits of liberalization become realistic only if the true costs of products are reflected in their prices. In other words the environmental costs have to be reflected in the cost of goods and services. This practice of including environmental cost would also rectify the aberrations in the value of GNP which is the indicator of economic health of a country.

Case of Madhya Pradesh Teak Forests and GNP

Till recently, there was not much concern about the way teak trees were cut and sold for timber. Madhya Pradesh teak being a fine quality material for furniture and house or office building was used indiscriminately because the cost was not high. Later after 70s due to depletion of teak forests and due to restrictions imposed on cutting of trees, availability became scarce and prices became high. The result was that alternative timber source of Assam teak came under exploitation, the quality of which was inferior to Madhya Pradesh teak. Assam teak entered the market, its demand rose and prices went up. Assam teak forests also started getting depleted.

According to prevalent accounting norms the proceeds from these teak forests added to the GNP. But no depreciation/deduction is reflected in the national income for the depletion of forests and ecological

Contd...

imbalance caused due to felling of trees. (Forests, notably tropical rain forests are an example of perfect self sustaining system and if left undisturbed can provide everlasting revenue for future. They are an economic asset and if managed well could raise GNP in real terms.) Since the present system of national accounting does not take into consideration the depletion of forests and other resources, the calculated value of national income and wealth can create an illusion that a nation is on road to economic progress than it really is and therefore can sustain higher level of consumption. GNP, in such situation thus gives false signal in income generation. A nation can be heading towards resource depletion and ecological bankruptcy and still record GNP growth.

There is another falsity. While calculating GNP, the expenditure made towards combating pollution and other related activities is counted as income. Washington Post (March 14, 1991) wrote that the oil spill in Alaska that occurred in 1989 drastically degraded the environment, actually resulted in rise in GNP because of 2.2 billion dollars spent in clean up programme. Similarly, money spent on medical costs due to diseases or adverse effects of pollution is counted as the national income. Frank Bracho in "Redefining Wealth and Progress : New Ways to Measure Economic, Social and Environmental Change", very aptly described GNP as an indicator which is an indiscriminate ensemble that assigns a positive value to any economic activity, be it productive, unproductive or destructive".

There is one more problem. It is related to determining the monetary value of environmental costs and damages. For example many environmental services do not pass through markets and therefore no market prices exist to indicate value. Yet valuation and its internalization in the development project does take place. The issue of National Resource Accounting has been highlighted in the Economic Survey Report. It states that accounting schemes that more accurately measure the environmental costs of trade or economic activities could help increase the efficiency of natural resource use and reduce related environmental impacts. The need for National Resource Accounting (NRA) and their integration with the system of national accounts have been emphasized in various policy documents of MEF.

The Ministry has developed a framework for preparing such integrated accounts. It has taken up programmes for development of prototype account for air, water and biodiversity.

8.4 Environmental Accounting*

♦ National Accounts have been providing the most widely used indicators for the assessment of economic performance, trends in economic growth and the economic counterpart of social welfare. However, the new emphasis on sustainable development draws attention to the need for a broader assessment of growth and welfare by modified national accounts. In assessing cost and capital, national accounts do not consider scarcities of natural resources which threaten the sustained productivity of the economy and the degradation of environmental quality and consequential effects on human health and welfare. In addition, some expenditure for maintaining environmental quality are accounted as increases in national income and product. This is despite the fact that such outlays could be

* *Source:* Economic Survey, 1997-98.

considered a maintenance cost of the society, rather than social progress. Thus, the conventional accounts are likely to send wrong signals and may result in policy decisions which are non-sustainable for the country. Green accounting or environmental accounting on the other hand is, focused on addressing such deficiencies in conventional accounts with respect to the environment.

- Integrated environment and economic green accounting, therefore, attempt at accounting for both socio-economic performance and its environmental effects and integrating environmental concerns into mainstream economic planning and policies. Such accounting imply allocating environmental costs (and benefits) to those activities and sectors that have caused them, in other words accounting for accountability, is a pre requisite for national management of both the environment and the country. Given the experimental nature of some of the proposed methodologies, particularly those on monetary valuation of non-marketed assets and externalities, such environmental accounting would require numerous and controversial estimates and valuation.

- Such integrated accounts can be useful in assessing the sustainability of economic growth and also the structural distortion of the economy by environmentally unsound production and consumption patterns. However, lack of international consensus on how to incorporate environmental assets and costs (and benefits) of their use in national accounts and existence of low statistical capacities for measuring natural resources depletion and environmental quality changes have resulted in a slow progress in development of green accounts.

- Nevertheless, the idea of placing statistical coverage of environmental concerns in a national accounts framework commands widespread support. Already, several attempts have been made at experimenting with satellite accounts - notably in Costa Rica, Mexico, the Netherlands, Norway and Papua New Guinea, among others. Indicative estimates suggest that conventionally measured GDP may exceed GDP adjusted for natural resources depletion and environmental degradation by between 1.5 per cent to 10 per cent.

Reverting to liberalization of Trade and its linkage with Environment, it is worth noting that India made liberalization a step-wise process. The objective was to improve the efficiency of resource use gradually and to step up the growth of economy and industry. The last step was to give Indian economy a competitive edge internationally by allowing the industry and the consumer a smooth access to international goods and services. The liberalized trade not only enhances efficient use of resources but also promotes transfer of environmentally sound technologies for cleaner production, thus resulting in overall improvement of EMS of an enterprise. Also increased competition from trade liberalization leads to innovations in use of resources.

Industry in India is under greater pressure to remain concerned about environmental performance because of stringent environmental standards required to India's exports. The most noted case is that of Leather industry. The western countries would permit import of leather goods from India only if these meer the high environmental standards

in its manufacture. The Indian exporters of leather products may need ISO 14001 to sell these in other countries. A thorough study and research is required to assess whether liberalization would increase or decrease environmental problems. But as explained above, if India wants to maintain competitiveness in trade at global level, it has to adopt environmentally clean technologies which have to be either transferred from west or developed indigenously. And in this venture, the government of India has to encourage the use of environmentally sound technology by measures such as economic instruments or any other price mechanism. Discussed below. (See the box)

8.5 Use of Economic Instruments/Price Mechanisms*

While regulatory and legislative measures are strong force in the protection of environment and resource conservation alternative, approaches are equally important. Market choices in protection of environment are being adopted by both the North and South. The underlying philosophy in this approach is to give a clear signal about the cost of utilizing environmental and natural resources. If the environmental costs are properly reflected in the prices paid for goods and services then companies and ultimately the consumer would adjust market behavior in a way that would reduce damage to environment, pollution and waste production. Price signal will also influence behavior to avoid exploitation or excessive utilization of natural resources. Such measures would facilitate operationalizing the approach of "Polluter Pay Principle". Removing subsidies that encourage environmental damage is another measure.

8.6 Environmental Taxes*

- As against the Command and Control approach to management of the Environment, the Economic or Market Based Instruments (MBIs) approach sends economic signals to the polluters to modify their behaviour. The approach normally involves financial transfers between polluters and the community and affects relative prices. But the polluters have freedom to respond and adjust, in the manner they want. They can thus choose the least cost option to meet the requirements. Hence, it is considered to be an efficient approach compared to the approach based on standards and regulations. The MBIs, therefore, have the benefit of being flexible and cost effective providing incentives for dynamic efficiency and resource transfer.
- Economic instruments used for environmental tax include pollution charges (emission/affluent tax/pollution tax), marketable permits, deposit refund system, input taxes/product charges, differential tax rates and user administrative charges and subsidies for pollution abatement. These can be both price based and quality based instruments.
- MBIs have been applied in both developed as well as developing countries. In general, price based MBIs have been more widely used than those which are

* ***Source:*** Economic Survey, 1997-98.

quantity based. Within price based MBIs, indirect instruments such as input-output taxes, differential tax rates and user fees have found extensive application in developed countries. By contrast, developing countries have made greater use of subsidies including those for end-of-pipe treatment equipment.

- The main MBIs used in India are subsidies for pollution abatement equipment for air and water resources. This provides rebates on duties for various pollution control equipment, monitoring instruments and abatement machinery for air/water pollution and promotion of unleaded fuel/fuel efficient automobile subsidy on automobile pollution kits/converters etc. Accelerated depreciation for pollution control machinery is also provided. Among user charges/administration charges, consent fee is charged from industries under the Water Act and the Air Act. A water cess based on the consumption of water and type of industry (polluting) is also levied on selected industries and urban municipalities to conserve consumption and control pollution of water.

Business Prospects

Environmental Management is not only an issue of legislative/regulatory controls but it also relates strongly to sound business practice. According to a recent survey published in UK, 67% of the 1000 companies stated that they attach more importance to environment today than a year ago. Their reasons for doing this ranges from public image to financial gains accrued from such actions as cutting down the cost of raw material wastes.

The industry and financial sector even in India which tended to ignore environmental issues is now becoming aware not only of environmental risks but also its ability to affect investment decisions. In addition, an important motivation for environmental concern is their public image.

So far as the link between environment and business is concerned, the issue is whether it is possible to make profit in business and at the same time keep the environment free from degradation. Till recently, it was believed that what helped business did not help the environment? And business is for profit. But the scene is changing fast and in fact it has changed for many companies.

Though there may be a view that the business is there for profit but at the same time there are many business corporations that are committed not to do harm to environment. Either public pressure or legislation or out of self benevolence, companies have imposed social and environmental obligations. Realization is increasingly coming to large corporations that business should contribute to the good of the society. When we say that business should contribute to the good of the society, it implies that business has an obligations both for stakeholders and environment. It is also increasingly realized that both business and environment can coexist and ultimated business can generate wealth in a manner that can lead to sustainability in development. In other words improving environment and resource conservation can bring in more profits to the company.

Some business/industrial houses are already implementing 'responsible care' and programmes of assessment of compliances and audits. A positive contribution of business and industry to sustainable development according to Agenda 21, "can be achieved by "using economic instruments in which the prices reflect environmental costs of their production, recycling and disposal. The improvement of production system through technologies and processes that use less resources and produce less waste is an important pathway towards sustainability in business and industry; therefore two programmes have been proposed in this regard": These are (i) Cleaner Production; (ii) Promotion of Responsible Enterpreneurship.

8.7 Cleaner Production

The concept of cleaner production is to include optimal environmental care at every stage of the product. The recommendations of Earth Summit were that :

(a) Governments, business and industry including Multinational Companies (MNCs) should strengthen partnership in regard to above proposal.

(b) Government should adopt mix of economic instruments and other measures like law, standards and audit in consultation with business and industry including MNCs for promoting cleaner production with special consideration for small and medium sized industries.

(c) Governments, business and industry should work towards developing system for internalization of environmental costs into accounting and pricing. This has been dealt with in details in the earlier part of this chapter as also the efforts of Government of India in this direction.

(d) Business and industry including MNCs should be encouraged to report annually on their environmental records indicating use of natural resources and energy used.

(e) Governments should promote technology know-how and transfer among the enterprises.

(f) Industry should integrate cleaner production policies in its operations, also taking into account its implications on suppliers and consumers.

(g) Industries should make efforts in impressing awareness, knowledge and skills of workers for sustainable development operations.

(h) Various organizations, International and National should strengthen database on cleaner production and should forge networking.

8.8 Promotion of Responsible Entrepreneurship

Agenda 21 explains that entrepreneurship is one of the most important driving force for innovations towards responding to challenges in regard to marketing, manufacturing and operations. Small and medium sized entrepreneurs play an important role in social

and economic development of the country especially for rural development and improving livelihood for women in developing countries. Responsible entrepreneurship can play a major role in this direction. It is proposed that responsible entrepreneurship should encourage:

(a) Concept of stewardship in the management and utilization of natural resources by entrepreneur.

(b) Increasing the number of entrepreneurs engaged in enterprises that encourage sustainable development policies.

In order to achieve the above following steps are required to be taken:

(i) Governments should encourage the establishment of sustainably managed enterprises. It would mean mix of economic incentives, streamlining of regulatory and administrative procedures in dealing with applications for approval.

(ii) Governments should encourage in collaboration with private sector, establishment of Venture Capital Fund for sustainable development projects.

(iii) Business and Industry including MNC's should encourage establishing world-wide corporate policies on sustainable development and arrange for environmentally sound technologies to be available to affiliates owned mostly by their parent companies in developing countries without extra external charges and encourage these affiliates to tailor procedures keeping in view the local ecological situations.

(iv) Large business and industry including MNCs should establish partnership with small and medium sized enterprises to facilitate exchange of experience in managerial skills, market development and technology transfer wherever appropriate.

(v) Business and Industry should establish National Councils for sustainable development and help entrepreneurship in formal and informal sectors.

(vi) Business and industry should increase efforts in Research and Development of environmentally sound technologies in collaboration with academia, scientists and engineers.

(vii) Business and industry should ensure responsible and ethical management of products and services from the point of view of environmental aspects. Various codes, regulations, charters, conventions and other initiatives should be integrated in planning and decision making.

8.9 Is it Possible

Is it possible to implement various suggestions outlined above? In many businesses, today there exists stiff competition and declining margins with the result that company's capacity to respond to environmental challenges would increase the expenditure. The question is whether companies can afford the environmental costs. At macro level or

national level it may be possible to implement recommendations in regard to business moving towards environmentally sustainable practices and acquiring a competitive advantage through strict environmental policies. But is it possible at the level of individual corporation to become competitive while maintaining environmentally sound practices? The U.S. giant company, Texaco has been investing huge money for environmental compliances and reduction in emissions and the total investment exceeds its assets base. Will it not affect the shareholders value? The cost of adopting environmentally sound practices would continue to increase in view of new regulations required to be met by the industry being mandated every now and then. And there seems to be no end to such regulations in near future. Even without new regulations, the present ones are always under revision for stricter standards. All this means more costs for the company. It seems therefore, that costs for environmentally sound practices may be prohibitive for the companies but this doesn't mean that the managers should not care for environmental issues and return to old ways, meeting at the most legal requirements to escape penalties. There is certainly a trade off between environment and economic concerns and it is advisable that the managers who have a difficult task should concentrate on this aspect. It is probable that solutions which would lead to long term resource conservation and ecofriendly practices will be ones that are equitable to both the environment and business. Therefore managers should look for a situation in which business become profitable, protecting shareholders interest and value and at the same time maintaining high environmental standard. The trade off is such in which environmental benefit is weighed against the value destruction of company. Focus on value should enable the managers to make choices in respect of environmental issues. A choice can be strategic when a manager finds that impact of environmental issues on value is high. The manager may choose to and make heavy environmental investments to come to front line by becoming leaders in a particular business. Instead of only following legal or mandatory requirements, he moves towards innovations, even shows a zeal and missionary approach towards environmental issues. Or he may choose to stay behind and just remain concerned about compliance of legal requirements.

8.10 Debt and Environment

Founding of United Nations, World Bank and International Monetary Fund (IMF) is a landmark in the history of developments of International Institutions - agencies for political, social and economic issues. Among other things World Bank and IMF perform the function of foreign aid - giving grants, loans and advice to poor nations, so that they can become wealthier, more democratic like USA. Fifty years after founding of these institutions, it was discovered that poor nations have become slave of rich nations. Poor nations owe so much to World Bank and IMF that they are spending more on foreign debt payments than on social programs.

Various agencies lent billions of dollars for the projects in poor countries with the hope that the loans would stimulate their economies and exports and they would be able to repay the loans. But in many cases, it did not happen that way. Blame is put both on lending agencies and the borrowers. Though the data are old (1997) Zambia devoted

40% to debt services and only 7% to social services like health, education, sanitation and water. For Sri Lanka, corresponding figures are 22 and 13.

In 1980s the lending agencies like World Bank, IMF and even the Governments of rich nations like USA lent money to developing countries with the strings. The borrowing nations were asked to change their economic policies, such as privatization of state run enterprises. These changes or reforms were called as structural adjustments. The World Bank Report of 2000 has this to say "We urge a broader approach to reducing poverty and provide opportunity, empowerment and security". According to observers on debt crisis, this statement shows that World Bank made mistakes and there were flaws in its policies. Sometimes loans were siphoned off to other projects, even going to the personal account of dictator presidents of certain countries. Corrupt practices became common.

The developmental efforts of last few decades resulted in many disasters - economic environmental, human rights. World Bank funded Ganga Action Plan for clearing up river ganges. The river continues to remain polluted. Uganda shifted funding meant for providing safe drinking water to poverty reduction.

8.11 Environmentally Sound Business Embraces all Disciplines

In 'Earth in the Balance', Al Gore writes that we can produce for the world market place the new products and technologies that foster economic progress without environmental destruction. Also, Michael Porter from Harvard Business School argues that economic progress and environmental protection is not a conflicting proposition. According to these views, the successful managers redesign the product, and adopt newer technologies that are now available; they can achieve goal of less resources depletion and less waste production. It is an eco-friendly business. It means that managers understand the impact of business on ecosystem and sustainability. This requires a new kind of thinking and strategies in respect of environment business relationship. A change is needed at all levels starting from organizational structure, finance, manufacturing, marketing, operations, accounting and other related disciplines. Take for example, the case for organizational structure. An organisation's structure is based on its culture. We cannot expect to change organisation structure and its culture unless we understand the processes that gave rise to it. In other words it is important to know what are the practices that gave rise to unsustainable nature of business. When we understand these, it become easy to chalk out strategies to change the culture for attaining environmentally sustainable business objectives.

Manufacturing

So far as manufacturing is concerned, the traditional method is that raw material is procured to transform it into a product and in the process some waste is produced which is disposed. But for making the manufacturing process eco-friendly, new concepts of 'Industrial Ecology' as discussed earlier have to be adopted where consumption of raw material is optimized and waste is minimized and the waste of one process serves

the raw material for the other. We can learn much for manufacturing process from what happens, in nature -the case of tropical rain forests. The tropical rain forest is a self sustaining system. No one adds fertilizer to the soil of these forests. These is no human input in so far as the growth of these forest is concerned. The bacteria, algae, leaves and fruits of the trees of these forests decompose and provide nutrients for maintaining the flora and fauna of the forest through a mechanism of recycling – waste of one is the source of nutrient for others.

In actual practice the nations, especially the developed ones need to change the habits and mindset in so for manufacturing and consumption are concerned. Of course, it is not possible to attain an ideal situation as it obtains in tropical rain forest but it is possible to minimize the use of non renewable resources and attain a situation of minimum waste production by way of recycling.

There is one more aspect in so far as eco-friendly manufacturing is concerned. This refers to technology used in manufacturing. All environmental problems cannot be solved by technological interventions. Technology, no doubt, can make a difference by reducing the rate of consumption of resources but there is no technology that can lower the sea level once it has risen or there is no technology to manufacture ozone in the stratosphere.

Another point is that in a decentralized economy, the manufacturer has no responsibility for the operation or final disposal of the product, the latter may lead to environmental damage. The manufacturing system should be such where manufacturer has the opportunity and incentive for recovery, reuse and recycling of durables.

Marketing

The strategy has to change in respect of marketing if a business is to meet the challenges of environmental issues. In fact, changing marketing strategy may give an advantage to the business as it does in manufacturing. Some of the companies have already, adopted so called 'Green Marketing'. Samsung Refrigerator being sold in India has a prominent label, "CFC free". Many other products have come to market that claim to be using recycled products. Many fuel efficient cars and appliances have been claimed. The consumers are increasingly becoming aware about these and should prefer to buy eco-friendly products. The consumer express their concern about environment through market behavior. Therefore, the business has to keep this in mind when it devises its promotional campaign. The companies have to make a truthful environmental claims while marketing their products.

8.12 Environment: Trade GATT-WTO

As discussed in earlier chapters, Environment - the Nature's life support system is under great stress due to many reasons. The reasons have been elaborated. Our economies keep on increasing pressure on our ecosystem, land, rivers, oceans, fisheries, forests and other natural resources. The Earth's carrying capacity is being over-stretched.

What is the role of trade in this kind of scenario? Do trade practices benefit the environment or damage the environment? Should we have restrictions on free trade? Should an importing country care for or should have responsibility for environmental damage in the exporting countries caused by production of traded commodities? These are important questions to be addressed. One thing is certain and it relates to the approach we adopt in this regard. The approach refers to integrated ecological system for economies. This means we have a belief that ecological preconditions provide a framework for economic development and it is essential that ecological or environmental resources and services, which form the core of the framework, have to be used efficiently within this framework.

We discuss here the conditions under which international trade is related to ecologically sustainable development. We also discuss the trade regulations that have impact on environment.

The concern about the relationship of trade and environment grew to significant level in late 1980's and early 1990's when there was a dispute between USA and Mexico; the former having imposed restrictions on the import of Mexican fish called tuna. It was argued by Americans that in the process of catching tuna, dolphins get killed, since these fishes swim underneath the dolphins. For catching the tuna, the fisherman would drop his net under the dolphins and when the chase is over, he would haul in the fish and dolphins together, often killing the latter. Similarly several European countries discussed about trade restrictions against import of timber, because of its impact on the environment.

To start with the subject of trade and environment, we may refer to Principles No. 2, 11, 12, 13 and 16 of Rio Conference (1992) given in this book. All these principles relate to trade and environment. We may also note that before Rio, there were agreements having implications for trade. These are:

- Convention on the Preservation of Fauna and Flora in their Natural State - 1933
- International Convention on the Prevention of Birds - 1950
- International Plant Protection Agreement - 1951
- European Convention on the Protection of Animals during Transportation-1968
- Convention on International Trade on Endangered Species of Wild Fauna and Flora (CITES) - 1973
- Montreal Protocol on Substances that deplete Ozone Layer - 1987
- Basel Convention on the control of Transboundary Movement of Hazardous Wastes and their Disposal - 1989

General Agreement on Tariff and Trade (GATT) was established in 1947 for better organization of International Trade. The member countries regarded rules of the Agreement as binding. In fact GATT served as forum for simplification of trade regulation among member countries. In 1992 GATT had 108 countries as members. The objective of GATT was to remove various barriers in international trade for promoting

economic development.

Within GATT framework, other agreements were finalized among the members. Technical barrier to Trade (TBT) was one of these agreements and this specifically mentioned term 'environment' in GATT context. Among other rounds of agreements under GATT framework is famous Uruguay Round, which began in 1986 and completed in 1994. It discussed, for the first time Trade in Services and Intellectual Property Rights (IPRS). Uruguay Round specifically mentioned Environmental issues also.

A technical group called Environmental Measures and International Trade (EMIT) was established within GATT in 1991, a year before Rio was held. EMIT was more or less a discussion forum and did not have much binding on environmental rules for trade. The Ministers who met at the final round of Uruguay Round of Talks on Multilateral Trade Negotiations in 1994 reached the agreement establishing World Trade Organization (WTO), keeping in view the spirit of Rio Declaration on Environment and Development, its follow up in GATT and followed by decisions to coordinate the policies in the field of trade and environment.

Main objectives of WTO are:

(i) To supervise and liberalize international trade

(ii) To supervise the settlement of commercial disputes.

It will implement and promote further the objectives of GATT 1994 and Multilateral Trade Agreements including the general agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). According to GATT 1994:

Countries have to be facilitated to enter into reciprocal and mutually beneficial arrangements directed to reduction of tariffs and other barriers to trade and to eliminate discriminatory treatment in international trade relations.

Among other objectives WTO members are to expand production and trade in goods and services allowing optimal use of natural resources for achieving sustainable development seeking to protect the environment.

Since 1994 WTO programmes on environment have been based on the discussions of Committee on Trade and Environment (CTE). Accordingly, CTE submitted a report to the Ministerial Conference of Singapore (1996) and to WTO Council in 1997 on the theme of linkage between Multilateral Environmental Agenda and Multilateral Trade Agenda. In 1997 the CTE organized meetings from the secretariats of CITES, Basel Convention, Montreal Protocol, U N Convention on Laws of Sea, CBD and GEF. The idea is that there should not be any incompatibility between WTO regulations and International Protocols Conventions on various environmental problems.

In 1998 CTE established WTO database on Environment. Also CTE held meetings of secretariats of various Multilateral Environmental Programmes and UNEP. Discussions were also' held on Eco-labeling. CTE at its meeting in 2001 discussed market access implications of environmental measures and development arising from trade in fisheries,

agriculture, energy, access to traditional knowledge, genetic resources and TRIPS. It also discussed dispute settlement issues.

Decision making in the CTE and other committees is by consensus. If decision is not arrived, the' matter is decided by voting at the meeting of Ministerial Conference and General Council.

WTO is thus the body overseeing international trade. It claims that trading system adopted under WTO is beneficial in the sense that it stimulates economic growth, job creation, raises standards of living, gives voice to small countries and allows trade disputes settled peacefully. The system lowers the trade barriers, thus increases trade volume, which in turn leads to higher economic growth and generate employment. Further it claims that if WTO did not exist, the larger and powerful countries would impose their unilateral decisions on smaller trading partners. The preamble to the agreement, which established WTO include among its objectives, the optimal use of resources, environmental protection and sustainable development. Many observers, however, point out that claims made by WTO may not be correct. One may recall the protests and riots at the Ministerial Conference held in Seattle, USA, in December 1999. There were indications that cracks were appearing in the World Trade Organization and the decisions that were to be taken were undemocratic. Many negotiations took place in closed-door meetings in which most of the developing countries were not invited. Minister from Ghana remarked that there was no transparency in the proceedings and African countries were excluded from certain viral issues. Some observers also feel that decisions tilt in the favour of rich countries. Vandna Shiva, an eminent environmentalist said that rules of WTO are driven by objectives of establishing corporate control over every dimension of our lives!!

- It is most desirable that GATT/ WTO rules must permit trade measures that are in conformity with International Environmental Agreements.
- Trade has environmental implications. It is not the primary cause of environmental damage. The primary cause lies in production processes, therefore, source of problem should be rectified.
- Trade barriers aimed at rectifying the environmental effects of production within another country must be justified keeping in view the multilateral international environmental regulations.

8.13 ECO-LABELLING

Eco-label is an environmental claim that appears on the packaging of a product. It is awarded to a manufacturer by an appropriate authority. ISO 14020 is a guide to the award of Eco-labels.

The common person is now becoming aware of the deterioration of environment especially when it relates to human health. There is a growing demand for goods and services that cause less damage both to the health of human and environment. The

consumer in developing countries too is showing great interest and concern on the environmental effects of products and services. This in turn, effects the purchasing behavior. In developed countries there is increasing concern about what is called as 'green purchasing' which in final analysis leads to conservation of natural resources and sustainable development. This concern has led the governments especially in the countries of North to formulate guidelines that regulate sales and trades. In fact, 'green shopping' is now becoming popular in these countries.

The Government of India launched an Eco-mark Scheme in 1991 to increase consumer awareness in respect of environment friendly products. The aims of the scheme are to encourage the consumer ro purchase those products which have less harmful environmental impact. Eco-mark label is awarded to products which meet specified criteria and quality requirements of Indian standards. (The European Union Eco-labelling scheme is in operation for the last few years. The Eco-labels in this case represent independently verified sign of environmental excellence and encourage manufactures to make environment friendly products. The manufacturer has to submit an evidence that its particular products meet the criteria set out for its category. An approved laboratory validate the tests. The Eco-label product has competitive advantage).

Eco-labelling can lead to:

(i) Improvement of image and sales of products.

(ii) Manufacturer becomes more accountable to environmental impacts.

(iii) Consumer's awareness that their choice of product do affect the environment as some products are less damaging ro environment than others.

Operation of Eco-mark Scheme of the Government of India

There are three stages that lead to award of Eco-mark in India. These are:

(a) The Steering Committee of the MEF determines the product categories for coverage under the scheme and to formulate strategies for implementation and future developments of the scheme.

(b) The second stage is the identification of specific products to be selected and the individual criteria to be adopted by the Technical Committee of the CPCB.

(c) In the third stage the Bureau of Indian Standards (BIS) is to certify the product and formulate contract with the manufacturer allowing the use of eco-mark.

Criteria for Eco-mark

According to MEF, criteria for awarding Eco-mark cover all the stages of product from raw material to manufacture and to final disposal (LCA). These criteria refer to general and specific requirements for products.

The general requirements are:

(i) Products to meet the relevant standards of BIS.

(ii) Manufacturers to produce documentary evidence in regard to compliance of EPA, Water and Air Acts and other rules and regulations such as Prevention of Food Adulteration Act and Drugs and Cosmetics Acts and rules made thereunder.

