UNIT 6:
Social Issues and The Environment

6.1 FROM UNSUSTAINABLE TO SUSTAINABLE DEVELOPMENT

Until two decades ago the world looked at economic status alone as a measure of human development. Thus countries that were economically well developed and where people were relatively richer were called advanced nations while the rest where poverty was widespread and were economically backward were called developing countries. Most countries of North America and Europe which had become industrialized at an earlier stage have become economically more advanced. They not only exploited their own natural resources rapidly but also used the natural resources of developing countries to grow even larger economies. Thus the way development progressed, the rich countries got richer while the poor nations got poorer. However, even the developed world has begun to realise that their lives were being seriously affected by the environmental consequences of development based on economic growth alone. This form of development did not add to the quality of life as the environmental conditions had begun to deteriorate.

By the 1970s most development specialists began to appreciate the fact that economic growth alone could not bring about a better way of life for people unless environmental conditions were improved. Development strategies in which only economic considerations were used, had begun to suffer from serious environmental problems due to air and water pollution, waste management, deforestation and a variety of other ill effects that seriously affected peoples' well being and health. There were also serious equity issues between the "haves and the have nots" in society, at the global and national levels. The disparity in the lifestyles between the rich and the poor was made worse by these unsustainable development strategies.

Many decades ago, Mahatma Gandhi envisioned a reformed village community based on sound environmental management. He stressed on the need for sanitation based on recycling human and animal manure and well-ventilated cottages built of recyclable material. He envisioned roads as being clean and free of dust. His main objective was to use village made goods instead of industrial products. All these principals are now considered part of sound long-term development. Gandhiji had designed a sustainable lifestyle for himself when these concepts were not a part of general thinking.

A growing realization of the development strategy that Mahatma Gandhi had suggested many decades earlier is now accepted by experts on development across the world. This is based on his concept that the world could support people's needs but not their greed. It has become obvious that the quality of human life has worsened as economies grew. The world now appears to be at a crossroad. It has taken the path of short term economic growth and now suffers the consequences of environmental degradation at the cost of loss of 'quality of human life'. The earth cannot supply the amount of resources used and wasted by the economically well off sectors of society as well as that required for day to day sustenance of the ever growing population in less developed countries. Society must thus change its unsustainable development strategy to a new form where development will not destroy the environment. This form of sustainable development can only be brought about if each individual practices a sustainable lifestyle based on caring for the earth.

It was also realized that these were not simple issues. Indira Gandhi said in the Stockholm Conference in 1972 that poverty was the greatest polluter. This meant that while the super rich nations had serious environmental problems, the under-developed in Asia, Africa and South America had a different set of environmental problems linked to poverty. Developing countries were suffering the consequences of a rapidly expanding human population with all its

effects on the over utilization of natural resources.

Thus increasingly the world began to see the need for a more equitable use of earth resources. The control over natural resources and the wealth that it produces also begins to create tensions between people that can eventually lead to both strife within a country and wars between nations. This is also a major cause for the loss of quality of life. How then could a new form of development be brought about that could solve the growing discontent in the world? It has become obvious that development must begin to change from aiming at short term economic gains to a long term sustainable growth that would not only support the well being and quality of life of all people living in the world today but that of future generations as well.

The current strategies of economic development are using up resources of the world so rapidly that our future generations, the young people of the world, would have serious environmental problems, much worse than those that we are facing at present. Thus current development strategies have come to be considered unsustainable for the world's long-term development. The newer concept of development has come to be known as "Sustainable Development". The nations of the world came to clearly understand these issues at the Rio Conference in 1992. Several documents were created for the United Nations Conference on Environment and Development (UNCED), which brought out the fact that environment and development were closely connected and that there was a need to 'care for the Earth'.

Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It also looks at the equity between countries and continents, races and classes, gender and ages. It includes social development and economic opportunity on one hand and the requirements of environment on the other. It is based on improving the quality of life for all, especially the poor and deprived within the carrying capacity of the supporting ecosystems. It is a process which leads to a better quality of life while reducing the impact on the environment. Its strength is that it acknowledges the interdependence of human needs and environmental requirements.

To ensure sustainable development, any activity that is expected to bring about economic growth must also consider its environmental impacts so that it is more consistent with long term growth and development. Many 'development projects', such as dams, mines, roads, industries and tourism development, have severe environmental consequences that must be studied before they are even begun. Thus for every project, in a strategy that looks at sustainable development, there must be a scientifically and honestly done EIA, without which the project must not be cleared.

Large dams, major highways, mining, industry, etc. can seriously damage ecosystems that support the ecological health of a region. Forests are essential for maintaining renewable resources, reducing carbon dioxide levels and maintaining oxygen levels in the earth's atmosphere. Their loss impairs future human development. Loss of forests depletes biodiversity which has to be preserved to maintain life on earth. Major heavy industries if not planned carefully lead to environmental degradation due to air and water pollution and generate enormous quantities of waste that lead to long term environmental hazards. Toxic and Nuclear wastes can become serious economic problems as getting rid of them is extremely costly. Thus the economic benefits of a project must be weighed against the possible environmental costs before a project is permitted.

We as citizens of our Nation, and increasingly as citizens of one common future at the global level, must constantly monitor the pattern of development. If we see that a development project or an industry is leading to serious environmental problems, it is our duty to bring this to the attention of authorities such as the local administration, the Forest Department or the Pollution Control Board, to look into the issue. Further if new development projects are being planned in and around the place where we live it is our duty to see that this is brought about in accordance with environmental safeguards. While we all need to think globally, we need to act locally. We have to see to it that we change development from its present mandate of rapid economic growth without a thought for future ecological integrity, to a more sustainable ecologically appropriate strategy.

If new projects of a large size are to be passed Government has made it compulsory to publish the summary report of the Environmental Impact Assessment (EIA) and conduct a 'Public Hearing'. It is essential that all of us as responsible citizens read, evaluate and respond to such public hearings held in our area and make comments on the possible impacts of the project. In many situations there are proponents of the project who only look at their own rapid economic gains. It is for citizens as concerned individuals and groups to counter these vested interests so that our environment is not degraded further. Life has to be made more livable for all. We cannot support the economic growth of one sector of society while we permit environmental degradation to destroy the lives of the less fortunate.

6.2 URBAN PROBLEMS RELATED TO ENERGY

Urban centers use enormous quantities of energy. In the past, urban housing required relatively smaller amounts of energy than we use at present. Traditional housing in India required very little temperature adjustments as the materials used, such as wood and bricks handled temperature changes better than the current concrete, glass and steel of ultra modern buildings.

Embodied energy

Materials like iron, glass, aluminium, steel, cement, marble and burnt bricks, which are used in urban housing, are very energy intensive. The process of extraction, refinement, fabrication and delivery are all energy consuming and add to pollution of earth, air and water. This energy consumed in the process is called embodied energy.

Until the 1950s many urban kitchens were based on fuelwood or charcoal. This was possible and practical when homes had chimneys and kitchens were isolated from the rest of the house. Smoke became a problem once this changed to apartment blocks. Kerosene thus became a popular urban fuel. This changed to electrical energy and increasingly to natural gas by the 1970s in most parts of urban India.

Urban centers in hot climates need energy for cooling. The early systems of fans changed into air-conditioning, which consumes enormous quantities of energy. New buildings in our country have taken to using large areas covered by glass. While in cold climates this uses the green house effect to trap the warmth of the sun inside, in our hot climate this adds several degrees to the temperature inside. Thus it requires even more energy to run large central air conditioning units. High rise buildings in urban centers also depend on energy to operate lifts and an enormous number of lights.

CASE STUDY

Energy efficiency

Urban residential and commercial facilities are responsible for approximately 35% of USA's greenhouse gas emissions. Buildings need to be made energy efficient and reduce carbon dioxide emissions, which cause 'heat islands' or pockets of high temperature over these urban areas.

Urban transport depends on energy mainly from fossil fuels. Most urban people use their own individual transport rather than public transport systems for a variety of reasons. Urban transport in different cities and even different parts of a city are either inefficient or overcrowded. Thus even middle income groups tend to use their own private vehicles. This means more and more vehicles on the road which leads to traffic congestion, waste of time for all the commuters, and a great load of particulate matter and carbon monoxide from the exhaust of vehicles. This causes a rise in the number of people having serious respiratory diseases. Thus there is a need to develop a more efficient public transport system and discourage the use of individual vehicles in all our urban areas.

Each of us as an environmentally conscious individual must reduce our use of energy. An unnecessary light left on carelessly adds to energy use. Imagine the amount of energy wasted by thousands of careless people. If we learned to save electricity, we would begin to have a more sustainable lifestyle.

6.3 WATER CONSERVATION, RAINWATER HARVESTING, WATERSHED MANAGEMENT

6.3.1 Water Conservation:

Conserving water has become a prime environmental concern. Clean water is becoming increasingly scarce globally. With deforestation surface runoff increases and the sub soil water table drops as water has no time to seep slowly into the ground once vegetation is cleared.

As many areas depend on wells, it has become necessary to go on making deeper and deeper wells. This adds to the cost and further depletes underground stores of water. This could take years to recharge even if the present rate of extraction is reduced which seems hardly possible in most situations.

As deforestation and desertification spreads due to extensive changes in land use the once perennial rivers are becoming increasingly seasonal. In many areas the small streams run dry soon after the monsoon as the water table drops further and further below the surface. To this is added serious problems caused by rapid surface flow of water during the rains, which leads to extensive floods with loss of life and property.

When we waste water, we do not realise that it is affecting the lives of all of us in so many different ways. Water has to be equitably and fairly distributed so that household use, agriculture and industry all get a share of the water. It's over use and misuse due to various activities that waste water or cause pollution has led to a serious shortage of potable drinking water. Thus water conservation is linked closely with overall human well being.

Traditional systems of collecting water and using it optimally have been used in India for many generations. These have been forgotten in the recent past. Conserving water in multiple small percolation tanks and 'jheels' was important in

traditional forms of agriculture. Villages all over the country had one or more common 'talabs' or tanks from which people collected or used water carefully.

As women had to carry water to their homes over long distances, this was a time consuming and laborious activity, thus the water could not be wasted. Many homes had a kitchen garden that was watered by the wastewater. Conservation of water was done in traditional homes through a conscious effort.

CASE STUDY

Pani Panchayat – Pune District, Maharashtra

Mahur village in Pune District of Maharashtra is situated in a drought prone area. People were not able to grow a good crop in most years. Clean drinking water was also scarce. Vilasrao Salunkhe initiated a movement known as Pani Panchayat, to conserve water in this drought prone area. Watershed development was initiated on a barren and uncultivated piece of land belonging to a temple. Conservation of soil and water harvesting through a comprehensive micro-watershed management program gradually led to a surplus of water. Out of the 16 hectares of land in the village, 9.6 hectares were brought under irrigation, 2.4 hectares was afforested and 4 hectares was converted into percolation tanks. Wells and field bunds were built. While 200 quintals of grains were produced on 24 acres of Salunkhe's land, 40 acres in the same area yielded only 10 quintals. This made other villagers follow suit. The area rapidly turned green and productive.

During the British period many dams were built across the country to supply water especially to growing urban areas. Post independence, India's policy on water changed towards building large dams for expanding agriculture to support the green revolution. While this reduced the need to import food material and removed starvation in the country, the country began to see the effects of serious water shortages and problems related to its distribution. The newer forms of irrigated agriculture such as sugarcane and other water hungry cash crops required enormous quantities of water. Finally however, such irrigated areas become waterlogged and unproductive. As excess water evaporates rapidly from the surface of heavily irrigated croplands, it pulls up subsoil water along with salts to the surface of the soil. This leads to salinization by which the land becomes unproductive. Reducing the high salinity levels in soil is extremely expensive and frequently impossible.

With all these ill effects of the poorly conceived management of water at the national and local level there is a need to consider a new water policy for the country.

Saving water in agriculture: Drip irrigation supplies water to plants near its roots through a system of tubes, thus saving water. Small percolation tanks and rainwater harvesting can provide water for agriculture and domestic use. Rainwater collected from rooftops can be stored or used to effectively recharge subsoil aquifers.

Saving water in urban settings: Urban people waste large amounts of water. Leaking taps and pipes are a major source of loss of water. Canals and pipes carrying water from dams to the consumer lead to nearly 50% loss during transfer. Reducing the demand for water by saving it is more appropriate than trying to meet growing demands.

6.3.2 Rain water Harvesting

As our world faces serious water shortages, every drop of water we can use efficiently becomes of great value. One method is to manage rain water in such a way that it is used at the source. If as much water as possible is collected and stored this can be used after the rainy season is over. In many parts of the world especially in very dry areas this has been traditionally practiced. However the stored water has to be kept pollution free and clean so that it can be used as drinking water. Stored water can grow algae and zooplankton (microscopic animals). This can be pathogenic and cause infections. Thus keeping the water uncontaminated is of great importance.

Current technologies of rainwater harvesting require that all roof and terrace water passes down into a covered tank where it can be stored for use after the monsoon. This is most advantageous in arid areas where clean water is very scarce. However there are practical difficulties such as constructing large storage tanks which are expensive.

CASE STUDY

Mewar, Rajasthan

The Mewar region of Rajasthan has a rich legacy of traditional water harvesting systems to share the available water for cultivation. There are various types of rainwater harvesting systems.

Medhbandi: This is a stone embankment built on a hill slope to help create a level field for cultivation. It controls erosion and conserves moisture.

Naada/bandha: These are stone check dams across streams or gullies that are constructed to capture runoff on a stretch of fertile land that is submerged in water during the monsoon. The land not only becomes more fertile after trapping silt, but also retains substantial quantities of water in the soil. These dams are constructed in phases over several years. The height is slowly increased up to the right height of the check dam which determines the size of the *naada.*

Hembar: These are small temporary dams constructed with stones, twigs and mud over a seasonal stream when water flows in it is reduced to a point that it cannot be taken directly to the fields for irrigation.

Chak: Chak is a big plot of land, usually a *charnot* or village pasture land, enclosed by a stone boundary wall called *kot.* Tree plantations, seeding of grass for fodder, contour bunds with trenches and loose stone check dams are developed in the chak. The *chak* is used for fodder and fuel wood. It reduces soil erosion and enhances recharge of ground water.

