

***ENVIRONMENT,
DEVELOPMENT AND POLITICS***

ELECTIVE COURSE: (POL4 E06)

IV SEMESTER

M.A. POLITICAL SCIENCE

2019 Admission onwards



UNIVERSITY OF CALICUT

School of Distance Education

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Study Material

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ENVIRONMENT, DEVELOPMENT AND POLITICS

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Module I

Ecology and Environment

Ecosystem

An Ecosystem is a region with a specific and recognizable landscape form such as forest, grassland, desert, wetland or coastal area. The nature of the ecosystem is based on its geographical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands. It is also controlled by climatic conditions such as the amount of sunlight, the temperature and the rainfall in the region. The geographical, climatic and soil characteristics form its non-living component. These features create conditions that support a community of plants and animals that evolution has produced to live in these specific conditions. The living part of the ecosystem is referred to as its biotic component.

Ecosystems are divided into terrestrial-land based ecosystems, and aquatic ecosystems in water. These form the two major habitat conditions for the Earth's living organisms. All the living organisms in an area live in communities of plants and animals. They interact with their non-living environment, and with each other at different points in time for a large number of reasons. Life can exist only in a small proportion of the earth's land, water and its atmosphere. At a global level the thin skin of the earth on the land, the sea and the air forms the biosphere. At a sub-global level, this is divided into bio-geographical realms, geographical realms, eg. Eurasia called the Palaearctic realm; South and South-

East Asia is the Oriental realm; North America is the Nearctic realm; South America forms the Neotropical realm; Africa the Ethiopian realm; and Australia the Australian realm. At a national or state level, this forms biogeographic regions.

There are several distinctive geographical regions in India- the Himalayas, the Gangetic Plains, the Highlands of Central India, the Western and Eastern Ghats, the semi-arid desert in the West, the Deccan Plateau, the Coastal Belts, and the Andaman and Nicobar Islands. These geographically distinctive areas have plants and animals that have been adapted to live in each of these regions. At an even more local level, each area has several structurally and functionally identifiable ecosystems systems such as different types of forests, grasslands, river catchments, mangrove swamps in deltas, seashores, islands, etc. to give only a few examples. Here too each of these forms a habitat for specific plants and animals. Ecosystems have been formed on land and in the sea by evolution that has created species to live together in a specific region. Thus ecosystems have both non-living and living components that are typical to an area giving it its own special characteristics that are easily observed.

The living community of plants and animals in any area together with the non-living components of the environment such as soil, air and water, constitute the ecosystem. Some ecosystems are fairly robust and are less affected by a certain level of human disturbance. Others are highly fragile and are quickly destroyed by human activities. Mountain ecosystems are extremely fragile as degradation of forest cover leads to severe erosion of soil and changes in river courses. Island ecosystems are easily affected by any form of human activity which can lead to the rapid extinction of several of their unique species of plants and animals. Evergreen forests and coral reefs are also examples of species rich fragile ecosystems which must be protected against a variety of human

activities that lead to their degradation. River and wetland ecosystems can be seriously affected by pollution and changes in the surroundings.

Natural ecosystems include the forests, grasslands, deserts, and aquatic ecosystems such as ponds, rivers, lakes, and the sea. Man modified ecosystems include agricultural land and urban or industrial land use patterns. Each ecosystem has a set of common features that can be observed in the field: ‘What does the ecosystem look like?’ One should be able to describe specific features of the different ecosystems in one’s own surroundings. Field observations must be made in both urban and natural surroundings. What is its structure? Is it a forest, a grassland, a water body, an agricultural area, a grazing area, an urban area, an industrial area, etc.? What you should see are its different characteristics. A forest has layers from the ground to the canopy. A pond has different types of vegetation from the periphery to its center. The vegetation on a mountain changes from its base to its summit. What is the composition of its plant and animal species? List the well-known plants and animals you can see. Document their abundance and numbers in nature: very common, common, uncommon, rare. Wild mammals will not be seen in large numbers, cattle would be common. Some birds are common – which are the most common species? Insect species are very common and most abundant. In fact, there are so many that they cannot be easily counted.

The ecosystem functions through several biogeochemical cycles and energy transfer mechanisms. Observe and document the components of the ecosystem which consists of its non-living or abiotic features such as air, water, climate and soil. Its biotic components, the various plants and animals. Both these aspects of the ecosystem interact with each other through several functional aspects to form Nature’s ecosystems. Plants,

herbivores and carnivores can be seen to form food chains. All these chains are joined together to form a 'web of life' on which man depends. Each of these use energy that comes from the sun and powers the ecosystem.

Ecosystem Degradation

The natural ecosystems in the wilderness provide a variety of products and are regions in which a number of vital ecological processes are present, without which human civilization would not be able to exist. Human actions which lead to the extinction of species of plants and animals that can live only in the different natural ecosystems. Some species if eliminated seriously affect the ecosystem. These are called 'keystone' species. Extinction occurs due to changes in land use. Forests are deforested for timber, wetlands are drained to create more agricultural land and semi-arid grasslands that are used as pastures are changed into irrigated fields. Pollution from industry and waste from urban settings can also lead to extinction of several species. The reason for the depletion of natural resources is twofold – our rapidly exploding population that needs to sustain itself on resources, and the growth of affluent societies, which consume and waste a very large proportion of resources and energy. Increasing extraction of resources is at the cost of natural ecosystems, leading to a derangement of their important functions.

Each of us in our daily lives uses a variety of resources. If tracked back to their source, one finds that the resources were originally obtained from nature and natural ecosystems. Our insensitivity to using resources carefully has produced societies that nature can no longer sustain. If one thinks before wasting resources such as water, reusing and recycling paper, using less plastics that are non-degradable, culminatively this can have positive implications on the integrity of our natural resource base and conserve the

resources that nature provides. Ecosystems and man: Every region of our earth has different ecosystems based on its climatic conditions and geographical feature. There are terrestrial ecosystems on land and aquatic ecosystems in water.

Resource Utilisation

Most traditional societies used their environment sustainably. Though inequality in resource utilization has existed in every society, the number of individuals that used a large proportion of resources was extremely limited. In recent times the proportion of ‘rich’ people in affluent societies, grew rapidly. Inequality thus became a serious problem. Whereas in the past many resources such as timber and fuel wood from the forest were extracted sustainably, this pattern has drastically changed during the last century. The economically better off sections began to use greater amounts of forest products, while those people who lived in the forest became increasingly poor. Similarly, the building of large irrigation projects led to wealth in those areas that had canals, while those who had to remain dependent on a constant supply of water from the river itself, found it difficult to survive. The key to this issue is the need for an ‘equitable’ distribution of all types of natural resources. A more even sharing of resources within the community can reduce these pressures on the natural ecosystems.

Environment

Environmental studies deals with every issue that affects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth’s finite resources. Its components include biology, geology, chemistry,

physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy.

As we look around at the area in which we live, we see that our surroundings were originally a natural landscape such as a forest, a river, a mountain, a desert, or a combination of these elements. Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities. But even those of us who live in cities get our food supply from surrounding villages and these in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder, and fish. Thus our daily lives are linked with our surroundings and inevitably affects them. We use water to drink and for other day-to-day activities. We breathe air, we use resources from which food is made and we depend on the community of living plants and animals which form a web of life, of which we are also a part. Everything around us forms our environment and our lives depend on keeping its vital systems as intact as possible.

Our dependence on nature is so great that we cannot continue to live without protecting the earth's environmental resources. Thus most traditions refer to our environment as 'Mother Nature' and most traditional societies have learned that respecting nature is vital for their livelihoods. This has led to many cultural practices that helped traditional societies protect and preserve their natural resources. Respect for nature and all living creatures is not new to India. All our traditions are based on these values. Emperor Ashoka's edict proclaimed that all forms of life are important for our well-being in Fourth Century BC.

The industrial development and intensive agriculture that provides the goods for our increasingly consumer-oriented society uses up large amounts of natural resources such as water,

minerals, petroleum products, wood, etc. Non-renewable resources, such as minerals and oil are those which will be exhausted in the future if we continue to extract these without a thought for subsequent generations. Renewable resources, such as timber and water, are those which can be used but can be regenerated by natural processes such as regrowth or rainfall. But these too will be depleted if we continue to use them faster than nature can replace them. For example, if the removal of timber and firewood from a forest is faster than the regrowth and regeneration of trees, it cannot replenish the supply. And loss of forest cover not only depletes the forest of its resources, such as timber and other non-wood products but affect our water resources because an intact natural forest acts like a sponge which holds water and releases it slowly.

Deforestation leads to floods in the monsoon and dry rivers once the rains are over. Such multiple effects on the environment resulting from routine human activities must be appreciated by each one of us, if it is to provide us with the resources we need in the long-term. Our natural resources can be compared with money in a bank. If we use it rapidly, the capital will be reduced to zero. On the other hand, if we use only the interest, it can sustain us over the longer term. This is called sustainable utilisation or development.

Environment is not a single subject. It is an integration of several subjects that include both Science and Social Studies. To understand all the different aspects of our environment we need to understand biology, chemistry, physics, geography, resource management, economics and population issues. Thus the scope of environmental studies is extremely wide and covers some aspects of nearly every major discipline.