(iii) The product to display the list of critical ingredients in descending order of quantity present.

(iv) The packaging to display the criteria based on which the product has been labelled environment-friendly.

(v) The material used for packaging to be recyclable/reusable/biodegradable.

(vi) The product to be accompanied by detailed instructions for proper use.

For Product Specific Requirements following issues are to be considered:

(i) Source of raw material.

(ii) Production process.

(iii) Energy use/conservation in the production.

(iv) Wastes arising from the process of production.

(v) Utilization of wastes.

(vi) Disposal of wastes.

(vii) Suitability for recycling or packaging.

(viii) Biodegradability.

Status of Eco-mark Development

According to a Report (1997), 16 categories of products have been identified by Eco-mark Steering Committee. The Eco-mark Technical Committee has finalized the eco-mark criteria for 14 categories. These are:

1. Soaps and detergents
2. Paper
3. Food items
4. Lubricating oils
5. Packaging materials
6. Paints and powder coatings
7. Batteries
8. Electrical/electronic goods

9. Food additives
10. Wood substitutes
11. Cosmetics
12. Aerosol propellants
13. Plastic products
14. Textiles

Despite the Eco-mark scheme being in existence for some time, the scheme is yet to take off.

Procedure for Obtaining BIS Eco-mark

1. The procedure for grant of licence by BIS under the scheme of Eco-mark is the same as applicable for grant of licence by BIS for its Product Certification Mark Scheme.
2. Under the scheme of Eco-mark, the Standard Mark of the Bureau shall be a single mark being a combination of ISI mark and Eco-mark.
3. The licence is granted initially for one year and is renewable.

During the licence period, officer of Bureau makes inspections and if he finds any deviation or non compliance, action as provided under the BIS Act is taken.

Environmental Protection Industry in India*

As per OECD estimates, the world market for environmental goods and services in 1990 was of the order of 200 billion US $ and is expecred ro touch 300 billion US $ by the year 2000. While the data indicate that the Indian environmental market is relatively very small, yet it is a very positive and definite indicator of potential growth. This is evident from the spurt in the number of environmental companies and their average growth rate. The number of environmental companies has grown from one hundred to approximately seven hundred in the last 4 to 5 years. This includes both equipment manufacturers and service providers. The current annual turnover of the environmental protection industry is estimated at about US $ 700 million.

Table 8.1 : Status of Global Environmental Goods and Services Market

(US $ billion)

Market		1990		2000	
		Total	Non-OECD	Total	Non-OECD
Estimate-I		200	36	300	55
Global	Estimate-II	270	37	408	61
	Estimate-III	300	100	600	200

Source: I : OECD.
II : Environmental Business International Inc.
III : International Finance Corporation.

*Environmental Protection Equipment Industry**

Indian pollution control industry is well diversified and has made a tremendous stride in the conventional and advanced technologies either on its own or through tie-ups with foreign manufactures. The most common products are systems for treating water and controlling air pollution. Though the range of pollution control equipment produced by Indian manufacturers is growing rapidly, it requires infusion of latest technologies which are more effective both in costs and efficiency to meet the increasingly stricter emission, effluent and disposal standards. It must be stressed here that conventional pollution control industry offering 'post facto' solutions is also undergoing a structural transformation. The spectrum of technologies and equipment from this sector is fast expanding to include conservation, resource recovery and waste utilization technologies. In fact many companies are diversifying in the areas of cleaner production technologies, specially in those sectors, where they have been actively offering pollution control solutions.

During the year 1993-94, the Indian pollution control equipment producers in the organised sector have reported an average growth of 20 percent in terms of sales turnover, and 40 percent in terms of profitability. A list of the growth registered by some of the leading pollution control equipment manufacturers during last financial year is given in Table 8.2.

Table 8.2 : Pollution Control Equipment : Growth of Selected Companies

Companies	1992-93 (Million US $)	1993-94 (Million US $)	Growth %
Flakt India Limited	26.0	35.3	37.7
Ion Exchange	24.0	28.0	16.6
TTG Industries	4.9	7.0	42.8
Western Bio Systems	1.5	3.7	146.6
Western Paques	9.5	14.6	53.6
Triveni Engineering	3.5	4.3	22.8
Hindustan Dorr-Oliver	2.4	3.0	25.0
Thermax	10.3	12.6	22.3

Despite this encouraging growth, Indian equipment manufacturers face a number of obstacles that include:

(i) Shortages of raw materials such as membranes, activated carbon, resins and other critical components;

(ii) Limited servicing capability, especially for more sophisticated equipments;

(iii) Limited access to available technology and potential foreign partners;

(iv) High cost of capital for diversification/new projects;

(v) Limited R&D for technology innovation and adaptation.

Environmental Protection Services

Environmental consultancy services are at present small, but are expected, to grow more quickly than the market for equipment as a result of increased domestic and global environmental imperatives such as Environmental Management System Certification. A growing number of Indian firms offer environmental services to industry. However, a large number of these firms also offer consultancy services in other areas of industrial operations. Turnkey consultancy services are more popular in Indian firms. The Indian environmental firms can be grouped into three main categories:

(i) Engineering consultancy services for the specification design, installation and commissioning of treatment systems;

(ii) Environmental studies such as Environmental Audits/Waste Minimization, Environmental Impact Assessments, Safety Reports, Development of Environmental Standards and Policy Research.

(iii) Environmental Monitoring and Laboratory Services for Regulatory Compliance and Treatability Studies.

Of these three segments, the firms offering engineering consultancy services are relatively well developed while the quality of the services provided by the firms in the environmental/safety, audit, environmental impact assessment studies varies widely. Only a few large consultancy firms are offering services in the latter category. There is an appreciable growth of small firms in last few years with one-to-five employees offering services in this specialised service sub-sector. At present, the market for pollution prevention services is limited mostly to large and medium manufacturing enterprises.

The services being provided by most private Indian monitoring and analytical laboratories are considered of variable quality; while this may satisfy some companies seeking regulatory approval, it leaves a substantial market for high quality laboratory services, especially, in areas of cluster of industries.

8.14 Green Funds

Establishment of Green Funds is a step that indicates socially and environmentally responsible behaviour of the companies. Before the concept of Green Funds was developed, the funding agencies were mostly concerned with investments that were matter of ethical concern, like manufacturing of armaments. During the last one decade or so, many funds adopted a selection criterion that is based on whether the investments were made in companies which demonstrate good environmental performance. The fund managers, in many developed countries include environmental issues in their functioning. The impact of Green Funds has been limited so far. However, there are few who believe that investors should look beyond financial bottom lines while making investment decisions. In U.K., the investment principle in pension funds takes into account the environmental consideration. This also gives the trustees more freedom in fund management. Of course, the fund managers need to have a thorough knowledge

of the companies in which funds are being invested, which means details of environmental impacts of the company in question. Also the funds can ask and encourage the companies to adopt environmental management system and audit for ISO 14001 and such other measures.

It would not be an understatement to say that Green Funds are going to have substantial influence in improvement of corporate environmental strategies.

8.15 Summary and Conclusions

Already in many industries organizational structure, manufacturing and marketing are changing to meet environmental challenges and they have recognized that caring for the environment is good business. Resource conservation, energy efficiency, waste reduction, better technologies and pollution prevention can increase profits both for the countries of South and North.

The South must expand its industry to escape from poverty and achieve sustainability. Three quarters of the world is under-industrialized, and need to strengthen its industries. But this development must follow a different pattern from that which has affected the environment and imposed heavy social costs in many countries of North.

Responsibility for ensuring sustainable and 'green' industrialization lies with governments, environmental experts and industry itself. Technology is available to clean up the mistakes of the past, and achieve new industrial growth without disaster.

Business must make ethic as an integral part of their corporate goal, taking care that their practices, processes, and products conserve energy and resources and have a minimum impact on ecosystems. Industries that are based on natural resources, like minerals, timber, fibre, and foodstuffs, etc. have a special responsibility for:

- adopting practices that have built-in environmental consideration.
- introducing processes that minimize the use of natural resources and energy, reduce waste, and prevent pollution;
- making products that are "environment-friendly", with minimum impact on people and ecosystem.

As societies commit themselves to sustainability, practices that are now limited to a few organizations will become universal. The inclusion of environmental impact assessment in the planning of company's policy, the regular conduct of environmental audits of company's activities and polluter should pay for the damage to environment are likely to be among these. The "Polluter Pays Principle" leads to:

- continuing development of processes which produce less wastes.
- more rigorous screening of the new products which are added each year in the market.

Attention should be on manufacturing as well as on the activities of the service industries, the financial sector, and the tourist industry – all have important relationships with the environment and natural resources.

In order to understand the intricate relationship between environmental and economic development it is important to send a message to conventional economic system that there should be a systematic 'Valuation' of environment. Thus to treat environmental goods and services having no value is an obsolete concept.

Also the business and economy must realize that there is an ecological basis of economic activities. The economic activities should be carried out with focus on social as well as natural (ecological) phenomena.

Corporate Merger and Acquisitions

Merger means two companies combine in a manner in which one company's identity survives. When two companies within the same industry combine, it is called horizontal merger.

When two companies participate at different stages of production or value chain, it is called vertical merger.

Acquisition means when one company takes controlling interest of another company or selected assets of another company.

It is estimated that the value of merges and acquisitions all over the world was over 3.5 trillion US Dollars in 2000 as against 2.5 trillion in 1998. Corpotare mergers are taking place within a country and across the national boundaries; the latter bring in foreign direct investment (FDI). The concept of mergers is to increase the shareholder's value. Whether this happens or not is difficult to answer. Mergers are being done in sectors like telecommunication, automobiles, and pharmaceuticals. These three sectors are the major players in global mergers. Besides above, other sectors are oil and gas, metals and chemicals. In India, after the liberalization of economic policies, the process of mergers and acquisitions started both in private and public sectors undertakings. Many public sectors undertakings have been on sale and have been acquired by private companies. At global level, besides the above mentioned sectors, the merger of media and communication companies even though some may be small – has a great impact on media market.

Initially mergers were largely financed through so called borrowed funds but today besides cash transactions, the mergers involve stocks swaps.

Environmental Concerns

The companies that are involved in mergers have to a ascertain whether they are free from environmental liabilities. The environmental laws require that companies must make disclosures of such things as existence of hazardous materials and to what extent these are released into the environment. Likewise it has to be known whether Water Act, Air Act and other provisions of EPA are being followed or not. These reportings

are essential, because the merged companies will have to prepare contingency plans to meet the requirement of law.

Review Questions

1. How is business linked with industry and how is it responding to environmental imperatives?
2. What is sustainable business? Why is it necessary to promote sustainable business?
3. What is the relationship between manufacturing and environmental protection?
4. Is it possible to develop trade off between environmental protection and shareholder value protection?
5. Write an account of environment protection industry in India.
6. What is eco-labelling?

UNIT

9

Waste Management

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- 9.1 Introduction
- 9.2 Types of Wastes
- 9.3 Integrated System for Waste Management
- 9.4 Management of Hazardous Wastes
- 9.5 Various Programmes
- 9.6 The Basel Convention
- 9.8 The Garbage Trade
- 9.9 Waste and Race in USA
- 9.10 Saga of Khian Sea
- 9.11 Commentary on Basel Convention
- 9.12 Lome and Bamako Conventions - A Regional Effort
- 9.13 Hazardous Wastes - Summary and Conclusions

9.1 INTRODUCTION

It is estimated that urban municipal solid waste generation in India will increase from 490 grams per person per day in 1997 to 945 grams per day in 2047. (For city-wise solid waste generation see Table 9.1). The per capita consumption of packaging paper is likely to increase from about 2.7 kg per year at present to 13.5 kg per year after 50 years. This means 60 times increase in the generation of packaging paper most of which of course, is recyclable. If such huge volumes are to be recovered and recycled, we need to plan strategies and implement them soon. Plastic consumption is likely to increase from 2.1 kg per capita per year in 1997 to about 17.2 kg per capita per year in 50 years.

As per estimates if present methods of waste disposal continue, the area under landfill sites would be seven-fold increase from today. However, if our municipal corporations restructure their waste management system to separate organic matter and compost it, extract recyclables and recycle them, and dump the remaining, not only will wealth be generated from waste, but the requirement for land will be more than halved.

Table 9.1: City-wise Quantity of Solid waste Generation

City	Estimated Quantity of Solid waste (Tonnes/day)
Mumbai	5,000
Delhi	4,600
Madras	3,500
Calcutta	3,500
Hyderabad and Secunderabad	2,800
Bangalore	2,700
Ahmedabad	1,600
Pune	1,527
Kanpur	1,314
Nagpur	1,100
Lucknow	1,043
Jaipur	1,021
Surat	1,000
Baroda	900
Indore	800
Patna	714
Madurai	711
Coimbatore	710
Kochi	680
Varanasi	661
Ludhiana	656
Vishakhapatanam	630
Allahabad	609
Meerut	547
Vijaywada	545
Jamshedpur	542
Bareilly	520
Trivandrum	515
Dhanbad	511
Bhopal	500

9.2 Types of Wastes

Solid wastes arise from:

(i) Domestic source – garbage.

(ii) Agricultural source – agricultural residues.

(iii) Construction sites – debris and unused material.

(iv) Power stations – fly ash.

(v) Industry – Both hazardous and non-hazardous wastes arise from industrial sources. Hazardous wastes are those wastes which are toxic and pose threat to human as well as to environment. Examples of these wastes are pesticides, asbestos, polish, paints, stain removers, fluorescent lights, certain types of oils, solvents etc.

Non hazardous industrial wastes are substances like metal and glass pieces, plastic, rubber and sludge from waste treatment plants.

(vi) Radio-active wastes from nuclear installations. So far as the Radio-active wastes are concerned, there are international conventions relating to their disposal. Legally no country can dump these in sea. These have to be disposed of or rendered harmless through established procedures.

(vii) Minning and quarrying.

(viii)Sewage sludge.

Excepting certain industrialized countries, in other countries the waste garbage or rubbish is handled by government agencies/municipal corporations. These are carried out of the town to the landfills through trucks. They are dumped or buried and no body cares what happens to these wastes. Mostly these wastes are burnt, though this practice is now discouraged in big cities. Dumping wastes whether hazardous or non hazardous in this manner results in:

(i) health risk to human.

(ii) environmental damage in the form of damage to soil, water and air because of leaching by which chemical and other harmful materials percolate into soil and ground water. Also as these wastes decompose, there is foul smell as well as production of methane gas.

9.3 Integrated System for Waste Management

Agenda 21 addressed the problem of waste management stating that sound management of wastes is among the major environmental issues for maintaining the quality of Earth's environment and achieving sustainable development. Accordingly, waste management is to be done through following systems.

(i) Minimum production of waste.

(ii) Maximizing reuse of waste and recycling.

(iii) Promoting environmentally sound waste disposal practices.

(iv) Extending waste services.

Minimum Production of Wastes

1. Consumption patterns and waste production are linked. If consumption is more (and unsustainable) production will increase resulting in increased waste production. A change in life style and attitude can help in lessening consumption.
2. Besides consumption patterns, the waste production can be minimized by adopting suitable technology in production process.
3. A waste minimization policy should be formulated which is possible if there is mechanism to quantify the waste production and to establish national goals by collecting data.
4. The Governments and UN should promote waste minimization by facilitating exchange of data and know-how. This is possible by:
   (i) Identifying and adopting clean technologies.
   (ii) Undertaking research on economic impacts of waste minimization at customers level.
   (iii) Reviewing waste minimization instruments and identifying new instruments for use at country level.
   (iv) Encouraging industry to change product design and reduce industrial process wastes i.e. waste minimization at source.
   (v) Producing products which have longer life, thus cutting down total production.
   (vi) Facilitating transfer of waste-reduction technologies to developing countries.
   (vii) Human resource development for waste minimization should be targeted at managers of waste management sector.

Maximizing Waste Reuse and Recycling

Reuse of wastes has become very important not only in view of the fact that wastes pose a threat to environment but also due to the fact that waste disposal has become very expansive. Time now has come to formulate a national programme for waste reuse and recycling. According to UN all the governments should have definite programmes to reuse the wastes by 2000 by industrialized countries and by 2010 by all the developing countries. These programmes should:

(i) Develop and strengthen national capacity to reuse the wastes in increasing proportions.

(ii) Provide incentives for waste reuse and recycling.

(iii) Change the existing norms to avoid discrimination against recycled material.

(iv) Develop public education and awareness programmes to promote the use of recycled products.

(v) Industry and other institutions of research should identify socially acceptable and cost effective forms of waste reuse relevant to each country.

(vi) Local waste management organizations and municipal bodies should review all the available options and techniques making waste reuse an integral part of strategy for healthy living.

(vii) Funds should be made available to encourage waste reuse for producing compost, for irrigation and for energy recovery by small scale industry.

(viii) Identify potential markets for recycled products.

(ix) Promote transfer of technology for waste reuse, as well as exchange of materials by industries to use waste as raw material.

(x) Make economic and regulatory instruments in such a way so as to support the principal that those who generate wastes pay for its disposal.

(xi) Promote the separate collection of recyclable parts of wastes. More than a decade ago, Newsweek published report abour Japan's system of managing wastes, also giving details of recycling. It says that Japan recognizes recyclable materials as resources. Japanese recycle almost 40% of solid wastes that include paper, cans and glass material. Many people separate recyclables into various categories, as many as 32 and carry these to collection centres. The hazardous material, if any are removed first and the rest categorized as reusable. The non recyclables are deposited in landfills and certain categories are incinerated. Every Japanese community has its own incinerator or an access to an incinerator. In USA different states have varying laws on separation of wastes. The separated wastes are picked up by municipal trucks or private organizations in a compartmentalized manner and sold to junk dealers, compost plants or manufactures of recyclables. Certainly this kind of simple technology has low operating costs. We are aware that in our own country, Kabaris whose number may run in thousands do good business in buying paper, cans, tyres and other recyclable wastes. And of course, we have ragpickers who pick up salable wastes and thrive on this practice for making both ends meet. In recycling, the manufacturers of products do realize that the process consumes less energy and water compared to manufacturing with raw material. For example, to produce steel, if the manufacturers use scrap iron instead of iron ore they would require 65% less energy and 40% less water and will produce less pollution. Like steel, recycling of paper is an important practice since it prevents clearing of forests and degradation of ecosystem.

A nationwide data base is required to let the people know who is using recyclables for manufacturing process so that waste materials can be sent there.

What Is Reusing

The reuse of product means using same product over and over in its original form. Glass bottles or Cola bottles instead of cans are used again and again. Why not use glass material for beverages instead of cans or cardboard cartons. Similarly it is good practice to carry lunch in steel boxes instead of containers of plastic material which is not biodegradable and reusable.

To encourage the use of recyclables, a system of refund/deposit be introduced.

Human Resource Development efforts should be intensified to train the people in various organisations to reorient current waste management practices to include waste reuse and recycling.

Promoting Environmentally Sound Waste Disposal

Despite the fact that waste production is minimized and wastes are reused and recyled, some wastes still remain. Even after treatment, wastes still remains and have impact on environment. Treatment of municipal wastes like garbage and fecal material should be given priority. Efforts should be:

(i) To establish waste treatment and disposal quality criteria and standards based on assimilative capacity of the receiving environment.

(ii) To establish mechanism for monitoring waste-related pollution.

(iii) To ensure that 50% of all wastes are treated or disposed in conformity with national/ international standards by all the developing countries by 2005 and 100% by 2025 as stated in Agenda 21. Both the developed and the developing countries have a longway to go in this regard. In developed countries the focus is on improving facilities to meet higher environmental quality criteria for waste disposal while developing countries need investment to build new treatment facilities for this purpose.

Various options for waste disposal are :

(i) Recycling and reuse.

(ii) Landfills.

(iii) Composting.

(iv) Incineration.

Recycling and Reuse: have been disused above.

Landfills: As mentioned above, earlier almost all the wastes were dumped at so called landfills and burnt releasing smoke and foul smell. These landfills are source of soil and water pollution. This dumping of waste is not environment friendly.

The sanitary landfills scientifically serve as large sites for decomposing biodegradable materials. They should be managed in such a way that garbage and other wastes should be spread out evenly and covered with soil on daily basis. Ideally landfills should be constructed in such a way that they are covered with plastic sheets all around or semipermeable soil/clay/sand/gravel to prevent ground water pollution from leaching. Landfills have following drawbacks:

(i) They are unpopular among the residents because of truck movements, foul odour, worms and flies and vultures and other scavenging animals.

(ii) Gases like methane which result from decomposition of wastes are released into air causing pollution.

(iii) As rainwater starts flowing into landfills, the decomposing waste get mixed with it (this is called leachate) and if there is no mechanism of draining off the leachate, it becomes a source of pollution for water table in neighbourhood.

Composiling

Municipal solid wastes, garbage from kitchens, food processing industry and degradable wastes from slaughterhouse can be composted in composting plants and sold as fertilizer. Household garbage can be composted at backyard to serve as useful nutrient marerial for vegetation.

Incineration: Incineration is another method of disposal especially of garbage. It is disposal of waste through burning. Ir can reduce both the volume and the weight of the wastes. It can render toxic wastes into less toxic substances. The case of Japan using incinerators is mentioned above. Switzerland is another country which incinerates most of its solid wastes at the same making use of heat generated for producing energy. Impacts of incineration include release of fumes and harmful substances unless it is carried out at very high temperatures and equipped with pollution control devices. People usually don't like incinerators near their homes unless they meet high standards of performance and maintenance.

As a result of incineration about 25% of waste residue is left as an ash and it is usually disposed off by depositing it in landfills. If the landfills are not sanitary landfills made in accordance with standard procedures, the residues of incinerators would cause soil and water pollution.

Extending Wastes Services

Ir is estimated that by year 2000, more than two billion people will be without access to basic sanitation and half of the urban population in developing countries would be without adequate solid waste disposal services. It is known that five million people, mostly children die each year from wasre related diseases. Environmental impacts of waste management go beyond affecting urban or semiurban settlements and result in water and land pollution and contamination over a wider area.

It was resolved at Earth Summit that by the year 2025 all the urban populations should be provided with adequate waste management services. The governments with the cooperation of UN and other organisations should :

(i) Establish financial mechanisms for waste management services in deprived areas.

(ii) Apply "polluter pays" principle by setting waste management charges for those who generate the wastes.

9.4 Management of Hazardous Wastes

Till 1970's disposal of hazardous wastes did not attract much attention. Not much concern was shown then about the hazardous wastes leaking from dumping grounds into the adjoining areas causing land and water pollution. Since last decade increasing concern has been shown in regard to Hazardous Waste Management including its:

(i) Control of generation

(ii) Storage

(iii) Transport

(iv) Reuse

(v) Recycling

(vi) Disposal

Hazardous Waste Management requires not only national but international efforts and cooperation because transboundry shipment of these waste has now come under scrutiny and is covered under Basel Convention. The UN General Assembly in a resolution dated Dec. 22, 1984 requested regional commissions to prevent the illegal traffic of hazardous wastes.

The resolution also requested the commissions to coordinate with UNEP in this regard. The overall objective of hazardous waste management is to direct efforts towards minimizing generation of hazardous wastes and its disposal in such a way so as to protect both the human health and environment. The Transboundry Shipment of hazardous waste carried out between the countries must conform to regulatory requirements as stipulated:

(a) Under "Basel Convention on Transboundry Movements of Hazardous Wastes and their Disposal.

(b) Under ratification by the concerned countries of Bamako Convention on Ban on Import into Africa and the control of Transboundry Movement of Hazardous Wastes within Africa.

(c) Under other regional conventions.

9.5 VARIOUS PROGRAMMES

How to Promote Prevention and Minimization of Hazardous Wastes

Environment is increasingly affected adversely with the increase in the production of Hazardous Wastes. Adopting prevention strategy for Hazardous Wastes implies increasing costs to the society. It has therefore become important to acquite all the information and knowledge on the economics of prevention and management of Hazardous Wastes.

One of the first priorities is minimization programme as a part of approach to changing industrial processes and consumer patterns through cleanet production strategies and the most important step in this direction is the recovery of useful materials from hazardous wastes. The countries that can afford to adopt suitable technologies for minimization of waste must proceed in this direction keeping in view Regulatory requirements for recycling/reuse.

The second priority is conversion to less hazardous/non-hazardous materials. There are various methods of doing this:

(i) These wastes like municipal wastes can be dumped on the land so that they get degraded over a period of time.

(ii) Incineration or burning of these wastes is another method; though this is an expansive method and as mentioned above still leaves the question of disposal of residues.

(iii) Another method is to detoxify these wastes in treatment plants but this again is expansive.

(iv) Biological techniques are now possible to deal with the hazardous wastes. These involve use of bacteria to convert the toxic into nontoxic materials. It is not very expansive but it is slow process.

(v) Another method of dealing with hazardous wastes is storage. If recycling/reuse and conversion are not possible, these wastes may be stored in specially constructed underground places or landfills. These storage places have to be monitored to check up for leakage, only then these are safe for storage.

Promoting Institutional Capacities in Managing Hazardous Wastes

It has been mentioned in the document on Agenda 21 that most of the countries do not have enough resources and capacity to handle these wastes. These countries do not have strict vigilance and implementation procedures regarding storage and handling of the hazardous substances, what to say of wastes. The recent case of numerous deaths due to explosion of hazardous chemicals in Delhi is a pointer in this direction. (See the box)

Case study of Delhi Godowns Storing Hazardous Materials – Potential Infernos

The Hindustan Times, New Delhi dated June 1, 1999 reports that death toll in yesterday's fire in Lal Kuan, old Delhi rose to 39 today. The figure is likely to rise because many victims in hospital have more than 70% burns. A case has been registered against the owner of New Aligarh Transport Co., godown where fire originated. He was arrested by the police. The preliminary investigations by the Crime Branch revealed that the New Aligarh Transport Co., used to collect goods from different companies for transporting these to outstanding. The goods were hazardous inflammable materials. According to the report, several illegal godowns storing and transporting hazardous materials are mushrooming in the lanes of Old Delhi. According to Deputy Commissioner of Central District, no survey has been done to find out such godowns. A high level meeting was called by Lt. Governor to find out way of shifting chemical godowns from the city. The meeting was attended by the Chief Minister and other officials. It was decided that storage of non-pharmaceutical and inflammable chemicals be shifted from the residential areas. It was also decided that a detailed census of dealers dealing with hazardous chemicals will be carried out.

This case is an ample proof of either ignorance of regulatory requirements or violation of Hazardous Wastes (Management and Handling) Rules 1989/Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended upto 1994.

The lack of capacity is due to inadequate facilities, deficiencies in regulatory requirements and their implementation, insufficient education and training and lack of knowledge about pollution, health risk and effect on ecosystem. Not only knowledge and awareness is required is this regard but also an institutional based research and development and a data base including networking are urgently required.

What should Government and other Agencies do?

The governments should maintain inventories of hazardous wastes including their recycling, transformation, disposal sites and storage places and identify and notify the risks to environment and human health. The Industry and other Agencies should give publicity and make all informations available to public especially the neighborhood. The governments as well as industry should carry out environmental and health impact assessment of the concerned areas in so far as hazardous wastes are concerned. In developing countries, a group of industries should have combined facilities for waste management. (Some steps are being taken towards this direction in India)

Promoting International Cooperation In Transboundary Shipment of Hazardous Wastes

Mention has been made about the Basel Convention on Hazardous Wastes. This is discussed below. Besides International instruments like Basel Convention, efforts should be made to have regional cooperation and conventions like Bamako Convention.

Case of India

There is growing recognition in India that the environmental performance of waste and recycling Industry needs to be improved. There are four recycling units of lead and twenty that recycle zinc – all in organized sector. But there are 500 or more smaller units recycling these metals without adequate facilities and safeguards.

Not only the recycling of metal and chemicals pose a threat to environment but there is a pathetic state of waste disposal, both hazardous and non hazardous types. A PIL was filed on Solid Waste Management for Class I cities in India by INTACH in Delhi. Mr. Patel, the representative of INTACH sought the courts direction to the government for urgently improving sanitation in all the cities of India. An expert committee was appointed under the direction of Supreme Court. The committee has submitted its report to the Supreme Court recently. [Hindustan Times, dated May 10, 1999]. The committee has recommended that the Centre Government set up a high level national technology mission on Solid Waste Management to monitor and guide municipal agencies and State Governments in maintaining sanitary conditions. Other recommendations of the committee are:

(i) partial privatization of civil waste disposal services.