Talab: The Mewar region is well-known for its built reservoirs (*talabs*). Udaipur City is famous for its large number of *talabs*, and is called the lake city. A small reservoir of less than five *bighas* is called *talai,* a medium sized lake is called *bandh* or *talab* and a bigger lake is called *sagar or samand.*

Saza kuva: This is an open dug well which has several owners. In *Mewari* language, saza means partner. This is an important method for irrigation in the Aravalli hills. About 70,000 wells in the Udaipur District provide water for 80% of the area under irrigation and provide water for their owners. These are considered common property resources.

Another way of using rooftop rainwater harvesting is to collect it so that it percolates into the ground to recharge wells instead of flowing over the ground into rivers. Thus by recharging ground water harvested from rooftops, the water table rises and the surrounding wells retain water throughout the year.

6.3.3 Watershed Management:

Rivers originate in streams that flow down mountains and hill slopes. A group of small streams flow down hillsides to meet larger streams in the valley which forms the tributaries of major rivers. The management of a single unit of land with its water drainage system is called watershed management. It is a technique that has several components. This includes soil and water management and developing vegetative cover. The natural drainage pattern of a watershed unit if managed appropriately can bring about local prosperity by a year round abundance of water that improves the quality of human life in the area.

As it provides water throughout the year, this improves health in the community, as clean water becomes available. Watershed management enhances the growth of agricultural crops and even makes it possible to grow more than one crop in a year in dry areas.

Watershed management begins by taking control over a degraded site through local participation. People must appreciate the need to improve the availability of water both in quantity and quality for their own area. Once this is adequately demonstrated, the community begins to understand the project, people begin to work together in the activities that lead to good watershed management.

The first technical step is to take appropriate soil conservation measures. This is done by constructing a series of long trenches and mounds along contours of the hill to hold the rainwater and allow it to percolate into the ground. This ensures that underground stores of water are fully recharged. This is enhanced by allowing grasses and shrubs to grow and by planting trees (mainly local species) which hold the soil and prevents it from being washed away in the monsoon. Local grass cover can however only increase if free grazing of domestic animals is prevented by stall feeding.

The next measure is to make 'nala' plugs in the streams so that the water is held in the stream and does not rush down the hillside. In selected sites, several small check dams are built which together hold back larger amounts of water. All these measures constitute sound watershed management. It improves the water table and keeps the streams and nalas flowing throughout the year.

Watershed management principles:

This is a land management program that looks at a region from the perspective of all its water related issues. It can be used to manage a river from its source to its termination. Watershed management could also consider the management of a single valley as a unit, based on its small streams. Saving water from its local source by allowing it to percolate into the ground by nala plugs and check dams instead of allowing it to run off rapidly along the surface during the monsoon, is a major aspect of good watershed management. This allows underground aquifers to fill so that ground water is recharged. Deforestation is a major cause of poor water supply. Afforesting such degraded areas is an important aspect of watershed management.

6.4 RESETTLEMENT AND REHABILITATION OF PEOPLE: ITS PROBLEMS AND CONCERNS

Major projects such as dams, mines, expressways, or the notification of a National Park disrupts the lives of the people who live there and may also require moving them to an alternative site. None of us would like to give up the home we grew up in. Uprooting people is a serious issue. It reduces their ability to subsist on their traditional natural resource base and also creates great psychological pressures. Especially tribal people, whose lives are woven closely around their own natural resources, cannot adapt to a new way of life in a new place. Thus no major project that is likely to displace people can be carried out without the consent of the local people. In India, lakhs of people have been unfairly displaced by thousands of dams created since independence to drive the green revolution. The dams have been built virtually at the cost of these poor local people who have been powerless to resist the Government's will. The Government is expected to find 'good' arable land to resettle displaced persons and provide them with an adequate rehabilitation package to recover from the disruption. This has rarely occurred to the satisfaction of the project affected individuals. In many cases across the country, this has not been implemented satisfactorily for decades.

Resettlement requires alternate land. However, in our overpopulated country, there is no arable high quality land available. Thus most project affected persons are given unusable wasteland. Rehabilitation involves more than just giving land. In most cases this is also not adequately done. The greatest battle to save their own precious land has been carried out by the tribal people of the Narmada River. They have fought to save their lands for decades. The Narmada Bachao Andolan has shown how bitter people can get over this issue.

CASE STUDY

The Tehri Project

The Tehri Dam in the outer Himalayas in Uttar Pradesh, when finished will submerge Tehri town and nearly 100 villages. Since the dam was sanctioned in 1972, local people have been opposing the dam and resisting its construction. Scientists, environmentalists and other groups have also opposed this dam.

Little is done to ensure proper rehabilitation and compensation for nearly a lakh of people who will be uprooted from their homes as a result of this dam, with little hope of rehabilitation, as no alternative land is available. There is also emotional and psychological trauma caused by forcibly removing people from their homeland where their families have lived for centuries.

Resettlement not only puts pressure on the project affected people but also on the people who have been living in the area that has been selected for resettlement. Thus both the communities suffer and conflict over resources is a distinct possibility in future.

CASE STUDY

Indigenous tribes

It is not flora and fauna alone that is under the threat of extinction. Among the many tribes across the globe, the Jarawa of the Andamans in the Indian Ocean are dwindling. Dispossession of their customary rights over land has put their survival at risk. They have been compelled to give up their traditional lifestyles resulting in rapidly diminishing indigenous population.

There are however situations where communities request for shifting to a new site. This is often observed where people live inside or on the periphery of a National Park or Wildlife Sanctuary. In these situations, such as the Gir in Gujarat, the local people have asked to be given alternate land where they could live peacefully away from lions that kill their cattle, but the Government has been unable to find suitable areas where they can be shifted for decades.

6.5 ENVIRONMENTAL ETHICS: ISSUES AND POSSIBLE SOLUTIONS

Environmental ethics deals with issues related to the rights of individuals that are fundamental to life and well being. This concerns not only the needs of each person today, but also those who will come after us. It also deals with the rights of other living creatures that inhabit our earth.

6.5.1 Resource consumption patterns and the need for their equitable utilisation:

Environmental ethics deals with issues that are related to how we utilise and distribute resources. Can individuals justifiably use resources so differently that one individual uses resources many times more lavishly than other individuals who have barely enough to survive? In a just world, there has to be a more equitable sharing of resources than we encounter at present. The just distribution of resources has global, national and local concerns that we need to address. There are rich and poor nations. There are rich and poor communities in every country. And there are rich and poor families. In this era of modern economic development, the disparity between the haves and have-nots is widening. Our human environments in the urban, rural and wilderness sectors, use natural resources that shift from the wilderness (forests, grasslands, wetlands, etc.) to the rural sector, and from there to the urban sector. Wealth also shifts in the same direction. This unequal distribution of wealth and access to land and its resources is a serious environmental concern. An equitable sharing of resources forms the basis of sustainable development for urban, rural and wilderness dwelling communities. As the political power base is in the urban centers, this itself leads to inequalities and a subsequent loss of sustainability in resource management in the rural and even more so for forest dwelling people.

In 1985, Anil Agarwal published the first report on the Status of India's Environment. It emphasized that India's environmental problems were caused by the excessive consumption patterns of the rich that left the poor poorer. It was appreciated for the first time that tribals, especially women and other marginalized sectors of our society, were being left out of economic development. There are multiple stakeholders in Indian society who are dependent on different natural resources which cater directly or indirectly to their survival needs. Anil Agarwal brought forth a set of 8 propositions which are of great relevance to the ethical issues that are related to environmental concerns. These include:

1. Environmental destruction is largely caused by the consumption of the rich.

2. The worst sufferers of environmental destruction are the poor.

3. Even where nature is being 'recreated', as in afforestation, it is being transformed away from the needs of the poor and towards those of the rich.

4. Even among the poor, the worst sufferers are the marginalised cultures and occupations, and most of all, women.

5. There cannot be proper economic and social development without a holistic understanding of society and nature.

6. If we care for the poor, we cannot allow the Gross Nature Product to be destroyed any further. Conserving and recreating nature has become our highest priority.

7. Gross Nature Product will be enhanced only if we can arrest and reverse the growing alienation between the people and the common property resources. In this we will have to learn a lot from our traditional cultures.

8. It is totally inadequate to talk only of sustainable rural development, as the World Conservation Strategy does. We cannot save the rural environment or rural people dependent on it, unless we can bring about sustainable urban development.

Equitable use of forest resources: We think of forests as being degraded due to fuelwood collection by poor rural communities, but forget that the rich use much greater quantities of timber. Biomass based industries include cotton textiles, paper, plywood, rubber, soap, sugar, tobacco, jute, chocolate, food processing and packaging. These need land, energy, irrigation and forest resources. Do each of us realise this when we utilise, use excessively or waste these resources that we get indirectly from the forests?

Who pays for the cost of environmental degradation? Most sections of society do not feel the direct effects of degradation of the environment till it is too late. Those who suffer most are the poor, especially rural women, and tribal people who are dependent on forests. Traditional fishermen who are dependent on streams and rivers, and coastal people who fish and catch crustacea, are seriously affected by the degradation of aquatic ecosystems. Fuelwood gatherers from different types of forests, and pastoralists who are dependent on common grazing lands suffer when their resources are depleted.

Several marginalised sectors of society are most affected by deforestation, or the loss of grassland tracts, or the deterioration of perennial water sources. All these effects can be linked to unsustainable increasing pressures on land and natural resources.

"I am often amazed and extremely angry, when people talk about Environment Education for the villages. It is the so-called, educated people who need Environment Education more than anyone else".

– Anil Agarwal, 'Human-Nature Interactions in a Third World Country'.

The well to do educated urban dweller consumes much larger quantities of resources and energy, than the traditional rural individual. Urban dwellers who are far removed from the source of natural resources that sustain their lives thus require exposure to a well-designed environment education program to appreciate these issues. While the rural people have a deep insight on the need for sustainable use of natural resources and know about methods of conservation, there are however several newer environmental concerns that are frequently outside their sphere of life experiences. Their traditional knowledge of environmental concerns cannot be expected to bring about an understanding of issues such as global warming, or problems created by pollution, pesticides, etc. These people thus require a different pattern of environment education that is related to their gaps in information. With the rapidly changing rural scenario the development that is thrust on unsuspecting rural communities needs to be ad-

dressed through locale specific environment awareness programs designed specifically for rural school children and adults. This must also use their local traditional knowledge systems as a base on which modern concepts can be built, rather than by fostering concepts that are completely alien to their own knowledge systems.

Common property resources in India once included vast stretches of forests, grazing lands and aquatic ecosystems. When the British found that they were unable to get enough wood for ship building and other uses they converted forest areas into Government 'Reserved Forests' for their own use to grow timber trees. This alienated local people from having a stake in preserving these resources. This in turn led to large-scale losses in forest cover and the creation of wasteland. In the past, in traditional villages that were managed by local panchayats, there were well defined rules about managing grazing lands, collecting forest resources, protecting sacred groves, etc. that supported conservation. There was a more or less equitable distribution that was controled by traditional mechanisms to prevent misuse of common property resources. Any infringement was quickly dealt with by the panchayat and the offender was punished. Common property resources were thus locally protected by communities. As landuse patterns changed, these mechanisms were lost and unsustainable practices evolved, frequently as a result of an inadequately planned development strategy.

6.5.2 Equity – Disparity in the Northern and Southern countries

Environmental ethics are concerned with, who owns resources and how they are distributed. This can be looked upon at different levels. At the global level it deals with the great North – South divide between the rich industrialized nations of North America and Europe, as against the needs of developing countries of the South such as in South and Southeast Asia and South America. People living in the economically advanced nations use greater amounts of resources and energy per individual and also waste more resources. This is at the cost of poor people who are resource dependant and live in developing nations.

The economically advanced West has exploited their own natural resources to such an extent that they have exhausted them nearly everywhere. They now buy their resources from resource rich but economically deprived nations at a low cost. This depletes the developing nations of natural resources on which their poor depend for their livelihood.

Changing this unfair economic practice to a more just and fair way in managing trade would require a new thinking on the part of people who live in the super rich countries.

6.5.3 Urban – rural equity issues

The common property of rural communities has increasingly been used to supply the needs of the urban sector. Land itself that was once held as a common property resource of villages is being taken over by the urban and industrial sectors as it expands. The rural sector not only supplies food, but also a part of the energy needs (mainly fuelwood) to most towns and cities in India, at a pittance. As a result, the commons of the rural sector are being depleted of their resources. Thus while the cities get richer, the rural sector, especially the landless, get poorer. The urban rich must appreciate where their resources are derived from and be willing to pay a fair price for using them.

6.5.4 The need for Gender Equity

All over India, especially in the rural sector, women work on the whole longer hours than

men. The life of a woman is enmeshed in an inextricable cycle of poverty. In attempting to eke out a living from their environment, they must constantly collect fuelwood for their homes and for sale to nearby urban areas. They laboriously collect fodder for their cattle. They have to trudge several kilometers to reach a reasonably clean water source. And finally must cook meals in a smoky unhealthy atmosphere on crop waste or other inefficient sources of energy. All this can take 10 to 12 hours a day of very hard work, every day of the year. There is thus the question of who should control the environmental resources of a rural community. Unfortunately it is the men who play a decisive role in managing the village commons and its resources whereas it should be the local women whose lives are deeply linked with the utilisation and conservation patterns of natural resources, who should be decision makers at the local level. Unfortunately women have not been given an equal opportunity to develop and better their lot. This begins with the lack of attention given to girls whose education is always given less attention than the boys in the family. Unless society begins to see that development cannot be planned by a male dominated society from the male perspective alone, will we be able to create a better living environment for women and their children?

The great divide between women and men is most apparent in communities that live near forests and have by tradition made the woman play a greater role than men in collection of natural resources. Women fetch water, collect fuelwood, fruit, medicinal products, etc. day in and day out, while the men work only sporadically in the fields. This disparity in the lives of women and men has also led to a lower access to education and health care for girl children.