We live in a world in which natural resources are limited. Water, air, soil, minerals, oil, the products we get from forests, grasslands, oceans and from agriculture and livestock, are all a part of our life support systems. Without them, life itself would be impossible. As we keep increasing in numbers and the quantity of resources each of us uses also increases, the earth's resource base must inevitably shrink. The earth cannot be expected to sustain this expanding level of utilization of resources. Added to this is misuse of resources. We waste or pollute large amounts of nature's clean water; we create more and more material like plastic that we discard after a single use; and we waste colossal amounts of food, which is discarded as garbage. Manufacturing processes create solid waste by-products that are discarded, as well as chemicals that flow out as liquid waste and pollute water, and gases that pollute the air. Increasing amounts of waste cannot be managed by natural processes. These accumulate in our environment, leading to a variety of diseases and other adverse environmental impacts now seriously affecting all our lives. Air pollution leads to respiratory diseases, water pollution to gastrointestinal diseases, and many pollutants are known to cause cancer.

Improving this situation will only happen if each of us begins to take actions in our daily lives that will help preserve our environmental resources. There are several internationally known environmental thinkers. Among those who have made landmarks, the names that are usually mentioned are Charles Darwin, Ralph Emerson, Henry Thoreau, John Muir, Aldo Leopold, Rachel Carson and EO Wilson. Each of these thinkers looked at the environment from a completely different perspective. Charles Darwin wrote the 'Origin of Species', which brought to light the close relationship between habitats and species. It brought about a new thinking of man's relationship with other species that was based on evolution. Alfred Wallace came to the same conclusions

during his work. Ralph Emerson spoke of the dangers of commerce to our environment way back in the 1840s. Henry Thoreau in the 1860s wrote that the wilderness should be preserved after he lived in the wild for a year. He felt that most people did not care for nature and would sell it off for a small sum of money.

John Muir is remembered as having saved the great ancient sequoia trees in California's forests. In the 1890s he formed the Sierra club, which is a major conservation NGO in the USA. Aldo Leopold was a forest official in the US in the 1920s. He designed the early policies on wilderness conservation and wildlife management. In the 1960s Rachel Carson published several articles that caused immediate worldwide concern on the effects of pesticides on nature and mankind. She wrote a well-known book called 'Silent Spring' which eventually led to a change in Government policy and public awareness. EO Wilson is an entomologist who envisioned that biological diversity was a key to human survival on earth. He wrote 'Diversity of Life' in 1993, which was awarded a prize for the best book published on environmental issues. His writings brought home to the world the risks to mankind due to manmade disturbances in natural ecosystems that are leading to the rapid extinction of species at the global level.

There have been a number of individuals who have been instrumental in shaping the environmental history in our country. Some of the well-known names in the last century include environmentalists, scientists, administrators, legal experts, educationists and journalists. Salim Ali's name is synonymous with ornithology in India and with the Bombay Natural History Society (BNHS). He also wrote several great books including the famous 'Book of Indian Birds'. His autobiography, 'Fall of a Sparrow' should be read by every nature enthusiast. He was our

country's leading conservation scientist and influenced environmental policies in our country for over 50 years. Indira Gandhi as PM has played a highly significant role in the preservation of India's wildlife. It was during her period as PM, that the preservation sites grew from 65 to 298. The Wildlife Protection Act was formulated during the period when she was PM and the Indian Board for Wildlife was extremely active as she personally chaired all its meetings. India gained a name for itself by being a major player in CITES and other International Environmental Treaties and Accords during her tenure. BNHS frequently used her nod to get conservation action initiated by the Government.

S P Godrej was one of India's greatest supporters of wildlife conservation and nature awareness programs. Between 1975 and 1999, SP Godrej received 10 awards for his conservation activities. He was awarded the Padma Bhushan in 1999. His friendship with people in power combined with his deep commitment to conservation led to his playing a major advocacy role for wildlife in India. M S Swaminathan is one of India's foremost agricultural scientists and has also been concerned with various aspects of biodiversity conservation both of cultivars and wild biodiversity. He has founded the MS Swaminathan Research Foundation in Chennai, which does work on the conservation of biological diversity. Madhav Gadgil is a famous ecologist in India. His interests range from broad ecological issues such as developing Community Biodiversity Registers and conserving sacred groves to studies on the behaviour of mammals, birds and insects. He has written several articles, published papers in journals and is the author of 6 books. M C Mehta is undoubtedly India's most famous environmental lawyer. Since 1984, he has filed several Public Interest Litigations for supporting the cause of environmental conservation. His most famous and long drawn battles supported by the Supreme Court include protecting the Taj

Mahal, cleaning up the Ganges River, banning intensive shrimp farming on the coast, initiating Government to implement environmental education in schools and colleges, and a variety of other conservation issues.

Anil Agarwal was a journalist who wrote the first report on the 'State of India's Environment' in 1982. He founded the Center for Science and Environment which is an active NGO that supports various environmental issues. Medha Patkar is known as one of India's champions who has supported the cause of downtrodden tribal people whose environment is being affected by the dams on the Narmada River. Sunderlal Bahugna's Chipko Movement has become an internationally eminent example of a highly successful conservation action program through the efforts of local people for guarding their forest resources. His fight to prevent the construction of the Tehri Dam in a fragile earthquake prone setting is a battle that he continues to wage. The Garhwal Hills will always remember his dedication to the cause for which he has walked over 20 thousand kilometers.

Biodiversity

The great variety of life on earth has provided for man's needs over thousands of years. This diversity of living creatures forms a support system which has been used by each civilization for its growth and development. Those that used this "bounty of nature" carefully and sustainably survived. Those that overused or misused it disintegrated. Science has attempted to classify and categorize the variability in nature for over a century. This has led to an understanding of its organization into communities of plants and animals. This information has helped in utilizing the earth's biological wealth for the benefit of humanity and has been integral to the process of 'development'. This includes better health care, better crops and the use of these life forms as raw

material for industrial growth which has led to a higher standard of living for the developed world. However, this has also produced the modern consumerist society, which has had a negative effect on the diversity of biological resources upon which it is based. The diversity of life on earth is so great that if we use it sustainably we can go on developing new products from biodiversity for many generations. This can only happen if we manage biodiversity as a precious resource and prevent the extinction of species.

‘Biological diversity’ or biodiversity is that part of nature which includes the differences in genes among the individuals of a species, the variety and richness of all the plant and animal species at different scales in space, locally, in a region, in the country and the world, and various types of ecosystems, both terrestrial and aquatic, within a defined area.

Biological diversity deals with the degree of nature’s variety in the biosphere. This variety can be observed at three levels; the genetic variability within a species, the variety of species within a community, and the organisation of species in an area into the distinctive plant and animal communities constitutes ecosystem diversity. Each member of any animal or plant species differs widely from other individuals in its genetic makeup because of the large number of combinations possible in the genes that give every individual specific characteristics. Thus, for example, each human being is very different from all others. This genetic variability is essential for a healthy breeding population of a species. If the number of breeding individuals is reduced, the dissimilarity of genetic makeup is reduced and in-breeding occurs. Eventually, this can lead to the extinction of the species. The diversity in wild species forms the ‘gene pool’ from which our crops and domestic animals have been developed over thousands of years. Today the variety of nature’s bounty is being

further harnessed by using wild relatives of crop plants to create new varieties of more productive crops and to breed better domestic animals. Modern biotechnology manipulates genes for developing better types of medicines and a variety of industrial products.

The number of species of plants and animals that are present in a region constitutes its species diversity. This diversity is seen both in natural ecosystems and in agricultural ecosystems. Some areas are more-rich in species than others. Natural undisturbed tropical forests have a much greater species richness than plantations developed by the Forest Department for timber production. A natural forest ecosystem provides a large number of non-wood products that local people depend on such as fruit, fuel wood, fodder, fiber, gum, resin and medicines. Timber plantations do not provide the large variety of goods that are essential for local consumption. In the long-term the economic sustainable returns from non-wood forest products are said to be greater than the returns from felling a forest for its timber. Thus the value of a natural forest, with all its species richness is much greater than a plantation. Modern intensive agricultural ecosystems have a relatively lower diversity of crops than traditional agro-pastoral farming systems where multiple crops were planted. At present conservation scientists have been able to identify and categorise about 1.8 million species on earth. However, many new species are being identified, especially in the flowering plants and insects. Areas that are rich in species diversity are called 'hotspots' of diversity. India is among the world's 15 nations that are exceptionally rich in species diversity.

Ecosystem Diversity

There are a large variety of different ecosystems on earth, which have their own complement of distinctive inter linked, species

based on the differences in the habitat. Ecosystem diversity can be described for a specific geographical region, or a political entity such as a country, a State or a taluka. Distinctive ecosystems include landscapes such as forests, grasslands, deserts, mountains, etc., as well as aquatic ecosystems such as rivers, lakes, and the sea. Each region also has man-modified areas such as farmland or grazing pastures. An ecosystem is referred to as 'natural' when it is relatively undisturbed by human activities, or 'modified' when it is changed to other types of uses, such as farmland or urban areas. Ecosystems are most natural in wilderness areas. If natural ecosystems are overused or misused their productivity eventually decreases and they are then said to be degraded. India is exceptionally rich in its ecosystem diversity.