(ii) induction of modern technology for waste management.

(iii) changing the laws to make waste management more effective.

(iv) special provision to safeguard the waste management's supervisory staff against the abuse of 1989 Scheduled Caste and Scheduled Tribes (Prevention of Atrocities) Act by the Safai Karmcharis (Safai Karmcharis are workers engaged in cleanliness jobs and for maintaining sanitary conditions). The supervisory staff should be kept out of the provisions of this Act so that they can "fearlessly and effectively oversee the work of employees".

(v) The Centre and State Governments should share funds with municipal bodies to make them financially sound. It cited the case of municipalities of Ahmedabad and Bangalore that have floated bonds for this purpose.

(vi) All the biodegradable wastes be composted for use as fertilizer.

(vii) Tax and other incentives should be given for setting up of composting plants.

9.6 The Basel Convention

The Background

In the late 1980s, when concern was building up about global warming, ozone depletion and other environmental issues, the world was shocked with news about a lethal underworld trade in the export of hazardous wastes from developed to developing countries. The cases reported were horrifying : 15,000 tonnes of toxic flyash from the US dumped in Guinea and Sierra Leone; a proposal to export hazardous waste from West Germany to Liberia; 4,000 tonnes of Italian waste dumped in Koko, Nigeria; 120 drums of mercury laced sludge from New Jersey dumped in South Africa.

The worst affected continent was Africa. The Greenpeace, which has done the most commendable work to monitor toxic wastes trade and alert governments of the danger observed that "if European industrial powers could have an opportunity to build a pipeline across the Mediterranean Sea towards Africa for the discharge of their hazardous effluents, they would have most probably done so". Instead, an invisible pipeline, sweetened with much needed foreign cash, was built to Africa through a barrage of unsavoury schemes.

The African governments reacted with anger to this growing threat of "garbage imperialism", in the words of President Daniel Arap Moi of Kenya. Nigeria which found over 3,000 tonnes of Italian wastes, including radioactive material, on the port of Koko, when workers unloading the shipment started vomiting blood, entered into a bitter diplomatic row with Italy. The Nigerian government impounded the ships, arrested the involved businessmen, and threatened to execute all those found guilty in the toxic wastes deal. The Italians took the waste home only to encounter angry crowds who tried to keep the waste from being unloaded.

The Convention*

Export of Hazardous wastes from the countries of North to those in South was a shocking revelation. The worst affected was African Continent. Therefore UN had to intervene for devising a Treaty to set global rules for the control of Trade on Hazardous Wastes - The Basel Convention. This convention requires environmentally sound disposal of hazardous wastes.

Many developing countries sought ways ro control the trade in waste through regional co-operation. Countries of Africa, Caribbean and Pacific collecrively joined with European Community to prohibit the waste trade between their countries.

The Organisation of African Unity (OAU), an intergovernmental political organisation of all African countries, except South Africa and Morocco, declared that dumping of hazardous wastes was a crime against Africa and adopted a resolution to refrain from entering into waste agreements. Thus in a separate move, the 16 member states of the Economic Community of West Africa (ECOWAS) agreed to make trade in toxic wastes a criminal offense by enacting national legislation against dumping of foreign wastes. It said, "we cannot accept that at a rime when industrialized nations refuse to buy our commodities at reasonable prices, these same countries are selling us death for ourselves and our children."

UNEP began work on a treaty to set global rules for the control of the trade of hazardous wastes on the basis of a request from the Heads of African governments. The treaty, called the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, also called the Basel Convention, was signed in March 1989 by 33 countries. But the very African countries which pushed for the treaty were so disappointed with the final outcome that they refused to sign.

---

* Source for Basel Convention and related material is "Towards Green World", by Anil Agarwal and Sunita Narain, Central for Science and Environment.

Disillusioned with global solidarity, African nations came together in 1991 to formulate a treaty which closes the continent to all hazardous wastes. The Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, also known as the Bamako Convention, is a direct outcome of the failure of the Basel Convention. Officials explaining the new treaty claim, "after Basel, Africans realized that we would have to take the responsibility for protecting our own continent as it was clear that many industrialized nations were unwilling to help us do so.

Table 9.2: Waste Trade 1990

The following list indicates waste exporting countries and the developing countries targeted for waste trade. The list has been prepared by Greenpeace.

Exporting country/territory	Countries of intended import
Belgium	Mauritinia, Sierra Leone
Canada	Gabon
Czechoslovakia	Lebanon
Denmark	Turkey
France	Benin, Senegal
Gibraltar, U.K.	Benin, South Africa
Italy	Djibouti, Dominican Rep., Ethiopia, Lebanon, Nigeria, Syria, Tunisia, Turkey, Venezuela
Luxembourg	Congo
Norway	Guinea, Haiti, Nigeria, Panama
Portugal	Guinea-Bissau
Soviet Union	Benin, Nigeria
Switzerland	Angola, Benin, Djibouti, Dominican Rep., Mexico, Nambia, Senegal, South Africa, Venezuela
The Netherlands	Congo, Niger, Nigeria
UK	Benin, Congo, Equatorial Guinea, Liberia, Morocco, Nigeria, Sierra Leone, South Africa
US	American Samoa, Argentina, Australia, Bahamas, Bangladesh, Bermuda, Brazil, Chile, China, Colombia, Congo, Costa Rica, Dominican Rep., El Salvador, Equatorial Guinea, Guatemala, Guinea, Guyana, Haiti, Honduras, Hong Kong, India, Indonesia, Jamaica, Marshall Islands, Mexico, Morocco, Namibia, Nicaragua, Nigeria, Pakistan, Panama, Papua, New Guinea, Paraguay, Peru, Philippines, Senegal, Sierra Leone, Solomon Islands, South Africa, South Korea, Sudan, Taiwan, Tonga, Uruguay, Western Samoa, Zimbabwe
West Germany	China, Hong Kong, Mauritania, Morocco, Tunisia, Turkey

9.8 The Garbage Trade

Before finding out why industrialized nations let the developing countries down in the subject of toxic wastes trade, one may look at the nature of the trade itself. The size of this trade is at best a guess. The only figures available have been put forward by Greenpeace, which has, through its extensive worldwide network, uncovered the extent of the trade. If the incidents which have come to light are any indication, the trade is enormous. According to Greenpeace, between 1986 and 1988, more than three million tonnes of wastes were shipped from industrialised to developing countries but this "should be interpreted as a minimum total - the tip of the iceberg. In addition, various governments rejected proposals to ship 17.5 million tonnes during this period. Waste traders have attempted to ship more than 160 million tonnes of waste between 1986 and 1990. But, again, Greenpeace cautions that these figures are an underestimate, as the trade remains officially unmonitored.

The trade has boomed primarily to cut the costs of disposal by evading stringent and expensive environmental regulations in developed countries. As richer nations have become alarmed by the hazards of toxic wastes, they have passed stricter rules about what can and cannot be done with garbage. The cost of burying a tonne of hazardous waste in the US rose from US$ 1 in 1980 to US$ 250 by 1989. Incineration costs soared to US $ 1,500 per tonne. In Europe, disposal costs have quadrupled in the past ten years. Industries are increasingly getting caught between a pincer environmental attack - stricter government rules and widespread environmental concern which calls for expensive incineration; but incineration capacity has remained limited because of public reluctance to permit new plants. Developing countries have, therefore, become the most convenient dustbins.

At the same time, the amount of waste generated in industrialized countries is increasing dramatically. According to one estimate, the US produces roughly 275 million tonnes of hazardous wastes, each year, almost one tonne per American citizen. This does not include the municipal or other wastes, which are not defined as hazardous under US law, but have been the subject of international controversy.

The share of developing countries in the global toxic wastes trade is smaller than that of the trade between developed countries themselves. Canada has the distinction of being the biggest toxic waste dumpsite for the US. The problem, however, is that developing countries have fewer controls and are more at risk from improper dumping. Also, these countries face an added compulsion, the need for money, because of which waste brokers can ship tonnes of poison in connivance with corrupt local officials or private businessmen.

Another Dimension

At international level of dumping wastes on the Third World is one aspect. The other is that the industrialised nations of the North have shown themselves just as willing to inflict the hazards of wastes onto their own people; or at least certain sections of them. See section 9.8 below.

9.9 Waste and Race in USA

In a survey carried out in USA in 1987 of commercial hazardous waste facilities and uncontrolled toxic waste sites, the Commission for Racial Justice of the United Church of Christ found a disturbing correlation between the siting of these dumps and the ethnic and racial mix of the locality. For example, in communities with two or more such dumping facilities or with one of the five largest landfills, the average minority percentage was more than three times that of communities that had no such facilities (38 per cent verses 12 percent). Three out of five blacks and hispanics (around 23 million people) were found to be living in communities with uncontrolled toxic waste sites.

"The possibility that these patterns resulted by chance is virtually impossible", the Commission concludes, calculating the odds at less than one in 10,000 and implicating government and industry in what it dubs "an insidious form of racism".

Europe's Fastest Growing Dumping Ground

As the emergent democracies of central and eastern Europe race to open themselves upto western investment, goods and services, their need for hard currency has never been more acute. One way of bringing in the dollars and deutschemarks is to allow themselves to become a dumping ground for the sludges, ashes and residues that their new trading partners do not want on their own doorsteps.

In the former East Germany, state secrecy laws that had been used to conceal information about the import of hazardous wastes have been abolished. Since the political reforms of 1989, environmentalists in what was West Germany have succeeded in banning the export of industrial garbage from west to east. But wastes of all other sorts are still pouring from the west of the country into the Schoenberg landfill site - covering 20 square kilometers, the largest in Europe containing some one million tonnes of municipal wastes and over 3.5 million tonnes of building rubbish. With dumping fees at between US $ 50 and US $80 per tonne, the temptation of hard currency revenues has proved too strong to resist. The "facilities" are primitive - garbage is simply dumped onto a field and has contaminated the groundwater in a big way.

Similarly, Poland's rush to open its borders to Western trade could have highly toxic consequences. At least 46,000 tonnes of sewage sludge, electronic scrap, incinerator ash and other hazardous wastes have been secretly shipped to Poland in the past two years, according to Greenpeace, which makes Poland as Europe's fastest-growing dumping ground.

Since 1989, at least 72 foreign firms, and brokers from 13 countries were involved in 64 waste trade schemes, half of which originated in West Germany. In the year from then to the publication of Greenpeace's report in 1990, 7,000 tonnes of incineration residues were imported by the Polish cement industry from west Berlin.

Although the Polish government has barred the import of hazardous wastes since 1989, Greenpeace researchers say the ban has been extremely difficult for the authorities to

implement and enforce. They suffer from a scarcity of resources to monitor shipments and a lack of experience among customs officials.

As part of the wooing of Poland by the West, complete plants for the incineration of waste and 'recycling" have been offered free of charge, but on terms that the plants will accept waste imports and that the residues from the processing will stay in Poland.

The opening up of Soviet Union is also directing the attention of the international "waste mafia" toward the country believing that vast territories could accommodate hundreds of millions of tonnes of hazardous waste.

For many years already, the Soviet Union has accepted spent nuclear fuel from Eastern Europe and Finland. In early 1990, Leningrad TV reported that more than 100 barrels from West Germany, labelled as containing a non-toxic chemical, were in fact filled with low-level radioactive materials. The final destination of this cargo was Tomsk, a Siberian town, where a nuclear processing plant is located. The Soviet people, however, know nothing about the amount of radioactive materials delivered to the USSR.

In 1989, two American companies, Admiralty Pacific and Micronesian Marine Development, offered the tiny Pacific state of the Marshall Islands a proposal to import over 34 billion pounds of municipal waste from the US, paying them over $139 million. The first bait was to use this waste to protect the nation from rising sea levels due to global warming. When this failed, the companies repackaged the scheme as a fisheries development project proposing to use waste car tires to build artificial reefs, which would attract fish. Over 250 million tyres are discarded each year in the US leading to serious disposal problems. Enormous fires rage for weeks at many tyre dumps, spreading toxic fumes over miles. Greenpeace investigated the Pacific project and found that the company had a long record of bribe. But much worse, it discovered that plans included illegal toxic and nuclear waste exports. Household garbage, too, contained a high level of toxic compounds which could easily leach into the subsoil and severely damage the fragile environment of the Marshall Islands.

9.10 Saga of Khian Sea

The journey of the Khian Sea, a ship carrying 14000 tonnes of toxic incinerator ash from Philadelphia, USA has now become historic in the annals of waste dumping. The ship's journey began in 1986. It wandered around the world for years in a bid to dump the ash on some unsuspecting nation. During its epic voyage, the 'Philadelphia ash flotilla', as it came to be called, visited five continents, finally unloading its toxic cargo somewhere in the Indian Ocean region.

The ship first docked in Haiti where the national department of commerce had issued it an import permit for fertilizer import. The 'deal' which disguised toxic municipal ash containing high levels of mercury, cadmium, lead, arsenic and toxins like dioxins, was arranged by a Haitian company headed by associates of former dictator "Baby Doc" Duvalier. It was only when the ash was being removed from the ship that the authorities discovered its true nature and ordered it to be removed. But the ship departed in the

middle of the night leaving behind some 4000 tonnes of ash on the beaches, where it still remains.

The Khian Sea then sailed to Philadelphia but was forbidden to offload the ash. It started on its journey, crossing the Atlantic to dock in Yugoslavia in July 1988. There it changed its name to Felicia, to shake off the environmental watch and, unsuccessful in its bid to dump the ash, it moved on to Senegal, then Bangladesh, Sri Lanka, Indonesia and the Philippines. Greenpeace reports that the ship appeared off the Singapore coast with a new name and a empty hold in November 1988 and suspects that the ash was dumped in the Indian Ocean, perhaps in the Bay of Bengal or some sparsely populated island in the Indian Ocean. The crew of the ship claims that the wastes were not dumped at sea, but rather in the territory of a country they would not name.

9.11 Commentary on Basel Convention

The Basel convention was no doubt, the culmination of international efforts to regulate trade of hazardous waste. A UNEP working group of legal and technical experts which met in May 1984 had prepared an initial document which required countries exporting harmful chemicals to notify authorities in the importing country and to assist them with timely information. Under the London Guidelines for the Exchange of Information on Chemicals in International Trade, formulated by UNEP, countries were again required to provide information about their toxic exports. The Basel convention made the guidelines and other procedures legally binding on the signatory countries.

The convention does not call for an outright ban of the trade. It seeks to regulate the trade by insisting that companies wishing to export wastes have to notify the government of the country importing the waste or located en route. Only when the importing country gives the company its "prior informed consent", can the government of the exporter, rubber stamp the deal. In the event that the shipment is found to be illegal, the exporter is required to reimport the waste within 30 days. However, the convention also provides that if this reimportation is found impracticable, it could be avoided and the waste disposed off in an "environmentally sound manner".

The convention provides for bilateral agreements outside its terms, but only if the agreements stipulate provisions that are not less environmentally sound than those included in the convention. However, the convention fails to clarify what is "environmentally sound".

The main criticism of the Basel convention has come from African countries and Greenpeace. According to Greenpeace, throughout the final week of negotiations in Basel, developing countries pointed out to numerous flaws and loopholes in the draft. But these were ignored or expanded because of the insistence of industrialised countries. The convention, in fact, merely borrowed and slightly revised existing laws on waste trade in North America and the European Community. "It became clear that the industrialized countries would not sign the Basel convention unless it was a weak, loophole ridden vehicle through which they could justify and expand their involvemenr

in the international waste trade. These nations ultimately succeeded in limiting the scope of the convention to a simple waste trade notification system. The convention was tailored to the demands of the industrialized countries", reports Greenpeace.

The existing convention has several drawbacks. Firstly, by providing a legal framework within which to trade waste, it legitimizes what should be considered an undesirable activity. "The Basel convention's greatest danger is that it creates the illusion that the international waste trade is now under control", says Greenpeace.

According to the "New Scientist", existing controls only ask for prior consent and they are so weak that many countries will feel under pressure to earn foreign currency by allowing their territory to become a dumping ground for other nations' garbage. During the negotiations for the convention, the minister of natural resources from Guinea Bissau explained why his country was reluctant to postpone a deal which would have brought 15 million tonnes of waste and US $600 million to his cash hungry country. "We need the money", he said. "Prior informed consent cannot be a just contract in a world of such disproportional economic and political plans" says Greenpeace.

Greenpeace reports that wastemongers were "openly chuckling as the convention was signed. The prominent Italian businessman who had masterminded a shipment from Italy to Djibouti, declared that the convention does almost nothing to prevent him from engaging in waste trade, as getting the signature of one government official from developing countries was a minor hurdle in his garbage business.

The industrialized countries argued that a total ban was impractical as the facilities for disposal of waste were often highly specialized, needing a global market for survival. Mostafa Tolba, executive director of UNEP at that time expressed his opposition to a "total ban" during the negotiation on the convention. He said, "sometimes it is more environmentally sound to move hazardous waste from one country to another where there are more environmentally sound disposal facilities.

But this does not explain why developed countries objected to banning trade to other countries, not equipped with environmental waste disposal facilities. Greenpeace points our that "the US objected to a clause in the convention which would have banned waste shipments to countries which have less environmentally sound waste disposal standards than the country of export, and the clause – perhaps the most important part of the convention – was deleted." Commenting on this, New Scientist wrote, "the strategy makes it clear that the US, Britain and other want to keep open the option to export their garbage. Furthermore, the convention can be entirely circumvented by bilateral or multilateral treaties or agreements with countries not party to the convention, weakening it even more.

But it must be said to the credit of the convention that it recognizes the right of any nation or group of nations to ban the import to hazardous waste into their country. It further stipulates that once this decision has been made, and the secretariat of the convention informed accordingly, no country can thereafter allow the export of hazardous waste to that nation.

A major problem with the convention is that it does not specify what is hazardous. It merely lists some 40 odd classes of materials – that need to he controlled. It also lists hazardous characteristics of waste like flammability, corrosion, poison and toxic etc. Here the controversy starts. For instance, a load of wastes containing five parts per million of mercury could be called hazardous in some countries, but not in others. It has also been pointed out by Greenpeace that, as the treaty now teads, radioactive wastes are excluded from the scope of the convention.

Another major loophole in Basel Convention relates to wastes intended for "recycling". The treaty permits the export of hazardous wastes in conditions where the "wastes in question are required as a raw material for recycling or recovery industry in the country of import". This has left the treaty open to abuse. In the waste business, such dispensations could easily lead to sham recycling, where waste is exported ostensibly for reuse. This was the precise case of the Philadelphia ash which was exported to Guinea. It was to be reused in building bricks, only it turned out to be toxic garhage. According to Greenpeace, this leaves waste traders to disguise highly dangerous substances as "fertilizer, road building material etc." For instance, as several Caribbean countries suffer from shortages of roads and electricity, traders have tried to build toxic waste incinerators which would presumably produce electricity, along with toxic air emissions and ash. The toxic ash would be used to build roads. In early 1980s, an American was arrested for exporting hazardous wastes for Mexico to a 'mercury recovery plant' where it was simply dumped and burned.

A fundamental issue raised strongly by experts is that, without an absolute global ban, there is no compulsion for industrialized countries to minimize wastes or to implement clean production technologies. The ultimate solution to waste disposal is the prevention of waste generation. But investments in such technologies or reduction in consumption will only be possible when such measures become cheaper.

9.12 Lome and Bamako Conventions – A Regional Effort

Many developing countries now have sought ways to bring the trade in hazardous wastes under control through regional cooperation. In late 1989, just nine months after the Basel convention, 66 less industrialized countries from Africa, the Caribbean and the Pacific, collectively known as the ACP countries, joined with the European Community (EC) to totally prohibit the international trade in waste among their countries. The agreement, under the Lome Convention, bans all radioactive and hazardous waste shipments from the EC countries to ACP countries. In addition, ACP countries have agreed to ban imports of wastes from any other country. The agreement has been approved by the European Parliament. Earlier the joint declaration of the EC and ACP countries had stated that the draft Basel convention "in its present form was unacceptable as its primary aim was to legalize and facilitate the international trade in waste" – an interesting comment from one of the main actors – Europe, responsible for the final formulation of the convention.

In the early 1990s, Greenpeace reported that one other such regional effort was seriously jeopardized. The US successfully blocked efforts to ban waste trade, through an international convention, in the Caribbean region. The battlefield was a meeting of the Cartagean Convention, a treaty to protect the environment of the Caribbean region. The Carbbean and Central American countries supported a special protocol to prevent the import of hazardous and nuclear waste into the region. But the US delegation was able to get the decision reversed.

In 1991, the Africans took the initiative to end the ditty trade in their backyards. Under Bamako Convention which totally bans the import of hazardous wastes, including radioactive wastes, to the African subcontinent. The convention, in contrast to the Basel convention, requires hazardous waste generation audits and imposes strict, unlimited liability on hazardous waste generators. The convention, which Greenpeace has called probably the most progressive hazardous waste legislation in the world is the direct consequence of the failure of the Basel convention to address issues of immediate environmental concern to African nations and their people.

Obviously, safeguarding the global environment calls for much bolder action than the Basel convention and its negotiators were willing to take. Even the commercial interests of waste traders are dearer to governments of industrialised nations than the poor people of the world, their health and their environment.

9.13 Hazardous Wastes – Summary and Conclusions

The United Nations Environmental Programme (UNEP) brought the regulation of hazardous waste trade on the world agenda in response to demand from various sections of society. The international negotiations for regulations of dumping the hazardous waste in developing countries resulted in the 1989 Basel Convention. It was in 1994 when the signatories agreed to total ban on the shipping of hazardous waste from the European Community to developing stares. The Basel convention to which India and 115 other countries are signatories establishes a framework through which action can be taken to prevent export of hazardous wastes to countries having no facility for managing the wastes. In 1995, an amendment was made to the rules of Basel Convention putting 'ban' on shipping hazardous waste from OECD (Developed Countries) to other countries. The ban awaits ratification by three fourths of signatories. The merits of 'ban' were considered in 1995 and 1998. At both the occasions there was sharp debate. It was argued that non OECD countries need import of wastes from OECD countries to achieve the economies of scale necessary to build cost effective hazardous wastes recycling operations. The 1998 meeting concluded with general endorsement of ban. Pending ratification, the export of wastes from OECD countries to other countries continues.

Earlier in 1980, the international media published several stories regarding dumping of hazardous waste by private companies of the industrialized states in developing countries

particularly Africa through illegal agreements. Unable to keep waste in their country, or unwilling to incur the high cost of waste management, waste traders exported the hazardous waste to developing countries some of whom were tempted to earn foreign exchange in this way. The exporters and the developed nations opposed all talks of banning these exports. At the most they were prepared to an arrangement through which they would seek the "informed consent" of the host country before exporting the waste. The problem was eventually defined in the manner the developed countries wanted in view of their superior bargaining proposition. The US gave the waste importing states an ultimatum at Basel conference that if they did not accept the "informed consent regime" they had to be content with the status-quo. The industrialized states succeeded in finding an agreement that would manage transboundary shipment of hazardous waste without imposing strict controls. The Basel Convention, therefore, simply requires that the exporting states seek the consent of the importing state, and any transit state, before transboundary movement of waste may take place. The Convention requires "environmentally sound" disposal of the waste, although the terms have not been defined. The Convention applies to both disposal and recycling operations. The Convention does not discourage waste generation, nor does it provide measures for waste prevention.

Review Questions

1. What are the sources of solid wastes?
2. Describe integrated system of solid waste management.
3. How would you carry out the disposal of Hazardous Wastes?
4. Write an account of Basel Convention.
5. Give an account of saga of Khian Sea.
6. What are Bamako and Lome Conventions?

A Small Price to Pay

Industries in the former GDR worked with absolutely no concept of environmental consciousness. After reunification, 80 per cent of the production units were shut down and renovated in keeping with environmental safety standards. With the government determined to make Bitterfield, Germany a showpiece of what can be done to clean up a basketcase of pollution, it was observed that even the toxic soil in the area was physically removed, treated and replaced. The contaminated groundwater was sucked up and cleaned before releasing it into the ground again. All this, of course, came at a prohibitive price, but the government decided it was worth it in terms of ecological and human well-being. According to Dr. Rolf Danke, a senior official in chemipark which is now reselling cleaned up parcels of land to industry, physical illnesses in the area have declined.

In fact, most German firms today have become so environment conscious that they bring out annual environment reports explaining all the measures they have adopted in ensuring that their products are

Contd...

clean. One of the main ones is Siemens, the world's second largest software manufacturer after IBM. All its employees are required to act in an environmentally conscious manner as are its contractual partners. The easiest conservation technology is, of course, based on consuming less. Therefore, new projects are begun with built-in conservation measures.

Right from the early part of this decade, German industry has consciously sought to reduce energy consumption. Between 1990 and 1996, there was 35 per cent drop in industrial water use. Modern automation and technologies enabled new and integrated production processes resulting in significant energy savings. The information revolution has brought about a new category of pollution – that from electronic scrap. The life of a personal computer has declined from 10 years to as little as 4.3 years since 1970. Europe's leading PC suppliers have been forced to adopt an ecological approach from start to finish in the manufacture of such products. This begins with an environmentally compatible production process to a product take-back and recycling scheme.

Customer Outlook

In another initiative, many companies have sought to eliminate the use of hardware altogether, opting instead for the virtual screen which can be projected onto any surface and activated by a simple hand gesture. With the advent of high technology, firms have begun to confront the problem of recycling electronic scrap. Western companies claim that they have now started manufacturing their electronic products using parts which are easily recyclable. This, they claim, is not the case with firms in the Third World which tend to cut corners to maximize profit.

An area of particular concern to countries like India is that of environmentally compatible mobility. This is one area where the Germans have made great strides. They have realized that integrated strategies are the only way out of the mobility dilemma facing us today and that for public transport to be an alternative to private transport, it must be genuinely attractive. While Indian cities are still trying to bring emission levels under control, in countries like German automobile technology has become so advanced and accurate that nitrogen oxide emissions in diesel cars has been reduced by as much as 70 per cent.

An argument against environment friendly products is that they tend to be more expensive. In fact, Indian industry has often resorted to this. But in the more advanced countries, the buyer or user of goods and services are beginning to look beyond the initial price. When it comes to household appliances, for example, the customer are prepared to pay more for products that are clean and economical to run.

Environmental education begins at the trainee level in major western firms. Unlike in India, where an industry sets up shop whether local residents like it or not, the trend in the industrialised countries now is to have their environmentally sensitized managers hold meetings with non-specialist audiences in order that everyone is involved and that there are no concerns on environmental issues that are unanswered.

---

* ***Source:*** Lalita Panicker (Times of India, June 17, 1999).

UNIT

10

Air - Noise - Soil Pollution

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- 10.1 Introduction
- 10.2 International Efforts
- 10.3 India's Efforts in Controlling Air Pollution
- 10.4 Factories Act, 1948
- 10.5 Industrial (Development and Regulation) Act, 1951
- 10.6 Mines and Mineral (Regulation and Development) Act, 1957
- 10.7 Water and Air Pollution Boards
- 10.8 Air (Prevention and Control of Pollution) Act, 1981
- 10.9 Functions of the Central Board
- 10.10 Functions of the State Board
- 10.11 Air Pollution Control Areas
- 10.12 Penalties
- 10.13 Courts Assistance for Restraining a Person Causing Pollution
- 10.14 Motor Vehicles Act
- 10.15 Noise Pollution
- 10.15
- Soil and its Pollution
- Management of Land

10.1 INTRODUCTION

According to Environment Protection Act (1986), Environment includes water, air, land and their inter-relationship with human beings, other living creatures, plants and micro-organisms. Air pollution is the state of environment in which the outer ambient atmosphere contains gases and other materials in concentration which are harmful to man and environment.

The atmosphere is being polluted by the discharge of emissions originating from industrial plants, domestic sources, mobile vehicles and thermal power plants. Both in the developed and developing countries, the urban areas in particular, are exposed to such levels of atmospheric pollution that cause serious hazard to public health and hygiene. Presence of sulphur oxides, nitrogen oxides, carbon monoxide, hydrocarbons and toxic particulate substances in atmosphere have caused harmful influence on man and other living beings.