This has deep implications for the rate of utilization of natural resources and its conservation. Rural women who are intimately connected to resources, appreciate the value of conserving natural resources more deeply than men. Thus several environmental movements such as Chipko have been more strongly supported by local women folk rather than men.

6.5.5 Preserving resources for future generations:

Can we use up all the resources of the world, leaving nothing for our future generations? This ethical issue must be considered when we use resources unsustainably. If we overuse and misuse resources and energy from fossil fuels, our future generations would find survival much more difficult. A critical concern is to preserve species and natural undisturbed ecosystems that are linked with bioresources, which must be protected for the use of future generations. Our generation does not own the world's resources to do whatever we please with them. Just as our ancestors have left resources for us, it is our duty to leave them behind for our future generations. These unborn people have a right to these resources. We only hold the world as trustees so that future generations can also survive.

Our current development strategies have led to environmental resources being overused and misused by our present generation, without a thought for the needs of future unborn generations. We need to appreciate that the next generation and those that will come later also have a right to the earth's natural resources. As they are not here today to exercise their rights, it is our generation's responsibility to appreciate the needs of future generations. We have no right to destroy their claim to the use of the earth's resources just because of the accident of being born before them. Development strategies have not looked at the sustainable levels at which we can use resources so that the rights of future generations are protected. We are not given the earth so that we can use up its resources. It is given to us to hold in trust so that

future generations are given their just share of the earth's resources.

6.5.6 The rights of animals:

Can man, a single species, use and severely exploit the earth's resources which we share with billions of other plant and animal species? Within our world there are a variety of living beings. The plants and animals that share the earth with us too have a right to live and share our earth's resources and living space. We have no right to push a species that has taken millions of years to evolve towards extinction. Not only do wild and domesticated animals have a right to life, but have the right to a dignified existence. Cruelty to an animal is no different ethically from cruelty to another human being.

> Mahatma Gandhi's philosophy was based on the assumption that human beings were not masters of the other forms of life. He believed that humans were 'trustees of the lower animal kingdom'.

Human beings are one small cog in the wheel of life on earth. We frequently forget that man has learned to exploit nature and other species well beyond what we should use justifiably. Every plant and animal has a right to life as a part of our earth's community of living things. While nature by itself has natural prey-predator relationships, left to itself, nature maintains a balance in each ecosystem. While evolution has developed a system whereby species become extinct and new ones evolve to fill the world's ecosystems with new plant and animal species, it is man alone that has been responsible for the recent rapid decline in the number of species on earth. Much more important man is now reducing the abundance levels of so many species that in the near future we will in all probability create a major extinction spasm on earth that will seriously endanger the existence of mankind. Thus endangering the existence of wild plants and animals and bringing them close to the brink of extinction is not only unfair to a species but also to future generation of people who may find them of great use. Quite apart from the use of these species, there is a strong ethical basis for the rights of animals and plants to exist on earth. Every individual, human or animal, that is living has feelings and emotions. Cruelty to animals is a crime that must be regarded seriously and action must be taken against offenders. Animals have a right to a dignified existence, and their life, well-being and liberty must be respected. While dominating over the animal world due to his superior intelligence, man cannot remain unfeeling to the right to life and well being of other species. There is a growing awareness of animal rights in our country and cruelty to animals is being increasingly regarded as a criminal offence.

CASE STUDY

Chipko movement

About 300 years ago, a ruler in Rajasthan decided to fell 'khejri' trees in his State to create lime. Local women led by a Bishnoi woman, Amrita Devi, clung to the trees to prevent the felling of the trees that formed the basis of the scarce resources on which they were dependent. The women were ruthlessly massacred. It is said that the ruler later realised his mistake. The story however has been remembered and was revived in the 1970s when severe tree felling for timber in the Himalayas prompted local women, supported by people such as Sunderlalji Bahuguna and Chandi Prasad Bhat, led a people's movement to prevent deforestation by timber contractors. They called their movement the 'Chipko' movement in memory of the event during which women had clung to their trees and given up their lives. The movement followed the path the 300 Bishnoi women had taken three centuries ago in Rajasthan.

Chipko is a movement primarily begun and supported by local women in the hills of Uttarakhand and Garhwal, where the women have had to bear the brunt of deforestation. They have not only realised that their fuelwood and fodder resources have receded away from their 'resource use areas' around their settlements due to commercial timber extraction, but that this has led to serious floods and loss of precious soil.

Chipko activists have made long padyatras across the Himalayas protesting against deforestation. The movement has been highly successful and has been primarily supported by empowering local women's groups who are the most seriously affected segment of society by deforestation. The movement has proved to the world that the forests of the hills are the life support systems of local communities of immense value in terms of local produce that is essential for the survival of local people and that the forest has less quantifiable but even more important ecological services such as soil conservation and the maintenance of the natural water regime of the whole region.

The ability of local women to band themselves together in the foothills of the Himalayas goes back to the pre Independence days when women such as Miraben, a disciple of Gandhiji, moved to this region and understood that it was the deforestation that led to floods and devastation of villages in the valleys and in the Gangetic plains below. They also appreciated that substitutions of oak and other broadleaved forests of the Himalayas by planting fast growing pine for timber and resin was an ecological and social disaster which reduced the forest resources used by traditional hill communities.

6.5.7 The ethical basis of environment education and awareness:

Perhaps the most important concern is related to creating an ethos that will support a sustainable lifestyle in society. This brings us to the need for environmental education. The Honorary Supreme Court of our country has thus ordered that every young individual at school and college level be exposed to a course on environment. It is not to create only an awareness of environmental issues, but also to bring about pro environmental action. Among the variety of tools that can bring home the ethical issues of the environment, no solution is as powerful as real life experiences in nature. Creating a love for nature brings about strong pro environmental action. Our current educational processes at

school and college level are being reoriented to bring this about.

The Gandhian way of life

Mahatma Gandhi had deep insights into the need to conserve resources. 'Mans needs but not his greed can be supported by our earth' was an important concept that was initiated by him when people had not realized how short the world would be of resources in future. At the time natural resources seemed to be limitless to most people. This was thus a new concept and suggested the need for a uniquely different pattern of living.

Gandhiji believed in simplistic living to save our earth's resources. He once said that if India was to become an industrial nation on the lines of England, the world itself would be stripped bare of its resources by India's people alone.

Education in nature – The Shantiniketan model

Rabindranath Tagore founded Shantiniketan and taught an environment-based philosophy. Tagore's philosophy of education focused attention on the need for a harmonious association between human beings and their environment. To achieve this he relied on exposing young people to nature. This went back to our roots where in ancient India, learning centers were established in remote forests. Tagore linked these concepts with celebrations of nature through music, dance, drama and poetry. At Shantiniketan, there were celebrations for each season and ceremonial tree planting. He started Vriksha ropan way back in 1928. In fact much of what was initiated in Shantiniketan is now accepted as the route to environment education and sustainable living and is essentially based on preserving nature.

There are two aspects that are closely connected with ethical issues that are related to our environment. These are based on valuing nature and appreciating the beauty of nature and treasuring the magnificence of the wilderness.

Valuing nature as a resource: It is essential that a value system that is based on environmental concern becomes a part of the thinking that we as responsible citizens of our country and our earth need to bring into our own daily lives. For our ancestors, Nature was considered to be like a mother. This has been essentially forgotten. In ancient India, forests were considered sacred. We now know that forests clean up our air, and act like a sponge that can hold water for the dry season. In the Hindu scriptures, Buddhist philosophy and especially in the Jain religion, each and every species on earth is supposed to have a place in the scheme of life. Many species were not only valued, but also venerated.

In today's world where many of us are far removed from nature, we need to remind ourselves that everything we use, if tracked back to its source, has come from nature. We depend on an intact unpolluted world which is based on nature's goods and services. No life is possible without this. If we as citizens begin to again respect Nature and all its varied species forming a complex web of life, and appreciate Nature's functions and services, it will continue to support our lives. If we disrespect nature one cannot expect her to continue to support our well being. Nature's resources that we all use and depend on can only be optimized if they are equitably shared by all of us. If the disparity is too great it can only result in anarchy. The 'have not's' cannot be expected to remain in

abject poverty, making a bare minimum living from the meager resources they can get, while the 'haves', who are already rich become richer through unsustainable consumer oriented, short-term economic development strategies.

Bringing back an ethic for nature conservation requires environment education and conservation awareness. The best way to do so is to expose young people not only to our dependence on natural resources from the wilderness, but by bringing about an appreciation of the beauty and wondrous aspects of nature. This forms a sharp contrast to the sad plight of degraded areas and polluted sites in which most of humanity now lives in the developed and developing world.

Appreciating the beauty of Nature and treasuring the magnificence of the Wilderness: We often take Nature for granted. We rarely take the opportunity to gaze at a scenic sunset, or spend the time to sit in the incredible silence of the forest, or listen to the songs of birds and the sound of the wind rustling through the leaves. Or take the trouble to watch the magic of a seed germinating from the ground and gradually growing into a seedling over several days. Or observe a tree through a round of seasons as it gets new leaves, flowers, fruit and seeds. Or reflect on the incredibly large number of linkages between all the different animals and birds that depend on the seasonal changes in their habitat. It is the beauty of Nature that gives it an intrinsic value which we tend to ignore. These are not mundane day to day events, they are magical and mystical aspects of nature's clock that is ticking silently all around us. They are part of our living throbbing earth. If we fail to enjoy these wondrous aspects of Nature our lives will always remain empty.

Once we realise that the wilderness has a value all its own, this puts man in his rightful role as a custodian of nature rather than an exploiter. Visit a wilderness area, a forest, lakeside, waterfall, or seashore where man's hand has not made drastic changes to the ecosystem and one begins to value its beauty. It is there to heal the human soul and elevate his spirit. Without the wilderness, the earth would be a sad bleak human dominated landscape. The problem is how much of the wilderness can we preserve in the presence of an ever-growing hunger for land and resources for its utilitarian values. Unless we begin to see the ecological values of the wilderness, an ethic for its conservation cannot become part of our daily lives. And without the wilderness the earth will eventually become unlivable.

The concept of *'Karma'* is based on a thinking that the soul moves from man to animal and in reverse depending on ones actions. This itself brings about a concept of the oneness of all forms of life. *Ahimsa* or non-violence towards life which includes all plants and animals provides India with its basic philosophy which early Hindu philosophers and later sages such as Buddha, Mahavir and Mahatma Gandhi spoke of. Buddhist and Jain philosophy is intrinsically woven around non-violence and the great value of all forms of 'life'. It brings in the notion that animals are not to be viewed purely for their utility value but are a part of the earth's oneness which is linked with our own lives as well. In Hindu philosophy the earth itself is respected and venerated. In contrast, in Western thought Nature is to be subjugated and used. These are basic differences in thinking processes. Several modern philosophers in the West have now begun to see these eastern patterns of thought as a new basis for human development. This shift however, from a purely utilitarian or scientific exploitation of Nature, to one of harmony with Nature, can only occur if each of us loves and respects nature's great 'oneness'.

6.5.8 The conservation ethic and traditional value systems of India

In ancient Indian traditions people have always valued mountains, rivers, forests, trees and several animals. Thus much of nature was venerated and protected. Forests have been associated with the names of forest gods and goddesses both in the Hindu religion as well as in tribal cultures. 'Tree' goddesses have been associated with specific plant species. *Ficus religiosa*, the peepal tree, is venerated and is thus not to be cut down. The Banyan tree in some regions such as Maharashtra, is venerated once a year by tying a thread around it as a symbol of respect. The Tulsi plant is grown on the doorstep outside every home.

Patches of forest have been dedicated to a deity in many Indian cultures especially in tribal areas. These traditionally protected forest patches depict the true nature of undisturbed vegetation and have a large number of indigenous plant species as their exploitation has been controlled through local sentiments.

Certain species of trees have been protected as they are valued for their fruit or flowers. The mango tree is protected for its fruit around most farms even when wood becomes scarce. The Mohua tree (*Madhuca indica*) is protected by tribal people as it provides edible flowers, oil from its seeds and is used to make a potent alcohol. Many plants, shrubs and herbs have been used in Indian medicines which were once available in the wild in plenty. These are now rapidly vanishing. Many species of animals are venerated as being the 'vahan' or vehicle of different gods on which they are said to travel through the cosmos.

In Indian mythology, the elephant is associated with Ganesha. The elephant headed Ganesha is also linked to the rat. Vishnu is associated with the eagle. Rama is linked to monkeys. In mythology, Hanuman, the monkey god, rendered invaluable help to Rama during his travels to Lanka. The Sun god, Surya, rides a horse and has a superb chariot on which he moves through the sky. The lion is linked to Durga and the blackbuck to the moon godess. The cow is associated with Krishna. Vishnu's incarnations have been represented as taking various animal forms which serially include, fish, tortoise, a boar and a dwarf, and a half man half lion form.

The associations to various plants that have been given a religious significance include Tulsi, which is linked to Lakshmi and Vishnu. The Tulsi plant is also linked to the worship of ones own ancestors. The peepal tree is said to be the tree under which Buddha attained enlightenment. It is also associated with Vishnu and Krishna. Several trees are associated with the goddess Laxmi, including Amalaki, Mango and the Tulsi shrub.

Traditions also held that these species, which were considered as an important aspect of Nature, were the basis of local life support systems and were integral to bringing about a harmonious life. In traditional societies of the past, these examples were all a part of ethical values that protected nature. As modern science based on the exploitation on nature spread into India, many of these traditions began to lose their effectiveness as measures that led to conserving nature.

Concepts that support nature's integrity must thus become a part of our modern educational systems. This constitutes a key solution to bring about a new ethic of conserving nature and living sustainable lifestyles.

6.6 CLIMATE CHANGE, GLOBAL WARMING, ACID RAIN, OZONE LAYER DEPLETION, NUCLEAR ACCIDENTS AND HOLOCAUST

6.6.1 Climate change:

The average temperature in many regions has been increasing in recent decades. The global average surface temperature has increased by 0.6° + 0.2° C over the last century. Globally, 1998 was the warmest year and the 1990s the warmest decade on record. Many countries have experienced increases in rainfall, particularly in the countries situated in the mid to high latitudes.