Evolution and the Genesis of Biodiversity

The origins of life on earth some three and a half billion years ago are obscure. Life was probably initiated as a product of organic reactions in the Earth's primordial seas. Alternative possibilities such as life beginning in a muddy ooze, or of life having been seeded from outer space have also been suggested. Once life took hold on the planet, it began gradually to diversify. Unicellular unspecialized forms gradually evolved into complex multicellular plants and animals. Evolution is related to the ability of living organisms to adapt to changes in their environment. Thus the abiotic changes in nature such as climatic and atmospheric upheavals, repeated glaciations, continental drift and the formation of geographical barriers, segregated different communities of plants and animals and gradually lead to the formation of new species over millions of years. Most species appear to have a life span extending over several million years. Their adaptability to gradual changes in their habitat and interactions with newly formed species produce groups of inter linked organisms that continue to evolve together. Food chains,

prey-predator relationships, parasitism, commensalism, etc. are important examples.

Behavioural patterns of the different species comprising a community of species links them to each other through their breeding biology, feeding patterns, migrations, etc. As ancient species became extinct due to geological upheavals, they left behind empty ‘niches’ in the habitat that stimulated existing species to fill them through the formation of new species. The Earth’s ancient history has seen periods of mega extinctions, which have been followed by periods of formation of new species. Though these repeatedly led to a drastic reduction in the number of species, the diversity of life recuperated each time by gradually increasing the number of species existing on earth. This however took millions of years, as evolution is a very slow process. Thus when man came on the scene some 2 million years ago, the earth was more rich in species than ever before. During the recent past however, extinctions due to the activities of modern man have begun to take place so rapidly that nature has had no time to evolve new species. The earth is losing species more rapidly than ever before. The diversity of life at all three organisational levels, genetic, species and ecosystem, is thus being rapidly modified by modern man. This is a great loss to future generations who will follow us.

Preservation and Conservation of Ecology

Article 20 of the UN Watercourses Convention provides an obligation upon States to protect and preserve the ecosystems of an international watercourse. However, the “ecosystem” concept was used by the International Law Commission (ILC) when they drafted the text of the Convention because it was seen to have a narrower scope to that of the “environment”. “Ecosystem” was accordingly defined by the ILC as “an ecological unit consisting

of living and non-living components that are interdependent and function as a community”.

Under the Convention, the obligation to protect and preserve ecosystems in Article 20 is seen as an extension of the requirement that States utilise their waters in an equitable and reasonable manner. In other words, it can be said that any activity which threatens the protection and preservation of ecosystems of an international watercourse might potentially be considered inequitable and unreasonable because it threatens the long-term viability of the resource. The obligation to protect ecosystems encompasses measures relating to conservation, security and water-related disease, as well as technical and hydrological control mechanisms, such as the regulation of flow, floods, pollution, erosion, drought and saline intrusion. Additionally, the obligation to protect includes the duty to shield ecosystems from a significant threat of harm and therefore by the need to adopt a precautionary approach.

The obligation to preserve ecosystems of international watercourses refers to maintaining freshwater ecosystems in a “pristine or unspoiled condition” and can be seen as subordinate to the obligation to protect. Sometimes the preservation of watercourse ecosystems involves setting aside a portion or the entirety of a river flow based on its condition or beauty. It should be noted though that such decisions must be weighed against all relevant factors applicable to the principle of equitable and reasonable utilisation, as well as the duty of no significant harm.

The Ecosystem Services Approach

The ecosystem services approach is based upon the understanding that there are economic benefits to healthy ecosystems. In this respect, the protection and preservation of ecosystems are not

only environmentally important but also economically beneficial. It is a relatively new approach in freshwater management but is increasingly used by scientists in order to quantify and in-turn seek to harness the economic benefits that healthy watercourse ecosystems can provide both directly and indirectly to riparian States. An extension of this approach - “payment for ecosystem services” - involves assessing the financial value of specific ecosystem services to economic and social development. Policy mechanisms can then be developed that seek to integrate these financial values into water management strategies, including providing compensation for preserving ecosystems. Notably, the UNECE Water Convention has codified a strategy to implement this approach.

Conservation of Biodiversity

The enormous value of biodiversity due to their genetic, commercial, medical, aesthetic, ecological and optional importance emphasizes the need to conserve biodiversity. Gradually we are coming to realize that wildlife is not just ‘a game to be hunted’, rather it is a ‘gift of nature’ to be nurtured and enjoyed. A number of measures are now being taken the world over to conserve biodiversity including plants and wildlife. There are two approaches of biodiversity conservation: (a) In situ conservation (within habitat): This is achieved by protection of wild flora and fauna in nature itself. e.g. Biosphere Reserves, National Parks, Sanctuaries, Reserve Forests etc. (b) Ex situ conservation (outside habitats) This is done by establishment of gene banks, seed banks, zoos, botanical gardens, culture collections etc.

In Situ Conservation

At present we have 7 major Biosphere reserves, 80 National Parks, 420 wild life sanctuaries and 120 Botanical gardens in our country covering 4% of the geographic area. The Biosphere Reserves conserve some representative ecosystems as a whole for long-term in situ conservation. In India, we have Nanda Devi (U.P.), Nokrek (Meghalaya), Manas (Assam), Sunderbans (West Bengal), Gulf of Mannar (Tamil Nadu), Nilgiri (Karnataka, Kerala, Tamil Nadu), Great Nicobars and Similipal (Orissa) biosphere Reserves. Within the Biosphere reserves we may have one or more National Parks. For example, Nilgiri Biosphere Reserve has two National Parks viz. Bandipur and Nagarhole National Park. A National Park is an area dedicated for the conservation of wildlife along with its environment. It is also meant for enjoyment through tourism but without impairing the environment. Grazing of domestic animals, all private rights and forestry activities are prohibited within a National Park. Each National Park usually aims at conservation specifically of some particular species of wildlife along with others.

Wildlife sanctuaries are also protected areas where killing, hunting, shooting or capturing of wildlife is prohibited except under the control of highest authority. However, private ownership rights are permissible and forestry operations are also permitted to an extent that they do not affect the wildlife adversely.

For plants, there is one gene sanctuary for Citrus (Lemon family) and one for pitcher plant (an insect eating plant) in Northeast India. For the protection and conservation of certain animals, there have been specific projects in our country e.g. Project Tiger, Gir Lion Project, Crocodile Breeding Project, Project Elephant, Snow Leopard Project etc.

Ex situ Conservation

This type of conservation is mainly done for conservation of crop varieties, the wild relatives of crops and all the local varieties with the main objective of conserving the total genetic variability of the crop species for future crop improvement or afforestation programmes. In India, we have the following important gene bank/seed bank facilities:

National Bureau of Plant Genetic Resources (NBPGR) is located in New Delhi. Here agricultural and horticultural crops and their wild relatives are preserved by cryo-preservation of seeds, pollen etc. by using liquid nitrogen at a temperature as low as -196°C . Varieties of rice, pearl millet, Brassica, turnip, radish, tomato, onion, carrot, chilli, tobacco, poppy etc. have been preserved successfully in liquid nitrogen for several years without losing seed viability.

National Bureau of Animal Genetic Resources (NBAGR) located at Karnal, Haryana. It preserves the semen of domesticated bovine animals.

National Facility for Plant Tissue Culture Repository (NFPTCR) for the development of a facility of conservation of varieties of crop plants/trees by tissue culture. This facility has been created within the NBPGR. The G-15 countries have also resolved to set up a network of gene banks to facilitate the conservation of various varieties of aromatic and medicinal plants for which India is the networking co-ordinator country.

Marxist Theory of Environment

There are two common accusations against Marxism regarding the environment, from right-wingers and some green activists, as well as from part of the left. The first is that Karl Marx had an

overly positive view of industrialisation and saw nature as an unlimited source to be exploited. The second is that Marxism bears the responsibility for some of the worst ecological catastrophes, in the Soviet Union. Contrary to these claims, consciousness about and struggle for the environment is nothing new for Marxists. In fact, Marx was a pioneer in analysing and criticising the destructive effect of capitalist industrialisation on nature as well as on society. Both Marx and Friedrich Engels, authors of the Communist Manifesto in 1848, closely studied and followed science in all fields. Capitalist industrial production, and the working class (the proletariat) and its labour, had only come into existence in the preceding decades, but were immediately understood by Marx as the key elements for the development of society. Stressing the importance of the working class did not mean ignoring the environment.

Interestingly, Marx viewed labour as “a process in which both man and nature participate”. This is underlined in Marx’s Critique of the Gotha Programme – the programme adopted by the initial congress of the Social Democratic Party of Germany (SPD) in 1875. Marx takes up the programme’s assertion that, “labour is the source of all wealth and all culture”. “Labour is not the source of all wealth”, Marx wrote. “Nature is just as much the source of use values as labour, which itself is only the manifestation of a force of nature, human labour power”. The wrong idea of labour as the sole source came from Ferdinand Lassalle, not from Marx.