The Air (Prevention and Control of Pollution) Act, 1981, defines "Air Pollutant" and in reference to them defines air pollution. "Air Pollutant" means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Air pollution means, the presence in the atmosphere of any air pollutant. In this connection definition of "Emission" is also relevant. "Emission" means any solid, liquid or gaseous substance coming out of any chimney, duct or any other outlet. There are 'standards' and legislation that exist for emissions. The company manager must be familiar with these. They should also ensure that emissions stay within legal limits.

10.2 International Efforts

Air pollution is a problem at local or national level but sometime it may emanate in one country and may engulf the neighbouring countries.

It seems that earliest effort at air pollution control was made by the 1957-58 WHO Conference. It is known as "Clean Air Conference". Later a symposium was held on Epidemiology of Air Pollution at the regional office of WHO for Europe in 1966. The 1972 Stockholm Conference was the first major effort to discuss control of pollution including air pollution.

In 1974 some of the major industrial countries of the world (19 European countries, Australia, Canada and Japan) convened a meeting for the control of air pollution. In this meeting two basic principles were evolved:

(i) Polluter must pay for pollution, and

(ii) Concept of transfrontier control of air pollution.

The principle that 'polluter must pay for pollution' laid down that the Industry where pollution originates must pay for its control. The second concept says that no single state should be taken into account as a unit of protection against air pollution but the aim should be the welfare and preservation of the health of not only of people of one state but of people throughout the world. And protection should be of total environment for the good of mankind and other living beings and plants.

10.3 India's Effort in Controlling Air Pollution

In India especially the big cities are having the problem of air pollution on account of concentration of industries and power plants. Also the automobiles are proving to be the greatest challenge for abatement of air pollution.

In pursuant to the Stockholm Conference, India passed the Air (Control and Prevention of Pollution) Act 1981. Earlier also air-pollution measures were enacted through:

1. The Factories Act, 1948.
2. The Industries (Development and Regulation) Act, 1951.
3. Mines and Minerals (Regulation and Development) Act, 1957.

In some state Municipal Statutes also have provision for prevention of air-pollution.

Our Industry

Despite these Acts, the problem of Air Pollution in India (Urban and Industrial Estates) continue to remain serious. Industry is second largest source of air pollution after the transport sector. The Industries which are categorized as Air Polluting are listed in Table 10.1.

Table 10.1 : Air polluting industrial sectors in India

High Potential	Low Potential
Aluminum Smelter	Pesticide
Asbestos	Pharmaceuticals
Battery manufacturing	Glass manufacturing
Cement plants	Boilers for steam generation
Copper smelters	Sugar, textile processing
Carbon Black	Fermentation industries
Calcium Carbide	Dyes and Dye Intermediates
Coke Oven units	Tanneries
Fertilizer industries	Small Furnaces in recycling
Integrated iron & Steel Plants	Rubber reclamation
Mining	Lead,
Oil refineries	Chromium, Nickel recycling
Petrochemicals	Plastic recycling
Pulp and Paper	Secondary metallurgical, recycling units
Refractories	Stone Crushing units
Sulphuric Acid Plants	
Thermal Power Plants	
Zinc Smelters	
Foundries	
Ferro Alloys	

10.4 FACTORIES ACT, 1948

Industries are the main cause for causing pollution. The Factories Act, 1948 as amended by the Act of 1987 contains provisions for preventing pollution. Section 48 of the Act runs:

1. In every factory in which, by reasons of the manufacturing process, there is given off any dust or fume or, other impurity of such a nature and to such an extent as is likely to be injurious or offensive for the workers employed therein, or any dust in substantial quantities, effective measures shall be taken to prevent its inhalation and accumulation in any work-room, and if any exhaust/appliance is necessary for this purpose, it shall be fixed as near as possible to the point of origin of the dust, fume or other impurity, and such point shall be enclosed so far as possible.

2. In any factory no stationary internal combustion engine shall be operated unless the exhaust is conducted into the open air, and no other internal combustion engine shall be operated in any room unless effective measures have been taken to prevent such accumulation of fumes therefrom as are likely to be injurious to workers employed in the room.

In those factories where humidity of the air is artificially increased, the State Government may make rules : (a) prescribing standards of humidification; (b) regulating the methods used for artificially increasing the humidity of the air; (c) directing prescribed test for determining the humidity of the air to be correctly carried out and recorded; and (d) prescribing methods to be adopted for securing adequate ventilation and cooling of the air in the work rooms.

Section 37 is meant to regulate air pollution by dust, gas or fume. It lays down:

Where in any factory any manufacturing process produces dust, gas, fume or vapour of such character and to such extent as to be likely to explode an ignition, all practicable measures shall be taken to prevent any such exposition by:

(a) effective closure of the plant or machinery used in the process;

(b) removal or prevention of the accumulation of such dust, gas, fume or vapour; and

(c) exclusion or effective enclosure of all possible sources of ignition.

Further, no plant, tank or vessel which contains explosive or inflammable substance shall be subjected in any factory to any welding, brazing, soldering or cutting operation which involves the application of heat unless adequate measures have first been taken to remove such substance and any fumes arising therefrom or to render such substance and fumes non-explosive or non-inflammable, and such substance shall be allowed to enter such plant, tank or vessel after any such operation until the metal has cooled sufficiently to prevent any risk of igniting the substance.

The Factories (Amendment) Act, 1987 relates to "hazardous processes". A hazardous process means any process or activity in relation to an industry specified in the First

Schedule where, unless special care is taken, raw materials used therein or the intermediate or finished products, bye-products, wastes or effluents thereof would:

(i) cause material impairment to the health of the persons engaged in or connected therewith, or

(ii) result in the pollution of the general environment.

In First Schedule are listed seventeen industries involving hazardous process. These include metallurgical industries, chemical industries, foundries, coal, paper and pulp, fertilizer, cement, petroleum, drugs, and pharmaceutical industries, rubber, paints, leather tanning and electroplating. The State Government has power to add any other industry in this list.

The Act lays down detailed provision for taking all safety measures by occupier and manufactures of these articles and substances. Section 36 lays down precautions to be taken against dangerous fumes, gases, vapour or dust coming out of the processes. It is laid down that:

1. No person shall be required or allowed to enter any chamber, tank, vat, pit, pipe, flue or other confined space in any factory in which any gas, fume, vapour or dust is likely to be present to such an extent as to involve risk to persons being overcome thereby, unless it is provided with a manhole of adequate size or other effective means of egress.

2. No person can undertake any prospecting or mining operations in any area, except under and in accordance with the terms and conditions of a prospecting licence or a mining lease granted to him under the Act and the rules made thereunder. The conditions for obtaining a prospecting licence or a mining lease are specified in Section 5. The applicant is entitled for the grant of certificate of approval as a matter of right, the only condition being that he should be a citizen of India and should deposit the prescribed fee. The Act does not provide for refusing or canceling the certificate of approval. Prospecting licenses and mining leases are void and of no effect if granted, renewed or acquired in contravention of the provisions of the Act or any rules or orders made thereunder. Penalty provided is imprisonment as well as fine. Further, no court, can take cognizance of any offence punishable under this Act except upon complaint in writing made by a person authorized in this behalf by the Central or the State Government.

The provisions are made for the regulations of industries and mines. The Act is silent to the problem of environmental pollution, but under the Rules, power of the Government are utilized to restore the abandoned mines and to prevent pollution.

As is evident, the above statutes can help in the control and containment of air pollution only indirectly. A government conscious of its ohligations to control and prevent air pollution may use them.

10.5 Industrial (Development Regulation) and Act, 1951

The Industrial (Development and Regulation) Act 1951 makes provisions for the development and regulation of certain industries through licensing. Although we are now closing the era of industrial licensing, we are yet retaining the power to permit opening up some industries, particularly, hazardous and polluting industries, only by a licence. The most important provision is the one which places burden of proof on the person who violates the condition of the licence. Section 28 lays down:

"Where any person prosecuted for contravening any order made under Section 18 G which prohibits him from doing an act without a permit ..... the burden of proving that he has such authority, permit ..... shall be on him".

10.6 Mines and Mineral (Regulation and Development) Act, 1957

The Mines and Mineral (Regulation and Development) Act 1957 of the natural resources of the earth which, among other things, include the preservation of the quality of air and control of air pollution.

10.7 Water and Air Pollution Boards

With a view to preventing and controlling air pollution, the Act contemplates for the establishment of Central and State Water Pollution Boards. Since the Water (Prevention and Control of Pollution) Act, a statute passed earlier stipulated to establish similar Board, now these Boards have been amalgamated and are called Water and Air Pollution Boards.

The Water and Air Pollution Boards are given the status of body corporate having perpetual success on and a common seal with power to acquire and dispose of property, to enter into contracts in its name, and to sue and be sued in the court of law in its name.

10.8 Air (Prevention and Control of Pollution) Act, 1981

The Preamble of the Act specifically states that it has been enacted to take appropriate steps for the prevention, control and abatement of air pollution.

No person shall enter any confined space as is referred to in sub-section (1), until all practicable measures have been taken to remove any gas, fume, vapour or dust, which may be present so as to bring its level within the permissible limits and to prevent

(a) a certificate in writing has been given by a competent person, based on a test carried out by himself that the space is reasonably free from dangerous gas, fume, vapour or dust; or

(b) such person is wearing suitable breathing apparatus and a belt securely attached to a rope, the free end of which is held by a person outside the confined space.

A new Chapter IV-A specifically deals with hazardous chemicals.

10.9 Functions of the Central Board

Apart from overviewing the improvement in the quality of air and to prevent, control and abate air pollution, the Central Board has the following functions:

(a) advise the Central Government on any matter concerning the improvement of the quality of air and the prevention, control or abatement of air pollution;

(b) plan and cause to be executed a nation-wide programme for the prevention, control or abatement of air pollution;

(c) co-ordinate the activities of the State Boards and resolve disputes among them;

(d) provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problems of air pollution and prevention, control or abatement of air pollution;

(e) perform such of the functions, of any State Board as may be specified in an order under sub-section (2) of Section 18;

(f) plan and organize the training of persons engaged or to be engaged in programmes for the prevention, control or abatement of air pollution on such terms and conditions as the Central Board may specify;

(g) organize through mass media a comprehensive programme regarding the prevention, control or abatement of air pollution;

(h) collect, compile and publish technical and statistical data relating to air pollution and the measures devised for its effective prevention, control or abatement and prepare manuals, codes or guides relating to prevention control or abatement of air pollution;

(i) lay down standards for the quality of air;

(j) collect and disseminate information in respect of matters relating to air pollution.

The Central Board has power to set up laboratories or recognize existing ones with a view to get examined air pollutants.

10.10 Functions of the State Board

The fact is that it is the State Boards which have to look after an improvement in the air quality and to prevent and control air pollution. The State Boards have been assigned the following functions:

(a) to plan a comprehensive programme for retention, control or abatement of air pollution and to secure the execution thereof;

(b) to advise the State Government on any matter concerning the prevention, control or abatement of air pollution;

(c) to collect and disseminate information relating to air pollution;

(d) to collaborate with the Central Board in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of air pollution and to organise mass-education programme relating thereto;

(e) to inspect, any control equipment, industrial plant or manufacturing process and to give, by order, such directions to such persons as may consider necessary to take steps for the prevention, control or abatement of air pollution;

(f) to inspect air pollution control areas at such intervals as it may think necessary, assessee the quality of air therein and take steps for the prevention, control or abatement of air pollution in such areas;

(g) to lay down, in consultation with the Central Board and having regard to the standards for the quality of air laid down by the Central Board, standards for emission of air pollutants into the atmosphere from industrial plants and automobiles or for the discharge of any air pollutant into the atmosphere from any other source whatsoever, not being a ship or an aircraft;

Provided that different standards for emission may be laid down under this clause for different industrial plants having regard to the quality and composition of emission of air pollutants into the atmosphere from such industrial plants;

(h) to advise the State Government with respect to the suitability of any premises or location for carrying on any industry which is likely to cause air pollution.

The State Boards will also perform such other functions as may prescribed or entrusted to it by the Central Board or the State Government. It may also do other things and perform such other functions as it may think necessary for the proper discharge of its function and also for the purpose of carrying into effect the purposes of the Act.

10.11 Air Pollution Control Areas

Establishment of Air Pollution Control areas is one of the important steps in the prevention of air pollution. Such area or areas can be established by the State Government after consulting its State Board by a notification in the Official Gazette. The Union Territory of Pondicherry and the Union Territory of Chandigarh declared such areas with effect from 25-1-1988 and 2-2-1988 respectively. The advantage of establishing air pollution control areas is that:

(a) Use of any fuel except the approved one cannot be used in the area, and use of any other fuel can be stopped;

(b) Use of any appliance other than the approved one can be prohibited;

(c) Burning of any material (not being fuel) which causes or likely to cause pollution may be prohibited;

(d) Standards for emission of air pollutant from automobiles in a particular area can he laid down;

(e) No industrial plant can be installed without prior permission of the State Board. (This will not apply to plants operating before coming into being of the pollution control area). However, such a plant may be installed with the consent of the State Board on such conditions and restrictions as may be prescribed where consent for operating such a plant is given, compliance with the following conditions is necessary;

(i) control equipment of such specifications as the State Board may approve in this behalf shall be installed and operated in the premises where the industry is carried on or proposed to be carried on;

(ii) the existing control equipment, if any, shall be altered or replaced in accordance with the directions of the State Board;

(iii) the control equipment referred to in clause (i) or clause (ii) shall be kept at all times in good running condition;

(iv) chimney, wherever necessary, of such specifications as the State Board may approve in this behalf shall he created or recreated in such premises;

(v) such other conditions as the State Board may specify in this behalf; and

(vi) the conditions referred to in clauses (i), (ii) and (iv) shall be complied with within such period as the State Board may specify in this behalf.

(f) no person operating any industrial plant will be allowed to discharge the emission of any pollutant in excess of the prescribed standard.

The Board has been given various powers to discharge its functions. Among its functions are the following:

(a) whenever in any area, the emission of any air pollutant into the atmosphere is in access of the standard or apprehended to be in access due to some accident or any other cause, the person in charge of the premises should immediately inform the Board;

(b) the Board can empower any person to enter any premises for the purpose of inspecting such premises;

(c) the Board has power to obtain information about the type of pollutants emitted into the atmosphere and the level of emission of such pollutant;

(d) the Board has power to take samples of air pollutants discharged from any establishment;

(e) with a view to control and prevent air pollution, the Board has power to issue instructions, directions, to any person or officer or authority.

Monitoring of Human Exposure to Air Pollution

In this study, human exposure to air pollution has been assessed in a highly industrialised area in the city of Mumbai (Table-10.2). The target group was people of low socio-economic level who reside and work in the study area as they are subjected to the worst exposure due to air pollution. The major objectives were to investigate the relation between ambient air quality and personal exposure measurements as well as to identify the factors which affect exposure concentrations.

This can provide important inputs for estimation of health risk of population. The major recommendations of the study are given below:

- The most important result of this study is that personal exposure levels to air pollution are much higher than the ambient air quality values monitored at some fixed stations.
- The importance of ambient air monitoring cannot be undermined but it should be realized that this cannot solely be taken for estimation of health risk. In fact, the ambient air quality values measured should be correct and modified to represent actual exposure concentration before comparing with the standards prescribed to protect human health.
- The results of this study ptovide important information to policy makers, regulatory authorities, general public and industrialists. More studies on exposure assessment need to be undertaken for other cities. Further in order to get a realistic picture of health risk due to pollution a broader range of pollution subgroups like school children, youth, women drivers, commuters need to examined.
- Exposure assessment can be used a estimate the relative importance of air pollution sources with respect to their impact on human health. Emission sources can he weighted by their exposure effectiveness and thus lead to new strategies in control and management. Thus improvement in ventilation of houses, usage of enhanced household fuel quality, better design of traffic booths are urgently needed measures, these strategies could have immense benefits in terms of exposure reduction and human health, although ambient levels may not be much affected.
- Public awareness and education programs need to be otganised on air pollution exposure, indoor air pollution sources, health effects of exposure and measures for reducing exposure. An air pollution exposure index can be developed for various population subgroups depending on their time activity patterns, which can give an indication of their health risk due to air pollution. People should be educated on various ways of reducing exposure like improvement in ventilation, proper maintenance of stoves, usage of better fuel etc.

There are several gaps in knowledge and understanding in the field of exposure assessment. Research work in needed on exposure monitoring instrumentation, indoor, outdoor relation models, estimation of exposure effectiveness of sources and epidemiological studies to relate health effects to air pollution exposure.

10.12 PENALTIES

Under the original Act the punishment was mild but after the amendment of 1987, these have been enhanced. For the violation, whosoever establishes any industrial plant in the pollution control area without the permission of the Board or where plants are emitting pollutants excess of the standard or whosoever fails to comply with the directions of the Board will be awarded a punishment for a term of imprisonment which will not be less than one year and six months and which may extend to six years as well as fine. (The amount of fine has not been prescribed). In case the offence continues, an additional punishment of fine which may be upto Rs. 5,000 every day of defiance or failure to comply. If the failure or defiance continues for more than one year then punishment will not be less than two year's imprisonment and which may extend to seven years as well as fine.

Penalty for the following offences may extend to three month's imprisonment or a fine which may be Rs. 10,000 or both for a person who:

(a) destroys, pulls down, removes or defaces any pillar, post or stake fixed in the ground or any notice or other matter put up, inscribed or placed, by or under the authority of the Board, or

(h) obstructs any person acting under the orders or directions of the Board from exercising his powers and performing his functions under this Act, or

(c) damages any works or property belonging to the Board, or

(d) fails to furnish to the Board or any officer or other employee of the Board any information required by the Board or such officer or other employee for the purpose of this Act, or

(e) fails to intimate the occurrence of the emission of air pollutants into the atmosphere in excess of the standards laid down by the State Board or the apprehension of such occurrence, to the State Board and other prescribed authorities or agencies as require under sub-section (1) of Section 23, or

(f) fails in giving any information which he is required to give under this Act, or makes a statement which is false, or

(g) for the purpose of obtaining any consent under Section 21, makes a statement which is false in any material particular.

For committing any offence, both the companies and Government Department are punishable. In the former case every person who, at the time the offence was committed, was directly in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and in the latter case, the Head of the concerned Government Department. But if such a person proves that offence was committed without his knowledge or he exercised all due diligence to prevent the commission of the offence, be will not be punished.

10.13 Courts Assistance for Restraining a Person Causing Pollution

It is paradoxical that the Board cannot issue orders for preventing a person causing air pollution. It has to approach the court (metropolitan magistrate or judicial magistrate class I) for restraining the person from causing pollution. The magistrate may then issue any orders restraining such person from causing air pollution. The court may by order:

(a) direct such person to desist from taking such action as is likely to cause emission;

(b) authorize the Board, if the direction under clause (a) is not complied with by the present on whom such direction is issued, to implement the direction in such manner as may be specified by the Court.

10.14 Motor Vehicles Act

Under the Motor Vehicles Act and Rules framed thereunder stringent measures are stipulated to prevent air pollution. It is a fact that in practically all the cities and towns, motor vehicles are the main cause of air pollution. Poor condition of vehicles, use of petrol having lead and two stroke engines are causing too much air of pollution.

Emission standards for petrol driven vehicles (4 Vehicles) are given below (Table 10.2).

Table 10.2: Emission Standard for Petrol Driven Vehicles (4 Vehicles)

Pollutant	Without Catalytic Converter	With Catalytic Converter
CO (gm/km)	8.68 - 12.40	4.36 - 6.20
HC + NO (gm/km)	3.0 - 4.36	1.5 - 2.18
Total (CO + HC + NO)	11.68 - 16.76	5.84 - 8.38

CO = Carbon Monoxide, HC = Hydrocarbons, NO = Nitric Oxide

10.15 Noise Pollution

Noise is unwanted, unpleasant sound. We cannot live without sound, yet too much of sound is unwanted. The unit for measuring sound is decibel (dB). Sound of 20 dB is whisper; 60 dB is normal conversation, 100 dB is conversation in running train; 120 dB is thunder and 140 dB is the level when sound becomes unbearable and irritating. Noise inside many factories exceed 100 dB, aeroplane creates noise of 150 dB. This is what constitutes Noise Pollution. To determine whether a sound is a noise, attitude and annoyance threshold are determining factors. Degree of annoyance may not necessarily be related to the intensity of sound and personal attitude is an important influencing factor. A loud music may be liked or even considered melodious by a person whereas very feeble sound may be noise for another person. Noise pollution in such cases becomes subjective.

Noise pollution affects the health physiologically, psychologically and in behavior sense; with excessive noise, human beings become more irritable. It is estimated that noisy conditions result in lower efficiency and increased errors by the workers.

Sources of Noise

Major sources of noise are:

(i) Industry;

(ii) Road traffic;

(iii) Trains;

(iv) Aircraft;

(v) Construction work;

(vi) Loud speakers.

Control of Noise Pollution

Noise pollution can be controlled by:

(i) Devising noise control devices;

(ii) Creating noise free zones;

(iii) Legal means.

It is possible to install a machinery which is less noise producing. It is also possible to repair the machinery in time before it starts making noise. Use of silencers is another method. Noise free zones do exist outside hospitals, schools and few other places.

So far as legal means are concerned, it may be noted that though there are acts like Railway Act, Aircraft Act and Factories Act, there is no specific provision in these acts to prevent noise pollution.

The Motor Vehicle Act of 1988 contains some effective provisions for controlling noise emanating from the automobiles. There is a provision in the Act that horns fitted in the automobiles must be in accordance with the standard approved by Bureau of Standards, exceptions being horns fitted in ambulances, police and fire fighting vehicles. Further the provisions of the Act lay down that every vehicle should be fitted with silencers and should conform to noise standards.

Noise by loud speakers can be controlled under the provisions of Section 268 of Indian Penal Code as it is a type of nuisance. The cognizance of offence can be taken only on complaint made by aggrieved party. However, in Yoginder Lal vs. Municipal Corporation Simla AIR 1984 NOC 137, the Himachal Pradesh High Court observed that:

"When loud speakers are allowed to disturb the neighbourhood ..... it is the duty of police and the Depury Commissioner to take appropriate action. Under the Police Act of some states noise pollution can be controlled. In India we do not have uniform law

for prevention of pollution by noise unlike Water Act and Air Pollution Act. There are some provisions under Motor Vehicle Act as mentioned above but we lack efforts to implement these.

Management of Land

Management of Land and its Soil has been occupying the attention of mankind since times immemorial. Land resources provide food supply, large part of clothing and fuel. Though there are substitutes, being developed for fuel or fibre, our dependence on land resources would continue. Land, since prehistoric time, has been a source of conflicts and competition. There has been unequal distribution of land, as revealed by historical records. Famines have been there for long times and migration of people for better pastures and resources has been going on till today.

Today, we face shortage of land, because of growing populations. We need extra cultivation to save ourselves form famines and to support livestock. Land is needed for forestry, for conserving bio-diversity, besides its need for housing, transport, industry, parks and recreation purpose.

Land constitutes that part of Earth's surface that is not covered with water. Roughly, one tenth of surface of land is cropland and one fifth is rangeland, i.e., land that is unable to sustain crop production and is mostly arid or semiarid, but supports billions of livestock – sheep goats etc.; for grazing. Economies of many countries depend on their livestock. World's beef and mutton are produced largely on rangeland. World's wool industry, leather goods and people associated with these products depend upon rangeland.

All over the world, land whether rangeland or cropland is in the process of degradation. As a result the current livestock population which is increasing, year after year, may not be sustainable.

For India, it has been estimated that fodder requirement is 700 million tons, per year, whereas the sustainable supply may be 500 tons or so. The result of this is that in states like Rajasthan fodder supply would meet about 70 percent of need; 30 percent cattle would be unproductive. Land degradation, due to overgrazing is another factor for loss of livestock and if this process continues, it would lead to erosion.

The land resources are under pressure to produce more material and services for the people for good living standards. Estimates of future demands of food and livestock to meet the demand would vary with population growth and consumption level. There may be higher yields and production, but the environmental side effects of these activities are becoming apparent.

Soil and its Pollution

The immediate surface of the earth that serves, as a natural medium for the growth of plants constitutes soil. It is not found on mountain peaks and perpetual ice and snow. Soil may be deep or shallow. It can be sand, clay or loom and contains minerals, organic matter, air and water. The plant life on the soil protect it from wind and water erosion. Soil needs to be protected against loss of its capacity to support growth of

plants, i.e., fertility of the soil has to be conserved. This implies all land use and management methods must protect soil against degradation, especially by erosion and chemicals. If plant life is supported well, it will in turn support the animal life that depends on plants. The upper thin layer of topsoil is very important to support the growth and it should be protected. It is estimated that one third of world's cropland is losing topsoil at a rate that would threaten our food security.

Soil pollution arises from:

(i) Pollution of soil with chemicals

(ii) Discharge of sewage

(iii) Disposal of solid wastes

(iv) Spent material from mining activities

The pollution caused due to chemicals has serious consequences. The pollutants reach the ground water, which is consumed both by man and plants, thus gets into food chain. The pollutant chemicals arise mostly from fertilizers and pesticides. One can recall the story of DDT, which is now officially banned in many countries. DDT absorbed in soil contaminates plants/ crops and ultimately reaches the human system.

Management Issues

It is well known that fundamental principle of Land Management is sustainability, which should be possible with judicious production and conservation practices. Production has to increase, because there is still a great demand for food in developing countries. Poverty in these countries further puts great demand on land productivity. Land Management cannot ignore the principles underlying natural ecosystem and must adopt these principles. Land husbandry, small-scale irrigation and agro-forestry (combination of agriculture with forestry helping farmers to grow trees) should be practised. All these practices unfold relationship among soil, water and plants as a basis for sustainable development. Land husbandry is new approach to conservation. In this approach attention is given to ecological methods of conservation, especially maintenance of topsoil layer. Agro-forestry is another land husbandry practice and should be encouraged. Lastly, involvement of local people in Land Management is also a necessity, besides technical approach.

Review Questions

1. What is air pollution?
2. "Polluter must pay for pollution". In which conference this principle was enunciated? What does this principle imply?
3. Write a note on trans-frontier control of air pollution.
4. The Stockholm Conference has made landmark contribution in the direction of controlling air pollution. Discuss.
5. What measures would you suggest to control pollution created by the automobiles?

6. What is the objective of the Air (Prevention and Control of Pollution) Act, 1981? Has it proved effective?
7. State briefly the provisions of the Factories Act relating to the control of air pollution.
8. What are the main functions of the Central Board for the control of air pollution?
9. What are the major penalties prescribed for those who cause air pollution?

Supreme Court Guillotine on Diesel Demons

Times of India, New Delhi, dated May 4, 1999 published a report under the above heading. It says that Supreme Court of India has ordered that only those cars that meet Euro-I emission standards can be sold in Delhi, the capital of India. It further says that from April, 2000, the car manufacturers will have to adhere to Euro-II norms.

According to Anumita Chaudhary Coordinator of clean air compaign launched by the Centre for Science and Environment, Delhi's car demand grows annually by 10% which means we would have had to cope with 2400000 cars by 2009 which would not have been meeting emissions standards had the Supreme Court not intervened. The environmentalists and public in Delhi is happy over the decision of the apex Court. According to eminent environmentalist and advocate, Mr. M.C. Mehta on whose petition the Supreme Court gave the ruling, the investment that car manufacturers have to make for upgradation to meet Euro-I & II standards is minimal compared to what public is forced to pay for health care due to pollution. Mr. Mehta wanted to know if the car manufacturers would be able to sell in Europe the same cars they sell in Delhi at present. He says that it is because of absence of people's lobby to neutralize automobile lobby that there is little initiative to control vehicular pollution in Delhi and if the "Government of India is really concerned, they would have brought in these regulations on their own without the Supreme Court's direction".

According to Euro-I Standards:

1.	Carbon monoxide emissions should not exceed (For petrol and diesel vehicles)	= 3.16 g/km.
2.	Hydrocarbons and nitrogen oxides levels should be at	= 1.13 g/km.
3.	Particulate matter (SPM) should be at (For diesel vehicles)	= 0.18 g/km

According to Euro-II Standards:

1.	Carbon monoxide should not exceed:	
	for petrol vehicle	= 2.2 g/km.
	for diesel vehicles	= 1.09 g/km.
2.	Hydrocarbons	= 0.5 g/km.
3.	Particulate matter	= 0.08 - 0.01 g/km.