In some regions, such as parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades. Episodes of El Niño, which creates great storms, have been more frequent, persistent and intense since mid-1970s compared with the previous 100 years. All these are signs that the earth is sick. Its climate is changing, making it more difficult for mankind to survive. The earth is losing its ability to balance itself due to the imbalances created by human activities.

Projections of future climate change are derived from a series of experiments made by computer based global climate models. These are worked out on estimates of aspects such as future population growth and energy use. Climatologists of the Intergovernmental Panel on Climate Change (IPCC) have reviewed the results of several experiments in order to estimate changes in climate in the course of this century. These studies have shown that in the near future, the global mean surface temperature will rise by 1.4° to 5.8°C. Warming will be greatest over land areas, and at high latitudes. The projected rate of warming is greater than has occurred in the last 10,000 years. The frequency of weather extremes is likely to increase leading to floods or drought. There will be fewer cold spells but more heat waves. The frequency and intensity of El Niño is likely to increase. Global mean sea level is projected to rise by 9 to 88 cm by the year 2100. More than half of the world's population now lives within 60km of the sea. They are likely to be seriously impacted by an ingress of salt water and by the rising sea. Some of the most vulnerable regions are the Nile delta in Egypt, the Ganges-Brahmaputra delta in Bangladesh, and many small islands including the Marshall Islands and the Maldives, (WHO, 2001).

Human societies will be seriously affected by extremes of climate such as droughts and floods. A changing climate would bring about changes in the frequency and/or intensity of these extremes. This is a major concern for human health. To a large extent, public health depends on safe drinking water, sufficient food, secure shelter, and good social conditions. All these factors are affected by climate change. Fresh water supplies may be seriously affected, reducing the availability of clean water for drinking and washing during drought as well as floods. Water can be contaminated and sewage systems may be damaged. The risk of spread of infectious diseases such as diarrhoeal diseases will increase. Food production will be seriously reduced in vulnerable regions directly and also indirectly through an increase in pests and plant or animal diseases. The local reduction in food production would lead to starvation and malnutrition with long-term health consequences, especially for children. Food and water shortages may lead to conflicts in vulnerable regions, with serious implications for public health. Climate change related impacts on human health could lead to displacement of a large number of people, creating environmental refugees and lead to further health issues.

Changes in climate may affect the distribution of vector species (e.g. mosquitoes) which in turn will increase the spread of disease, such as malaria and filariasis, to new areas which lack a strong public health infrastructure. The seasonal transmission and distribution of many diseases

that are transmitted by mosquitoes (dengue, yellow fever) and by ticks (Lyme disease, tick-borne encephalitis) may spread due to climate change.

CASE STUDIES

Damage to coral reefs, Pacific

The severity of periodic warming due to El Nino in 1997 in the Pacific led to the most serious death in coral ever known. It is estimated that about 10% of the Earth's coral reefs were dead, another 30 % were seriously affected and another 30% were degraded.

The Global Coral Reef Monitoring Network Townsville, Australia, has predicted that all the reefs could be dead by 2050.

Butterfly populations in the United Kingdom

Global warming is leading to an early arrival of butterflies in Britain. Scientists say that butterflies can now be spotted much earlier every year in the last two decades. Some, like the red admiral, can now be seen a month earlier than was the case in the mid – 1970s. Others, like the peacock and the orange tip are appearing between 15 and 25 days earlier than in the past. Future rise in temperature is likely to have a detrimental effect on these butterflies. Some butterflies which need cooler temperatures might suffer.

A Task Group set up by WHO has warned that climate change may have serious impacts on human health. Climate change will increase various current health problems, and may also bring new and unexpected ones. Strategies aimed at reducing potential health impacts of anticipated climate changes should include monitoring of infectious diseases and disease vectors to detect early changes in the incidence of diseases and the geographical distribution of vectors; environmental management measures to reduce risk; disaster preparedness for floods or droughts; and their health related consequences. It will be necessary to create early warning systems and education for epidemic preparedness. Improved water and air pollution control will become increasingly essential for human health. Public education will have to be directed at changes in personal behaviour. Training of researchers and health professionals must become an essential part of the world becoming more responsible towards the expected outcome of Global Climate Change (GCC).

6.6.2 Global warming:

About 75% of the solar energy reaching the Earth is absorbed on the earth's surface which increases its temperature. The rest of the heat radiates back to the atmosphere. Some of the heat is trapped by greenhouse gases, mostly carbon dioxide. As carbon dioxide is released by various human activities, it is rapidly increasing. This is causing global warming.

The average surface temperature is about 15°C. This is about 33°C higher than it would be in the absence of the greenhouse effect. Without such gases most of the Earth's surface would be frozen with a mean air temperature of -18°C.

Human activities during the last few decades of industrialisation and population growth have polluted the atmosphere to the extent that it has begun to seriously affect the climate. Carbon dioxide in the atmosphere has increased by 31% since pre-industrial times, causing more heat to be trapped in the lower atmosphere. There is evidence to show that carbon dioxide

levels are still increasing. Many countries have signed a convention to reduce greenhouse gases under the United Nations Convention on Climate Change. Current international agreements are however not still effective to prevent the significant changes in climate and a rise in sea levels.

Global warming is accelerating faster than what climatologists had calculated a few years ago. In 1995, the Intergovernmental Panel on Climate Change predict that global warming would rise temperatures by 3.5 to 10 degrees Centigrade during the 21st century, if the present trends continue. It is now believed that this could be much greater. This would lead to not only temperature changes but in the amount of rainfall. India may see great annual fluctuations in rainfall leading to floods and drought.

6.6.3 Acid rain:

When fossil fuels such as coal, oil and natural gas are burned, chemicals like sulfur dioxide and nitrogen oxides are produced. These chemicals react with water and other chemicals in the air to form sulfuric acid, nitric acid and other harmful pollutants like sulfates and nitrates. These acid pollutants spread upwards into the atmosphere, and are carried by air currents, to finally return to the ground in the form of acid rain, fog or snow. The corrosive nature of acid rain causes many forms of environmental damage. Acid pollutants also occur as dry particles and gases, which when washed from the ground by rain, add to the acids in the rain to form a more corrosive solution. This is called acid deposition.

Damage from acid rain is widespread in North America, Europe, Japan, China and Southeast Asia. In the US coal burning power plants contribute to about 70% of sulfur dioxide. In Canada oil refining, metal smelting and other industrial activities account for 61% of sulfur dioxide pollution. Motor vehicle exhaust fumes are the main source of nitrogen oxides. The acids in acid rain chemically react with any object they come in contact with. Acids react with other chemicals by giving up hydrogen atoms.

Effects: Acid rain is known to cause widespread environmental damage.

1. Acid rain dissolves and washes away nutrients in the soil which are needed by plants. It can also dissolve naturally occurring toxic substances like aluminium and mercury, freeing them to pollute water or poison plants.

2. Acid rain indirectly affects plants by removing nutrients from the soil in which they grow. It affects trees more directly by creating holes in the waxy coating of leaves, causing brown dead spots which affect the plant's photosynthesis. Such trees are also more vulnerable to insect infestations, drought and cold. Spruce and fir forests at higher elevations seem to be most at risk. Farm crops are less affected by acid rain than forests.

3. Acid rain that falls or flows as ground water to reach rivers, lakes and wetlands, causes the water in them to become acidic. This affects plant and animal life in aquatic ecosystems.

4. Acid rain also has far reaching effects on wildlife. By adversely affecting one species, the entire food chain is disrupted, ultimately endangering the entire ecosystem. Different aquatic species can tolerate different levels of acidity. For instance clams and mayflies have a high mortality when water has a pH of 6.0, while frogs can tolerate more acidic water, although with the decline in supply of mayflies, frog populations may also decline. Land animals that are de-

pendent on aquatic organisms are also affected.

5. Acid rain and dry acid deposition damages buildings, automobiles, and other structures made of stone or metal. The acid corrodes the materials causing extensive damage and ruins historic buildings. For instance the Parthenon in Greece and the Taj Mahal in India have been affected by acid rain.

6. Although surface water polluted by acid rain does not directly harm people, the toxic substances leached from soil can pollute water supply. Fish caught in these waters may be harmful for human consumption. Acid, along with other chemicals in the air, produces urban smog, which causes respiratory problems.

Solutions: The best way to stop the formation of acid rain is to reduce the emissions of sulfur dioxide and nitrogen oxides into the atmosphere. This can be achieved by using less energy from fossil fuels in power plants, vehicles and industry. Switching to cleaner burning fuels is also a way out. For instance using natural gas which is cleaner than coal, using coal with lower sulfur content, and developing more efficient vehicles. If the pollutants have already been formed by burning fossil fuels, they can be prevented from entering the atmosphere by using scrubbers in smokestacks in industry. These spray a mixture of water and limestone into the polluting gases, recapturing the sulfur.

In catalytic converters, the gases are passed over metal coated beads that convert harmful chemicals into less harmful ones. These are used in cars to reduce the effects of exhaust fumes on the atmosphere. Once acid rain has affected soil, powdered limestone can be added to the soil by a process known as liming to neutralize the acidity of the soil.

6.6.4 Ozone layer depletion:

Ozone is formed by the action of sunlight on oxygen. It forms a layer 20 to 50kms above the surface of the earth. This action takes place naturally in the atmosphere, but is very slow. Ozone is a highly poisonous gas with a strong odour. It is a form of oxygen that has three atoms in each molecule. It is considered a pollutant at ground level and constitutes a health hazard by causing respiratory ailments like asthma and bronchitis. It also causes harm to vegetation and leads to a deterioration of certain materials like plastic and rubber. Ozone in the upper atmosphere however, is vital to all life as it protects the earth from the sun's harmful ultraviolet radiation. The ozone layer in the upper atmosphere absorbs the sun's ultraviolet radiation, preventing it from reaching the earth's surface.

This layer in the atmosphere protects life on earth from the dangerous UV radiation from the sun. In the 1970s, scientists discovered that chemicals called chlorofluorocarbons or CFCs, which were used as refrigerants and aerosol spray propellants, posed a threat to the ozone layer. The CFC molecules are virtually indestructible until they reach the stratosphere, where UV radiation breaks them down to release chlorine atoms. The chlorine atoms react with ozone molecules which break down into oxygen molecules, which do not absorb UV radiations. Since the early 1980s, scientists detected a thinning of the ozone layer in the atmosphere above Antarctica. This phenomenon is now being detected in other places as well including Australia. Although the use of CFCs has been reduced and now banned in most countries, other chemicals and industrial compounds such as bromine, halocarbons and nitrous oxides from fertilizers may also attack the ozone layer.

The destruction of the ozone layer is seen to cause increased cases of skin cancer and cataracts. It also causes damage to certain crops and

to plankton, thus affecting natures food chains and food webs. This in turn causes an increase in carbon dioxide due to the decrease in vegetation.

With the signing of the Montreal Protocol in 1987, a treaty for the protection of the ozone layer, the use of CFCs was to be banned by the year 2000. After 2000, the ozone layer is expected to recover slowly over a period of about 50 years.

6.6.5 Nuclear Accidents and Nuclear Holocaust:

Nuclear energy was researched and discovered by man as a source of alternate energy which would be clean and cheap compared to fossil fuels. And although this did happen, along with the benefits of nuclear energy came its downfalls. In the short history of nuclear energy there have been accidents that have surpassed any natural calamity or other energy source extraction in their impacts. A single nuclear accident can cause loss of life, long-term illness and destruction of property on a large scale for a long period of time. Radioactivity and radioactive fallout leads to cancer, genetic disorders and death in the affected area for decades after, thus affecting all forms of life for generations to come.

CASE STUDY

Nuclear disasters and leakages

In 1986 the Nuclear Power Station at Chernobyl in USSR developed a problem that led to a fire and a number of explosions in its Nuclear Reactor. The radioactive dust spread over many kilometers and covered not only Europe but North America as well. Three people died in the explosion and 28 shortly after due to radiation exposure. Some 259 sick were hospitalized. As the area had to be evacuated 1,35,000 people had to be moved immediately and another 1.5 lac by 1991. As radioactive fall out continued even more people had to be moved. An estimated 6.5 lakh people may have been seriously affected. They may get cancer, thyroid tumours, and cataracts, and suffer from a lowered immune mechanism.

As radioactivity passes from grass to herbivores, sheep in Scotland and Reindeer in Lapland were affected and were unfit for human consumption. Vegetable, fruit and milk were contaminated in Europe.

A French Nuclear Waste Processing Center in Normandy may have affected the lives of children playing nearby. They may develop leukemia (blood cancer) in later life.

Nuclear holocaust:
The use of nuclear energy in war has had devastating effects on man and earth. The Hiroshima and Nagasaki incident during World War II, the only use of nuclear power in war in history, is one of the worst disasters in history. In 1945, the United States dropped atomic bombs in Japan over the towns of Hiroshima and Nagasaki. These two atomic bombs killed thousands of people, left many thousands injured and devastated everything for miles

around. The effects of the radiation from these nuclear bombs can still be seen today in the form of cancer and genetic mutations in the affected children and survivors of the incident.

6.7 WASTELAND RECLAMATION

Loss of vegetation cover leads to loss of soil through erosion, which ultimately creates wastelands. This is one of the pressing problems of the country. Loss of soil has already ruined a large amount of cultivable land in our country. If it remains unchecked, it will affect the remaining land. Unless we adequately safeguard our 'good' lands, we may eventually face a serious shortage of food grains, vegetables, fruit, fodder and fuel wood. Hence, conservation of soil, protecting the existing cultivable land and reclaiming the already depleted wastelands figures prominently among the priority tasks of planning for the future. Some of the wasteland reclamation programs have been unsuccessful because after sometime the land reverts to its original poor condition due to mismanagement and unscientific ways in which the reclamation has been carried out.

In choosing wasteland reclamation methods attention must be paid to the cost factor. This has to be taken into account before deciding on a particular method for reclamation of wastelands. A proper study of environmental aspects and human impacts which are responsible for the development of wastelands have to be looked into.

Wasteland can be classified into three forms: (1) Easily reclaimable, (2) Reclaimable with some difficulty, (3) Reclaimable with extreme difficulty.