Marx warned of the effects of the disruption in the relationship between humanity and nature. Therefore, he saw the alienation of workers in capitalist production as part of the same process as humanity’s alienation from nature. In his time, this was particularly obvious in the industrialisation of agriculture. The working class was and is at the forefront of the effects of capitalism on the environment. For example, energy companies –

oil, coal, nuclear power – pose a direct threat to workers in those industries as well as to people and the natural environment in whole regions or countries. Workers in those industries are often the most conscious about those dangers. The struggle to improve the working environment is an important part of environmental struggles.

In addition, Marxist philosophy (dialectical materialism) offers the means to analyse and explain today's climate crisis. Marx and Engels in the mid-19th century showed how both society and nature develop through the build-up of contradictions leading to qualitative leaps. Today, climate researchers echo this method in warning of tipping points, the moment when the environment passes irreversibly from one stage to another. Many of those blaming Marx for neglecting the environment have not studied his work, but that of his self-appointed 'followers' in social democracy or Stalinism. The societies they constructed, and described as socialism, completely contradicted Marx in relation to workers' democracy, the role of the state, and also in their treatment of the environment. In contrast, Marx had predicted that "natural science... will become the basis of human science, as it has already become the basis of actual human life". (Economic and Philosophical Manuscripts, 1844)

Marx on Nature

To understand Marxism and the environment there is a need to understand the method: that Marx always looked at the world and its history in its totality, as the point of departure for his analysis and programme. The fact that Marx regarded capitalism as a historically progressive system has been misunderstood and distorted by many. For example, Michael Lowy, from the United Secretariat of the Fourth International, wrote that Marx had "a fairly uncritical attitude toward industrial civilisation particularly

its destructive relationship to nature”. Lowy also claimed that “Marx does not possess an integrated ecological perspective”. (For a Critical Marxism, Against the Current, November-December 1997)

Firstly, the progressive side of capitalism, according to Marx, was in comparison to feudalism and was, therefore, temporary. The main achievement was that capitalism was the first society that created the basis not only to eliminate itself but class society altogether. The working class taking power with the support of poor peasants would mean the rule of the majority and the beginning of a process towards a completely different society. Already in the Paris Commune in 1871, where workers held power for two months, Marx’s perspective was proven right.

Understanding the role of capitalism does not correspond to a defence of that system. Marx, before and more than anyone else, understood capitalism as a system for producing profit out of surplus labour. Science and natural forces are adapted and exploited for this purpose. The health of workers is ignored, and so are the effects on nature. Marx clearly saw and warned against steps to form nature according to capitalism. Some critics claim that Marx saw nature as something that was for free, and unlimited. But his point was that nature under capitalism had no value. His own conclusion was that unexploited nature also held use value: for example, the air, forests and fish.

Marx studied in particular the non-mechanistic materialism of Epicurus (341-270 BCE) and the dialectics of GWF Hegel (1770-1831) and developed his philosophy, dialectical materialism. It was a brilliant view of the world, fitting perfectly into the period. The major event of the epoch, the French revolution, was a result of both the material basis – capitalist economy and society

overtaking feudalism – and the conscious action of the revolutionary masses.

Marx's ideas were the most developed of all the philosophies breaking with the religious past. Instead of the Earth never changing and being at the centre of everything, with mankind the centre of the Earth, Marxism in line with classic materialism regards the world as always changing, even mortal. Life was a product of Earth (nature) and not of a god. Humanity was one with nature, not outside. Likewise, Marx did not divide history into social or natural, but saw them as one. Dialectical laws apply in both nature and society, and their developments are interchanging, affecting each other. Marx used the term 'metabolism': a chain of processes linked to each other, as one body.

Marx showed that the increasing division between town and country was a breach of this metabolism, summarised in the term 'metabolic rift' by John Bellamy Foster, author of the useful book, Marx's Ecology. In the third volume of Capital, published in 1894 after Marx's death (1883), Marx describes capitalism as a break with the natural laws of life: "On the other hand, large landed property reduces the agricultural population to a constantly falling minimum and confronts it with a constantly growing industrial population crowded together in large cities. It thereby creates conditions which cause an irreparable break in the coherence of social interchange prescribed by the natural laws of life".

Based on a discussion about the long-term degradation of the soil following the use of chemical fertilisers in agriculture, Marx wrote that "all progress in capitalistic agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil;

all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility”.

He explained: “Capitalist production, by collecting the population in great centres... disturbs the circulation of matter between man and the soil, ie, prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil”. And further: “Capitalist production, therefore, develops technology, and the combining together of various processes into a social whole, only by sapping the original sources of all wealth – the soil and the labourer”. (Capital, Volume I, 1867) In a farsighted prediction, Marx warned that capitalism’s constant modernisation would increase “this process of destruction”.

Engels summarised the dependence on, and need to learn from, nature: “Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside of nature – but that we, with flesh, blood and brain, belong to nature, exist in its midst, and that all our mastery of it consists in the fact that we have the advantage of all other creatures of being able to learn its laws and apply them correctly”. (The Part Played by Labour in the Transition from Ape to Man, 1876)

Today, the climate and environment are engaging growing numbers of activists. Around the world, there are numerous struggles against the big oil companies, fracking, dangerous industrial waste, new speculative motorway and mining projects, etc, as well as against the empty promises of the politicians. Marxists are part of these struggles: from protests against Shell’s drilling platform in Seattle to the struggle that stopped the East-West tunnel in Melbourne, the massive local movements against gold mines in Greece, and against fracking in Ireland. Anti-

capitalism is growing among climate activists. In Naomi Klein's book, *This Changes Everything – which, by no accident, has the subtitle Capitalism Versus the Climate* – she reports how right-wing Tea Party-type activists argue that climate change is an invention by 'communists' in order to implement a planned economy. In this distorted way, they understand the inability of capitalism to solve such a huge crisis. The system, in Klein's words, is at war with life on earth, including human life.

Of course, the world has changed since the days of Marx and Engels. Marx would undoubtedly have eagerly followed the reports from today's environmental and climate change scientists. The rift he found in the interdependent functions of Earth has expanded enormously, with accelerating pace. Above all, Marxists can offer a way forward today. Growing social and environmental crises are caused by the same system, capitalism, and the struggle against them is linked together. Oil companies and their allies will never give up voluntarily. The only force able to solve the environmental crisis is the strongest collective force, the working class, in alliance with the growing numbers already fighting for the environment, many of them indigenous people and poor peasants and rural populations. Crises and struggles are building up for a social revolution, abolishing capitalism.

The climate and environmental crisis has developed very far, underlining the need for urgent action. The only real alternative is a democratic and sustainable planning of resources on a global basis. Such a democratic socialist society will improve the living standards for the vast majority of people while regarding nature and humanity as one interchanging body.

Gandhian Perspective

Much before the convening of any of the international conferences like the Stockholm Conference of 1972 or the Rio Earth Summit of 1992 and almost a hundred years ago, Gandhi has voiced his concern for environment. The concern was evident in his speeches, writings and his messages to the workers. It is apt to note that he was the “World’s early environmentalist in vision and practice”. Much before any modern environmentalist, writes A. Mukherjee, Gandhi had cautioned the world about the problems of large-scale industrialisation, which we are confronting today. His seminal work, *Hind Swaraj*, written a hundred years ago in 1909 warned of the dangers the world is facing today in the form of environmental destruction and the threat to the planet. It is interesting to note that ‘the British who turned *Hind Swaraj* as seditious are also party to the conventions and treaties concerning environment. ‘Gandhi’s *Hind Swaraj* was a warning against growing consumption, materialism and wrong model of development’, about which the world is concerned in our contemporary times.

Environmental Crisis Before we study Gandhi’s views at length, it is necessary to note the background that serves as the catalyst for understanding Gandhi’s views. The Industrial Revolution has greatly changed the face of European civilisation including heavy industrialisation, pursuit of capitalist pattern of economy, exploitation of labour and injudicious use of natural resources. It has given to human society tremendous material pleasure and prosperity that was eventually pursued by other nations. At the same time, it has also imperceptibly done irreparable loss to mankind. Reckless and limitless pursuit of industrialisation by all nations is now posing serious problems for very existence of not only man but also for all living creatures and all kinds of species on our Planet.

Population explosion, mass poverty, over-utilisation of renewable resources, overuse of fertilizers leading to water pollution, rapid industrialisation, global warming, desert formation, deforestation, emission of harmful substances into air causing air pollution, industrial and synthetic wastes, nuclear hazards that are more man-made in nature are all causing irreparable damages to our planet. As the environmental consciousness spread worldwide, there were meetings including the Stockholm Conference, the United Nations Conference on Environment and Development and so on that recognised the need to use the natural resources judiciously so as to ensure a safe future for the coming generations. The ‘Union of Concerned Scientists’ stated that the human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on the critical resources. It calls for a great stewardship to halt further damage and mutilation of the planet and also called for reducing the over-consumption to reduce the pressure on global environmental resources. Gandhi precisely called for the same measures in a prophetic tone.