SPM = Suspended Particulate Matter

BLOCK – IV

UNIT

11

Water Resource and Water Pollution

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ☐ 11.1 Introduction
- ☐ 11.2 Water Pollution
- ☐ 11.3 Laws Relating to Prevention of Water Pollution
- ☐ 11.4 Water (Prevention and Control of Pollution) Act, 1974
- ☐ 11.5 The Water (Prevention and Control of Pollution) Cess Act, 1977
- ☐ 11.6 The River Boards Act, 1956

11.1 INTRODUCTION

One of the basic conditions of living is availability of water. Adequate supply of safe water is essential for maintaining health and sanitary conditions. Not only this, water as a natural resources has influence on almost every aspect of development. Agriculture production, for example can be increased by irrigated cultivation through water for greater economic prosperity. Likewise labour productivity can be increased if the labour force and their families have adequate safe water supply. Water management requires special efforts especially for water-short basins. Besides providing water to household both in villages and cities, adequate water supply is essential for nation's industries. In developing countries, in early phases of development water demand always increases. Some industries use more water than others. Development of water resources will continue to rise if we have to attain higher economic growth.

Environmental Concerns

Sustainable management of water resources has implications for environment and ecosystem. These are dams, silting of reservoirs, submergence of forests, extinction of rare plants and animals and outbreak of disease. A systematic study of impact of water resource projects on environment has to be undertaken at national level. The people who are likely to be affected by projects – like river valley projects, water shed projects or dams should be taken into confidence and even involved in project formulation and implementation.

The Environmental Impact Assessment (EIA) of water resources project like River Valley Projects is carried out by Impact Assessment Division (IAD) of MEF, Government of India. The committee of IAD in addition to the above takes into consideration the following safeguards so far as environmental issues are concerned:

(i) Prevention of soil erosion;

(ii) Compensatory afforestation;

(iii) Provision of drainage system in irrigated area;

(iv) Measures for prevention of disease;

(v) Alternatives in case of adverse effects on fauna and flora.

National Water Policy

National Water Resource council under the chairmanship of Prime Minister of India adopted a national Water Policy in 1987. The highlights of the national Water Policy are:

- Appropriate organisation should be set up in each state for planned development of river basins.
- All development projects should be formulated by the states and considered within the framework of an overall plan for a basin.
- Comphrensive plans should be set up in each state taking into considerarion not only the needs of irrigation but also other water uses keeping in view the existing Agreements and Tribunal Awards.
- Water should be made available to water short areas by transfer from one river basin to another basin on national prospective after taking into consideration the requirement of area.
- Policy also requires that awareness should be created that water is a scarce resource and needs to be conserved.

We continue to regard water as a perpetual resource whereas it is not so and we continue to ignore the fact there is no substitute of fresh water unlike some other renewable resources. Water shortage and water pollurion are two common observations in India.

11.2 Water Pollution

There are standard practices that industry or companies or house holders should follow for water management. These are:

1. Make a plan for quantity of water to be used at each unit for the industry.
2. Set a target for reduction of water use.
3. Recover and reuse rhe processed water.

4. Use low-flush lavatories.

5. Reduce cistern's capacity.

6. Collect rainwater on roofs.

The major sources of pollution of our natural waters including coastal waters are the discharge of wastes from industry and human settlements. Most of waste waters go into water courses rendering them unfit for most uses. In a report on a study of the seriousness of water pollution in the Yamuna caused by the discharge of Delhi's wastes, the Central Board for Water Pollution states:

"What is depicted in this report is a replica of what may be seen at Ludhiana, Srinagar, Varanasi, Patna, Calcutta, Guahati, Cuttack, Visakhapatnam, Indore and Madras. The daily discharge of waste water ... is threatening the natural water bodies like rivers, estuaries and coastal waters."

Harvesting of Rain Water — Case Study of Chennai

The Chennai branch of National Water Harvesters Network (NWHN) reports a success story of rain water harvesting (RWH). Under the leadership of A. Vaidyanathan, Chennai has made a remarkable progress in terms of water harvesting. Since builders have a crucial role in rain water harvesting, in June, 1999 a meeting of NWHN was organized with the builders and others. At this meeting discussions were held as to how to promote the concept of RWH. It was also pointed out that installation of RWH structures involve low expenditure and quality and quality of ground water has shown improvements in areas where RWH projects have been in operation. The wells now provide iron free water. According to a resident of Korattur who has been harvesting rain water at his residence for the last nine years, the quality of well water has improved over the years. There was a consensus to implement RWH not only in residential areas but also in offices. It was felt that lack of information has been major impediment in the use RWH. Chennai Metro Water Supply and Sewage Board has brought out a booklet in Tamil. It was suggested to revise this booklet to include line drawing, cost estimates and names of the persons who have expertise in constructing RWH structures. The Board approved this. It was also suggested that evaluation for assessing the impact of RWH projects of Chennai Metro Water Supply Board be undertaken. Involvement of architects was also highlighted as they have a major task to perform in RWH schemes.

The Madras Institute of Development, Chennai has agreed to undertake a project to assess existing RWH programmes in Chennai. The CSE in New Delhi is supporting this project.

Sources of Water Pollution

The two major causes of water pollution are :

(a) discharge of all city wastes, and

(b) discharge of industrial effluents into the rivers/other bodies of water/open land.

Take the case of Kanpur.

According to a report 274.50 million litres a day of sewage water is being discharged into the river Ganga from the city of Kanpur, which is the highest in the State of Uttar

Pradesh and next only to the city of Calcutta which discharges 580.17 million litres a day of sewage water into the River Ganga.

This pollution into the River Ganga from Kanpur is occurring because of the following reasons:

(a) Sixteen drains collecting sullage water, sewage, textile waste, power plant waste and tannery effluents were being discharged without any treatment into the river till recently.

(b) The dairies located in the city have a cattle population of about 80,000. The dung, fodder waste and other refuse from cattle population is quantitatively more than the sullage from the city of human population of over 20 lakhs. All this finds its way into the sewerage system. It chokes many branches of sewers and trunk sewers resulting in the overflow of the system.

(c) The night soil is collected from the unsewered areas of the city and is thrown into the big drains (Nalas).

(d) There are more than 80 tanneries, the effluent from these used to be directly discharged into the river till recently.

(e) The total water supply in Kanpur is about 55 million gallons per day. After use major part of it goes down the drains, and sewers. Sewage is taken to Yamuna sewage pumping station and a part of it is being supplied to farms after diluting it with raw Ganges water and the remaining part is discharged into the river.

(f) Dhobi Ghats add their share of pollution of the river.

In the progress Report of the Ganga Action Plan, from the samples, collected from August 1986 to January 1987 from Uttar Pradesh region of river Ganga, it is shown that pollution of the water in the river Ganga is of the highest degree at Kanpur. The Ganga water samples taken at Kanpur show that it consisted of 2.9 mg/ml of iron in the month of August, 1986 when the ISI limit for river water is 0.3. The manganese content was 0.900 mg/ml whereas the WHO limit of manganese for drinking water is 0.05. The progress Report for the period February, 1987 of Micro-level Intensive Monitoring of Ganga under Ganga Action Plan describes the analysis of the samples of the water taken from the river Ganga at Kanpur. It has found that BOD* and COD* values are high. These values clearly indicate that river water is not fit for drinking, fishing and bathing purposes.

The most disturbing feature of water pollution is that cities and industries discharge their untreated or partially treated waste waters into neighbouring streams thereby removing waste matter from their own neighbourhood. But in doing so, they create pollution in streams and rivers and expose the downstream riparian population to unhygienic conditions. In many developing countries, numerous riparian and

* BOD = Biological Oxygen Demand
* COD = Chemical Oxygen Demand.

agricultural population generally rely on streams and rivers for water for their cattle and for themselves for cooking, bathing, washing and other uses. These populations need special protection from the growing menace of water pollution. Since the total amount of a country's utilizable water remains essentially the same and the demand for water is always increasing, schemes for the prevention of water pollution should aim at making the best use of treated waste waters either in industry or agriculture. Very often such processes also result in other benefits in addition to mere reuse. The effluents reaching agricultural land supply not only much needed water to crops but also nutrients.

In summary main cause of pollution of our major rivers including Ganga and Yamuna are : urban liquid waste, such as sewage, storm drainage mixed with sewage, human, cattle and kitchen wastes carried by drains, industrial wastes and effluents, surface run-off chemical fertilizers, and pesticides.

11.3 Laws Relating to Prevention of Water Pollution

1. River Boards Act, 1956.

Laws to prevent water pollution are:

2. Merchant shipping (Amendment) Act, 1979.
3. Water (prevention and Control of Pollution) Act, 1974, amended as Act of 1979, and
4. Water (Prevention and Control of Pollution) Cess Act, 1977.

Of these the most important is the third one, Water (Prevention and Control of Pollution) Act of 1974.

11.4 Water (Prevention and Control of Pollution) Act, 1974

In terms of Acts, water pollution means contamination of water or alteration of the physical, chemical or biological properties of water due to discharge of any sewage or industrial effluent or any other liquid, gaseous or solid substance into water whether directly or indirectly as may or as likely to, render such water harmful to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants including micro-organisms. In this connection sewage effluents are defined to mean effluent from any sewerage system or sewage disposal works and include sullage from open drain. Sewer means any conduit pipe or channel open or closed carrying sewage or industrial effluent. Industrial effluent includes any liquid, gaseous or solid substance which is discharged from any premises used for carrying on any trade or industry, other than domestic sewage.

(i) river;

Stream is defined very widely in the Act. In includes:

(ii) water course (whether stagnant or temporarily dry);

(iii) inland water (whether natural or artificial);

(iv) sub-terranean waters; and

(v) sea, coastal or tidal waters to such extent or, as the case may be, to such point as the State may, by notification in the Official Gazette, specify in this behalf.

Central and State Water Boards

The Act provides for the constitution of the Central Water Board and State Water Boards. Section 16 of the Water Act sets out the functions of the Central Board and Section 17 of the Act lays down the functions of the State Boards. The functions of the Central Board are primarily advisory and supervisory.

- The Central Board is required to advise the Central Government on any matter concerning the prevention and control of water pollution and to co-ordinate the activities of the State Boards.
- The Central Board is also required to provide technical assistance and guidance to the State Boards, carry out and sponsor investigations relating to problems of water pollution and prevention, control or abatement of water pollution.

The Functions of State Boards

The functions of the State Board are more comprehensive. In addition to advising the State Governments on any matter concerning the prevention, control or abatement of water pollution, a State Board is required among other things:

(i) to plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the State and to secure the execution thereof,

(ii) to collect and disseminate information relating to water pollution and the prevention, control or abatement thereof;

(iii) to encourage, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution;

(iv) to inspect sewage or trade/industrial effluents, works and plants for the treatment of sewage and effluents;

(v) to review plans, specifications or other data relating to plants set up for the treatment of water works for the purification thereof and the system for the disposal of sewage or trade industrial effluents or in connection with the grant of any consent as required by the Water Act;

(vi) to evolve economical and reliable methods of treatment of sewage and trade/industrial effluents, having regard to the peculiar conditions of soils, climate and water resources of different regions and more especially the flow characteristics of water in streams and wells which render it impossible to attain even the minimum degree of purification;

(vii) to lay down standards of treatment of sewage and trade/industry effluents to be discharged into any particular stream taking into account the minimum fair weather dilution available in that stream and the tolerance limits of pollution permissible in the water of the stream, after the discharge of such effluents.

(viii) to lay down, modify or annul effluent standards for the sewage and trade effluents and for the quality of receiving waters (not being water in an inter-State stream) resulting from the discharge of effluents and to classify waters of the State.

(ix) to evolve methods of utilization of sewage and other suitable effluents in agriculture;

(x) to evolve efficient methods of disposal of sewage and effluents on land, as are necessary on account of the predominant conditions of scant stream flows that do not provide for major part of the year the minimum degree of dilution;

(xi) to make, vary or revoke any order:

(a) for the prevention, control of abatement of discharges of waste into streams or wells;

(b) requiring any person concerned to construct new systems for the disposal of sewage and trade effluents or to modify, alter or extend any such existing system or to adopt such remedial measures as are necessary to prevent control or abate water pollution.

(xii) to lay down effluent standards to be complied with by persons while causing discharge of sewage or sullage or both and to lay down, modify or annul effluent standards for the sewage and trade effluents;

(xiii) to advise the State Government with respect to the location of any industry which is likely to pollute a stream or well;

(xiv) to perform such other functions as may be prescribed or as may, from time to time, be entrusted to it by the Central Board or the State Government

Powers of the State Boards

With a view to carrying out its function, each State Board has been given several powers. These include:

(i) to obtain information and conduct survey of any area and gauge and keep record of the flow and other characteristics of any stream or well in the area;

(ii) to take samples of water, trade or any other effluent or of any sewage or effluents for the purpose of making analysis;

(iii) to enter and inspect any premises for the purpose of performing its functions under the Act and to see whether direction of the Board are carried out, and ro examine any plant etc. and records of the establishment;

(iv) to prohibit disposal of effluent in the streams and wells;

(v) to restrict new outlets, discharge for sewage and industrial effluents.

Standards and Consent Orders

The Act requires that no person shall knowingly cause or permit any poisonous, noxious, or polluting matter determined in accordance with such standards as may be laid down by a Board to enter (whether directly or indirectly) in any stream or well. Further there is a prohibition on a person to discharge sewage or trade effluent into a stream without the consent of the Board.

Some Ambiguities in the Functions of Boards

1. There are some ambiguities and overlap in the above mentioned provisions. The Board under Section 25 lays down the standards for domestic and industrial effluents. An industry or a local authority or an individual cannot put a pollutant into a stream which is in excess of the limits of these standards. The units concerned have to apply for consent orders of the Board whether their effluent is in accordance with these standards or not. The purpose of the consent order appears to be to permit a unit to follow a lower standard than the laid down standard either for an indefinite time or for a limited period of time within which it should take the necessary steps either by way of establishing an effluent treatment plant or diverting the effluent somewhere else or even closing down the unit.

2. Can the Board ask a unit to follow higher standards than those prescribed under Section 24? At times this may be necessary because the actual standards in a particular area may depend upon the number and types of industries, their location and the quantity of water in the stream. Different standards may have to be necessary for different areas and streams for what is relevant is not the effluent standards but the stream standards. However, the scheme of Sections 24 to 26 does not seem to permit this.

3. The Board has so far not evolved its standards. It follows the standards prescribed by the Indian Standards Institute (ISI). The Central Board follows these standards with minor variations. It has also not yet adopted ISI standards for domestic effluent. The State Boards also follow standards without any variation.

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

The Water (Prevention and Control of Pollution) Cess Act authorizes for the levy and collection of cess on water consumed by persons engaged in certain industries and by local authorities, with a view to augmenting the resources of Water Boards. Cess is payable by:

(a) every person carrying on any specified industry; and

(b) every local authority, and shall be calculated on the basis of water consumed by such person or local authority, as the case may be, for any of the purposes specified in Schedule II, at such rate, not exceeding the rate specified in the corresponding entry in column (2) thereof, as the Central Government may by notification in the Official Gazette, from time to time specify. 'Specified Industry' means any industry specified in Schedules I. Schedule I lists fifteen industries. The maximum water consuming ones are:

1. metallurgical industry,
2. chemical industry,
3. paper industry,
4. cement industry.

Purpose for which water is consumed as per schedule II

1.	Industrial cooling, spraying in mine pits or boiler feed.
2.	Domestic purpose.
3.	Process whereby water gets polluted and the pollutants are easily bio-degradable.
4.	Process whereby water gets polluted and the pollutants are not easily bio-degradable and are toxic.

11.6 The River Boards Act, 1956

The River Boards Act has been enacted for the establishment of River Boards for the Regulation and Development of inter-state rivers and river valleys. The Act stipulates constitution of River Boards with the following major functions:

(a) conservation, control and optimum utilization of water resources of the inter-state river;

(b) promotion and operation of schemes for irrigation, water-supply or drainage;

(c) promotion and operations of schemes for the development of hydro-electric power;

(d) promotion and operation of schemes for flood control;

(e) promotion and control of navigation;

(f) promotion of afforestation and control of soil erosion; and

(g) prevention of pollution of the waters of the inter-state river(s).

Prescribing of standards and giving of consent orders by the Boards is complex exercise requiring knowledge of several technical and other factors. The degree of complexity can be imagined for the fact that the following three difficult questions have ro be tackled with:

(a) prescribing domestic or effluent standards;

(b) deviation from standards in different situations; and

(c) reconciling of trade or domestic effluent standards with the stream standard.

Every Board, therefore, will have to make an independent individual judgement in granting consent orders. In granting consent orders the question is not merely to grant time for a unit to comply with the standards laid down by Board, but the more important question is what deviation should the Board allow from the prescribed standards. It seems, the Boards have been following a rule of thumb in following the ISI standards.

Since a Board has to make independent study of its own to determine what variations it should allow from the prescribed standards in a particular case, the function of the Board will be quasi-judicial. In other words, the Board has to observe principles of natural justice, i.e. to give hearing to the party concerned.

In prescribing standards and giving consent orders, the Boards have to keep in view the practical aspect of industrialization. It appears that the Central Board does keep this factor in view as its annual reports say "that the objectives and approach for control of pollution at the source to the maximum extent possible with due regard to techno-economic feasibility by prescribing Minimal National Standards and such standards as may be required in a particular situation".

The greatest problem is of compliance with standard and consent orders. The multiplicity of authorities create problems. There are irrigation department, local municipal boards and other authorities. There is problem of coordination among them. Small scale industries pose different problems. Sewerage treatment plants exist only in a few place. Water may also be polluted because of storage or discharge on land. For instance in Goa, a sugar factory stores molasses on the ground leading to contamination of ground water. The court ordered that the same should be kept in stainless steel containers.

Penalties

Chapter VII of the Act provides for penalties. It has been laid down that whoever fails to comply with any direction given under Section 20 or Section 32 shall, on conviction, be punishable with imprisonment for a term which may extend to 3 months or with fine which may extend to 5,000 rupees or with both. Whoever fails to comply with any direction issued by a Court under subsection (2) of Section 33 shall, on conviction, be punishable with imprisonment for a term which may extend to 3 months or with fine which may extend to 5,000 rupees or with both. Section 43 says that the person who contravenes the provision of Section 24 shall be punishable with imprisonment for a term which shall not be less than six months but which may extend to six years and with fine. Whoever contravenes the provisions of Section 25 or Section 26 shall be punishable with imprisonment for a term which shall not be less than six months but which may extend to six years and with fine.

Where an offence under this Act has been committed by a company, every person who at the time the offence was committed was incharge of, and was responsible to the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly : provided that nothing contained in this sub-section shall render any such person liable to any punishment provided in this Act if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission or such offence. Where an offence under this Act has been committed by a company and it is proved that the offence has been committed with the consent or connivance of, or is attributable to any neglect on the part of any Director, Manager, Secretary or other official shall also be deemed to be guilty of that offence and shall be liable to be proceeded accordingly.

No individual can sue any polluting agency under the Act. It is for the Board to bring action against polluter. It only through public interest litigation that an individual or a social organization can sue polluters.

Review Questions

1. What are the major sources of water pollution?
2. What measures have been adopted to keep Ganga clean?
3. List the enactments passed by the Parliament for preventing water pollution.
4. Write a note on the effectiveness of the Water (Prevention and Control of Pollution) Act, 1974 as amended Act of 1979.
5. List some of the important functions of the Central and State Water Boards?
6. What are "consent orders" under the Water (Prevention and Control of Pollution) Act?
7. What do you understand by "Pollution Standards"?
8. What penalties can be imposed on companies and Government departments for committing water pollution offences?
9. What is the background to Ganga Action Plan?
10. Discuss briefly the orders of Supreme Court in respect of Ganga Pollution Case.

Ganga Pollution Case

Preamble

Before taking up the study of Ganga Pollution Case, it would be appropriate to underscore the basic facts regarding the cultural, geographical and scientific aspects of this river. The River Ganga popularly called "Mother Ganga" is more than a source of water for millions of people living in Indian sub-

Contd...

continent. It symbolizes the great culture and civilization which developed on its banks. People from all over the country come to have a glimpse of this mighty river. It originates at 4000 metres above sea level from Himalayas at a place known as Gomukh (Mouth of a cow), enters the plains at Rishikesh and stretches down 2500 kms, passing through different states of India, Bangladesh and finally to the Bay of Bengal. It is known as Bhagirathi at the place of its origin. It has on its banks some of the oldest living cities of the world like Haridwar, Varanasi, Prayag and Pataliputra. Few rivers in the world irrigate such a vast stretch of land and provide fresh water to such a huge population as Ganga does. Several rivers, as for example Jamuna, Gomti join Ganga on its way. There are nearly 700 towns in the Ganga basin, of which 27 major ones are located on the bank of Ganga itself. Thickly populated and highly industrialized cities like Calcutta and Kanpur are also situated on its banks.

In ancient scriptures, the Ganga water is called Amrit (nectar). It is said to have such qualities as coolness, sweetness, transparency, high tonic property, ability to remove evils etc.

Before Ganga Action Plan

The Ganga water, even today, has a remarkably high capacity to purify itself by removing the organic pollution load added to it. The point load discharge of Biological Oxygen Demand (BOD) in Ganga takes less than a day or a run of less than 100 km. for complete recovery to the original state. The Dissolved Oxygen (DO) along the entire course shows a remarkably stable pattern and oxygen content never falls below the critical level of 5 milligrams per litre except near some large cities like Kanpur, Allahabad and Varanasi. The pollution load added to Ganga has been rising with the population explosion urbanization and industrialization, (average density in Ganga basin is around 300 persons per square kilometre) and use of pesticides. As soon as Ganga descends the plains, its pollution begins: At Rishikesh the Indian Drugs and Pharmaceuticals, and at Haridwar, Bharat Heavy Electricals Ltd. had been throwing solid wastes and untreated water into it before the launch of Ganga Action Plan. At Kanpur over 70 tanneries had been mixing domestic and highly toxic tannery wastes and carrying it to the river upto 10 kms. down stream, making water unfit for consumption in any form. In Varanasi, 60 million litres of untreated sewage had been coming to the river through six major and 61 minor drainages. Over 50 million litres of untreated sewage used to be discharged at Patna every day. Calcutta and other towns in West Bengal with 150 factories which include 87 jute mills, 12 textile mills, 7 tanneries, 5 paper and pulp factories and 4 distilleries have been using Ganga (known as Hoogly in that part) as their drain. The maximum pollution takes place in 256 km. stretch from Barauni to Farakka. It was estimated in mid 1980's that 1400 million litres of domestic sewage and 250 million litres of industrial sewage were discharged in Ganga every day. In addition to this, Ganga had to carry unburnt bodies, animal carcasses, garbage from cities, harmful residues of pesticides and fertilizers caused by run off from agricultural fields. Silting has been another major problem which this river has been facing. The massive deforestation has resulted into the rich top soil coming to the river for being carried away to the sea ultimately. The silt deposits raise riverbeds at many places, cause floods in the monsoons. It is estimated that 40 percent travails of Ganga arise due to silting.

The Ganga Action Plan-I

The Central Pollution Control Board which was asked to study the water pollution in Ganga basin submitted a report in 1984 which formed the basis for the Ganga Action Plan. The report revealed that almost three fourths of the pollution of Ganga was from untreated municipal sewage, because only a

Contd...

few cities have sewage treatment facilities. Industries accounted for one fourth of the total river pollution. The problem was acute in such areas as Calcutta and Kanpur. The organic pollution load in Ganga was found to be significantly high for BOD – more than 3 milligrams between Haridwar and Trighat and 10 to 20 milligrams per litre in the stretch from Cauvary to Kanpur. The Coliform count in Ganga was high, in the lower reaches of Hoogli, very high total coliform count was observed during October to June.

The ambient water quality was found to be in a state which could be put to class C and D which are fit for drinking after conventional treatment followed by disaffection.

The Central Ganga authority was established in 1985 under the chairmanship of the then Prime Minister Rajiv Gandhi and the Ganga Action Plan was formally launched in 1986. A total of 261 schemes were sanctioned under the plan which was broadly divided into six categories:

(i) Inception and diversion of waste;

(ii) Sewage Treatment Plants;

(iii) Low-Cost Sanitation;

(iv) Electric Crematoria;

(v) River Front Facilities;

(vi) Biological Regeneration of River.

The details of the scheme and its progress state-wise are given in Table 7:1.

Table 11.1: State-wise and Type-wise Distribution of Schemes Sanctioned and Completed – Ganga Action Plan

Sl. No.	Type of Schemes	Uttar Pradesh	Bihar	West Bengal	Total
1.	Sewage Interception & Diversion	40 (40)	17 (17)	30 (31)	87 (88)
2.	Sewage Treatment Plant	12 (13)	3 (7)	14 (15)	29 (35)
3.	Low Cost Sanitation	14 (14)	7 (7)	22 (22)	43 (43)
4.	Electric Crematoria	3 (3)	8 (8)	17 (17)	28 (28)
5.	River Front Development	8 (8)	3 (3)	24 (24)	35 (35)
6.	Other Schemes	28 (28)	3 93)	1 (1)	32 (32)
	Total:	105 (106)	41 (45)	108 (110)	254 (261)

(Figures in brackets show the number of schemes sanctioned and figures outside indicate number of schemes completed).

Contd...

Data Source: Ministry of Environment and Forests, Government of India, Annual Report, 1998-99.

It would be seen from the table 11.1 that out of 261 schemes 254 have been completed. The work on sewage treatment plants has been terribly slow. The lack of coordination between different agencies in the Central and State Governments, administrative lapses, problems and litigations on land acquisitions and cost escalations are stated to be the major causes of poor performance.

The industries on the banks of the river continue to pour toxic and untreated waste into the river almost unchecked.

The quality of the river water has shown some improvement in the areas where pollution control measures have been taken under Ganga Action Plan as given in Table 7:2. The BOD levels have improved in all towns except Kanpur where it has deteriorated further at an alarming rate. The DO deteriorated in Kanpur, while in the remaining four towns it has been showing improvement.

Table 11.2 : the impact of ganga action plan on river water quality (mg/l) in selected towns

Town	(BOD) Biochemical Oxygen Demand		(DO) Dissolved Oxygen	
	1986	1993	1986	1993
Rishikesh	1.67	1.32	8.1	9.6
Kanpur	8.57	24.46	6.7	5.15
Allahabad	15.50	1.88	6.6	7.16
Varanasi	10.60	0.95	5.9	7.58
Patna	2.20	1.50	8.1	8.0

Source: National River Action Plan, Ministry of Environment and Forest, Government of India, New Delhi, April, 1994.

The Ganga Action Plan Phase-II

The second phase of the Ganga Action Plan incorporates pollution abatement of Yamuna and Gomti rivers. Yamuna emanates from glaciers in lower Himalayas at an elevation of 6378 metres above sea levels in Uttar Kashi. It covers 1200 kms. before its confluence with Ganga at Sangam, Allahabad. Very high levels of pollution exist along vast stretches of Yamuna. Every day its 48 kms. portion through Delhi picks up nearly 200 million litres of untreated sewage and 20 million litres of industrial effluents. From Delhi to Agra, Jamuna water is unfit for drinking and bathing. Fifteen towns in Yamuna basin are selected for pollution abatement in Phase II of Ganga Action Plan. The plan envisages the use of appropriate treatment technologies and resource recovery from sewage by using the treated sewage for irrigation and aquaculture, and bio-gas for power generation. The sewage treatment plants with a total capacity of about 900 million litres per day would be set up. The scheme also provides for constructing low cost sanitation, improved crematoria, improvement of bathing ghats, afforestation along the river bank and community participation in the scheme. The problems of river bank erosion and pollution from agricultural run off containing fertilizers and pesticides will also be taken up. The scheme was formally launched in June, 1993.

Contd...

The scheme has been looked upon by the people basically as a Government Plan. There have been very little participation by the local inhabitants. The benefits of the scheme as claimed by the authorities have been questioned. In Varanasi, for instance, a large number of small drains going into river are capable of pouring enough untreated sewage to pollute the ghats where thousands of people take bath daily. Mass communication media like television, radio, newspapers and magazines in local languages should be used extensively to create awareness and attitudinal change about the environment in general and river pollution in particular.