Easily reclaimable wastelands can be used for agricultural purposes. Those which can be reclaimed with some difficulty can be utilized for agro forestry. Wastelands that are reclaimed with extreme difficulty can be used for forestry or to recreate natural ecosystems.

Agriculture: Wasteland can be reclaimed for agriculture by reducing the salt content which can be done by leaching and flushing. Gypsum, urea, potash and compost are added before planting crops in such areas.

Agro forestry: This involves putting land to multiple uses. Its main purpose is to have trees and crops inter- and /or under planted to form an integrated system of biological production within a certain area. Thus, agro forestry implies integration of trees with agricultural crops or livestock management simultaneously.

Forestry: Attempts to grow trees in highly non alkaline saline soils have been largely unsuccessful. Field experiments have shown that species like Eucalyptus, Prosopis and Acacia Nilotica could not be grown in highly alkaline soil. Studies have shown that if tree seedlings are planted with a mixture of original soil, Gypsum, and manure, better growth can be achieved. It is however important to use indigenous species of trees so that the program recreates the local ecosystem with all its species.

Need for wasteland development:
Wasteland development provides a source of income for the rural poor. It ensures a constant supply of fuel, fodder and timber for local use. It makes the soil fertile by preventing soil erosion and conserving moisture. The program helps maintain an ecological balance in the area. The increasing forest cover helps in maintaining local climatic conditions. Regenerated vegetation cover helps in attracting birds which feed on pests in the surrounding fields and function as natural pest controllers. The trees help in holding back moisture and reduce surface run off rates thus helping in the control of soil erosion.

Components of wasteland reclamation:
The first major task is the identification of the problem at the micro level. For this it is necessary to have District, Village and plot level surveys of the wasteland. A profile of the maps indicating the detailed distribution and information on the wasteland is essential. With the help of local government institutions such as the village Panchayats, along with Block Development Officers, Revenue Department functionaries, a plan based on the community needs must be produced. This must be done through a participatory exercise that involves all the different stakeholders in the community. A think-tank of administrators, ecologists, and local NGOs must also be involved in the process.

The next step is to identify the factors that are responsible for the formation of wastelands. Based on these factors the wasteland is classified into: marginally, partially or severely deteriorated lands. Locale specific strategies for reclaiming the wasteland must be worked out. Government officials along with the local NGOs must assist the farmers by demonstrating improved methods of cultivation, arranging for loans for the small, marginal and landless farmers and the people from the weaker sections of the society. Involving local women has proved to be of great value. Another essential component of the program is to organize publicity campaigns, integrated with training farmers and frontline Government and Forest Department staff on the various aspects of wasteland utilization. Environmental scientists can help by suggesting the necessary changes in cropping patterns particularly for drought prone areas. Other tasks that should be addressed include the selection of appropriate crops for fodder and trees that provide local people with non-wooded forest products according to the nature of the wasteland. Testing soil in laboratories provides guidance to the farmers on the proper land management to be used. Irrigation and other expertise needed for improving productivity without creating unsustainable patterns of development provide the local people with newer technological advances. Guidelines regarding control of water logging must be provided. Appropriate technologies must be made available to people belonging to the weaker sections and landless farmers. Collective efforts have to be made to check soil losses through water and wind erosion to prevent the collapse of the irrigation system through siltation. Plans concerning wasteland reclamation and utilization prepared at various stages must be properly integrated for a successful long-term outcome.

CASE STUDY

Tehri, Uttar Pradesh

Nagchaund village in Tehri District of Uttar Pradesh was once an eroded and deforested land. When Soban Singh Bhandari returned to his village after retirement from the army in 1987 he was struck by this degradation. After six months he became the *pradhan* of the village and decided to implement various village development schemes differently. Through the Jawahar Rozgar Yojana, he gained immense community support. In 1990 the Forest Department selected a 30-hectare barren piece of community land for a micro-watershed development program. The villagers controlled grazing in the area, undertook plantations for fuel and fodder. Bhandari helped the village raise money by selling the fodder from the area to a neighboring village and the money was used for development and maintenance work. This community effort has had a great impact on the ecology of the area. The moisture content of the area increased and the water sources of the villages were recharged. Local people now have access to all the natural resources they need for their daily lives.

The demands of our increasing human population for environmental goods and services has imposed severe pressures on the available land resources especially on the forests and green cover. This is closely linked to the wellbeing of the rural population which constitutes a large percent of the population which depends on local natural resources for their survival. The increasing demand for food, fodder, fuel wood, etc. has led to activities that are responsible for increasing environmental degradation. This is responsible for the extension of wastelands. Thus the development of agro forestry based agriculture and forestry has become the prime prerequisite for an overall development of the economy in the country. The pressure on land is already very high and the only hope of increasing productivity lies in bringing appropriate improvement in the various categories of wasteland spread over the country.

6.8 CONSUMERISM AND WASTE PRODUCTS

Modern societies that are based on using large amounts of goods, especially those that are manufactured for one time use, are extremely wasteful. The increasing consumption of natural resources has lead to serious environmental problems around the world. Current consumption patterns are depleting non-renewable resources, poisoning and degrading ecosystems, and altering the natural processes on which life depends. The present pattern of consumption, especially in affluent societies, is mainly responsible for the high level of utilization of resources. People in the industrialized countries make up 20% of the world population but consume 80% of the world's resources and produce 80% of wastes. This is due to a pattern of economic development that ensures that people go on consuming even more than they actually need. India is rapidly moving into this unsustainable pattern of economic growth and development. The rich in such a society get richer often at the cost of the poor whose lives are not improved by the process of development. It is seen that today's consumption patterns are depleting natural resources at a rapid rate and widening the inequalities in consumption in different societies. Consumerism causes wasteful use of energy and material far beyond that needed for everyday living at a comfortable level. Money is not the only way to measure the cost of an item that we use. When one adds up all the raw material and energy that goes into the manufacture of goods or the services provided by nature that one uses during a day's activities, the toll on the environment is large. When this cost is multiplied over a lifespan, the amount is staggering. If one considered the overutilisation in each family, city or a country, the impacts are incredibly high. For example: two hundred billion cans, bottles, plastic cartons and paper cups, are thrown away each year in the "developed" world. "Disposable" items greatly increase this waste. Rather than compete on quality or reliability, many industrial consumer products are made for one-time use. Buying quality products that are warranteed against failure or wearing out, learning about the raw materials that things are made of, and an appreciation of their origin from nature's storehouse, as well as knowing the conditions of the workers that make them, are some ways of resisting consumerism and decreasing waste.

CASE STUDY

Himachal Pradesh was the first State in India to regulate the manufacture and use of plastics. The State proposed a ban on all types of polythene packing.

While there may be some new appliances and cars that are more productive and energy efficient, discarding the old often leads to an almost total waste of the energy and material already invested in these products. This alone

may more than nullify the energy savings of the new product. This is a tricky problem.

Consumerism is related to the constant purchasing of new goods, with little attention to their true need, durability, product origin, or the environmental consequences of their manufacture and disposal. Consumerism is driven by huge sums spent on advertising designed to create both a desire to follow trends, and a personal feeling of satisfaction based on acquisition. Materialism is one of the end results of consumerism.

Consumerism interferes with the sustainable use of resources in a society by replacing the normal common sense desire for an adequate supply of life's necessities, with an insatiable quest for things that are purchased by larger and larger incomes to buy them. There is little regard for the true utility of what is bought. An intended consequence of this strategy which is promoted by those who profit from consumerism, is to accelerate the discarding of the old, either because of lack of durability or a change in fashion. Especially in developed countries, landfills are being rapidly filled with cheap discarded products that fail to work within a short time and cannot be repaired. In many cases consumer products are made psychologically obsolete by the advertising industry long before they actually wear out.

The inordinate amount of waste that is generated by consumer-oriented societies around the world is now a serious environmental issue. Most human activities are related to production and consumption cycles which produce excessive amounts of waste in the form of solid, liquid and gaseous waste products. The problems of waste management in the urban and rural sectors are different. Rural communities that were smaller, once had a limited amount of waste which was recycled as the communities used them effectively. With the advent of an industrial civilization the highly complex technological processes for production of goods has rapidly increased problems due to inadequate waste disposal. This creates a heavy burden on natural resources, degrades the environment and creates health hazards. With the rapid increase in population, the amount of waste in terms of quantity and quality has increased waste management pressures many fold in recent years. If the high quantities of waste generated continues, mankind will be drowned under heaps of garbage, and streams of sewage. His health will be affected by dangerous industrial effluents, and he will be smothered by clouds of smoke and unhealthy gases. Human civilisation will run out of resources, preventing further development.

The increasing demands of consumption on the finite resources of the planet, increasing level of environmental pollution, and the problems of waste disposal must be changed to the careful utilization of resources, recovery of used material by waste recycling. Therefore reuse of goods and waste utilization should become a part of the production -consumption cycle. Utilizing various forms of waste must be made a part of the planning and development process. Current patters in the industrial sector have led to the disposal of waste in a careless uneconomical manner. Burning or dumping wastes into streams and oceans, or creating more landfills damages the environment. For example it is estimated that the per capita production of domestic waste is many times higher in a developed country when compared to a developing country. Unfortunately, many developing countries are now working out similar wasteful trends through development, but do not have the same economic potential to handle the waste this new unsustainable strategy produces. Large quantities of solid, liquid and gaseous waste is produced by urban industrial communities in the form of plastic, paper, leather, tin cans, bottles, mineral refuse, and pathological waste from hospitals. Dead animals, agricultural wastes, fertilizer and pesticide overuse, and human and

animal excreta are essentially rural concerns. The waste is either discharged into the atmosphere, into water sources, or buried underground. These wastes are not considered to have any economic value. This attitude towards waste has led to disastrous effects on the environment besides over exploiting natural resources.

Reduce, reuse, recycle

Reduce, Reuse, Recycle, or the 3Rs principle, is the new concept in waste management. But what does it actually mean? Although some waste is inevitable in any society, we must minimize the generation of waste at the source by using minimal resources. Do not use what you do not need. The goal of every society should be to reach a low-waste or no waste society.

Eg. Fancy packaging of consumer products in two or three layers is not necessary.

Use your own reusable cloth/ jute bags instead of plastic bags.

The residual waste can be converted into a useable resource. In developed countries waste is used to produce energy.

Several technological breakthroughs have recently been made to recover material from industrial waste such as heavy metals and chemicals such as mercury and nitric acid. Thus the waste does not remain a waste product anymore, but becomes a useful resource.

Eg. Using kitchen wet waste to make compost that can be used as an organic fertilizer.

Using sewage in a biogas plant to make fuel.

One industry's waste could be a valuable resource for another industry.

Eg. Cloth rags from the textile industry are bought and used by paper and other industries.

Bagasse, a waste product of the sugar industry, is used in the paper, ply industries.

The material left over after extraction of oil from seeds is used as cattle feed.

CASE STUDY

Plastic to oil

The Indian Oil Corporation Limited and the Department of Science and Technology are expected to establish India's first plant to convert waste plastic into petrol, diesel and LPG.

The generated waste or discarded material that cannot be used again in its original form can be sent back to the industry to be broken down and used as a resource to be made into a new product of the same type or into something entirely different.

Eg. Plastic items are recycled into new plastic products.

Metal scrap and broken glass is used to make new metal products.

Finally, the waste material generated which can neither be reused or recycled, must be disposed off in a proper manner with minimum impact to the environment.

- Non toxic solid waste should be properly segregated and disposed off in landfills that are properly sealed to avoid leakage and contamination of surrounding land and groundwater.

- Toxic wastes should be treated or disposed off separately in a proper manner.

- Sewage and industrial wastewater should be adequately treated and raw materials recovered from it where possible before it is released into our rivers and waterways.

The 3R principle of Reduce, Reuse, Recycle, should be followed in that order.

- Reduction is the best option. If we reduce at source, there is a smaller chance of waste generation and the pressure on our already stretched natural resources is reduced.

- Reuse is the next best option, as the product is reused in its current form without any energy expended to convert it into a new item.

- Recycling is the last option, as although it converts a waste into a resource, it uses energy to transform that resource into a new useable product.

Thus by following the 'Reduce, Reuse, Recycle' principle, i.e. by reducing use at source, by reusing and recycling whatever possible and finally by proper disposal of residual waste, we can cut down or the waste generated and ensure that the minimal residual waste does not harm our environment. This principle can be followed by everyone, from an individual or an industry to a whole country.

What can I do? You can follow the 3Rs principle in the following ways:

1. Use only as much as you need, be it any resource – water, food, paper, etc.

2. Next time you throw away something, think about whether it is really a waste. If it is of no use to you, could someone else use it?
   Reuse rinse water to water your garden, etc.
   Donate old clothes to the needy, instead of throwing them away.

3. If you are sure the item is not usable in its present form, can it be recycled? Paper, plastics, glass, metal can all be recycled.

4. Segregate your waste into wet and dry garbage. Wet garbage includes most kitchen wastes. Most of this can be used for composting. Most dry garbage is recyclable.

The amount of dry waste generated in your household is an indicator of how well you are following the 3Rs principle. A lot of dry waste means you should go back to the 'Reduce and Reuse' principles and try to follow them better.

5. Avoid the use of non-biodegradable materials such as Styrofoam and certain types of plastics.

Although most plastics are recyclable, recycling still takes up energy, which is another precious resource not to be wasted. If thrown away as waste, Styrofoam and plastics can take hundreds of years to decompose.

6. Do not litter or throw garbage in public places. Garbage and litter is a visual contaminant and can cause diseases health problems. Proper disposal of garbage is an important part of waste management.

7. Be a conscious consumer and do not buy products that are over packaged. Try choosing products that are made from recycled material or are organically grown.

Suggestions for better waste management:

1) Every country must survey all the different forms of waste generation along with its sources. They must set up priorities concerning waste utilization. Most waste can be converted to resources which can enhance the economy of the country.
2) Plans should be prepared for controlling waste at the source. This must include segregation of wet and dry waste, where the wet waste can be converted to compost and used and the dry waste is recycled.
3) Research and developmental programs to find innovative methods of waste recycling must be encouraged. Recycling should be a part of conservation and environmental protection programs. Private and public organizations for waste recycling and management should be set up.
4) Uneconomical methods of waste disposal like land filling, or incineration must be reduced to a minimum. Plans for appropriate disposal of non-utilizable hazardous waste from chemical industries must be implemented and strictly monitored.
5) Every community should organize extensive programs on education and demonstration on the reduction of waste, and the proper disposal and effective reutilization of waste material. People should be informed of the need for waste management to protect the quality of the environment. This should be included in the curriculum at school and college level.
6) Every society should make efforts to design peoples' life styles and cultural patterns based on low waste production. The goal of every society should be to reach a low-waste or no waste society.