Spiritual Basis of Environmentalism

Gandhi’s views on environment consist of moral, spiritual and non-violent dimensions. To him, the hallmark of development of man consisted not in materialism or consumerism but in spiritual self-realisation, a character heavily loaded with morality and non-violence. The craving for materialistic wants was alien to him for it hindered the path to one’s realisation. His simple living and high thinking reiterated his love for all living beings, which is the very manifestation of God’s creation. His concept of non-violence thus encompassed all living beings and embodied the eternal values of life in his thought and actions. As Gandhi said, ‘My ethics not only permits me to claim but requires me to own

kinship with not merely the ape but the horse and the sheep, the lion and the leopard, the snake and the scorpion

He insisted on the eternal sacredness of life that included a tree, plant or a cow. 'Indeed his love towards all life constitutes his attempt to realize the Vaishnava ideal 'Vasudevam Sarvamidam'. Gandhi was greatly influenced by Adolph Just's book 'Return to Nature' that further strengthened his conviction that if a man desires to live a wholesome life, he will have to share his life with not only humans but all living beings - birds, animals, plants and the whole ecosystem. Man must return to nature what he takes from her. He abhorred violence, in any form, towards animals or other living beings. Gandhi thus expressed his sense of the unity of all life. He wrote in Harijan in 1937, "I do believe that all God's creatures have the right to live as much as we have." Gandhi was a great believer in advaita (non-duality) and in the essential unity of man and all lives (Young India, 1924). Thomas Weber brings an interesting perspective on how Arne Naess, who was thoroughly influenced by Gandhian philosophy, interprets the link between self-realisation and non-violence.

Weber's interpretation is as follows: 1. Self-realisation presupposes a search for truth. 2. All living beings are one. 3. Himsa (violence) against oneself makes complete self-realisation impossible. 4. Himsa against a living being is Himsa against oneself and. 5. Himsa against a living being makes complete self-realisation impossible. The ancient Indian religious philosophy, thought and action and practices point out to a harmonious relation between man and other living beings. Gandhi was an ardent believer of this philosophy of Vedanta, a combination of spiritual faith and scientific thought.

Judicial Perspective

It is to the credit of the courts in India, particularly the higher judiciary that a truly strident march has been made in India in the protection of the environment. In fact, it would not be an exaggeration to say that the development of environment law in India is inextricably intertwined with the growth and development of the judicial institution in the country. A sub-continental nation-state of striking cultural, economic and ethnic diversity, burdened with the world's second largest population, the majority of which is steeped in illiteracy and poverty, poses challenges of governance which are indeed unique. The written Constitution which the people gave themselves on attaining independence, provides extensive fundamental rights, however the realisation of these rights has not been an easy task. The various developments in the body politic led to a situation where the courts were seen as the last surviving bastion of the rights and liberties of the people.

The post emergency era, particularly the 1980s, witnessed an activist judiciary at work and this was also the period when new and interesting developments took place in environment law. The focus shifted from the conventional approach of treating environmental violations as offences and/or civil wrongs, to the approach of treating environmental concerns as a part of the fundamental rights enshrined in the written Constitution.

The Indian Constitution specifically provides for protection and improvement of the environment. Article 48A, which is a part of the Directive Principles of State Policy under Chapter IV of the Constitution of India, requires the State to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 51A (g) casts a duty on every citizen of the country to protect and improve the environment.

Although not enforceable in a court of law, an activist judiciary has given effect to the objective underlying these Principles by reading them in conjunction with the fundamental rights, which are enforceable in a court of law.

The right to life under Art 21, it was held by the Supreme Court, was not limited to a mere animal existence. This article was later interpreted to bring within its sweep the right to a pollution free environment. Art 32 and 226 provide for issuance of prerogative and other writs have been invoked to grant reliefs. Art 32 enables an individual to approach the Supreme Court directly for infringement of a fundamental right. Art 226 empowers a High Court to issue a writ for violation of a fundamental right or any other legal right. Further, the rulings with regard to the expansion of the principle of locus standi for invoking these provisions were applied to protect against environmental degradation.

Perhaps the most important piece of legislation in this field of law is the Environment Protection Act 1986. Enacted in the wake of the Bhopal Gas Tragedy, this Act covers the whole gamut of environment issues. 'Environment' has been defined under the Act to include water, air and land and the inter-relationship which exists among and between them and human beings, other living creatures, plants, micro-organisms and property. The Act empowers the central government to take such measures as it deems necessary to protect and improve the quality of the environment and to prevent, control and abate environmental pollution. An 'umbrella' legislation, this Act authorises the Central government, inter alia, to set new standards for emissions etc., regulate location of industries, devise procedures for handling hazardous substances, safeguard against accidents causing environment pollution and generally collect and disseminate information regarding environmental pollution.

The common law principle of 'nuisance' offers a legal basis for initiating action against environmental violations. The Code of Civil Procedure 1908 ('CPC'), the Indian Penal Code 1860 ('IPC') and the Code of Criminal Procedure 1973 ('CrPC') contain provisions in respect of public nuisance. Section 91 of the CPC entitles two or more persons to institute a suit for a public nuisance affecting or likely to affect the public. In the Bhopal Gas Tragedy, the Central Government enacted the Bhopal Gas Leak Disaster (Processing of Claims) Act 1985, conferring on it the exclusive right to represent the claims of the victims in *parens patriae* suits. The validity of this legislation was upheld by the Supreme Court in *Charan Lal Sahu vs Union of India*. Public nuisance is an offence punishable under the IPC. Several provisions of the IPC deal with various types of nuisance which cause public injury. The CrPC under section 133, empowers a magistrate to remove a public nuisance of an environmental nature, sections 142 and 144 empower the magistrate to take immediate action to prevent danger or injury of a serious kind. The *Ratlam* case in 1980 is a major landmark in terms of the application of this provision as an effective tool for enforcing duties of local bodies. The case concerned provision of drainage facilities by the local body to the residents of the area.

The financial inability pleaded by the council for not providing the facilities was rejected by the Supreme Court by holding that 'decency and dignity are non-negotiable facets of human rights and are a first charge on the local self-governing bodies'. Even before this decision, the Supreme Court in the case of *Govind Singh vs Shanti Swaroop* dealing with nuisance caused by smoke emanating from a bakery, held that what is involved is not merely the right of a private individual but the health, safety and convenience of the public at large.

The Air Act¹¹ and The Water Act provide for a regime of regulation and control of discharge of pollutants through a system of licensing/permits. The provisions are administered by Central and State Boards established for this purpose. The violations of standards prescribed under these enactments attract penalties, which now include closure of an industry/plant. The Water Cess Act imposes a levy on the consumption of water, which is used to enforce the provisions of The Water Act. The Act provides a 70 per cent rebate on the cess payable upon installation of effluent treatment equipment.

The Indian Forest Act 1927 and The Forest (Conservation) Act 1980 are important. The later Act envisages permission of the Central Government for de-reserving a reserved forest, use of forestland for non-forest purposes or assignment of forestland and other issues concerning reforestation. Mention may also be made of The Wild Life Protection Act 1972, The Atomic Energy Act 1962 and The Factories Act 1948. In addition, there are Rules made under the Environment Protection Act including The Hazardous Wastes (Management and Handling) Rules 1989 and The Hazardous Micro-organisms Rules 1989 which deal with manufacture, use, import, export and storage of hazardous micro-organisms and genetically engineered cells.

A reference may also be made to the Public Liability Insurance Act 1991 and also to the National Environment Tribunal Act 1995. The Public Liability Insurance Act provides for mandatory public liability insurance for installations handling hazardous substances to provide minimum relief to the victim. The Environment Tribunal Act envisages imposition of strict liability for damages, by reason of accidents caused by handling hazardous substances. The Act enables the Central Government to establish a national tribunal and benches to hold enquiries and make awards which appear to be 'just'. In fact, by a recent

decision¹⁵, the Supreme Court has enabled the courts to refer the scientific and technical aspects of environmental concerns, arising out of Arts 32 and 226, of the Constitution earlier.

Public Interest Litigation and Environment Law

A distinctive feature of the growth of environment law in India is the fact that major developments in the law have been at the instance of non-governmental organisations and public spirited individuals. As mentioned earlier, the judiciary assumed a more activist role during the 1980s as new modes of justice-delivery were devised. The courts overcame the limitations imposed by the traditional adversarial system by expanding the principle of locus standi. In the celebrated SP Gupta case, the Supreme Court declared that any member of the public acting bonafide can maintain an action for redress where a public wrong or injury is caused by the state. It is significant to note that the court ruled that such a member of the public may approach the court on behalf of a person(s) who has been injured but is not able to approach the courts by reason of disabilities like poverty, social or economic hardship. This expansion of locus standi has been extensively used by environment groups and individuals to seek redress against environmental degradation by taking recourse to Arts 32 and 226 of the Constitution.

However, it is not to be forgotten that such expansion of locus standi to enable any member of the public to approach the court to vindicate the public interest is not an unmixed blessing. The courts have not hesitated to discourage and in fact strongly deprecate actions which are not bona fide.

The jurisprudence in environment law with its focus on human rights has provided for the internationally recognised third generation right to development. The law in India has thus

evolved whereby quality of life of the individual has been sought to be enhanced. The interpretation and application of the fundamental rights provisions in conjunction with Directive Principles of State Policy and Fundamental Duties to grant substantive relief is indeed a unique approach. Such an approach may, to a puritan, appear to be a deviation from established legal norms, but the need and necessity of the times have warranted it. With the onset of the millennium and the globalisation that is taking place in all walks of life, there are crucial issues to be tackled. Areas like bio-technology are growing at such a rapid pace that legal regimes all over the world need to adapt quickly to the changes taking place. The dynamism of the courts in India is a welcome approach. The approach adopted by the Indian courts for providing substantive relief and remedy to its people who constitute a substantial portion of the international population and a country which boasts some unique ecosystems should serve as an example to consider and apply.