The practice of throwing animal carcasses and half burnt and unburnt human carcasses, defecation at the bank of the river, washing clothes and other unhygienic practices should be stopped. What is happening on the banks of Ganga is also happening on the banks of its tributaries and most other rivers in the country. Orthodox beliefs, rituals and practices could be fought only through education, reasoning and demonstration of sound practices. NGOs, in particular the religious institutions and organizations can play important role in creating awareness among the people about the necessity of keeping rivers clean and removing orthodox beliefs and practices which result into polluting the rivers.

M.C. Mehta v. Union of India AIR 1988 SC 1115 (First Ganga Case)

M.C. Mehta v. Union of India AIR 1988 SC 1034 (Second Ganga Case)

It is a popular belief that the river Ganga is the purifier of all, but we are now led to the situation that action has to be taken to prevent the pollution of the water of the river Ganga since we have reached a stage where any further pollution of the river water is likely to lead to a catastrophe. There are today large towns inhabited by millions of people on the banks of the river Ganga. There are also large industries on its banks. Sewage of the towns and cities on the banks of the river and the waste effluents of the factories and other industries are continuously being discharged into the river. The Ganga is greatly polluted at Kanpur. All nallahs are discharging the polluted waste water into river Ganga. Although Parliament and the State legislature have enacted many laws imposing responsibilities on the Central and State Boards and the municipalities for prevention and control of pollution of water, many of these steps have just remained on paper without any adequate action being taken pursuant thereto. On account of failure of authorities to obey the statutory duties for several years, the water in the river Ganga at Kanpur has become so much polluted that it can no longer be used by the people either for drinking or for bathing. Shri M.C. Mehta an environmentalist, a public spirited person filed a writ petition to prevent municipalities and the industries from polluting the river Ganga. The Supreme Court considered the case of municipalities, particularly of the Kanpur Nagar Mahapalika. Kanpur being the biggest polluting city on the Banks of the Ganga and case of tanneries in and around the city of Kanpur was considered separately separately.

First Ganga Case

The Kanpur Nagar Mahapalika was established under the Uttar Pradesh Nagar Mahapalika Adhiniyam, 1959. Under the Act, it has several obligations, which include collection, removal and disposal of sewage, management of water-works, guarding drinking water from being contaminated or polluted.

Contd...

removal of carcasses of dead animals, etc. and to keep the city clean and its environment free from pollution. For these purposes, the Nagar Mahapalika has adequate powers. Similar provisions existed for smaller municipalities under the Uttar Pradesh Municipalities Act, 1916. Under the Water Supply and Sewerage Act, 1975 duty is imposed on the authorities regarding provision of clean water supply to cities and construction and maintenance of sewerage system. Thus, a cursory perusal of the provisions of the Municipal laws reveals that the Nagarpalikas and Municipal Boards have primary responsibility for the maintenance of cleanliness of areas under their jurisdiction and responsibility for the keeping the environment free from pollution.

Apart from this the Water Prevention and Control of Pollution) Act, 1974 specifically makes provisions for preventing and controlling pollution and imposes duty on the Central and State Water Boards to keep water free from pollution. This is not all. There is also the Ganga Action Plan. According to survey conducted for Prevention of Pollution of the Ganga it was revealed that the city of Kanpur alone discharges 274.50 million litres polluted water daily into the Ganga, which is highest in the State of Uttar Pradesh and next only to the city of Calcutta. According to figures made available by the Executive Engineer of Kanpur Nagar Mahapalika, the pollution in the river Ganga from Kanpur is occurring from the following sources:

(i) Sixteen nallahas collecting sullage water, sewage, textiles wastes, power plant wastes, and tannery effluents used to be discharged without any treatment into the river. However, some nallahas have been trapped now.

(ii) The dairies located in the city have a cattle population of about 80,000. The dung, fodder waste and other refuse from cattle population is quantitatively more than the sullage from the city of human population of over 20 lakhs. All this finds its way into the sewerage system and the nallahas. It has also totally choked many branches of sewers and trunk sewers resulting in the overflow of the system.

(iii) the night soil is collected from the unsewered areas of the city and thrown into the nallahas.

(iv) There are more than 80 tanneries in Jajmau whose effluent used to be directly discharged into the river.

(v) The total water supply in Kanpur is about 55 million gallons per day. After use major part of it goes down the drains, nallahas and sewers. The sewage is taken to Jajmau sewage pumping station and a part of it is being supplied to sewage farms after diluting it with raw Ganga water and the remaining part is discharged into the river.

(vi) Dhobi Ghats add their share of pollution.

(vii) Defecation by economically weaker sections also pollute the river.

Emphasising the urgency of the problem, the Supreme Court said:

"The crucial question is not whether developing countries can afford such measures for the control of water pollution but it is whether they can afford to neglect them. The importance of the latter is emphasized by the fact that in the absence of adequate measures for the prevention or control of water pollution, a nation would eventually be confronted with far more serious burdens to secure wholesome

Contd...

and adequate supplies of water for different purposes. If developing countries embark on suitable pollution prevention policies during the initial stages of their industrialization, they can avoid the costly mistakes committed in the past by many developed countries. It is, however, unfortunate that the importance of controlling pollution is generally not realized until considerable damage has already been done".

The Supreme Count's attention was drawn to several sources of pollution of the Ganga water. One of them is the practice of throwing corpses and semi-burnt corpses into the river. The Supreme Court said that this practice should be immediately brought to an end. The co-operation of the people and police should be sought in enforcing this restriction. Steps shall be taken by the Kanpur Nagar Mahapalika and the Police authorities to ensure that dead bodies or half burnt bodies are not thrown into the river Ganga.

Whenever applications for licenses to establish new industries are made in future, such applications shall be refused unless adequate provision has been made for the treatment of trade effluents flowing out of the factories. Immediate action should be taken against the existing industries if they are found responsible for pollution of water.

The Supreme Court further observed, that having regard to the grave consequences of the pollution of water and air and the need for protecting and improving the natural environment which is considered to be one of the fundamental duties under the constitution (vide Clause (g) of Article 51A of the Constitution) we are of the view that it is the duty of the Central Government to direct all the educational institutions throughout India to teach at least for one hour in a week lesson relating to the protection and the improvement of the natural environment including forests, lakes, rivers and wild-life in the first ten classes. The Central government shall get text books written for the said purpose and distribute them to the educational institutions free of cost. Children should he taught about the need for maintaining cleanliness commencing with the cleanliness of the house both inside and outside, and of the streets in which they live. Clean surroundings lead to healthy body and healthy mind. Training of teachers who teach this subject by the introduction of short-term courses for such training shall also be considered. This should be done throughout India.

In conclusion, the Supreme Court issued the following directions to the Kanpur Municipal Corporation:

1. Should submit its proposals to the State Board within six months from 12.1.1988.
2. Appropriate steps be taken to prevent pollution of water on account of waste accumulated at the dairies.
3. Should take immediate steps to increase the size of the sewers in the labour colonies so that the sewage may be carried smoothly through the sewerage system. Wherever sewerage line is not constructed, steps should be taken to lay it.
4. Immediate action should also be taken by the Kanpur Nagar Mahapalika to construct sufficient number of public latrines and urinals for free use of the poor people in order to prevent defecation by them on open land.
5. Steps shall be taken by the Kanpur Nagar Mahapalika and the Police authorities to ensure that dead bodies or half burnt bodies are not thrown into the river Ganga.

Contd...

6. Licences should not be issued to establish new industries unless adequate provision has been made for the treatment of trade effluents flowing out of the factories. Immediate action should be taken against the existing industries if they are found responsible for pollution of water.

7. Central Government should direct all educational institutions to include the subject of national environment in text-books.

8. Should make people aware of the importance of cleanliness and hazards of pollution. "Keep city/ village clean" weeks should be observed.

9. The directions given to the Kanpur Municipal Corporation applies mutatis matandis to other Municipal Corporations and Municipalities.

Second Ganga Pollution Case

The Second Ganga Pollution Case related to industries, particularly the tanneries in and around Kanpur, which have been dumping or washing the effluents into the river Ganga.

It was brought to the notice of the Supreme Court that some owners of the tanneries continue to discharge effluents from their factories into the river Ganga and refuse to set up primary treatment plants in spite of being asked to do so for several years. They did not care to do so even when notices were served on them. When the Supreme Court served notice on them they did not care to appear before the court to express their willingness to take appropriate steps to do so. In these circumstances, the Supreme Court directed that operation of these tanneries be stopped. The court also said that financial capacity of the tanneries should be considered as irrelevant while asking them to install primary treatment plants. A tannery cannot be allowed to continue to be in existence just because it claims that in has no funds to install primary treatment plants.

The court noted that the effluents discharged from a tannery are ten times more noxious when compared with the domestic sewage water which flows into the river from any urban area on its banks.

It is a known fact that the leather industry is one of the three major industries besides paper and textiles consuming large quantities of water for processing of hides and skins into leather. Naturally, most of the water used is discharged as waste water. The waste water contains organic and toxic inorganic materials which when discharged as such will deplete dissolved oxygen content of the receiving water courses resulting in the health of all aquatic life and emanating foul odour. Disposal of these untreated effluents on the land will pollute the ground water resources. Discharging of these without treatment into public sewers results in the choking of sewers. The facts that were submitted on behalf of the Government of India are:

1. About 70 small, medium and large tanneries are located in Jajmau area of Kanpur. On an average they generate 4.5 MLD of waste water.

2. Under the existing laws, tanneries like other industries are expected to provide treatment plants of their effluents to different standards depending on whether these are discharged into stream or land. It is the responsibility of the industry concerned to ensure that the quality of the waste water disposal conforms to the standards laid down.

Contd...

3. From time to time, tanneries of Kanpur have represented that due to lack of physical facilities, technical know-how and funds, it has not been possible to install adequate treatment facilities.

4. Jajmau is an environmentally degraded area of Kanpur. The location of numerous tanneries in the area is the major cause of pollution. Civic facilities for water supply, sanitation, solid waste removal, etc., are also highly inadequate. Accordingly, under the Ganga Action Plan an integrated sanitation project is being taken up for the Jajmau area.

It was submitted to the Supreme Court on behalf of the Government of India that:

(i) The medium and large units will have to set up pre-treatment facilities to ensure that the standard of sewage discharged into the municipal sewer conforms to the standards laid down. Scientific institutions such as Central Leather Research Institute are looking into the possibilities of pre-treatment including recovery of materials such as chromium. The setting up of pre-treatment facility in the respective units will be the responsibility of the individual units concerned. The Ganga Project Directorate, as part of the Ganga Action Plan, will play a facilitative role to demonstrate application of modern technologies for cost effective pre-treatment which the small tanners can afford.

(ii) Since the wastes will be ultimately discharged into the river, the wastes will have to further conform to the standards laid down for discharge into the stream. For this purpose, it will be necessary to treat the wastes further and as part of the Ganga Action Plan a treatment plant will be constructed for this purpose utilizing some advanced processes. It is also proposed to combine the domestic waste with the industrial waste conveyed through the industrial sewer which will then be treated in a treatment plant.

(iii) It is estimated that cost of this proposed sewage treatment facility which will treat the wastes from the domestic sources and the pre-treated wastes from tanneries will be about Rs. 2.5 crores. It will have a capacity of 25 MLD and the first demonstration module of about 5 MLD is expected to be installed in early 1988-89. Necessary work for designing of the plant has already been initiated and the infrastructure facilities such as availability of land, soil testing, etc., have also been ensured. Tender specifications are being provided and it is expected that the tenders will be floated sometime in October 1987. It is expected that in the combined treatment facility of 25 MLD, about 20 MLD will be from the domestic sources and 5 MLD will be from the tanneries after pre-treatment in the region.

On facts the tanneries did not dispute that they were discharging effluents into the river Ganga. Some said that they had already installed effluent treatment plants. Others said that they should be given time to install treatment plants. Yet, some pleaded financial constraint is doing so. But, it is interesting to note that all of them pleaded that it would not be possible for them to have the secondary system for treating waste water as that would involve enormous expenditure which the tanneries themselves would not be able to meet. The Supreme Court ordered:

The financial capacity of the tanneries should be considered as irrelevant while requiring them to establish primary treatment plants. Just like an industry which cannot pay minimum wages to its workers cannot be allowed to exist, a tannery which cannot set up a primary treatment plant cannot be

Contd...

permitted to continue to be in existence for the adverse effect on the public at large which is likely to occur by the discharging of the trade effluents from the tannery to the river Ganga would be immense and it will outweigh any inconvenience that may be caused to the management and the labour employed by it on account of its closure. Moreover, the tanneries involved in these cases are not taken by surprise. For several years they are being asked to take necessary steps to prevent the flow of untreated waste from their factories into the river. Some of them have already complied with the demand. It should be remembered that the effluent discharged from a tannery is ten times more noxious when compared with the domestic sewage water which flows into the river from any urban area on its banks. We feel that the tanneries at Jajmau, Kanpur cannot be allowed to continue to carryout industrial activity unless they take steps to establish primary treatment plants.

The court issued directions to the Government of India, the Uttar Pradesh Water Pollution Board and District Magistrate, Kanpur to enforce the order of the court faithfully.

In subsequent development, the Supreme Court ordered closure of some tanneries till they installed treatment plant.

The latest development (October 8, 1994) is that the Supreme Court had stopped funding of the Ganga Action Plan as it found that about Rs. 420 crores have already been washed away in the first phase of the Plan without any significant results, though nine years have elapsed since the Plan was formulated. The order was based on the report of the National Environment Engineering Research Institute which has advocated for setting up of an apex committee to overview the implementation of the Plan.

REFERENCES

•Keller, D. (2019). Environmental policy and management: An integrated approach. Oxford University Press.

•Norton, B. G. (2021). Sustainability: A philosophy of adaptive ecosystem management. University of Chicago Press.

•United Nations Environment Programme. (2021). Global Environment Outlook 6: Healthy Planet, Healthy People (GEO-6). UNEP. https://www.unep.org/resources/global-environment-outlook-6

UNIT

12

Forest Management

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- ☐ 12.1 Introduction
- ☐ 12.2 For a Global Consensus on the Management of Forests
- ☐ 12.3 Indian Scenario
- ☐ 12.4 Afforestation - (Compensatory Afforestation)
- ☐ 12.5 Deforestation
- ☐ 12.6 Degradation of Forests
- ☐ 12.7 Management
- ☐ 12.8 Tropical Rain Forests
- ☐ 12.9 Mangroves

12.1 INTRODUCTION

The management of forest resources and forest ecosystem is a challenging task. This task becomes more challenging when other important related issues like biodiversity face serious threat. (Tropical forests, for example, contain about 90% of biodiversity). It is true that forests are renewable resource. Forests contribute to economic development by providing goods and services for industry, people and forest dwellers. They provide employment. They play a vital role in maintaining ecological balance, quality of environment, preventing soil erosion, conserve water, regulate water cycle, maintaining balance between Oxygen and Carbondioxide and preventing floods. But are they managed in a way that would keep them renewable and continue playing vital roles as above? At Rio Summit a special statement on Forest Principles was issued as a non-legal binding authoritative document for a global consensus on management, conservation and sustainable development of all types of forests. These principles are as under:

12.2 For a Global Consensus on the Management of Forests*

Background

The subject of forests is related to the entire range of environmental and development issues and opportunities, including the right to socio-economic development on a sustainable basis. The guiding objective of these principles is to contribute to the management, conservation and sustainable development of forests and to provide for their multiple and complementary functions and uses. These principles should be examined within the overall context of environment and development, taking into consideration the multiple functions and uses of forests, including traditional uses, and the likely economic and social stress when these uses are constrained or restricted, as well as the potential for development that sustainable forest management can offer.

These principles reflect a first global consensus on forests. In committing themselves to the implementation of these principles, countries also decide to keep them under assessment for their adequacy with regard to further international cooperation. These principles apply to all types of forests, both natural and planted, in all geographical regions and climatic zones, including austral, boreal, subtemperate, temperate, subtropical and tropical. All these forests have complex and unique ecological processes which are the basis for their present and potential capacity to provide resources to satisfy human needs as well as environmental values, and as such their sound management and conservation are of concern to the Governments of the countries to which they belong and are of value to local communities and to the environment as a whole.

Recognizing that the responsibility for forest management, conservation and sustainable development is in many countries allocated among central/state governments, each country, in accordance with its constitution and/or national legislation, should pursue these principles at the appropriate level of government.

Principles

1. (a) Nations 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 policies and have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other countries or of areas beyond the limits of national jurisdiction.

   (b) The agreed full incremental cost of achieving benefits associated with forest conservation and sustainable development requires increased international cooperation and should be equitably shared by the international community.

* Earth Summit, U.N.

2. (a) States have the sovereign and inalienable right to utilize, manage and develop their forests in accordance with their development needs and level of socio-economic development and on the basis of national policies consistent with sustainable development and legislation, including the conversion of such areas for other uses within the overall socio-economic development plan and based on rational land-use policies.

   (b) Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter and employment, recreation, habitats for wildlife, landscape diversity, carbon sinks and reservoirs, and for other forest products. Appropriate measures should be taken to protect forests against harmful effects of pollution, fires, pests and diseases, in order to maintain their full multiple value.

   (c) The provision of timely, reliable and accurate information on forests and forest ecosystems is essential for public understanding and informed decision-making and should be ensured.

   (d) Governments should promote and provide opportunities for the participation of interested parties, including local communities and indigenous people, industries, labour, non-governmental organizations and individuals, forest dwellers and women, in the development, implementation and planning of national forest policies.

3. (a) National policies and strategies should provide a framework for increased efforts, including the development and strengthening of institutions and programmes for the management, conservation and sustainable development of forests and forest lands.

   (b) International institutional arrangements, building on those organizations and mechanisms already in existence, as appropriate, should facilitate international cooperation in the field of forests.

   (c) All aspects of environmental protection and social and economic development as they relate to forests and forest lands should be integrated and comprehensive.

4. The vital role of all types of forests in maintaining the ecological processes and balance at the local, national, regional and global levels through, inter alia, their role in protecting fragile ecosystems, watersheds and freshwater resources and as rich storehouses of biodiversity and sources of genetic material for biotechnology products, as well as photosynthesis, should be recognized.

5. (a) Appropriate conditions should be promoted for indigenous people, forests dwellers and local communities to enable them to have an economic stake in forest use, perform economic activities, and achieve and maintain cultural

identity and social organization, as well as adequate levels of livelihood and well-being, through, inter alia, those land tenure arrangements which serve as incentives for the sustainable management of forests.

(b) The full participation of women in all aspects of the management, conservation and sustainable development of forests should be actively promoted.

6. (a) Forests play an important role in meeting energy requirements through the provision of a renewable source of bio-energy, particularly in developing countries, and the demands for fuelwood for household and industrial needs should be met through sustainable forest management, afforestation and reforestation. To this end, the potential contribution of plantations of both indigenous and introduced species for the provision of both fuel and industrial wood should be recognized.

(b) National policies and programmes should take into account the relationship, where it exists, between the conservation, management and sustainable development of forests and all aspects related to the production, consumption, recycling and/or final disposal of forest products.

(c) Decisions taken on the management, conservation and sustainable development of forest resources should benefit, to the extent practicable, from a comprehensive assessment of economic and non-economic values of forest goods and services and of the environmental costs and benefits. The development and improvement of methodologies for such evaluations should be promoted.

(d) The role of planted forests and permanent agricultural crops as sustainable and environmentally sound sources of renewable energy and industrial raw material should be recognized, enhanced and promoted. Their contribution to the maintenance of ecological processes, to offsetting pressure on primary/old-growth forests and to providing regional employment and development with the adequate involvement of local inhabitants should be recognized and enhanced.

7. (a) Efforts should be made to promote a supportive international economic climate conducive to sustained and environmentally sound development of forests in all countries, which include, inter alia, the promotion of sustainable patterns of production and consumption, the eradication of poverty and the promotion of food security.

(b) Specific financial resources should be provided to developing countries with significant forest areas which establish programmes for the conservation of forests including protected natural forest areas. These resources should be directed notably to economic sectors which would stimulate economic and social subsritution activities.

8. (a) All countries, notably developed countries, should take positive and transparent action towards reforestation, afforestation and forest conservation, as appropriate. Efforts to maintain and increase forest cover and forest productivity should be undertaken in ecologically, economically and socially sound ways through the rehabilitation, reforestation and re-establishment of trees and forests on unproductive, degraded and deforested lands, as well as through the management of existing forest resources.

(b) The implementation of national policies and programmes aimed at forest management, conservation and sustainable development, particularly in developing countries, should be supported by international financial and technical cooperation, including through the private sector, where appropriate. In the formulation of policy guidelines, account should be taken, as appropriate and if applicable, of relevant internationally agreed methodologies and criteria.

(c) Forest management should be integrated with management of adjacent areas so as to maintain ecological balance.

(d) National policies and/or legislation aimed at management, conservation and sustainable development of forests should include the protection of ecologically viable or unique examples of forests, including primary/old-growth forests and other unique and valued forests of national, cultural, spiritual, historical and religious importance.

(e) Access to biological resources, including genetic material, should be with due regard to the sovereign rights of the countries where the forests are located and to the sharing on mutually agreed terms of technology and profits from biotechnology products that are derived from these resources.

(f) National policies should ensure that EIA should be carried out where actions are likely to have significant adverse impacts on important forest resources, and where such actions are subject to a decision of a competent national authority.

9. (a) The efforts of developing countries to strengthen the management, conservation and sustainable development of their forest resources should be supported by the international community, taking into account the importance of redressing external indebtedness, particularly where aggravated by the net transfer of resources to developed countries, as well as the problem of achieving at least the replacement value of forests through improved market access for forest products, especially processed products. In this respect, special attention should also be given to the countries undergoing the process of transition to market economies.

(b) The problems that hinder efforts to attain the conservation and sustainable use of forest resources and that stem from the lack of alternative options available to local communities, in particular the urban poor and poor rural

populations who are economically and socially dependent on forests and forest resources, should be addressed by Governments and the international community.

(c) National policy formulation with respect to all types of forests should take account of the pressures and demands imposed on forest ecosystem and resources from influencing factors outside the forest sector, and intersectional means of dealing with these pressures and demands should be sought.

10. New and additional financial resources should be provided to developing countries to enable them to sustainably manage, conserve and develop their forest resources, including through afforestation, reforestation and combating deforestation and forest and land degradation.

11. In order to enable, in particular, developing countries to enhance their endogenous capacity and to better manage, conserve and develop their forest resources, the access to and transfer of environmentally sound technologies and corresponding know-how on favorable terms, including on concessional and preferential terms, as mutually agreed, in accordance with the relevant provisions of Agenda 21, should be promoted, facilitated and financed, as appropriate.

12. (a) Scientific research, forest inventories and assessments carried out by national institutions which take into account, where relevant, biological, physical, social and economic variables, as well as technological development and its application in the field of sustainable forest management, conservation and development, should be strengthened through effective modalities, including international cooperation. In this context, attention should also be given to research and development of sustainably harvested non-wood products.

(b) National and, where appropriate, regional and international institutional capabilities in education, training, science, technology, economics, anthropology and social aspects of forests and forest management are essential to the conservation and sustainable development of forests and should be strengthened.

(c) International exchange of information on the results of forest and forest management research and development should be enhanced and broadened, as appropriate, making full use of education and training institutions, including those in the private sector.

(d) Appropriate indigenous capacity and local knowledge regarding the conservation and sustainable development of forests should, through institutional and financial support and in collaboration with the people in the local communities concerned, be recognized, respected, recorded, developed and, as appropriate, introduced in the implementation of programmes. Benefits arising from the utilization of indigenous knowledge should therefore be equitably shared with such people.

13. (a) Trade in forest products should be based on non-discriminatory and multilaterally agreed rules and procedures consistent with international trade law and practices. In this context, open and free international trade in forest products should be facilitated.

    (b) Reduction or removal of tariff barriers and impediments to the provision of better market access and better prices for higher-value-added forest products and their local processing should be encouraged to enable producer countries to better conserve and manage their renewable forest resources.

    (c) Incorporation of environmental costs and benefits into market forces and mechanisms, in order to achieve forest conservation and sustainable development, should be encouraged both domestically and internationally.

    (d) Forest conservation and sustainable development policies should be integrated with economic, trade and other relevant policies.

    (e) Fiscal, trade, industrial, transportation and other policies and practices that may lead to forest degradation should be avoided. Adequate policies, aimed at management, conservation and sustainable development of forests, including, where appropriate, incentives, should be encouraged.

14. Unilateral measures, incompatible with international obligations or agreements, to restrict and/or ban international trade in timber or other forest products should be removed or avoided, in order to attain long-term sustainable forest management.

15. Pollutants, particularly airborne pollutants, including those responsible for acidic deposition, that are harmful to forest ecosystems at the local, national, regional and global levels should be controlled.

12.3 Indian Scenario

India has a diverse ecosystem and diverse forests spread over from North East to Western Coast and Anadman Nicobar Islands to alpine forests of Himalayas. Table 12.1 gives the estimates of Forest cover. There are four major categories of forests namely tropical, subtropical, temperate and alpine.

Table 12.1: Forest Cover Estimates 1981-95

Period	Total Forest Cover (Million Hectare)	% of Geographic Area	% of area under Dense Forest	% of area under Open Forest
1981-83	64.08	19.5	—	—
1985-87	63.88	19.4	59.1	40.2
1987-89	63.94	19.5	60.2	39.1
1989-91	63.94	19.5	60.2	39.0
1991-93	63.89	19.4	60.2	39.0
1993-95	63.34	19.3	58.0	41.3

Source: State of Forest Reports, Forest Survey of India, MEF

There is tremendous pressure on forests with the result that it has led to deforestation. The pressure is from agriculture so that more land for crops becomes available. There is also pressure from industries and irrigation projects and for urban development and of course for forest products (timber, herbs, fodder, fuel etc.)

National Forest Policy in 1952 recommended that forest area is to be increased to 33% of total land area of the country. This has not become possible so far. In 1980 Forest (Conservation) Act was enacted to stop diversion of forest areas for other purposes. The Act laid down that no State Government or any other authority without the approval of Central Government will pass any order directing:

(i) that any reserved forest shall cease to be reserved.

(ii) that any forest land may be used for non-forest purpose.

"Non forest purpose" is defined as clearing of any forest land for any purpose other than afforestation. The Act was amended in 1988 to stipulate that leasing of forest land to a person or any agency not owned by the Government and clearing of trees which have grown naturally in any forest land or for the purpose of using it for re-afforestation will require approval of Central Government. A punitive clause has also been added in this Act. "When any offence under this Act has been committed by any department of government, the head of the department or person who at the time when offence was committed was responsible shall be deemed to be guilty of the offence and shall be liable to be punished".

In addition to the Forest Act (1980), the State Governments have their own laws, rules and regulations on forests.

According to the report of MEF (1998-99) the enactment of Forest Act (1980) and amendments (1988) have led to decrease in rate of diversion of forest land. MEF has also taken steps for streamlining the guidelines for forest clearance, diversion or dereservation. Compensatory afforestation is one of the most important conditions stipulated by the Central Government while approving these proposals. It is essential that proposals for diversion or dereservation of forest land for non forest uses must give a comprehensive scheme for compensatory afforestation and submitted to the Government.

12.4 Afforestation – (Compensatory Afforestation)

The detailed compensatory afforestation scheme alongwith details of non-forest/ degraded foresr area identified for compensatory afforestation map is required to be submitted in the prescribed form.

Land for Compensatory Afforestation

(i) Compensatory afforestation shall be done over equivalent area of non-forest land.

(ii) As far as possible, the non-forest land for compensatory afforestation should be identified contiguous to or in the proximity of Reserved Forest or Protected Forest to enable the Forest Department to effectively manage the newly planted area.

(iii) In the event that non-forest land of compensatory afforestation is not available nearby, non-forest land for compensatory afforestation may be identified anywhere else in the State as near as possible to the site of diversion, so as to minimize adverse impact on the ecosystem of the area.

(iv) Where non-forest lands are not available or non-forest land is available in less extent to the forest area being diverted, compensatory afforestation may be carried out over degraded forest twice in extent to the area being diverted or to the difference between forest land being diverted and available non-forest land, as the case may be.

(v) The non-availability of non-forest land for compensatory afforestation would be accepted by the Central Government only on the Certificate from the Chief Secretary to the State/UT Government to that effect.

(vi) As an exception to above, compensatory afforestation may be raised over degraded forest land twice in extent of the forest area being diverted/dereserved in respect of following types of proposals:

(a) For extraction of minerals. (However, if forest area to be diverted is above 500 hectares, compensatory afforestation over equivalent area of degraded forest shall be required to be done instead of twice the area being diverted subject to a minimum of 1000 hectares compensatory afforestation).