Resources must be conserved by proper selection, production technologies, recovering and recycling what is usable and reducing unnecessary demands for consumption and inventing technologies which would make it possible for reusing the waste resources so as to reduce over-exploiting of our existing resources.

6.9 THE ENVIRONMENT (PROTECTION) ACT

The Environment (Protection) Act, 1986 not only has important constitutional implications but also an international background. The spirit of the proclamation adopted by the United Nations Conference on Human Environment which took place in Stockholm in June 1972, was implemented by the Government of India by creating this Act.

Although there were several existing laws that dealt directly or indirectly with environmental issues it was necessary to have a general legislation for environmental protection because the existing laws focused on very specific types of pollution, or specific categories of hazardous substances or were indirectly related to the environment through laws that control landuse, protect our National Parks and Sanctuaries and our wildlife. However there were no overarching legislation and certain areas of environmental hazards were not covered. There were also gaps in areas that were potential environmental hazards and there were several inadequate linkages in handling matters of industrial and environmental safety. This was essentially related to the multiplicity of regulatory agencies. Thus there was a need for an authority which could assume the lead role for studying, planning and implementing long term requirements of environmental safety and give directions to, as well as coordinate a system of speedy and adequate response to emergency situations threatening the environment.

This Act was thus passed to protect the environment, as there was a growing concern over the deteriorating state of the environment. As impacts grew considerably environmental protection became a national priority in the 1970s. The decline in the environmental quality, was evidenced by increasing pollution, loss of forest cover and an increasing threat to biodiversity.

The presence of excessive concentrations of harmful chemicals in the atmosphere and aquatic ecosystems leads to the disruption of food chains and a loss of species. These are symptoms of a rapidly deteriorating environment. The growing risks of environmental accidents and threats to life support systems now looms threateningly over our civilisation. The decision taken at the conference in Stockholm strongly voiced these environmental concerns and several measures were made possible for environmental protection. While the need for a wider general legislation to protect our environment is now in place, it has become increasingly evident that our environmental situation continues to deteriorate. We need to implement this Act much more aggressively if our environment is to be protected.

Public concern and support is crucial for implementing the EPA. This must be supported by an enlightened media, good administrators, highly aware policy makers, informed judiciary and trained technocrats who together can influence and prevent further degradation of our environment. Each of us has a responsibility to make this happen.

6.10 THE AIR (PREVENTION AND CONTROL OF POLLUTION) ACT

The Government passed this Act in 1981 to clean up our air by controlling pollution. Sources of air pollution such as industry, vehicles, power plants, etc. are not permitted to release particulate matter, lead, carbon monoxide, sulfur dioxide, nitrogen oxide, volatile organic compounds (VOCs) or other toxic substances beyond a prescribed level. To ensure this, Pollution Control Boards (PCBs) have been set up by Government to measure pollution levels in the atmosphere and at certain sources by testing the air. This is measured in parts per million or in milligrams or micrograms per cubic meter. The particulate matter and gases that are released by industry and by cars, buses and two wheelers is measured by using air sampling equipment. However, the most important aspect is for people themselves to appreciate the dangers of air pollution and reduce their own potential as polluters by seeing that their own vehicles or the industry they work in reduces levels of emissions.

This Act is created 'to take appropriate steps for the preservation of the natural resources of the earth which among other things includes the preservation of high quality air and ensures controlling the level of air pollution.

The main objectives of the Act are as follows:

(a) To provide for the Prevention, Control and abatement of air pollution.

(b) To provide for the establishment of Central and State Boards with a view to implement the Act.

(c) To confer on the Boards the powers to implement the provisions of the Act and assign to the Boards functions relating to pollution.

Air pollution is more acute in heavily industrialized and urbanized areas, which are also densely populated. The presence of pollution beyond certain limits due to various pollutants discharged through industrial emission are monitored by the Pollution Control Boards set up in every State.

Powers and Functions of the Boards

Central Board: The main function of the Central Board is to implement legislation created to improve the quality of air and to prevent and control air pollution in the country. The Board advises the Central Government on matters concerning the improvement of air quality and also coordinates activities, provides technical assistance and guidance to State Boards and lays down standards for the quality of air. It collects and disseminates information in respect of matters relating to air pollution and performs functions as prescribed in the Act.

State Pollution Control Boards: The State Boards have the power to advice the State Government on any matter concerning the prevention and control of air pollution. They have the right to inspect at all reasonable times any control equipment, industrial plant, or manufacturing process and give orders to take the necessary steps to control pollution. They are expected to inspect air pollution control areas at intervals or whenever necessary. They are empowered to provide standards for emissions to be laid down for different industrial plants with regard to quantity and composition of emission of air pollutants into the atmosphere. A State Board may establish or recognize a laboratory to perform this function.

The State Governments have been given powers to declare air pollution control areas after consulting with the State Board and also give instructions for ensuring standards of emission from automobiles and restriction on use of certain industrial plants.

Penalties: Persons managing industry are to be penalized if they produce emissions of air pollutants in excess of the standards laid down by the State Board. The Board also makes applications to the court for restraining persons causing air pollution.

Whoever contravenes any of the provision of the Act or any order or direction issued is punishable with imprisonment for a term which may extend to three months or with a fine of Rs.10,000 or with both ,and in case of continuing offence with an additional fine which may extend to Rs 5,000 for every day during which such contravention continues after conviction for the first contravention.

What can an individual do to control air pollution?

1) When you see a polluting vehicle take down the number and send a letter to the Road Transport Office (RTO) and the Pollution Control Board (PCB).

2) If you observe an industry polluting air, inform the Pollution Control Board in writing and ascertain if action is taken.

3) Use cars only when absolutely necessary. Walk or cycle as much as possible instead of using fossil fuel powered vehicles.

4) Use public transport as far as possible, as more people can travel in a single large vehicle rather than using multiple small vehicles which add to pollution.

5) Share a vehicle space with relatives and friends. Carpools minimise the use of fossil fuels.

6) Do not use air fresheners and other aerosols and sprays which contain CFCs that deplete the ozone layer.

7) Do not smoke in a public place. It is illegal and endangers not only your own health but also that of others.

8) Coughing can spread bacteria and viruses. Use a handkerchief to prevent droplet in-

fection which is air borne. It endangers the health of other people.

It is a citizen's duty to report to the local authorities such as the Collector or the Pollution Control Board, and the press about offences made by a polluter so that action can be taken against the offender. It is equally important to prevent and report to the authorities on cutting down of trees, as this reduces nature's ability to maintain the carbon dioxide and oxygen levels. preventing air pollution and preserving the quality of our air is a responsibility that each individual must support so that we can breathe air that will not destroy our health.

6.11 THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT

The Government has formulated this Act in 1974 to be able to prevent pollution of water by industrial, agricultural and household wastewater that can contaminate our water sources. Wastewater with high levels of pollutants that enter wetlands, rivers, lakes, wells as well as the sea are serious health hazards. Controlling the point sources by monitoring levels of different pollutants is one way to prevent pollution by giving a punishment to a polluter. However it is also the responsibility of people in general to inform the relevant authority when they see a likely source of pollution. Individuals can also do several things to reduce water pollution such as using biodegradable chemicals for household use, reducing use of pesticides in gardens, and identifying polluting sources at workplaces and in industrial units where oil or other petroleum products and heavy metals are used. Excessive organic matter, sediments and infecting organisms from hospital wastes can also pollute our water. Citizens need to develop a watchdog force to inform authorities to take appropriate actions against different types of water pollution. A polluter must pay for his actions. However, preventing pollution is better than trying to cure the problems it has created, or punishing offenders.

The main objectives of the Water Act are to provide for prevention, control and abatement of water pollution and the maintenance or restoration of the wholesomeness of water. It is designed to assess pollution levels and punish polluters. The Central Government and State Governments have set up Pollution Control Boards that monitor water pollution.

Functions of the Pollution Control Boards:
The Government has given the necessary powers to the PCBs to deal with the problems of water pollution in the country. The Government has also suggested penalties for violation of the provisions of the Act.

Central and State water testing laboratories have been set up to enable the Boards to assess the extent of water pollution and standards have been laid down to establish guilt and default.

The Central and State Boards are entitled to certain powers and functions which are as follows:

Central Board: It has the power to advise the Central Government on any matters concerning the prevention and control of water pollution. The Board coordinates the activities of the State Boards and also resolves disputes. The Central Board can provide technical assistance and guidelines to State Boards to carry out investigations and research relating to water pollution, and organizes training for people involved in the process. The Board organizes a comprehensive awareness program on water pollution through mass media and also publishes data regarding water pollution. The Board lays down or modifies the rules in consultation with the State Boards on standards of disposal of waste.

The main function of the Central Board is to promote the cleanliness of rivers lakes streams and wells in the country.

State Boards: They have the power to advise the State Government on any matters concerning water pollution. It plans a comprehensive program for the prevention of water pollution. It collects and disseminates information on water pollution and participates in research in collaboration with the Central Board in organizing training of people involved in the process. The Board inspects sewage or trade effluents, treatment plants, purification plants and the systems of disposal and also evolves economical and reliable methods of treatment of sewage and other effluents. It plans the utilization of sewage water for agriculture. It ensures that if effluents are to be discharged on land the waste is diluted. The State Board advises State Governments with respect to location of industries. Laboratories have been established to enable the Board to perform its functions.

The State Boards have the power to obtain information from officers empowered by it who make surveys, keep records of flow, volume, and other characteristics of the water. They are given the power to take samples of effluents and suggest the procedures to be followed in connection with the samples. The concerned board analyst is expected to analyze the sample sent to him and submit a report of the result to the concerned Board. The Board is required to send a copy of the result to the respective industry. The Board also has the power of inspecting any plant record, register, document or any material object, and can conduct a search in any place in which there is reason to believe that an offence has been conducted under the Act.

Penalties are charged for acts that have caused pollution. This includes failing to furnish information required by the Board, or failing to inform the occurrence of any accident or other unforeseen act. An individual or organisation that fails to comply with the directions given in the subsections of the law can be convicted or punished with imprisonment for a term of three months or with a fine of Rs10,000 or both and in case failure continues an additional fine of Rs.5,000 everyday. If a person who has already been convicted for any offence is found guilty of the same offence again, he/she after the second and every subsequent conviction, would be punishable with imprisonment for a term not less than two years but which may extend to seven years with fine.

What can individuals do to prevent water pollution?

1. Inform the Pollution Control Board of any offender who is polluting water and ensure that appropriate action is taken. One can also write to the press.

2. Do not dump wastes into a household or industrial drain which can directly enter any water body, such as a stream, river, pond, lake or the sea.

3. Do not use toilets for flushing down waste items as they do not disappear but reappear at other places and cause water pollution.

4. Use compost instead of chemical fertilizers in gardens.

5. Avoid use of pesticides at home like DDT, Melathion, Aldrin, and use alternative methods like paste of boric acid mixed with gram flour to kill cockroaches and other insects. Use dried neem leaves to help keep away insects.

6.12 THE WILDLIFE PROTECTION ACT

This Act passed in 1972, deals with the declaration of National Parks and Wildlife Sanctuaries

and their notification. It establishes the structure of the State's wildlife management and the posts designated for Wildlife Management. It provides for setting up Wildlife Advisory Boards. It prohibits hunting of all animals specified in Schedules I to IV of the Act. These are notified in order of their endangeredness. Plants that are protected are included in schedule VI.

The Amendment to the Wildlife Protection Act in 2002 is more stringent and prevents the commercial use of resources by local people. It has brought in new concepts such as the creation of Community Reserves. It has also altered several definitions. For instance in animals, fish are now included. Forest produce has been redefined to ensure protection of ecosystems.

While there are several changes, the new Act still has serious issues concerned with its implementation. Laws are only as good as the ones that can be complied with. The Act is expected to deter people from breaking the law. However, there are serious problems due to poaching. One cannot expect to use the Act to reduce this without increasing Forest Staff, providing weapons, jeeps, radio equipment, etc. for establishing a strong deterrent force.

Penalties: A person who breaks any of the conditions of any license or permit granted under this Act shall be guilty of an offence against this Act. The offence is punishable with imprisonment for a term which may extend to three years or with a fine of Rs 25,000 or with both. An offence committed in relation to any animal specified in Schedule I, or Part II of Schedule II, like the use of meat of any such animal, or animal articles like a trophy, shall be punishable with imprisonment for a term not less than one year and may extend to six years and a fine of Rs 25,000.

In the case of a second or subsequent offence of the same nature mentioned in this sub-section, the term of imprisonment may extend to six years and not less than two years with a penalty of Rs.10,000.

What can an individual do?

1) If you observe an act of poaching, or see a poached animal, inform the local Forest Department Official at the highest possible level. One can also report the event through the press. Follow up to check that action is taken by the concerned authority. If no action is taken, one must take it up to the Chief Wildlife Warden of the State.

2) Say 'no' to the use of wildlife products and also try to convince other people not to buy them.

3) Reduce the use of wood and wood products wherever possible.

4) Avoid misuse of paper because it is made from bamboo and wood, which destroys wildlife habitat. Paper and envelopes can always be reused.

5) Create a pressure group and ask Government to ensure that the biodiversity of our country is conserved.

6) Do not harm animals. Stop others from inflicting cruelty to animals.

7) Do not disturb birds nests and fledglings.

8) When you visit the Zoo do not tease the animals by throwing stones or feeding them, and prevent others from doing so.

9) If you come across an injured animal do what you can to help it.

10) If the animal needs medical care and expert attention contact the Society for the Prevention of Cruelty to Animals in your city.