Green Politics

Green politics are a set of political ideologies and social movements which places a high importance on ecological and environmental goals, and on achieving these goals through broad-based, grassroots, participatory democracy. Green politics is advocated by supporters of the Green movement, which has been active through Green parties in many nations since the early 1980s. The political term Green, a translation of the German Grün, was coined by die Grunen, the first successful Green party, formed in the late 1970s. The term political ecology is sometimes used in Europe and academic circles. Supporters of Green politics, called Greens, share many ideas with the ecology, conservation, environmental, feminist, and peace movements. In addition to democracy and ecological

issues, green politics is concerned with civil liberties, social justice and nonviolence.

Adherents to green politics tend to consider it to be part of a higher worldview and not simply a political ideology. Green politics draws its ethical stance from a variety of sources, from the values of indigenous peoples, to the ethics of Mohandas Gandhi, Spinoza and Uexkull. These people influenced green thought in their advocacy of long-term seventh generation foresight, and on the personal responsibility of every individual to make moral choices. Unease about adverse consequences of human actions on nature predate the modern concept of “environmentalism.” Social commentators as far apart as ancient Rome and China complained of air, water and noise pollution.

The philosophical roots of environmentalism can be traced back to enlightenment thinkers such as Rousseau in France and, later, the author and naturalist Thoreau in America. Organised environmentalism began in late 19th Century Europe and the United States as a reaction to the Industrial Revolution with its emphasis on unbridled economic expansion. “Green politics” first began as conservation movements; for example, the Sierra Club, founded in San Francisco in 1892. The problematic history of “eco-fascism” has been extensively analysed in Germany, where the modern Green Party first became established as an important political force. And there can be many superficial similarities between policies of Green parties and those of neo-fascist parties. Green platforms draw terminology from the science of ecology, and policy from environmentalism, deep ecology, feminism, pacifism, anarchism, libertarian socialism, social democracy, eco-socialism, and social ecology. In the 1970s, as these movements grew in influence, green politics arose as a new philosophy which synthesized their goals.

In March of 1972 the world's first green party, the United Tasmania Group, was formed at a public meeting in Hobart, Australia. In May 1972, a meeting at Victoria University of Wellington, New Zealand, launched the Values Party, the world's first countrywide green party to contest Parliamentary seats nationally. A year later in 1973, Europe's first green party, the UK's Ecology Party, came into existence.

The German Green Party was not the first Green Party in Europe to have members elected nationally but the impression was created that they had been, because they attracted the most media attention: ~ The German Greens, contended in their first national election in 1980. The German Greens started as a provisional coalition of civic groups and political campaigns which, together, felt their interests were not expressed by the conventional parties. After contesting the 1979 Euro elections they held a conference which identified Four Pillars of the Green Party which all groups in the original alliance could agree as the basis of a common Party platform: welding these groups together as a single Party. This statement of principles has since been utilised by many Green Parties around the world. It was this party that first coined the term Green and adopted the sunflower symbol. In the 1983 federal election, the Greens won 27 seats in the Bundestag.

The first Canadian foray into green politics took place in the Maritimes when 11 independent candidates (including one in Montreal and one in Toronto) ran in the 1980 federal election under the banner of the Small Party. Inspired by Schumacher's *Small is Beautiful*, the Small Party candidates ran for the expressed purpose of putting forward an anti-nuclear platform in that election. It was not registered as an official party, but some participants in that effort went on to form the Green Party of Canada in 1983.

In Finland, in 1995, the Green League became the first European Green party to form part of a state-level Cabinet. The German Greens followed, forming a government with the Social Democratic Party of Germany from 1998 to 2005. In 2001, they reached an agreement to end reliance on nuclear power in Germany, and agreed to remain in coalition and support the German government of Chancellor Gerhard Schroder in the 2001 Afghan War. This put them at odds with many Greens worldwide but demonstrated also that they were capable of difficult political trade-offs.

Since green politics emerged as an ideology, it has been defined by a few key green principles. The German Greens drafted the earliest statement of this kind, called the Four Pillars of the Green Party. The Four Pillars have been repeated by many green parties worldwide as a foundational statement of the green ideology:

Ecological wisdom

Social justice

Grassroots democracy

Nonviolence

In 1984, the Green Committees of Correspondence in the United States expanded the Four Pillars into Ten Key Values which, in addition to the Four Pillars mentioned above, include:

Decentralization

Community-based economics

Post-patriarchal values (later translated to Feminism)

Respect for diversity

Global responsibility

Future focus

In 2001, the Global Greens were organized as an international Green movement. The Global Greens Charter identified six guiding principles:

Ecological wisdom

Social justice

Participatory democracy

Nonviolence

Sustainability

Respect for diversity

Green ideology emphasizes participatory democracy and the principle of thinking globally, acting locally. As such, the ideal Green Party is thought to grow from the bottom up, from neighbourhood to municipal to regional to national levels. The goal is rule by a consensus decision making process. Strong local coalitions are considered a pre-requisite to higher-level electoral breakthroughs. Historically, Green growth has been sparked by a single issue where Greens can bridge the gap to ordinary citizens' concerns. In Germany, for example, the Greens' early opposition to nuclear power won them their first successes in the federal elections.

Eco-Feminism

Ecofeminism is an ideology and movement that sees climate change, gender equality, and social injustice more broadly as

intrinsically related issues, all tied to masculine dominance in society. Specifically, ecofeminism holds that most environmental issues can be traced back to the global prioritization of qualities deemed masculine (particularly the ones some would regard as toxic, like aggression and domination) and those in power who embody those attributes. Ecofeminism also calls attention to the fact that women are disproportionately affected by environmental issues. According to one report from the United Nations, because women worldwide typically hold less monetary wealth and rely on the natural environment more, they are more likely to be displaced by climate change and have to travel farther for resources, like water, as dry seasons extend. Research shows women are also more greatly affected by radiation than men. One study has even suggested some men may have internalized aversions toward environmentalism, as it could be perceived as feminine.

There are several sub-branches of this movement, including vegetarian ecofeminism, spiritual ecofeminism, and materialist ecofeminism. But at their root, they all assert that masculine dominance has led to disconnect between nature and culture, which has adversely affected marginalized groups as well as nature itself. Feminism, in all its waves, has experienced evolutions and resurgences since it formally began in the mid-1800s. As climate change awareness and subsequent activism rose in recent decades, feminists began to identify the ways in which the movement for gender equality and the movement for environmental protection are related. The term ecofeminism was coined by French feminist Françoise d'Eaubonne in 1974. According to her, the disenfranchisement and oppression of women, people of color, and the poor are intrinsically linked to the degradation of the natural world, as both arose as a result of patriarchal dominance.

Over the years, many more have explored the sentiment behind ecofeminism—and begun advocating for it. Women such as Vandana Shiva, founder of the Research Foundation for Science, Technology, and Ecology, and Carolyn Merchant, author of *Death of Nature: Women, Ecology, and the Scientific Revolution*, are just two prominent names within this movement since its inception. Some other names of note include Val Blumwood, Greta Gaard, and Susan Griffin, just to name a few. It's been nearly 50 years since ecofeminism was formally introduced. Nowadays, even where the word itself is not used, the principles of ecofeminism are interwoven into the modern-day climate change movement among those who actively advocate for equitable change for people and the environment.

Major Eco-feminist Principles

1. Both the oppression of marginalized groups and the oppression of nature are connected by cause.

Patriarchal dominance, which presupposes masculine attributes are more valuable, has led to the degradation of nature (land and animals), along with the marginalization of groups, including but not limited to women, children, and people of color. Capitalism further propels this oppression, as it places value on productivity by any means, and subsequently does not value many attributes considered feminine, including nature itself.

2. We must replace our culture of domination with an ethic of care.

Ecofeminism advocates for overhauling this entire masculine system of domination and exploitation—and replacing it with an ethic of care, an approach to morality grounded in feminine characteristics of care and nurturing. This approach focuses on

human benevolence and acting in a way that prioritizes care for others.

3. All forms of oppression are unacceptable and interconnected.

Under ecofeminism, all forms of oppression are not acceptable. For environmentalism to be all-encompassing, it has to consider all people. Women, people of color, and the LGBTQ community all face particular issues—and when these issues overlap, their effects become compounded.

4. Understanding these connections is necessary for equitable change.

In order to make a real, positive impact in both the cases of environmental degradation and the oppression of marginalized groups, ecofeminism says we have to understand their links to patriarchal society. Feminism must consider ecological concerns and vice versa. It is really critical that we understand the gender dynamics around climate impacts, Wilkinson adds, because we need to have strategies and approaches through adaptation and resilience that respond to those inequities.