(b) For construction of link roads, small water works, minor irrigation works, school building, dispensaries, hospital, tiny industrial sheds of the Government or any other similar work excluding mining and encroachment cases, which directly benefit the people of the area – in hill districts and in other districts having forest area exceeding 50% of the total geographical area, provided diversion of forest area does not exceed 20 hectares.

(c) For laying of transmission lines up to 220 K.V.

(d) For mulberry plantation undertaken for silkworm rearing without any felling of existing trees.

(e) For diversion of linear or 'strip' plantation declared as protected forest along the road/rail/canal sides for widening or expansion of road/rail/canal.

(f) No compensatory afforestation shall be insisted upon in respect of the following:

(i) For clearing of naturally grown trees in forest land or in portion thereof for the purpose of using it for reforestation.

(ii) Proposals involving diversion of forest land up to one hectare. (However, in such cases, plantation of ten times the number of trees likely to be felled will have to be carried out by way of compensatory afforestation or any number of trees specified in the order).

(iii) For underground mining lease except in respect of forest area proposed to be freshly broken up for which compensatory afforestation shall be required to be undertaken on equivalent non-forest land.

Scheme for Compensatory Afforestation

(i) The scheme for compensatory afforestation should contain the following details:

(a) Details of equivalent non-forest or degraded forest land identified for raising compensatory afforestation.

(b) Delineation of proposed area on suitable map.

(c) Agency responsible for afforestation.

(d) Details of work schedule proposed for compensatory afforestation.

(e) Cost structure of plantation, provision of funds and the mechanism to ensure that the funds will be utilized for raising afforestation.

(f) Details of proposed monitoring mechanism.

Lands Identified for Compensatory Afforestation to be Transferred to the Forest Department

(i) Equivalent non-forest land identified for the purpose is to be transferred to the ownership of the State Forest Department, and declared as protected forests so that the plantation raised can be maintained permanently. The transfer must take place prior to the commencement of the project.

(ii) The compensatory afforestation should clearly be an additional plantation activity and not a diversion of part of the annual plantation programme.

(iii) In each case where the afforestation target is over 500 hectares in plains, and 200 hectares in hills, a Monitoring Committee shall be established with a nominee of the Central Government to oversee that the stipulations, including those pertaining to compensatory plantation are carried out.

To cut short delay in processing the proposals for forest clearance it has been decided that these proposals for development project be submitted to MEF's Regional Offices for processing.

12.5 DEFORESTATION

Despite various kinds of acts, rules, regulations and streamlining procedures, forests continue to be denuded. It is estimated that between 1950-1980, nearly 4.5 million hectare forest area was diverted. After Forest Act (1980) there has been reduction of diversion for non forestry purposes and according to Economic Survey Report, the present rate of diversion is 16000 hectare annually. (The forest area in the recent years has not changed much because its diversion for non forestry purposes has been more or less

compensated by afforestation). The annual deforestation rate during 1981-90 (10 year period) was 0.6% (0.34 million hectares) according to FAO.

12.6 Degradation of Forests

Besides deforestation which is diversion of forest to other uses, another phenomenon namely the degradation of forests has been occurring. It means reduction in the productivity of the forests due to unsustainable harvesting, forest fires, pollution and pests. Productivity mainly refers to production of timber, fire wood, fodder and industrial wood. Degradation has its own impacts. People indulge in over exploitation of forest resources which have declined due to degradation. Declining forest resources affect the poor people and those dwelling around forest areas for sustenance. Degradation affects the ecosystem and capacity of forests as Carbon Dioxide sinks. Another effect is on biodiversity. There is always a threat of species extinction and loss of genetic resources. Desertification too is affected by forest degradation.

12.7 Management

Forest management is a specialized discipline. We shall discuss here only general principles. Forests have degraded to such an extent that major investments are needed to restore them. Several general measures for conservation and management of forest resources have been suggested in the document on Agenda 21 outlined in the beginning of this chapter and there are indications that some countries are making progress in this direction. Summit +5 which is the document containing the report on post Rio scene, mentions that:

(i) Since the adoption of the Forest Principles at the Rio Conference, tangible progress has been made in sustainable forest management at national, regional and international levels and in the promotion of international cooperation on forests. The proposals for action contained in the report of the Ad Hoc Intergovernmental Panel on Forests on its fourth session (1997) which were endorsed by the Commission on Sustainable Development at its fifth session represents significant progress and consensus on a wide range of issues.

(ii) Yet there is urgent need to implement the proposals agreed by the Panel in an effective manner and in collaboration with indigenous people and local communities. The Intergovernmental Forum was to report on its work to the Commission on sustainable Development in 1999.

Forest Management is a complex system that deals with various aspects as:

(i) Legal;

(ii) Administrative;

(iii) Economic;

(iv) Social;

(v) Scientific.

It aims at efforts directed towards conservation of forests which include maintaining its ecosystem, for production of goods and services that are economically, socially, legally viable and sustainable. The management thus embraces many sectors of governmental policy and requires a complete coordination of these sectors.

In principle, management of forests would first involve understanding the functioning of forests as related to various activities that fall under three categories:

Role of Forests for Maintaining Ecosystem

This includes:

(i) Protection of fauna and flora;

(ii) Carbon cycle;

(iii) Protection of endangered/threatened species;

(iv) Wildlife conservation;

(v) Preservation of National Parks/Sanctuaries;

(vi) Tourism;

(vii) Control of soil erosion;

(viii) Reclamation of eroded land;

(ix) Irrigation and control of water runoff.

Forests as Resources for Consumption by Indigenous People/forest dwellers/rural and Deprived Population

This includes use/consumption of:

(i) Fuelwood;

(ii) Grazing of livestock;

(iii) Fruits and herbs;

(iv) Household uses like sheds, furniture, poles etc.;

(v) Weaving material like ropes and baskets;

(vi) Food products like honey.

Industrial Uses

(i) Pulp wood for various purposes like newsprints, paper, packaging;

(ii) Poles;

(iii) Sawlogs;

(iv) Gums, resins, oils etc.;

(v) Particle boards, fiber boards;

(vi) Veneer logs for plywood, furniture.

Methods for managing forests and forest resources are well developed in the countries of North. Most of the industrialized countries are aware of the need for developing efficient system with well defined management objectives based upon above three categories of activities.

While reviewing above activities in respect of developing countries one is led to the conclusion that these activities have led to serious deforestation and forest depletion. The management techniques would therefore, involve understanding the causes of deforestation and forest depletion in these countries. Though mention has been made about the causes of deforestation and degradation in the earlier part of this chapter, it must be reiterated that the most important is the clearing of forests lands for permanent agriculture. The other causes are rapid population growth and poverty forcing the landless people to clear and cultivate forest land and to cut trees for fuel wood, and of course, the exploitation and denuding of forests for industrial use. It is clear that the issue of deforestation cannot be discussed in isolation; it is very much linked with other developmental issues. The management efforts will have to come from outside the forest sector. These are:

(i) Land reform programmes that could provide landless people with alternatives rather than let them encroach forests. Intensify agriculture outside the forest lands.

(ii) Efforts have to be made to enable the forest dwellers and other dependent population to produce their own fuel wood and fodder or use alternative source of energy;

(iii) Promote rural development programmes for people living near forest in adopting such farming that would take off pressure on forests;

(iv) Efforts from other departments like animal husbandry for taking pressure off from forest grazing.

12.8 Tropical Rain Forests

Tropical Rain Forest need special mention because they are an excellent example of rich biodiversity and other characteristics and need different management practices. They are located between tropic of Cancer and tropic of Capricorn. They receive lot of rains and remain wet and humid. They are subjected to deforestation like other forests. It is estimated that more than 50% of plant and animal species exist in tropical rain forests and yet these forests cover a small area on earth. It is believed by the entomologists that one single species of tree support 400 species of insects in these forests. Therefore, tropical forests represent most diverse ecosystem and biological wealth and genetic

resource. They represent, according to scientists, such an efficient ecosystem that conserve and recycle itself for survival and can become basis of industrial ecology. Science News (1990) mention that "tropical rain forests ecosystem which support so much of life, is held in a delicate balance. As each component dies, its nutrients are recycled..... and then reabsorbed by the plants to provide new life". The dead decaying matter doesn't go out of forests because it is reabsorbed an efficient recycling.

The characteristics of Tropical Rain Forests:

- Management of Tropical Rain Forests involves sustainable concept in which there is a balance between harvest and regeneration.
- Plants including trees are continually dying in these forests; it is better they are harvested within the limits permitted by ecosystem.
- It must be realized that trees in these forests produce many useful products like rubber, nuts and fruits and it is better to harvest these products rather than cutting the whole tree for timber.
- Besides above, the general principles of Forest Management are applicable here viz.
  - (a) improving the lives of rural people;
  - (b) improving methods of shifting cultivation;
  - (c) improving food production;
  - (d) increasing supply of fuel wood or providing alternative source;
  - (e) expanding employment and incomes.

12.9 MANGROVES

These are forest ecosystems found mainly in the tropical and subtropical intertidal regions of the world. They inhabit large number of plants and have remarkable capacity for salt tolerance. They stabilize the shoreline, inhabit rich biodiversity and provide source of livelihood for people of area.

India has some of the best mangroves in the world located in the deltas of river Ganga, Godavari, Krishna and Cauvery and on Andman and Nicobar Islands. Government of India initiated a scheme on Conservation and Management of Mangroves and Coral Reefs in 1986-87. A National Committee on Conservation and Management of Mangroves and Coral Reefs was constituted. Based on the recommendations of this committee, mangroves and Coral Reefs have been identified for intensive conservation and management. State Level Committees have also been constituted to prepare and implement Management of mangroves and coral reefs. Management Action Plan for the following mangrove areas have been considered by the MEF.

- Sunder Bans (West Bengal);
- Pichavaram (Tamil Nadu);

- Muthupet (Tamil Nadu);
- Goa (Goa);
- Coringa (Andhra Pradesh);
- East Godavari (Andhra Pradesh);
- Krishna (Andhra Pradesh);
- Andman and Nicobar Island

Review Questions

1. What resources do forests provide?
2. What are the causes of deforestation?
3. Enumerate the principles for global consensus on conservations of forests as declared at Earth Summit.
4. Write an account of Forest (Conservation) Act of 1980.
5. What are the three categories of activities to which the management of forest is related?
6. Write notes on:
   (i) Tropical Rain Forests
   (ii) Mangroves.

UNIT

13

Biodiversity

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- 13.1 Introduction
- 13.2 Biodiversity in South
- 13.3 Acquisition of Biological Wealth
- 13.4 The Patents and Intellectual Property Right (IPR)
- 13.5 Indigenous Knowledge
- 13.6 Convention on Biological Diversity (CBD)
- 13.7 Implementation of CBD
- 13.8 Summary and Conclusions

13.1 INTRODUCTION

Biodiversity means the variety and variability of all living organisms. Biodiversity constitutes the biological wealth of a nation. Biodiversity is at three levels : Genetic Diversity, Species Diversity and Ecosystem Diversity.

Genetic Biodiversity

Genetic biodiversity means the variation of genes within a species. A species can have varieties and each variety has its own genes or genetic make up. Diversity of genes within a species increases its ability to adapt to disease, pollution and other changes in environment. When varieties of a species is destroyed, genetic diversity gets diminished.

Species Biodiversity

Species biodiversity means variety of species within a region. Such diversity can be measured on the basis of species in a region. More species biodiversity means more biological wealth.

Ecosystem Biodiversity

Ecosystem biodiversity means refers to variety of ecosystems in a particular region or zone as for example various ecosystems include forests, wetlands, arid zones, deserts etc. All these have their own fauna and flora (biodiversity).

All the three are linked and constitute a gene pool. The 1992, Untied Nations Conference on Environment and Development put biological diversity on the international agenda by signing the Convention on Biological Diversity (CBD). This convention addresses many issues ranging from forests, agriculture to Intellectual Property Rights (IPRs).

Before signing CBD, a lot of preparation was done. In August 1988, the United Nations Environment Programme (UNEP) convened a high-level panel of experts to advise it whether a global biodiversity convention was timely, and if so, what it should include. UNEP then convened a series of inter-governmental meetings to develop the CBD. The CBD was signed at Rio and has now been ratified by more than 165 countries. India is signatory to CBD and ratified it in 1993. The MEF, Government of India has recently finalized the National Policy and Action Strategy for Biodiversity. A legislation on Biodiversity is being finalized by MEF.

The objective of CBD are : "the conservation of biological diversity, the sustainable use of its components and equitable sharing of benefits arising out of the utilization of genetic resources." The Convention thus covers the ecological, economic and social aspects of biodiversity.

Progress in implementing the CBD can be assessed in two main ways : (1) by analyzing the changes in biodiversity components (i.e. species, and ecosystems); and (2) by measuring the effectiveness of measures taken to implement the CBD.

According to the Worldwide Fund for Nature, scientists have identified about 1.4 million living species. Of these around 1.03 million are animals and 248,000 are higher plants. But human knowledge of the world's biodiversity is still not complete. Humans have probably discovered 85 per cent of all the species of birds, mammals, reptiles, amphibians and fishes. Higher plants have also been fairly well studied but it is possible that 15 per cent more may still be discovered. Numerous insects, invertebrates, lower plants and micro organisms exist but have yet to be identified and described. One recent estimate puts this figure as high as 30 million.

Human impact on nature has reached such high proportions that the world is today witnessing an extraordinary rate of species loss. Many thousands of species will disappear even before they are found and described by biologists. In 1988, the International Union for Conservation of Nature (IUCN) listed 4,589 threatened animals. Scientists at the Kew Gardens in Britain listed around 20,000 plant species as threatened. According to an estimate by the IUCN's Threatened Plants Unit, by the year 2050 upto 60,000 plant species will become extinct or threatened. These estimates show that the current rate of extinction is at least 25,000 times greater than extinction that look place during

evolutionary times. The rate of extinction of mammals alone has risen from one species every five years in the 17th century to one every two years in the 20th century.

13.2 Biodiversity in South

The world's biodiversity exists mainly in the countries of South, in its tropical forests wet-lands and other ecosystems.

Tropical forests are said to contain at least half of the world's living species. One hectare of tropical forests contains 50-150 tree species. In contrast, temperate forests have only up to 10 species per hectare. Madagascar has between 10,000 and 12,000 plant species, of which more than 8,000 occur nowhere else in the world. Scientists argue that roughly 5 to 10 per cent of closed tropical forest species will become extinct per decade at current rate of tropical forest loss and disturbance in ecosystem. The age old farms of the countries of South have an extraordinary variety of valuable food crops and other useful species established by the people in agricultural societies.

When human beings initially began to domesticate plants, they selected plants that had traits which would be of great advantage to them. For example, they collected seeds which were larger and matured at harvest time. The repeated selection and sowing of rhese seeds led to the development of plants of the better variety.

Today, wild and domesticated biodiversity from the South is being used widely in the world's agricultural systems and biotechnological industries, especially in the countries of the North. The total contriburion of wild germplasm to rhe American economy has been estimated at US $ 65 million. The value of the South's germplasm for Western pharmaceutical industry is estimated at US $ 4.7 billion now which will rise to US $ 47 billion by year 2000. Approximately 119 pure chemical substances extracted from about 90 plants species are today used in medicines throughout the world. Today, the annual world market for medicines once used by tribal people of South has risen to US $ 43 billion. According to the Brazilian Foundation for Medicinal Plants, estimated sales of just three plants products in the US in 1989 were : (i) digitalis US $ 85 million; (ii) reserpine US $ 42 million; (iii) pilocarpine US $ 28 million.

Crop diseases cause annual losses worldwide exceeding US $ 25 billion. A disease of wheat called stripe rust, which reached epidemic proportions in the US in the 1960's was controlled with the help of genetic crossing from a wild wheat found in Turkey. The same wild variety provided resistance to some 50 other wheat diseases and is thought to be worth US $ 50 million each year. The world seeds industry now accounts for over US $ 15 billion each year, much of which derives from crop varieties that have been, "selected, nurtured, improved and developed by innovative Third World farmers for hundreds, even thousands, of years".

OECD has estimated the value of the south's wheat genes to US agriculture ar US $ 500 million each year. Similarly, with 16 per cent of the entire rice crop of the US originating from a variety developed at the International Rice Research Institute, it has been estimated thar the US gets an annual benefit of US $ 176 million from the rice

genes of the South. The US Department of Agriculture says that, today, germplasm is responsible for gains in productivity worth about US $ one billion annually. All 15 food crops worth one billion dollars or more in the US economy originate from, and are dependent upon, Southern gene pools. Their combined worth to the US exceeds US$ 50 billion each year.

In 1980's, the seeds of the famous Indian rice variety, basmati, which is unique for its fragrance, has been crossbred in Texas to produce a new variety called Texmati. Basmati exports, especially to West Asia, are an important source of foreign exchange to India, which could be affected in the future.

13.3 Acquisition of Biological Wealth

The first phase of acquisition of biological wealth started with Columbus who brought back maize from Central and South America. Others later brought back potatoes, squash, cassava, peanuts and common beans.

The most famous acquisition was the smuggling out of rubber from Brazil to Kew Gardens. From Kew it made its way to the botanical gardens in Singapore where it was distributed to start the rubber industry of Southeast Asia. Sugarcane travelled from Southeast Asia to the Americas; coffee came from Africa and Arabia and banana from Southeast Asia to South America, the banana republic.

Smuggling of Cinchona from Andes is another interesting story. It is known that the bark of the cinchona tree is harvested to make quinine – the malaria drug. Its properties were known to the ancient civilizations of the region. The bark was routinely harvested and exported to the colonial powers. By the late 1850's, the British in India were looking to have a quinine source closer to their Asian colonies. Kew Garden botanists were sent to the Andes to acquire the necessary seedlings. In the case of Bolivia, they were aware that a state export monopoly existed. In Ecuador, seedling removal was against the law. Kew Garden botanists struck up an association with a counter-revolutionary group and succeeded in collecting and then smuggling cinchona out of the region. Back in London, officials defended their theft by arguing that it was undertaken in the best interests of the tree (genetic conservation) since the method of harvesting the bark was threatening the survival of the medicinal tree. An earlier Kew study had actually recognized that the harvesting method employed in Latin America supported conservation. The region's cinchona exports had climbed to about 9 million kgs. a year before being destroyed by the new plantations in Asia. The region thus lost an important export crop.

While smuggling and transferring biological materials from one place to another, the colonial powers attempted to control the biological materials in their possession through manipulating production. The Dutch for example limited production of cloves and nutmeg to three islands. The French brandished the guillotine to anyone who dared to take indigo off Antigua. Thus trade in biological materials laid the basis of European prosperity. In the 16th century, fewer than 100 new plants were introduced into England.

But some 1,000 were introduced in the 17th century and 9,000 were brought in during the 18th century. These plants formed the basis of the European dye, chemical and pharmaceutical companies. The South thus generated enormous wealth for Europe.

It was only in the 1970s that the developing countries slowly began to realize the scale of the biological appropriation that has taken place at their cost. For years, Western seed companies have been acquiring germplasm and storing it in their own countries. According to one estimate, over 55 per cent of the world's collected germplasm is banked in the North, with USA alone holding 22 per cent.

The North has been ever watchful of any threat that may take place to its genetic needs. Former US Secretary of Agriculture, Richard Lyng once observed that the US and other industrialized countries are "totally at the mercy" of the Third World crop germplasm. Former US secretary of state, Edmund Muskie, once remarked, that genetic resources have introduced "a new dimension of national security". British environmentalist, Norman Myers wrote in the Guardian in the mid-1980s, that the CIA has been taking an interest in gene reservoirs overseas that could become increasingly important to US agriculture.

There can be no doubt that each country has to care about its access to genetic resources in the modern world. Modern agriculture and biotechnological industries are unsustainable without such access. As Jose T. Esquinas Alcazar, Secretary of the FAO Commission on Plant Genetic Resources puts it, "No country or region can be self-sufficient in its needs of genetic diversity and, according to current studies, the average interdependence between all regions of the world is more than 50 per cent and for some regions it may go up to 100 per cent for the most important crops. This is, therefore, an area where global collaboration is a vital imperative."

North's Dependence on South

According to Mooney and Flower, the North's genetic dependence on the South is accelerating in many crops. Australia, Europe and North America, combined, meet less than six per cent of their plant and animal species needs from their own territories. "For the West, there is no such thing as a homegrown meal: tomatoes carry genes from Central America, cucumbers from Burma, carrot and onion from Central Asia, potato from Andes and beans from other parts of Latin America...". The list is unending. Every Canadian wheat variety contains genes introduced in recent decades from up to 14 different Third World Countries. Further a steroid from a Mexican yam led to the development of birth control pill.

Concerned about the rapid loss of genetic resources in the poverty ridden South, it is being argued that biodiversity should be treated as a global resource or a common heritage of mankind. In other words, the faunal and floral wealth of, say, Arunachal Pradesh in India or of the Amazon in Brazil should belong not to individual nations but to the world as a whole. Clearly, the commercial context of the entire exercise has to be carefully looked into by the South while negotiating the proposed biodiversity

convention. Industrial countries have mainly put emphasis on measures of in situ conservation, demanding the setting aside of protected areas, especially in tropical forests. The economic reasoning behind this is that they want to ensure a continued supply of actual and potential raw materials for plant breeding, for new medicines and for the wider biotechnology industry. Many developing countries, on the other hand, question why should they forego development of their own territories simply to guarantee conservation for the benefit of the North. They argue that they have sovereign rights over their biological resources, and that they should restrict access to commercial interests in the North, and develop the resources for their own national benefit.

A year before the Earth Summit, the Malaysian delegation to the second preparatory committee of the UNCED told the conference, "It is easy enough to highlight that developing countries in the tropics, being custodians of world's biological diversity, do have the obligations to lock up vast stretches of land for such purposes. In doing so, developed countries who have in recent years utilized extensive areas of their natural forests for industrial development and economic growth must now recognize that they too have obligations to those developing countries to compensate the opportunity cost of land set aside in perpetuity to conserve biological diversity. In this connection, may I add that the opportunity cost foregone in not utilizing 3.8 million hectare of conservation areas which are totally protected for sustainable timber production in Malaysia is currently being valued at well over US$ 17 billion and to effectively protect and conserve these biological reserves an additional annual budget of US$ 5.6 million would be required."

Many countries of the South are opposing the concept of biological resources as a common heritage of humankind and are no longer willing to allow unconditional free access to the genetic resources under their national jurisdiction. While they concede that the international community has a common concern in conserving these resources, these countries maintain that they have the right to exploit and benefit from them.

In 1983, under the auspices of the FAO, an International Undertaking on Plant Genetic Resources was prepared, which has now been signed by over 90 countries. In FAO, the principle of free exchange of genetic resources has been endorsed by the majority of states, both developed and developing. They elaborate on this principle, however, stating that free access does not necessarily mean free of charge, and that the rights of farmers should be recognized and rewarded, based on "the enormous contribution that farmers of all regions have made to the conservation and development of plant genetic resources". The subject of farmers' rights is now talked about at all relevant international conferences. So far, farmers' rights remains a concept, concrete measures to benefit farming communities are lacking and the necessary funding has not been forthcoming.

In recent years, these principles of free access have been increasingly undermined by restrictions imposed on the exchange of genetic resources. Far reaching in their effect are the patents and other intellectual property rights now being granted on plants and animals and their genetic characteristic is in the North.

Between 1930 and 1960, various industrialized countries passed laws which gave the creator of plant varieties a temporary monopoly on exploitation and, in 1961, the convention establishing the Union for the Protection of New Varieties of Plants (UPOV) was signed by a number of industrialized countries. Creator means the plant breeder, not the country or farmer which houses the seed or discovered its use.

There was, however, a saving grace in the plant breeders' rights concept. Firstly, farmers had the right to keep the seeds they had grown for further crops. And, secondly, any plant breeder could use a seed protected by plant breeders' rights to develop a new variety. In other words, while a seed developed by a plant breeder was protected, and could not be reproduced for sale, its genes were freely accessible for further plant breeding. But the recent extension of patent law to living organisms means that even the genes, cells which contain the genes, and entire plants and varieties can be patented and kept away for exclusive use. This will mean that only large firms with their own exclusive stock of genetic resources can create new organisms.

13.4 The Patents and Intellectual Property Right (IPR)

Under patent law, which is developing rapidly, plant tissues, plasmid, cytoplasm, enzyme, or protein can be patented and, thus, reserved for exclusive use. Patent law acknowledges neither the farmer's privilege nor free access to patented inventions for the purpose of creation. Multinational corporations in the chemical, petroleum and pharmaceutical sector, which have a prime interest in the development of biotechnologies, have organised themselves within the International Chamber of Commerce to draw up their demands in legal form. They claim that rights under the UPOV Convention do not guarantee sufficient remuneration for biotechnological innovations and ask that patents should be permitted for all forms of living matter, from the gene fragment to species and genera.

Countries like the US which are under enormous pressure from commercial interests are modifying their existing patent laws through regulatory, administrative and judicial decisions. Cary Fowler points out to the dangers ahead: "New microorganisms are being redefined so that they are not longer considered products of nature (and thus excludable from many patent laws), but as products of human inventiveness".

The overall result is that genetic resources of the South are normally freely available without charge, while those based on Southern genetic resources but developed in the North are becoming subject to monopoly control by private companies. Northern countries are not only putting enormous political pressure on developing countries to accept uniform patent laws through GATT and other mechanisms, they are also refusing to make clear commitments to developing countries on access to biotechnology and other associated technologies.

UNEP's executive director Mostafa Tolba was constrained to point out at the second session of the ad hoc working group of legal and technical experts on biological diversity.

He stated, "there is a continuous argument in international fora that because technology patents are held by private firms, governments cannot, in view of current international treaties, dictate to the private sector policies regarding transfer of patented technologies.

"By the same token, areas rich in biodiversity are mostly in private hands. If governments of developing countries are expected to convince land owners to participate in the implementation of provisions of the (proposed biodiversity) convention that requires access to biological resources, then it is certainly not asking the impossible of industrialised countries to persuade their private sector to act in a similar way.

Not surprisingly, in the UNEP - sponsored biodiversity convention negotiations, many Third World governments which have signed the International Undertaking on Plant Genetic Resources are beginning to reject the common heritage and free access system altogether. Nowadays, there is free access to genetic resources, without payment, all over the world, except in the case of private collections. But in a recent meeting in Nairobi, the working group of legal and technical experts concluded "that the heritage of mankind should not be included in the convention", and that "it was largely agreed that accessibility to biological diversity should be based on mutual agreement between countries. Several countries objected to the concept of free access as such ....." The Malaysians, for instance, insist on the 'user pays principle'.

13.5 INDIGENOUS KNOWLEDGE

The compensation of farmers and tribals who have protected, developed and acquired the knowledge of biological resources and their use is an extremely vexing issue. The contribution of farmers has now been formally recognized by the international community. But farmers or other local communities are yet to benefit from these rights.

Espen Waehle, an anthropologist working with the Norwegian Agency for Development Cooperation points out, "Imagine you invented the elixir of life and someone from another country came and took samples, asked you about it, took it back to his country, processed and bottled it and made millions of dollars. How would you feel?" Waehle calls this a First World rip - off of the Third World's resources. Waehle cites the example of the rosy periwinkle (Vinca rosea) from Madagascar, a plant which now forms the basis of a US$ 100-60 million dollar drugs industry. (While the local people in Madagascar even lack money to conserve their unique flora and fauna.

The plant produces one active principle (leurocristine) that is used to inhibit leukemia in childhood and another (ajmalacine) to treat heart disease. These substances have increased the long-term complete remission chances of children stricken with leukemia from 20 per cent to 80 per cent. A kilogram of alkaloid from rosy periwinkle fetches US$ 240,000 and requires over 500 tonnes of plant material. None of the profits have returned to the people of Madagascar.

Indeed, the world's tribal people and their traditional knowledge in general have contributed enormously to the growth of the modern economy. The Couripacu and Yabarana tribes of the Ventauri and Manapiare rivers in Venezuela have been reported

to be especially knowledgeable in the use of plants. The 1960 census showed that their populations had dropped to a precarious level of 212 and 64 people, respectively. Yet it is people like these who have given the modern world such household, daily use commodities as maize, potato, tomato, peanuts, cassava, avocado, guava, cashew and sunflower as well as drugs like quinine and cocaine.