11) Create awareness about biodiversity conservation in your own way to family and friends.
12) Join organizations, which are concerned with protection of biodiversity, such as Worldwide Fund For Nature –India (WWF-I), Bombay Natural History Society (BNHS), or a local conservation NGO.

6.13 FOREST CONSERVATION ACT

To appreciate the importance of the Forest Conservation Act of 1980, which was amended in 1988, it is essential to understand its historical background. The Indian Forest Act of 1927 consolidated all the previous laws regarding forests that were passed before the 1920's. The Act gave the Government and Forest Department the power to create Reserved Forests, and the right to use Reserved Forests for Government use alone. It also created Protected Forests, in which the use of resources by local people was controlled. Some forests were also to be controlled by a village community, and these were called Village Forests.

The Act remained in force till the 1980s when it was realised that protecting forests for timber production alone was not acceptable. The other values of protecting the services that forests provide and its valuable assets such as biodiversity began to overshadow the importance of their revenue earnings from timber. Thus a new Act was essential. This led to the Forest Conservation Act of 1980 and its amendment in 1988.

India's first Forest Policy was enunciated in 1952. Between 1952 and 1988, the extent of deforestation was so great that it became evident that there was a need to formulate a new policy on forests and their utilisation. Large tracts of forestland had already been diverted to other uses. The earlier forest policies had focused attention on revenue generation only. In the 1980s it became clear that forests must be protected for their other functions such as maintenance of soil and water regimes centered around ecological concerns. It also provided for the use of goods and services of the forest for its local inhabitants.

The new policy framework made conversion of forests into other uses much less possible. Conservation of the forests as a natural heritage finds a place in the new policy, which includes the preservation of its biological diversity and genetic resources. It also values meeting the needs of local people for food, fuelwood, fodder and non-wood forest products that they subsist on. It gives priority to maintaining environmental stability and ecological balance. It expressly states that the network of Protected Areas should be strengthened and extended.

In 1992, the 73rd and 74th Amendments to the Constitution furthered governance through panchayats. It gives States the ability to provide power to the local panchayats to manage local forest resources.

The Forest Conservation Act of 1980 was enacted to control deforestation. It ensured that forestlands could not be de-reserved without prior approval of the Central Government. This was created as States had begun to de-reserve the Reserved Forests for non-forest use. States had regularized encroachments and resettled 'Project Affected People' from development projects such as dams in these de-reserved areas. The need for a new legislation became urgent. The Act made it possible to retain a greater control over the frightening level of deforestation in the country and specified penalties for offenders.

Penalties for offences in Reserved Forests: No person is allowed to make clearings or set fire to a Reserved Forest. Cattle are not permitted to trespass into the Reserved Forest. Felling, collecting of timber, bark or leaves, quarries or

collecting any forest product is punishable with imprisonment for a term of six months, or with a fine which may extend to Rs.500, or both.

Penalties for offences in Protected Forests: A person who commits any of the following offences like felling of trees, or strips off the bark or leaves from any tree or sets fire to such forests, or kindles a fire without taking precautions to prevent its spreading to any tree mentioned in the Act, whether standing or felled, or fells any tree, drags timber, or permits cattle to damage any tree, shall be punishable with imprisonment for a term which may extend to six month or with a fine which may extend to Rs.500, or both.

When there is a reason to believe that a forest offence has been committed pertaining to any forest produce, the produce together with all tools used in committing such offences may be seized by any Forest Officer or Police Officer. Every officer seizing any property under this section shall put on the property a mark indicating the seizure and report the seizure to the Magistrate who has the jurisdiction to try the offence. Any Forest Officer, even without an order from the Magistrate or a warrant, can arrest any person against whom a reasonable suspicion exists.

What can an individual do to support the Act?

1) Be alert to destructive activities in your local green areas such as Reserved Forests and Protected Forests, and in Protected Areas (National Parks and Wildlife Sanctuaries). Report any such act to the Forest Department as well as the Press. Report of violations can be made to the Conservator of Forest, District Forest Officer, Range Forest Officer, Forest Guard or the District Commissioner, or local civic body.

2) Acquaint yourself with the laws, detailed rules and orders issued by the Government.

3) Be in touch with concerned local NGOs and associations. Organize one with other like minded people if none exist in your area.

4) Create awareness about the existence and value of National Parks and Sanctuaries and build up a public opinion against illegal activities in the forest or disturbance to wildlife.

5) Pressurize the authorities to implement the forest and wildlife laws and rules to protect green areas.

6) Take legal action if necessary and if possible through a Public Interest Litigation (PIL) against the offending party. Use the help of NGOs who can undertake legal action.

7) Help to create public pressure to change rules laws and procedures when necessary.

8) Use better, ecologically sensitive public transport and bicycle tracks. Do not litter in a forest area.

9) Participate in preservation of greenery, by planting, watering and caring for plants.

Whom should forest offences be reported to?
If you as a citizen come across anyone felling trees, encroaching on forest land, dumping garbage, cutting green wood, lighting a fire, or creating a clearing in Reserved Forests, Protected Forests, National Park, Sanctuary or other forest areas, you must report it to the forest / wildlife officers concerned. For urgent action one can contact the police. In fact you should file an FIR in any case because it serves as an important proof that you have made the report.

6.14 ISSUES INVOLVED IN ENFORCEMENT OF ENVIRONMENTAL LEGISLATION

Environmental legislation is evolved to protect our environment as a whole, our health, and the earth's resources. The presence of a legislation to protect air, water, soil, etc. does not necessarily mean that the problem is addressed. Once a legislation is made at the global, National or State level, it has to be implemented. For a successful environmental legislation to be implemented, there has to be an effective agency to collect relevant data, process it and pass it on to a law enforcement agency. If the law or rule is broken by an individual or institution, this has to be punished through the legal process. Information to law enforcement officials must also come from concerned individuals. In most situations, if no cognizance is given, the interested concerned individual must file a Public Interest Litigation (PIL) for the protection of the environment. There are several NGOs in the country such as WWF-I, BEAG and the BNHS which take these matters to court in the interest of conservation. Anyone can request them to help in such matters. There are also legal experts such as MC Mehta who have successfully fought cases in the courts to support environmental causes. A related issue is the fact that there are several irregular practices for which a bribe to an unscrupulous official is used to cover up an offence. Thus the general public must act as a watch dog not only to inform concerned authorities, but also to see that actions are taken against offenders.

6.14.1 Environment Impact Assessment (EIA):

For all development projects, whether Government or Private, the MoEF requires an impact assessment done by a competent organisation. The EIA must look into physical, biological and social parameters. EIAs are expected to indicate what the likely impacts could be if the project is passed. The Ministry of Environment and Forests (MoEF) has identified a large number of projects that need clearance on environmental grounds. The EIA must define what impact it would have on water, soil and air. It also requires that a list of flora and fauna identified in the region is documented and to specify if there are any endangered species whose habitat or life could be adversely affected. Most development projects such as industries, roads, railways and dams may also affect the lives of local people. This must be addressed in the EIA. There are 30 different industries listed by MoEF that require a clearance before they are set up.

Impacts created by each type of industry differs and the proposed sites also vary in their sensitivity to impacts. Some areas are more fragile than others. Some have unique ecosystems. Others are the habitats of wildlife and some may be the home of endangered species of plants or animals. All these aspects require evaluation before a development project or an industry site is cleared.

New projects are called 'green field projects' where no development has been done. Projects that already exist but require expansion must also apply for clearance. These are called 'brown field projects'.

After the Environmental Protection Act of 1986 was passed, an EIA to get an environmental clearance for a project became mandatory.

Project proponents are expected to select a competent agency to undertake an EIA. Projects can be classified into those with a mild impact, a moderate impact or a serious impact. Some may have temporary major impacts, during the construction phase, which could later become less damaging, or be mitigated by a variety of measures. In other situations the impact may continue and even increase, for example where toxic solid waste will be constantly generated. Some

projects could thus cause temporary reversible damage while others can have irreversible or even permanent impacts.

To get an environmental clearance the proposer of the project is expected to apply to the State Pollution Control Board. The PCB checks and confirms that the EIA can be initiated. The Agency that does the assessment submits a Report to the proposer. This may take several months. A Report of the Environmental Statement is forwarded to the MoEF, which is the impact assessment authority.

After 1997, the MoEF has stipulated that a public hearing should be done at the local level. The Pollution Control Board puts an advertisement about the hearing in the local vernacular press. An Environmental Impact Statement which is an Executive Summary of the EIA is kept for the public to read. The venue and time of the Public Hearing is declared. Once the hearing is held and opinions have been expressed, both for and against the project, the minutes of the meeting are sent to the MoEF. Though this is done, it is evident that the voices of project affected people are still not heard. In some cases NGOs have taken up the cause of local people. Until educational levels and environmental awareness becomes a part of public thinking and is objectively based on the facts of the case, these hearings will remain an inadequate tool to control possible impacts of new development projects.

Experience shows that a large number of EIAs are inadequately researched and frequently biased as they are funded by the proposer of the project. While most EIAs are adequate for studies on the possibilities of air, water and soil pollution, they generally deal inadequately with issues such as preservation of biodiversity and the social issues that may arise from future environmental impacts.

Biodiversity concerns frequently are sketchily considered and mostly consist of a listing of species without population assessments, or census figures of wildlife, or a study of the effects on the ecosystem as a whole. Changes in landuse patterns effect whole communities of living organisms. This is rarely taken into account, as such issues are difficult to assess in quantifiable terms.

Issues related to equity of resources that are inevitably altered by development related projects are also not fully addressed. These cryptic concerns must be dealt with more seriously in environmental assessments and the public at large should know and appreciate these inadequacies. It is not sufficient to say that an EIA has been done. It is the quality and sincerity of the EIA that is of importance.

An EIA is not intended to stop all types of development. The siting of an industry can be selected carefully and if it is likely to damage a fragile area an alternate less sensitive area must be selected.

In some cases it is essential to drop projects altogether if the anticipated impacts are likely to be very severe. In other cases it is necessary for the project to counter balance its effects by mitigating the ill effects on the environment. This means compensating for the environmental damage by afforestation or creating a Protected Area in the neighbourhood at the cost of the project. Rehabilitation and resettlement of project affected people is a key concern which should be given adequate funds and done after a consent is clearly obtained from the people living in the area. In most cases it is advisable to avoid resettlement altogether. If an area's vegetation is being affected project costs must include the cost of compensatory afforestation and other protective measures.

6.14.2 Citizens actions and action groups:

Citizens must learn to act as watch dogs to protect their own environment from the conse-

quences of unsustainable projects around them. Well informed citizens not only have rights but also have a duty to perform in this regard. They can join action groups to develop a lobby to strengthen the environmental movements in the country, their State, town or village.

Individuals can take one or several possible actions when they observe offenders who for their own self interest damage the environment for others living in the area. An individual has the right to bring an environmental offence or nuisance to the attention of concerned authorities. This ranges from Government line agencies such as the Police, the Forest Department, the Collector or Commissioner of the area as the case may be. At times the concerned officials may not be able to easily appreciate complex environmental concerns and the individual may have to learn how to communicate these issues in a way in which it becomes essential for the concerned officer to act in a pro environmental fashion. If this does not work a citizen can seek legal redressal under relevant statutes of law. The Environment Protection Act and the Wildlife Protection Act are the most frequently used legal instrument for these purposes. It is possible to move courts by a Public Interest Litigation, and take this up to the Hon. Apex Court – the Supreme Court of India, which in the recent past has given several highly enlightened pro-conservation judgements.

Citizen groups can resort to alternate means of pressure such as 'rasta rokos', 'dharnas', etc. to draw attention to important environmental concerns. They can also elicit public support through the press and electronic media.

CASE STUDY

The Narmada Issue

The controversy over the plan to build several dams on the Narmada River and its tributaries symbolizes the struggle for a just and equitable society in India. The construction of these dams displaces many poor and underprivileged communities, destroying their relatively self-sufficient environmentally sound economy and culture and reducing a proud people to the status of refugees or slum dwellers.

The Narmada Bachao Andolan (Save the Narmada Movement) is one of the most dynamic people's movements fighting for the rights of these underprivileged people who are being robbed of their homes, livelihoods and way of living in the name of 'national interest'.

One such dam, the Sardar Sarovar Dam, when completed will drown 37,000 hectares of fertile land and displace 200,000 adivasis and cause incomprehensible loss to the ecology.

CASE STUDY

Silent Valley

The proposed Hydel project at Silent valley, a unique pocket of tropical biodiversity in South India, in the 1970s was stopped and the area declared a National Park in 1984. This was achieved by several dedicated individuals, groups and organisations lobbying to save the area from being submerged and protect its rich biodiversity.

Among the many environmental battles that have been fought in this country some have been won while many others have been lost. These projects have led to serious environmental degradation in spite of the laws intended to control such damage.

6.15 PUBLIC AWARENESS

Environmental sensitivity in our country can only grow through a major public awareness campaign. This has several tools. The electronic media, the press, school and college education, adult education, are all essentially complementary to each other. Green movements can grow out of small local initiatives to become major players in advocating environmental protection to the Government. Policy makers will only work towards environmental preservation if there is a sufficiently large bank of voters that insist on protecting the environment. Orienting the media to project pro environmental issues is an important aspect. Several advertising campaigns frequently have messages that are negative to environmental preservation.

6.15.1 Using an Environmental Calendar of Activities:

There are several days of special environmental significant which can be celebrated in the community and can be used for creating environmental awareness.

February 2: World Wetland Day is celebrated to create awareness about wetlands and their value to mankind. On February 2nd 1971, the Ramsar Convention on Wetlands of International importance was signed at Ramsar in Iran. You can initiate a campaign for proper use and maintenance of wetlands in the vicinity of the city or village.

March 21: World Forestry Day can be used to initiate a public awareness campaign about the extremely rapid disappearance of our forests. The program must be action oriented and become an ongoing process with activities such as tree plantation.

April 7: World Health Day – The World Health Organisation (WHO) came into existence on this day in 1948. A campaign for personal sanitation and hygiene to understanding issues of public health, occupational health, etc. can be carried out. Topics that deal with environment related diseases and their spread can be discussed and preventive measures suggested.