5. The people most affected by environmental destruction must be the ones to lead the movement.

As ecofeminists push for an inclusive care ethic, there's also an emphasis on the importance of having diverse leadership at the forefront of the movement. In particular, the people who are most affected by environmental destruction—women, particularly indigenous women and other women of color—are the ones who are best equipped to address it and identify the right solutions.

Free Market Environmentalism

Free-market environmentalism argues that the free market, property rights, and tort law provide the best means of preserving the environment, internalizing pollution costs, and conserving resources. Free-market environmentalists, therefore, argue that the best way to protect the environment is to clarify and protect property rights. This allows parties to negotiate improvements in environmental quality. It also allows them to use torts to stop environmental harm. If affected parties can compel polluters to compensate them they will reduce or eliminate the externality. Market proponents advocate changes to the legal system that empower affected parties to obtain such compensation. They further claim that governments have limited affected parties' ability to do so by complicating the tort system to benefit producers over others.

While environmental problems may be viewed as market failures, free market- environmentalists argue that environmental problems arise because:

The state encodes, provides and enforces laws which override or obscure property rights and thus fail to protect them adequately.

Given the technological and legal context in which people operate, transaction costs are too high to allow parties to negotiate to a solution better for the environment.

Laws governing class or individual tort claims provide polluters with immunity from tort claims, or interfere with those claims in such a way as to make it difficult to legally sustain them.

Though many environmentalists blame markets for many of today's environmental problems, free-market environmentalists blame many of these problems on distortions of the market and

the lack of markets. Government actions are blamed for a number of environmental detriments.

A misunderstanding of the tragedy of the commons, which is seen as a fundamental problem for the environment. When land is held in common, anybody may use it. Since resources are consumable, this creates the incentive for entrepreneurs to use common resources before somebody else does. Many environmental resources are held by the government or in common, such as air, water, forests. A claimed problem with regulation is that it puts property into a political commons, where individuals try to appropriate public resources for their own gain, a phenomenon called rent-seeking.

Tenure - Renters do not benefit from value accrued during their tenure and thus face an incentive to extract as much value as possible without conservation.

Political allocation - Political information does not have the incentives that markets do to seek superior information (profit and loss). Though many participants provide input to governments, they can only make one decision. This means that governments create rules that are not well crafted for local situations. The government's strategy is that of anticipation, to hide from danger through regulations. A healthier society would use resilience, facing and overcoming risks.

Perverse subsidies - Governments offer cross subsidies that distort price systems. This means that under consumers and over consumers are paying the same rates, so the under consumer is overpaying and the over consumer is underpaying. The incentive leads to consumers and fewer under consumers.

Increased transaction costs - Governments may create rules that make it difficult to transfer rights in ways that benefit the

environment. For example, in the western United States, many states have laws over water rights that make it difficult for environmental groups to purchase in-stream flows from farmers.

Markets are not perfect, and free-market environmentalists assert that market-based solutions will have their mistakes. Through strong feedback mechanisms such as risk, profit and loss, market-driven have strong incentives to learn from mistakes.

Individual choice - Consumers have the incentive to maximize their satisfaction and try to find low cost, high-value options. Markets allocate resources to the highest bidder. Producers make purchases on behalf of the consumer. Due to many actors in the market, there is no one-size-fits-all solution and entrepreneurs will seek to fulfil many values of society, including conservation.

Entrepreneurship - Entrepreneurs seek value, problem-solve, and coordinate resources.

Price system - When resources become scarce, prices rise. Rising prices incentivize entrepreneurs to find substitutions for these resources. These resources are often conserved. E.g. as prices for coal rise, consumers will use less and higher prices will drive substitution for different energy sources.

Property rights - Owners face a strong incentive to take care of and protect their property. They must decide how much to use today and how much to use tomorrow. Everybody is trying to grow value. Corporate value and share price is based on their anticipated future profits. Owners with the possibility of transferring their property, either to an heir or through sale want their property to grow in value. Property rights encourage conservation and defend resources against depletion, since there is a strong incentive to maximize the value of the resource for the future.

Common law - In order to have working property rights, you need a good system to defend them. When rights are weak, people will violate them. By creating a strong system, where common resources can be homesteaded, transferred, and defended against harm, resources can be protected, managed, allocated with the results that aggregate and balance humanity's needs and wants. The market is a non-political allocation device. Many environmentalist's proposals call to return resources from markets to become political problems.

Environmental Auditing and Environmental Democracy

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organisations of all kinds now recognise the importance of environmental matters and accept that their environmental performance will be scrutinised by a wide range of interested parties. Environmental auditing is used to:

Investigate

Understand

Identify

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organisation's environmental effects in a systematic and documented manner and will produce an environmental audit report. There are many reasons for undertaking an environmental

audit, which include issues such as environmental legislation and pressure from customers.

Environmental auditing should not be confused with environmental impact assessment (EIA). Both environmental auditing and EIA are environmental management tools, and both share some terminology, for example, 'impact', 'effect', and 'significant', but there are some important differences between the two. Environmental impact assessment is an anticipatory tool, that is, it takes place before an action is carried out. EIA therefore attempts to predict the impact on the environment of a future action and to provide this information to those who make the decision on whether the project should be authorised. EIA is also a legally mandated tool for many projects in most countries.

Environmental auditing is carried out when a development is already in place, and is used to check on existing practices, assessing the environmental effects of current activities. Environmental auditing therefore, provides a 'snap-shot' of looking at what is happening at that point in time in an organisation. The International Organization for Standardization (ISO) has produced a series of standards in the field of environmental auditing. These standards are basically intended to guide organisations and auditors on the general principles common to the execution of environmental audits. These are addressed elsewhere in this module.

Environmental auditing means different things to different people. Environmental auditing is often used as a generic term covering a variety of management practices used to evaluate a company's environmental performance. Strictly, it refers to checking systems and procedures against standards or regulations, but it is often used to cover the gathering and

evaluation of any data with environmental relevance-this should actually be termed an environmental review.

Environmental democracy is based on the idea that land and natural resource decisions adequately and equitably address citizens' interests. Rather than setting a standard for what determines a good outcome, environmental democracy sets a standard for how decisions should be made. At its core, environmental democracy involves three mutually reinforcing rights that, while independently important, operate best in combination: the ability for people to freely access information on environmental quality and problems, to participate meaningfully in decision-making, and to seek enforcement of environmental laws or compensation for damages. Far too often, the public is not meaningfully engaged in decisions that could affect their health, livelihoods, and culture. These three key components – access to information, participation and justice – also known as “access rights” are reflected in Principle 10 of the Rio Declaration on Environment and Development. They are at the heart of environmental democracy, embodying the procedural dimensions of the right to a healthy environment.

Right to access to information

The right to information is a basic right of every citizen in a democratic country. So, this fundamental right concerning environmental decisions, development project plans, environmental impact assessments, and pollution discharge must be embedded in both the state and local laws as the first step towards a secured environmental democracy. If this type of information is accessible to the public, it can participate effectively in policy decision making and by their support, the government can easily hold companies liable for their actions against the environment. The information available must not be

in a way that it cannot be easily and readily used by the people but it should be in a format in which factor-like literacy, use of technology, language, readability should be taken into consideration. In 1985, after several environmental disasters including the one in which a chemical was released from Union Carbide Plant in West Virginia harming and affecting many people' lives in a certain way, the USA developed the first-ever Pollutant Release and Transfer Register known as Toxic Release Inventory (hereinafter TRI) in 1986. TRI requires submission of the number of toxic chemicals released from industrial facilities by them only. Since 1986, more than 50 countries have developed Pollutant Release and Transfer Registers. If the US TRI has made the information open and free accessible, then there might be a reduced incidence of toxic release in the country.

Right to public participation

The right to public participation in policy-making concerning environmental issues should be given to every citizen in a democratic country. The state should pre-emptively and proactively consult its citizens, provide them with opportunities for participation, and inform them about the avenues for greater participation. If the said information flows between the public then, it would lead to a better and effective policy, it can help to avoid unintended consequences and can increase support in protecting the environment by sustainable use of the resources. There should be a proper public participation process without incurring burdensome costs both to the public and the state. The best known public participation process for the environment is through Environment Impact Assessments. When the public is given ample notice along with the necessary information to understand and participate meaningfully, these assessments can be effective ways to safeguard against environmental harms. On the other hand, public consultations that serve only to inform of a decision that has already been made undermines public trust, reduces legitimacy, and stifles the flow of important

information. For instance, the Land Transport Authority of Singapore published an environmental impact assessment online which was free and open to all the citizens regarding the widespread issue over a proposed Mass Rapid Transit line that would run through the Central Catchment Nature Reserve which was ostensibly causing significant and irreversible environmental damage. People started forming ad hoc volunteer groups to protect their environment. Thus with open communication by the state, people exercise democratic self-development and self-determination, determining their social life as equal and respected members of the country.

Access to justice

The state should establish environmental courts and tribunals as an open and inclusive system of redress for environmental injustice so that all citizens can enjoy the full suite of constitutional rights when they have been violated. They should possess the right to protest against the proposed policies and projects, demand compensation, and openly challenge violations of their environmental rights. They should have the right to access past judicial and administrative decisions concerning the environment with the unimpeded right of appeal. The main objective is to establish such a mechanism that promotes greater accountability to the citizens of the democratic state. There should be an establishment of an independent and impartial body to protect the environmental rights of the citizens like the one India has that is the National Green Tribunal. It was established in the year 2010 in recognition of a large number of cases concerning environmental disputes piled up in the courts. The National Green Tribunal has full jurisdiction over all environmental disputes and the aim of the body is to operate with haste that is maximum of six months each case time limit.