"All human cultures have their pharmacopoeias", says Siri Von Reis Altschul, author of a Harvard study on traditional medicines. "Up to half of the drugs in native medicinal repertories actually may cure or provide relief – if not necessarily for the reasons given by local tradition". In India, the ancient medical system of Ayurveda has a Materia Medica containing over 8,000 herbal recipes. The snakeroot, Rauwolfia serpentina, locally known as sarpagandha, was sold in Indian bazaars for thousands of years for snakebite and as a calmative for mental frenzies. Since the 1940s its active principle, reserpine, has been used as a tranquiliser and to lower blood pressure. Mosr modern tranquilisers have been developed from this plants. Today Rauwolfia serpentina is a base for drugs which sell up to US$ 260 million a year in the US alone. Ephedra, a semi-desert shrub known in China for thousands of years, produces the alkaloid ephedrine, which is used today as a nasal decongestant and a stimulant for the central nervous system.

Njugana Mugo of Nairobi University in Kenya, who has isolated a drug with anti-cancer activity from the leaves of a traditional herb, alleges: "In search for the treatment of cancer, the National Institute of Health, USA sent expert to all parts of the Third World to interview traditional medical practitioners ... and gather information on herbs which may have anti-tumour activity. Through this exercise, a lot of plant species have been investigated and as result of this donation of knowledge to the Americans, a lot of drugs, all belonging to the American government, will be introduced to the medical world".

If indeed the world paid a royalty for every potato it ate or used, the Amerindians would probably be one of the riches people in the world.

"The pharmaceutical companies are sending scientists into the tropics to gather genetic resources ... before it is too late", says Waehle. Some companies pay US$ 4,000 for any specimen brought to them. Merck, Sharpe and Dohme, a drug company, is working with Brazilian counterparts to exploit an anticoagulant, Tikiuba', used by the tribe Urueu-wau-wau of the Brazilian province, Rondonia. Monsanto has established a connection with the Jivaro peoples on the Brazil-Peru border and is now hot on the trail of several of the 1,000 medicinal plants described and used by the Jivaro. The US National Cancer Institute is well into a five year drive to gather in more than 1,500 medicinal plants from tropical forests and peoples – at about US$ 418 a plant. It is estimated that 70 per cent of all plant species so far known to have anti-cancer properties are tropical plants, and the tropical forests contain literally thousands of species whose potential has not yet been tested.

According to Melaku Worede, director of Ethiopia's renowned gene bank, an American scientist had collected a sample of Sorghum some years ago. After testing in rbe laboratory

he announced his discovery – a high lysine sorghum. The local farmers had a name for this variety. It was called 'why bother with wheat'. The farmers already knew the sorghum's qualities. So, asks Fowler who made the discovery.

With growing environmental awareness amongst Western consumers and preference for more natural products, Western companies are looking to the developing countries to satisfy this new demand, and the pressure on indigenous knowledge is set to increase. According to Darrell Posey, an ethnobiologist working on the issue of intellectual property rights, the potential value of a new generation of insect repellants, soaps, oils, food colourings, and cosmetics acquired from tribal people, is even greater than that of medicinal plants. In light of this possibility, "now more than ever, the intellectual property rights of native people need to be protected, and just compensation for their knowledge guaranteed." If something is not done soon, "mining of the riches of indigenous knowledge will become the latest – and ultimate – neocolonial form of exploitation of indigenous people". Little action has yet been taken by legal, professional, environmental, non-governmental or human rights organisations to secure intellectual property rights for the tribal people.

One of the major problems in the elaboration of peoples' rights over their knowledge, according to Waehle, is that a traditional cure for diarrhea from the Amazon, for example, may contain an alkaloid which a pharmaceutical company discovers will cure cancer. The company could then deny the relevance of intellectual property rights of the Amerindians, because it 'discovered' this new application.

In the past, organisations like the World Intellectual Property Organisation (WIPO) and UNESCO have tried to develop model conventions to protect folklore and artistic aspects of indigenous knowledge, though no legislation yet exists. If the WIPO/UNESCO model law was adopted by member states and determined to cover seeds and plants – after all, folklore should cover folkseeds or farmers' seeds bred outside the formal innovation system, and folk medicinal plants – it would ensure that the Third World is compensated for the genetic resources it has cultivated and preserved.

If current trends continue unabated and industrialised countries' Trade-Related Intellectual Property (TRIPS) proposals are enacted, the consequences for the Third World will be severe.

13.6 Convention on Biological Diversity (CBD)

As mentioned in Introduction, forming a convention on biodiversity was developed by International Union of Conservation of Nature and Natural Resources (IUCN). The Executive Director of UNEP in 1988 convened a meeting of experts to explore the possibility of having CBD. UNEP called a series of intergovernmental meetings to develop CBD and it was signed at Rio Conference. It has now been ratified by 165 countries. India is one of the first countries to sign CBD and 48th to ratify it 1994. It is a real milestone in the conservation of genetic resources and ecosystem. As discussed above the loss of biodiversity through extinction of species is staggering and the cause for this

is our interference with environment; e.g. over-harvesting, habitat destruction and pollution. Therefore, it becomes imperative that we undertake national and international efforts for in situ protection of ecosystem and ex situ conservation of biological/genetically resources. Hence CBD was timely.

The CBD document of 'Earth Summit' states the following:

"Governments, consistent with nation's national policies and practices, with the cooperation of relevant UN bodies and intergovernmental organisations and with the support of local people and their communities, NGO's, business and scientific communities, and in consistent with international law should:

(i) Develop strategies, plans of actions for the conservation of biodiversity and sustainable use of biological resources.

(ii) Integrate strategies for the conservation of biodiversity into relevant planning programmes (as in case of India, VIIIth and IXth Five Year Plan) with particular reference to genetic resources for food and agriculture.

(iii) Undertake studies to identify components of biological diversity important for conservation and protection.

(iv) Undertake studies to ascribe values to biological and genetic resources and evaluate potential economic implication of conservation of biological and genetic resources.

(v) Identify significant processes and activities that have impact on biological diversity.

(vi) Take effective social and economic measures to encourage promotion of biological diversity including forestry, wildlife management and agriculture.

(vii) Take action to respect, protect and promote the knowledge and its application and practices of indigenous people and local communities including women for conservation of biodiversity.

(viii) Undertake research into importance of biodiversity and ecosystem in producing environmental goods and services.

(ix) Take action for the conservation of biodiversity through in-situ and ex-situ conservation measures. The ex-situ measures should preferably be in the source country.

(x) Promote recovery of threatened and endangered species.

(xi) Promote establishment/strengthening of national inventory of biological resources. Develop information system and data base on biological and genetic resources including aquatic, coastal, marine and terrestrial ecosystems.

(xii) Increase and train more people in field related to conservation of biodiversity. Establish National Biodiversity Institutes.

(xiii) CBD commits all countries to share genetic resources but on the basis of reciprocal benefit-sharing. For the first time it authorizes a country to regulate access to its biodiversity and requires that all those who want access will have to obtain consent. It also stipulates that IPRs which run counter to CBD should be discouraged. These clauses in the CBD go in favour of developing countries.

(xiv) The secretariat of 'Earth Summit' had estimated that annual cost for seven years (1993-2000) of implementing the programmes outlined above would be 3-5 billion U.S. Dollars.

13.7 IMPLEMENTATION OF CBD

Major thrust to CBD is:

(a) conservation of biodiversity;

(b) sustainable utilization of genetic and biological resources;

(c) equitable sharing of benefits of biodiversity.

There has been progress but it has been slow.

Since Earth Summit, the Conference of Parties (CoP), the decision making body of CBD met a few times to review the progress on the follow up of convention. The Earth Summit +5 (1997) also assessed the progress in five year since 1992. In respect of Biodiversity, the Earth summit +5 states:

(i) There remains an urgent need for the conservation of biological diversity and equitable sharing of benefits arising from genetic resources.

(ii) There is also an urgent need to ratify the CBD for the countries which have not done so far.

(iii) Governments must implement the decisions of CoP and Jakarta mandate on Marine and Coastal Biological Diversity and pursue urgently other tasks identified by CoP at its third meeting on terrestrial biodiversity.

(iv) There is urgent need to implement the decision of CoP in regard to access to genetic resources and handling of biotechnology and its benefits.

(v) There is need to pay further attention to provision of additional financial resources for implementation of the CDB.

(vi) There is need to facilitate transfer of technology (biotechnology) to developing countries.

(vii) It is desirable to complete the biosafety protocol under CBD, pending which guidelines for safety in biotechnology may be used as interim measure.

Case of India

Indian Government was of the opinion that CBD can give new direction to agriculture and wildlife protection. Also the so called theft of genetic resources from one country to another would stop. Further the traditional communities who possess knowledge and skill would be able to regain their rights.

Have we moved towards protecting our biodiversity and generated equitable benefits from use of biodiversity? Have we been able to integrate conservation of biodiversity into our economic and development sectors? Have we been able to tackle the root cause of biodiversity loss as stressed by CoP?

All these things mean that we have to undertake the research studies on country's biodiversity and impact of human activities on it and then taking measures to eliminate the adverse impacts. Our efforts so far have been more on larger species of animals or plants. We have not included lower life, especially the micro organisms in our studies on biodiversity. CBD clearly mentions that it considers microbial genetic resources and herbs as important components for conservation.

- CBD requires the participation and involvement of local communities. Have we done it? In fact, our top-down model of wild-life management or other such programmes have alienated the local people (living around the natural habitats) who have a legitimate right over the resources.
- The Government must revise its economic and development policies vis-a-vis CBD. Under new policy of globalization, exports of natural resources have increased and we have encouraged opening up protected areas for commercial purposes. Is it justified?
- An Indian NGO, Kalpavriksh has cited evidence on patenting of microorganisms taken from India by U.S. pharmaceutical companies. As a result of these activities by the North, the Government of India is under pressure to come up with a notification regulating the transfer of Indian genetic material across the border.
- Widespread pressure on above issues has had some effect and according to a Report of MEF, 1998-99, several steps have been initiated, to meet various commitment. These relate to legislative, administrative and policy regimes in tune with the three fold objectives of CBD.
- Work is in progress in regard to legislation on biodiversity. A draft outline of biodiversity legislation was sent to all States and Union Territories, NGO's, industry, universities and experts to elicit views. A national level meeting under the chairmanship of the Minister for Environment and Forest, Government of India was held last year to discuss the draft. The draft was revised in the light of comments received. Further action is under way.
- A Task Force on Biosafety was set up for developing India's stand in international negotiations for a protocol on Biosafety.
- First National Report has been issued which gives the administrative details of measures undertaken for conservation of biodiversity. This report was sent to convention secretariat last year.

Contd...

- A National Policy and Action strategy on Biodiversity has been drawn up by the MEF. The draft on plan has been prepared in consultation with various stakeholders:

  (i) Central Government Ministries.

  (ii) State Governments.

  (iii) Scientific and Technical Institutions.

  (iv) Academic Institutions.

  (v) Academic Experts.

  (vi) Industry, particularly Pharmaceutical and Drug Industry.

  (vii) Local People.

  (viii) Tribes.

  The draft National Policy is a macro level statement of strategies for conservation of biodiversity. Also it includes preparation of draft legislation on IPRs on patenting of microorganisms etc.

13.8 Summary and Conclusions

During the twenty year period between the Stockholm Conference (1972) and the Rio Conference (1992) a number of conventions were adopted at various conferences. Convention on Biodiversity was adopted in 1992. Article 1 of the convention on Biodiversity accommodates the interest of North and South:

"The objectives of this convention .... are the conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of the benefits .... including by appropriate access to genetic resources and by appropriate transfer of relevant technologies .... and by appropriate funding".

As much of the biodiversity of the world is in the developing countries, North managed to use environmental negotiations to promote a broader agenda from sustainable development to international equity. It succeeded in linking North's demand for preservation of biodiversity to South's interest in financial assistance for conserving biodiversity and access to biotechnology. North was prompt in declaring South's biodiversity as a global or common heritage. This attitude was apparent at Rio on the question of "intellectual property rights". The Rio document, while reflecting the superior power-position of the North, shows a shift in international norms towards concerns of the South. By asserting their sovereignty over nature resources, the South secured legitimization of their right to put restrictions of access to their resources. They received partial success in regard to technology transfer. While the Biodiversity Convention allows research, profits and technology to be shared with country whose resources are used, the language used here falls short of making this mandatory. Even then, the U.S. was so opposed to it that president George Bush declined to sign the convention; it was done later by the new administration.

REVIEW QUESTIONS

1. Define biodiversity.
2. Which part of the world has rich biodiversity? Elaborate your answer with suitable examples?
3. How do the nations acquire biological wealth?
4. What do you understand by Patents and IPR?
5. Write briefly about CBD and its general principles.
6. Discuss the Indian scenario on biodiversity.

UNIT

14

Environmental Ethics

LEARNING OBJECTIVES

After reading this unit you should appreciate the following:

- 14.1 Introduction
- 14.2 Evolutionary Process
- 14.3 The Contemporary Stage

14.1 INTRODUCTION

Before embarking on a difficult but an interesting study on the subject of environmental ethics, certain basic issues in this regard need to be analyzed. These are issues of values and attitudes; not only in relation to environment but also relating to business or other human activities. A reference to these may thus be useful in understanding the complexities of environmental ethics and guiding our future course of action in environmental management.

14.2 EVOLUTIONARY PROCESS

A process of evolution is going on in the phenomenon called environmental ethics or values. (Remember this process is slow though it is not as slow as the evolutionary process in Darwinian sense). Few decades ago, the corporate world, the industry or others engaged in the use of natural resources or environmental services were mainly concerned with good business in economic sense. And if conservation of resources was required it was with a motive of more economic gains or profits. Concern for environment and resource depletion was not on their agenda.

Later development in the evolutionary process was raising the general ethical standards of business and a concern for social responsibility. The management became concerned to look after not only the interest of stakeholders but also that of community. One thing that becomes very clear at this stage is that ethics entered the realm of corporate behavior. A corporation must observe ethical code and according to M.B. Athreya*, "in the Indian context we are not too worried about talking ethics. People do understand

* Corporate Governance and Business Ethics, AIMA and Excel Books, 1997.

its necessity and importance. Swami Vivekananda's saying to build character first and then learn whatever trade is very much relevant. It is taken from our ancient distinction between vidya which you get at the IITs and the Harvard Business School and the IIMs and so on and Brahmvidya which you don't get there which is knowledge of self consciousness, ethics and that one has to pick up".

Social responsibility meant providing safety for the workers at workplace and concern for their health, reducing pollution and creating other welfare schemes in the areas like education and employment. A good social performance of an organisation was a positive development in the evolutionary process. Also, government's regulations for better work conditions in an organisation strengthened the issue of social responsibility. A company carrying out some sort of social responsibility and showing a concern for public at large could gain a better image which would enhance the business prospects. Upto this stage, the scholars of ethics believe that economic basis or economic ethics was still predominant. And the corporations still believed that being more socially responsible and being concerned for welfare of the society means spending more money resulting in lowering of profits. Can a manager pursue social goals that conflict with economic goals?

Probably at this stage when the conflict between the economic and social goals was being debated, the issue of environmental values entered the arena. It may or may not be coincidence that at this time the regulatory/mandatory requirements became more stringent and the organisation now have had to incorporate environmental values in their governance. Thus it became clear that guidelines in respect of certain issues of social and environmental concerns are necessary for corporate functioning. Also, at this stage companies wanted to give the impression that they are law abiding and cared for public welfare This also helped them to avoid penalities, thereby saving money. The economic concern was thus still at the root. (Perhaps it would continue to remain so).

A Case of the Body Shop

Social Responsibility

For many years, the Body Shop has advocated greater social responsibility in business. This operates on three levels.

The first and most basic requirement for a Socially Responsible Business is to obey the law and work towards best practice wherever the company is based. This may seem obvious, but with increasing pressures due to globalization of the international economy, standards of environmental protection and health and safety at work are already starting to be questioned in part of the industrialised world.

The second level of social responsibility is that of transparency and accountability. For two hundred years it has been accepted that financial prudence and transparency are linked. Hence the requirement for companies to file independently audited accounts.

Adam Smith, the so-called father of free trade and modern industrial capitalism was a great supporter of access to information. He believed that actors in a market economy had to be fully informed if they

Contd...

were to behave in a rational and efficient way in making commercial transactions. Strange then that it has taken so long for companies to come to terms with the need for transparency on issues like the environment and ethical behavior towards stakeholders. We have now environmental auditing available. This trend started in the late eighties and has accelerated in the current decade. Now it is perceived to be second rate business behavior for large companies in sectors like power, oil or chemicals not to give credible environmental statements. Alongside the requirements of the US Toxic Releases Inventory (TRI) and EMAS are now probably the most powerful factors for environmental transparency in industry worldwide. The Body Shop's view is that it is only matter of time before similar requirements for social and ethical transparency begin to be seriously discussed in international policy-making fora.

The third requirement of social responsibly in business is perhaps the most controversial. It is the question of active engagement in the community at local, national and, international levels. In this regard, it was The Body Shop's intention both to disclose social information and to create a replacable and recognizable model for other businesses. It was based on their experience with EMAS.

The steps followed in The Body Shop's social audit should be quite familiar to companies who have followed the EMAS route.

As with EMAS, key components are verification and reporting. Also in common with EMAS, social auditing can generate significant business benefits; it does not have to be motivated by a purely altruistic agenda. The Body Shop has found that its social auditing has led to an increased understanding of the company's identity, with massive votes of confidence by stakeholders in the values and mission of the organisation. Greater understanding of stakeholders needs and aspirations is already leading to improved communication and business decision-making by those departments responsible for looking after individual stakeholder groups. The Body Shop also believes that, in future, less mistakes will be made and less effort and resources expended on inappropriate business initiative.

Animal Protection

The final part of the accountability picture for the Body Shop is its relationship with the animal kingdom. Taking an ecological perspective in its mission, the company has to demonstrate transparency toward the environment and animals as well as its human stakeholders. Since the mid-80s, the Body Shop has checked its suppliers of raw materials and finished products to ensure that they comply with the company's 'Against Animal Testing' purchasing rule.

Animal protection groups have paid particular attention to the cosmetics and toiletries industry and to practices of animal testing. But until recently, these groups have no mechanism for ascertaining that companies actually do what they say they do. For reason, the Body Shop worked with SGS Yarsley to develop an appropriate assessment and certification procedure to provide independent assurance that the company was avoiding negative impacts on animals in the supply chain. ISO 9002 was chosen as the most appropriate vehicle for the assessment of the body Shop's animal protection procedures. Following successful certification to ISO 9002 in March 1995, the company was able to produce its first public Animal Protection Statement alongside the Social and Environmental Statements in January, 1996.

Stakeholder Response

The responses of stakeholders and commentators to the three documents, each with its own component of independent verification, have been overwhelmingly positive. The company and its management are

Contd...

fully satisfied that auditing and public reporting of ethical performance brings multiple business benefits: increases identify, improved efficiency and enhanced morale, in addition to the wider issues of maintaining legitimacy in an increasingly stakeholder-driven economy. The Body Shop intends to continue its cycles of auditing and reporting on ethical issues.

Programmes of community involvement and welfare are very laudable and are found in Europe and North America. These are also found in the socially conscious industries of more recently industrialised economies of the Indian sub-continent and the Far East.

But of course, programme for the community does not stop there. Business is very active in the development of public policy, making donations to political parties and lobbying for favourable fiscal and regulatory treatment, campaigning (privately) against threats to commercial or industrial interest. What is quite rare is for companies to be open about these activities. It is The Body shop's view that it is quite legitimate for business to pursue its interests and express opinions on public policy. But it should be done in such a way that other stakeholders know the conversation is taking place. After all, they too may have an opinion.

* Adapted from David Wheeler (General Manager, The Body Shop) in Green Business Opportunities, CII. We acknowledge our thanks to them.

13.3 The Contemporary Stage

Not only in India but all over the world, there is now a growing concern for ethical norms in all spheres of human activities. May it be public behavior, business or environment. In India the ethical debate has been intense recently due to scams and other such practices in business and many other dealings. As a consequence many companies have come to realize that ethical practices may be a good business especially the organisations engaged in Indian exports. These organisations have to satisfy the importer in regard to the quality, ethics and environmental standards.

When one discusses about environmental ethics, one is not merely concerned about the business organisation and their conformance to environmental standards. It is a larger issue that concerns ethical behavior of all types of organisations ranging from International bodies, national governments, opinion makers, media, intelligentia, public and private enterprises, NGOs. to common person. Environmental ethics concerns the value system of societies - the value system that has brought the state of environment to the present situation in which there is exploitation not only of nature but also exploitation of some societies by others. This brings us to exploration of crucial issue of relationship between environmental or ecological insights and our social and political systems.

There is one view which questions the need for any change in values and attitude of people vis-a-vis environment. The advocates of this view argue that we should make use of technology (e.g. develop CFC's free refrigerators or conform to Euro-II norms for vehicular emissions etc.). No change in attitude or value system is required. The other view is that not only business or economy has to be ecofriendly but also the attitudes

and behavior must change to be ecocentric. The term ecocentric means ecological thinking and it implies being in harmony with nature, realizing the intrinsic value of nature and taking a rational view of anthropocentric theory. According to anthropocentric theory human beings are at centre stage, they stand apart from nature and their destiny is to master the nature. Anthropocentric view therefore, is in contrast to ecological thinking. In ecological thinking emphasis is that human are part of nature. In one case it is the needs and interest of nature while in other it is the needs and interests of human.

According to ecocentric view nature and human beings are of equal status and have equal rights. Hence human beings who have come to master the nature must step back into nature. This is also called Deep Ecological view. Those who subscribe to ecocentricism believe that human self interests and those of nature are same. Certainly this view needs further analysis; deep ecology needs to be probed deeper. It goes beyond mundane thinking. It considers self as integrated with nature; in other words self interest of human are one and same as that of nature. Those who advocate antropocentricism argue that human in some way cannot help being anthropocentric. They believe that world's good always coincide with man's good.

These questions require a larger debate and it may not be easy to resolve the difference between the two divergent view points. Solution lies in their convergence. In the same way it is not easy to resolve the difference between equity – both intragenerational (present generation) and intergenerational (future generations). It is not easy to settle the question whether planetary resources should be equally distributed among nations and if so, who should decide this. The utilitarians are of the view that equal distribution has no ethical basis. What is basis that those who have less should get more, they argue. This is also the view of libertarians. Kristin Shrader Frechette at Global Possible Conference summed up that:

- Principle of equal distribution rests on stronger footing than the ethics of utilitarians.
- There is not much weight in the argument of the utilitarians that for larger good, the interest of few may be sacrificed. However, it should not be construed that governments should not restrict environmental damage or pollution.
- Discussing about resolving the difference between anthropocentric and ecocentric (ecosystemic) views, Krislin Shraden states that "although they may be correct in some theoretical sense, ecosystemic ethics are not feasible because of difficulties associated with defining what is 'natural', healthy or in keeping with 'balance of nature. He argues that many problem can be solved if one practices and just not preach the utilitarian ethics (anthropocentric). We should implement the accepted anthropocentric views rather than attempting to formulate some new environmental ethics".

In conclusion, it may be pointed out that issue of environmental ethics goes beyond the problems relating to protection of environment or nature in terms of pollution, resource

utilization or waste disposal. It is the issues of exploitive human nature and attitudes that should be addressed in a rational way.

A Case — The East Coast Road*

Ajit Koulagi, of the Indian National Trust for Art and Cultural Heritage (INTACH), had issued on 18 May, 1995 an 'environmental alert' to all his friends and co-workers in Karnataka that they should explore the possibility of obtaining stay orders from the Karnataka High Court against hastily drawn road projects. He recognized the tremendous importance of roads for the country's development, but his organisation felt that the Western experience in road development, which had caused havoc there, should not be followed blindly in India. INTACH believed that a more imaginative way of using roads in conjunction with rail, sea and waterways was much less threatening to the environment. Ajit was an architect concerned with appropriate building technologies and sustainable development.

He was projecting his experiences from the struggle to bring in equity and justice to the East Coast Road Project (ECR). When the case-writer discussed the matter with him on 26 February, 1996, INTACH had filed a contempt of court case in the Madras High Court against the Tamil Nadu Government and the Asian Development Bank who had funded the project. On 8 April, 1996, the court completely stayed the work, modifying the interim order of December, 1995 only to desist from cutting the trees. This was the second time the court had stopped operations, the first being in 1992 which was vacated in April, 1994.

The CER project was a 731 km highway which connected Madras to Kanyakumari. It was projected to:

1. function as the main artery linking the more advanced hinterland, and develop the area industrially and in agriculture
2. spread out urban population from Madras and Pondicherry
3. be strategically close to Sri Lanka and ensure defence preparedness
4. help cyclone relief operations
5. transport coal to thermal stations
6. save fuel costs by Rs 60 lakh
7. ease grain movement from this surplus area

INTACH's gave an alternate proposal, which was much shorter and basically differed from the official plan in that it avoided getting too close to the ecologically fragile sea coast and made much better use of the existing roadways. They had however not worked out a firm figure of alternate project costs nor a cost-benefit analysis for the revised project. Intuitively they felt it would be better than the official project.

The 1988 project report of the ECR was examined on behalf of INTACH by a team of international experts, Dorriah L. Page and Neil W. Pelkey of P. Squared Consultants. They found gross errors in the computation of the social cost-benefit analysis. The maintenance costs of roads as also the air-pollution damages had been understated, accidents due to fast-moving traffic had been ignored, and cost of houses that would have to be destroyed had also been ignored. Even without including environmental

Contd...

and social costs, the return was only 5 to 6 per cent and not 18 to 20 per cent as projected in the report passed by the Asian Development Bank. If social costs were included, the return would be zero. The project could not be expected to pay off its loan. 'The real benefits of the road accrue primarily to the construction company that builds the road,' they said.

The work on the 171 km Madras-Cuddalore section commenced in 1991 and was in full swing by 1992, with funding from the Asian Development Bank. But no environmental assessment had been done, nor had the local people been consulted. This was against the very detailed norms issued by the Ministry of Environment and Forests of the Government of India, which required a two-year advance notice to the affected individuals. The estimated cost of this section of the project was about Rs 95 crore (as on 25 February, 1996). Of this, Rs 20 crore had already been spent by 1992. When INTACH appealed to the Madras High Court, the cutting of trees was stayed (December, 1992).

The Tamil Nadu Government submitted its Environmental Appraisal Report to the Department of Environment, Government of India, in 1993 and also a counter-affidavit to the High Court. The environmental impact as seen by INTACH differed sharply from the Tamil Nadu Government Report (July, 1993). They contented that:

1. The digging of borewells close to the sea would result in salt-water incursions which would ruin agricultural land. If the areas was urbanized there would be no other way to get water than through boreholes.
2. Tourist traffic would decrease and not increase if the trees were cut and the beauty of the Coromandel coast would be destroyed.
3. Noise pollution would increase with increased traffic.
4. The road would destroy schools, temples and tanks.
5. The habitat of a wide range of organisms would be destroyed.
6. The project gave no benefits to the local population in terms of employment.
7. The area had no surplus grain to transport.
8. Port development had already been planned which did away with the need for transport of coal by road.

The strategic defence need made no sense to them if the road was anyway going to take so long that the current state of hostilities with the Tamil insurgents from Sri Lanka would have ceased by then. The benefits of increased traffic was taken in the gross, whereas only the net increase, after adjusting the decreased traffic along the old road, should have been considered.

The Government of India cleared the report conditionally after having it examined by an expert committee. Several portions of the project were scrapped and severe restrictions imposed on the cutting of trees. The Tamil Nadu government accepted the conditions and the High Court lifted the stay in April, 1994. But again in 1995, INTACH appealed to the court that the conditions had been violated. The court banned the cutting of trees in December, 1995, and completely stopped the work in April, 1996. The Tamil Nadu Government was preparing its appeal (May, 1996). Meanwhile the Asian Development

Contd...

Bank was also now sending its team for a reappraisal (February, 1996). This case raises a serious issue. The issue is whether you can think of alternative methods to ensure ethical decision process go hand in hand with speedy developmental programmes.

* Courtesy Authors.

Review Questions

1. What are the stages in the evolution of environmental ethics?
2. What is Anthropocentric view of ethics?
3. Describe ecocentricism.