April 18: World Heritage Day can be used to arrange a visit to a local fort or museum. Environment also includes our cultural monuments. Students could use this opportunity to create awareness among the local people about their very valuable heritage sites.

April 22: Earth Day was first celebrated in 1970 by a group of people in the USA to draw attention to increasing environmental problems caused by humans on earth. This day is now celebrated all over the world with rallies, festivals, clean-ups, special shows and lectures.

June 5: World Environment Day marks the anniversary of the Stockholm Conference on Human Environment in Sweden in 1972, where nations of the world gathered to share their concern over human progress at the expense of the environment. This day can be used to project the various environmental activities that the college has undertaken during the year. New pledges must be made to strengthen an environmental movement at the college level.

June 11: World Population Day is a day when the vital link between population and environment could be discussed in seminars held at college and other NGOs.

August 6: Hiroshima Day could be used to discuss our own Bhopal Gas Tragedy and the Chernobyl disaster.

September 16: World Ozone Day was proclaimed by the United Nations as the International Day for the preservation of the ozone layer. This is a good occasion for students to find out more about the threats to this layer and initiate discussion on what they can do to help mitigate this global threat. The day marks the Montreal Protocol signed in 1987 to control production and consumption of ozone depleting substances.

September 28: Green Consumer Day could be used to create an awareness in consumers about various products. Students could talk to shopkeepers and consumers about excess packaging and a campaign to use articles which are not heavily packaged could be carried out.

October 1-7: Wildlife Week can consist of seminars on conserving our species and threatened ecosystems. The State forest Departments organize various activities in which every student should take part. A poster display, a street play to highlight India's rich biodiversity can be planned. Wildlife does not only mean animals, but includes plants as well.

6.15.2 What can I do?

Most of us are always complaining about the deteriorating environmental situation in our country. We also blame the government for inaction. However how many of us actually do anything about our own environment?

You can think about the things you can do that support the environment in your daily life, in your profession and in your community. You can make others follow your environment friendly actions. A famous dictum is to 'think globally and act locally' to improve your own environment. 'You' can make a difference to our world.

Biodiversity Conservation: A great proportion of the residual wilderness of India is now under great threat. Its unique landscapes are shrinking as the intensive forms of agriculture and industrial growth spreads through a process called 'development'. Modern science has serious doubts about the possibility of the long-term survival of the human race if man continues to degrade natural habitats, extinguishes millions of years of evolution through an extinction spasm, and looks only at short-term gains. The extinction of species cannot be reversed. Once a species is lost, it is gone forever. Future generations will hold us responsible for this great loss.

We frequently forget that we are a part of a great complex web of life and our existence depends on the integrity of 1.8 million species of plants and animals on earth that live in a large number of ecosystems.

The following are some of the things you can do to contribute towards our ecological security and biodiversity conservation.

Dos:

1. Plant more trees of local or indigenous species around your home and your workplace. Encourage your friends to do so. Plants are vital to our survival in many ways.

2. If your urban garden is too small for trees, plant local shrubs and creepers instead. These support bird and insect life that form a vital component of the food chains in nature. Urban biodiversity conservation is feasible and can support a limited but valuable diversity of life.

3. If you live in an apartment, grow a terrace or balcony garden using potted plants. Window boxes can be used to grow small flowering plants, which also add to the beauty of your house.

4. Whenever and wherever possible prevent trees from being cut, or if it is not possible for you to prevent this, report it immediately to the concerned authorities. Old trees are especially important.

5. Insist on keeping our hills free of settlements or similar encroachments. Degradation of hill slopes leads to severe environmental problems.

6. When shopping, choose products in limited packaging. It will not only help cut down on the amount of waste in landfills, but also helps reduce our need to cut trees for paper and packaging.

7. Look for ways to reduce the use of paper. Use both sides of every sheet of paper. Send your waste paper for recycling.

8. Buy recycled paper products for your home. For example sheets of paper, envelopes, etc.

9. Reuse cartons and gift-wrapping paper. Recycle newspaper and waste paper instead of throwing it away as garbage.

10. Donate used books and magazines to schools, hospitals, or libraries. The donations will not only help these organizations, but also will reduce the exploitation of natural resources used to produce paper.

11. Participate in the events that highlight the need for creating Sanctuaries and National Parks, nature trails, open spaces, and saving forests.

12. Support Project Tiger, Project Elephant, etc. and join NGOs that deal with environmental protection and nature conservation.

13. Involve yourself and friends in activities carried out during Wildlife Week and other public functions such as tree plantation drives and protests against destruction of the environment.

Don'ts

1. Do not present flower bouquets instead give a potted plant and encourage your friends to do so.

2. Do not collect unnecessary pamphlets and leaflets just because they are free.

3. Do not use paper plates and tissues or paper decorations when you hold a party.

Habitat preservation: The rapid destruction of forests, and the growth of human habitations and activities have reduced the natural habitats of animals and birds. Loss of habitat is one of the major pressures on several species and has led to the extinction of several rare and endemic species. Many others are seriously threatened. We therefore have the responsibility to preserve remaining habitats and their inhabitants.

The following are some 'dos and don'ts' that can help preserve threatened ecosystems.

Dos:

1. Visit forests responsibly. Remember to bring out everything you take in, and clean up litter left by others. Stay on marked trails, and respect the fact that wildlife need peace and quiet. Study the ecosystem; it gives one a greater sense of responsibility to conserve it.

2. Be kind to animals. Stop friends from disturbing or being cruel to wild creatures such as birds, frogs, snakes, lizards and insects.

3. Learn about birds. Identify birds that are common in your area. Understand their food requirements and feeding habits. Construct artificial nesting boxes for birds. This will encourage birds to stay in your neighborhood, even if their nesting habitat is scarce.

   You can learn more about birds by making a birdbath. Birds need water to drink and to keep their feathers clean. You can make a birdbath out of a big ceramic or plastic saucer. Having birds around your home, school or college can even help increase species diversity in the area.

4. Attract wildlife such as small mammals, such as squirrels, to your garden by providing running or dripping water. Make a hole in the bottom of a bucket and poke a string through to serve as a wick. Hang a bucket on a tree branch above your birdbath to fill it gradually with water throughout the day.

5. Protect wildlife, especially birds and insects that are insectivorous and live in your neighborhood by eliminating the use of chemicals in your garden. Instead, use organic measures from vermicomposting and by introducing natural pest predators. Do your gardening and landscaping using local plants, to control pests in your garden.

6. If you have pets, feed them well and give them a proper home and in an emergency proper medical care.

7. When you visit a zoo learn about the animals that are found there but do not tease or hurt them through the bars of their cage. They have a right to a peaceful existence. The zoo is in any case not an ideal home for them.

Don'ts

1. Do not disturb, tease, hurt or throw stones at animals in a Protected Area and stop others from doing so. If you see an injured animal contact the Forest Officials.

2. Do not disturb or destroy the natural habitats of birds or animals.

3. Do not use articles like leather handbags and lipsticks, which are made from animal products. No wildlife products should be used.

4. Do not catch or kill butterflies or other insects. Butterflies, moths, bees, beetles and ants are important pollinators.

5. Do not kill small animals and insects like dragonflies and spiders as they act as biological pest control mechanisms.

6. Do not bring home animals or plants collected in the wild. You could be seriously harming wild populations and natural ecosystems where they were collected.

7. Do not buy products like purses, wallets, boots and that are made from reptile skins. If you are not certain that a product is made from a wild species, its better to avoid using it.

8. Do not buy products made from ivory. Elephants are killed for their tusks, which are used to make a variety of ivory products.

9. Do not use any wild animal or plant products that are collected from the wild and

have dubious medicinal properties. You may be endangering a species and even your own health.

Soil conservation: Soil degradation affects us all in some way, either directly or indirectly. There are many ways that each of us can help in solving environmental problems due to loss of soil.

Following are some of the dos and don'ts for conserving soil.

Dos:

1. Cover the soil in your farm or garden with a layer of mulch to prevent soil erosion in the rains and to conserve soil moisture. Mulch can be made from grass clippings or leaf litter.

2. If you plan to plant on a steep slope in your farm or garden, prevent soil erosion by first terracing the area. Terraces help in slowing the rain water running downhill so it can soak into the soil rather than carry the soil away.

3. Help prevent soil erosion in your community by planting trees and ground-covering plants that help hold the soil in place. You might organize a group of citizens to identify places that need planting, raise funds, work with the local government to plant trees, shrubs and grasses, and maintain them over the long term.

4. If your college is surrounded by open space, evaluate how well the soil is being conserved. Look for places where soil can run off, like on an unplanted steep slope or stream bank, or where soil is exposed rather than covered with mulch. These areas need special care and must be carefully replanted.

5. Add organic matter to enrich your garden soil. For example compost from kitchen scraps and manure from poultry, cows are good sources of nutrients. Make sure manure is not too fresh and that you do not use too much. Healthy soil grows healthy plants, and it lessens the need for insecticides and herbicides.

6. In your vegetable garden, rotate crops to prevent the depletion of nutrients. Legumes such as peas and beans put nitrogen back into the soil.

7. Set up a compost pit in your college or garden, so that you can enrich your soil with the organic waste from the kitchen and cut down on the amount of waste it sends to a landfill. Set up buckets in your college or lunchroom where fruit and left-over food can be put. Empty the buckets daily into a compost pit, and use the rich compost formed in a few weeks to enrich the soil around the college. Kitchen scraps, leaves and grass clippings are excellent compost.

8. Encourage your local zoo, farms, and other organizations or people that house a large number of animals to provide your community with bioferilizer made from animal manure. This can be composted to make a rich fertilizer, and it forms an additional source of income for the animal owners.

9. Buy organically grown produce to help reduce the amount of toxic pesticides used in farms that harm soil organisms. Look for organically grown produce in your grocery shop, or try growing some yourself if you have the space.

10. Support environmental campaigns in your State and community. Cutting down on irresponsible development can protect soil, biodiversity, and enhance our quality of life.

Don'ts:

1. Do not remove grass, leave it on the lawn. Cuttings serve as moisture-retention mulch and a natural fertilizer.

2. Do not use toxic pesticides in your garden—they often kill the beneficial organisms, your soil needs to stay healthy.

Conserving water: Most of India has good average annual rainfall, however we still face a water shortage nearly everywhere. This is one of the major environmental problems in our country. Conservation of this very precious natural resource is very important and it is the need of the hour. It should start with every individual. It must start with you! Following are some of the things you can do to conserve this precious natural resource.

Dos:

1. Reduce the amount of water used for daily activities. For example - turn off the tap while brushing your teeth to save water.

2. Reuse the rinsing water for house-plants. Reuse the water that vegetables are washed in to water the plants in your garden or your potted plants.

3. Always water the plants early in the morning to minimize evaporation.

4. Soak the dishes before washing them to reduce water and detergent usage.

5. Look for leaks in the toilet and bathroom to save several litres of water a day.

6. While watering plants, water only as rapidly as the soil can absorb the water.

7. Use a drip irrigation system to water more efficiently.

8. When you need to drink water, take only as much as you need to avoid wastage. So many people in our country don't even have access to clean drinking water!

9. Saving precious rainwater is very important. Harvest rainwater from rooftops and use it sustainably to recharge wells to reduce the burden on rivers and lakes.

10. Monitor and control wastes going into drains for preventing water pollution.

11. Replace chemicals like phenyl, strong detergents, shampoo, chemical pesticides and fertilizers used in your home, with environment friendly alternatives, such as neem and biofertilisers. Groundwater contamination by household chemicals is a growing concern.

12. For Ganesh Chaturthi, bring home a 'Shadu' idol instead of a Plaster of Paris idol and donate it instead of immersing it in the river to reduce river pollution.

Don'ts:

1. Do not turn your tap on full force, instead maintain a slow flow.

2. Do not use a shower, instead use a bucket of water for bathing. A 10 minute shower wastes many liters of water as compared to using water from a bucket.

3. Do not over water garden plants, water them only when necessary.

4. Do not pollute sources of water or water bodies by throwing waste into them. This is the water you or someone else has to drink!

5. Do not throw waste into toilets because finally it goes into water bodies.

Conserving energy: Coal, petroleum and oil are mineral resources and are non-renewable sources of energy. At the current rate of fossil fuel consumption, the present oil reserves on the earth will last only for the next 30 to 50 years. Crores of rupees are being spent to extract, process and distribute coal, petroleum and electricity. Experiments are being carried out to generate energy from wind, and photovoltaic cells. They are highly successful. At an individual level, every one of us should try to conserve energy. Following are some of the things you can do to conserve energy.

Dos:

1. Turn off the lights fans and air conditioning when not necessary.

2. Use low voltage lights.

3. Use tube lights and energy saver bulbs as they consume less electricity.

4. Switch off the radio and television when not required.

5. Use alternative sources of energy like solar power for heating water and by cooking food in a solar cooker.

6. Cut down on the use of electrical appliances.

7. In summer, shut windows, curtains and doors early in the morning to keep the house cool.

8. Use a pressure cooker as much as possible to save energy.

9. Turn off the stove immediately after use.

10. Plan and keep things ready before you start cooking.

11. Keep vessels closed while cooking and always use small, narrow mouthed vessels to conserve energy.

12. When the food is almost cooked, switch off the gas stove and keep the vessel closed. It will get completely cooked with the steam already present inside.

13. Soak rice, pulses etc., before cooking to reduce cooking time and save fuel.

14. Get your family to eat together, it will save re-heating fuel.

15. Select a light shade of paint for walls and ceilings, as it will reflect more light and reduce electrical consumption.

16. Position your reading tables near the window and cut down on your electricity bill by reading in natural light.

17. Use a bicycle—it occupies less space, releases no pollutant and provides healthy exercise.

18. Try using public transport systems like trains and buses as far as possible.

19. Plan your trips and routes before setting out.

20. Walk rather than drive wherever possible. Walking is one of the best exercises for your health.

21. Get vehicles serviced regularly to reduce fuel consumption and reduce pollution levels.

Don'ts:

1. Do not use unnecessary outdoor decorative lights.

2. Do not use a geyser during summer. Instead, heat water naturally with the help of sunlight.

3. Do not use halogen lamps as they consume a lot of electricity.

4. Do not put food in the refrigerator when they are still hot.