Module II

Perspectives in Development

Development as a concept can be discussed from various perspectives. They are: ‘Development’ as a long term process of structural societal transformation. ‘Development’ as a short-to-medium term outcome of desirable targets. ‘Development’ as a dominant ‘discourse’ of western modernity. ‘Development’ as a long term process of structural societal transformation. The first conceptualization is that ‘development’ is a process of structural societal change. This view, of ‘structural transformation’ and ‘long-term transformations of economies and societies’ is one that predominated in the 1950s and 1960s in particular. The key characteristics of this perspective are that: It is focused on processes of structural societal change. It is historical. It has a long-term outlook. In this conceptualization, development relates to a wide view of diverse socio-economic changes. The change in one structural element of the society has the propensity to bring changes in other institutions and elements. For example, when there is development in the economy, there is a change in the social institutions like family, marriage, education, system of stratification in the society.

‘Development’ as a short-to-medium term outcome of desirable targets- A second perspective on ‘development’ can be seen in the light of some targeted goals and their degree of achievements. At its most basic level it is simply concerned with development as occurring in terms of a set of short- to medium-term ‘performance indicators’- goals or outcomes - which can be measured and

compared with targets. For example change in the level of education, increase in income, poverty reduction etc. is the short or medium term outcomes used to indicate development. It is a practitioner accepted model of development very much used by the development agencies like the UNDP (the United Nations Development Programme), OECD (Organization for Economic Cooperation and Development), The World Bank etc. The key feature of this second perspective is that it is focused on the outcomes of change so that it has a relatively short-term outlook. But it becomes easy to measure development in terms of some pre fixed objectives and the level of their attainment.

‘Development’ as a dominant ‘discourse’ of western modernity: This is the ‘post-modern’ conceptualization of development. It is also referred to as the ‘post-development’, ‘post-colonial’ or ‘post-structuralism’ development perspective. This third perspective emerged as a reaction to the deliberate efforts at progress made in the name of development since World War II and was triggered in particular by the 1949 Declaration by the US President Truman that: “We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas.” The post-modern theorists are vocal against the development maladies created in the Third World countries. To the post-modern development theorists development created a neo-colonial regime in the Third World countries. Instead of creating abundance promised by theorists and politicians in the 1950s, the discourse and strategy of development produced its opposite: massive underdevelopment and impoverishment, untold exploitation and oppression. The western development model was super imposed on the Third world countries with a top-down, ethnocentric, and technocratic approach. It neglected the local people, their needs and cultural demands.

Western Capitalist, Socialist, Third World and Gandhian View

Western Capitalist View on Development

The capitalist model of development is characterised by provision of private ownership of property and means of production, minimum state control on economic enterprises, and a free economy regulated by competition. This developmental model also emphasises sustained growth and modernisation with massive state investment at the take-off stage. This perspective insists economic development would revolve around industrialisation. This model of development is criticised as pro-rich and anti-poor in character. It is claimed that it increases the rich-poor gap and results in uneven development. Modern economies in much of Western society today are organized under the banner of capitalism. Some of the most important aspects of a capitalist system are private property, private control of the factors of production, accumulation of capital, and competition. Put simply, a capitalist system is controlled by market forces, while a communist system is controlled by the government. Here we go over some of the main factors that describe a capitalist economy.

The right to private property is a central tenet of capitalism. Citizens cannot accumulate capital if they are not allowed to own anything, if they fear the stuff they own can be easily stolen or confiscated, or if they cannot freely buy or sell the things they own and transfer that ownership to others. As long as the owner stays within the parameters of the law, which generally are broad in capitalist systems, the individual may do what they want with the property they own. A private citizen may purchase property from another private citizen at a price that is mutually agreed upon and not dictated by a government. In a capitalist system, the free

market forces of supply and demand, rather than a central governing body, set the prices at which property is bought and sold. Private property rights are an important foundation of capitalist production. These rights clearly separate the ownership of the means of production from the workers who use them. For instance, an entrepreneur will own the factory and the machines used in it, as well as the finished product. A worker located inside of that factor and using those machines has no ownership of them, and cannot take home with the finished product for personal use or sale - that would be considered theft. The worker is only entitled to their wages in return for their labor.

In capitalism, private enterprise controls the factors of production, which include land, labor, and capital. Private companies control deploy a mix of these factors at levels that seek to maximize profit and efficiency. A common indicator of whether the factors of production are privately or publicly controlled is what happens to surplus product. In a communist system, surplus product is distributed to society at large, while in a capitalist system, it is held by the producer and used to achieve additional profit.

The centerpiece of a capitalist system is the accumulation of capital. In a capitalist system, the driving force behind economic activity is to make a profit. Capitalists see amassing profits as a way to provide a powerful incentive to work harder, innovate more and produce things more efficiently than if the government had sole control over citizens' net worth. This financial incentive is the reason capitalist economies see innovation as going hand-in-hand with their market system. Indeed, Karl Marx, observing how capitalism was emerging in the wake of the industrial revolution, understood the accumulation and re-deployment of capital, re-investing back into the company to expand production and efficiency, was a defining feature of capitalism.

Competition is the other vital attribute of a capitalist system. Private businesses compete to provide consumers with goods and services that are better, faster and cheaper. The principle of competition forces businesses to maximize efficiency and offer their products at the lowest prices the market will bear, lest they get put out of business by more efficient and better-priced competitors. While doing business with a particular company in a capitalist system is voluntary, in contrast, the central government in a communist system has effective monopolies in all industries. This means it has no incentive to operate efficiently or provide low prices because its customers do not have the option of looking elsewhere.

The main venue for this competition is in the free market. A market is an abstract notion that broadly describes how the forces of supply and demand manifest through prices. If demand for some good rises and the supply remains the same, the price will go up. The price going up, however, will send a signal to producers that they should make more of that good because it is suddenly more profitable. This will increase the supply to meet the new larger demand, sending the price back downward a bit. This process creates what economists call an equilibrium state that adjusts to fluctuations in supply and demand.

Socialist View on Development

The Socialist Model was contradictory to the capitalist model of development. It challenged the capitalist model of development. It propagated the abolition of ownership of private property and means of production, emphasised state ownership of means of production, state-owned public enterprise, and a state regulated economy and centralised planning by the state for economic growth. While both the capitalist and the socialist models laid primary emphasis on economic growth, the socialist model also

emphasised on the equal distribution of the fruits of growth among all sections of the population. This model of development faced its tragic consequences in the 80s when there was the fall of communism in Soviet Russia. The model could not yield its targeted result and failed to create an egalitarian society. Rather, poverty and unemployment became the worst outcomes of this model of development.

The socialist path of development adopted by the Second World was seen to be opposite or dichotomous to the capitalist path of development. The former, contrary to the latter, is characterized by state ownership of property and means of production, public enterprises and complete state regulation of economic activities. Thus, the socialist model refers to a regulated economy. The main allegation against the capitalist model is that, since it permits minimum state regulation, its economic system becomes exploitative in the sense that the working-class people do not get their due share. The capitalists enjoy a major share of the nation's resources. Hence it contributes to inequalities so that a few are very rich and the majority is very poor. The capitalist model is, therefore, alleged to be exploitative and non-egalitarian.

On the contrary, the socialist model was ideally considered as non-exploitative and egalitarian. Private ownership and the lack of state regulation, were considered to be important measures of exploitation of the weaker sections and hence the causes of income inequalities. Since, the socialist state did not allow private ownership of property, there was a strong belief that there was no room for exploitation and inequality in it. However, historical events proved this belief to be incorrect as the Soviet Union could not survive for long. The period of "Glasnost" and "perestroika" led by Gorbachev, the erstwhile Russian Prime Minister during the 1980's, dismantled the communist political and economic structure. The Soviet Union disintegrated into several small

countries and the socialist ideology gave way to capitalist tendencies. However, China still follows a socialistic socio-political order. The two models had also differed in their conception of development.

Whereas the capitalist model lays greater stress on economic growth, than on equal distribution of the fruits of economic growth. The socialist model laid equal stress on both resource generation and equal distribution of income and tried to change the social system in such a way that greater social justice could be ensured. In reality, socialist model did not give much space to individual initiative and consumerist desires. The foregoing discussion implies another difference between these models. The capitalist model does not see any major conflict in the interests of the two classes: workers and capitalists. In its eyes both the classes are complementary to each other, they; are functionally interdependent. The rules of society, particularly about ownership of property and distribution of income, are supposed to be based on consensus. Hence according to this model, there is no need to change the economic structure. On the contrary, the socialist model saw inherent conflict in the interests of the workers and the capitalists. According to it, rules are not based on consensus but are imposed on the weaker section by the stronger one. This leads to the exploitation of the weak by the strong, which is likely to result in conflicts, and in revolution by the exploited people who want radical change in the system itself.

Third World View on Development

The developing world is represented by the ex-colonial, newly independent and non-aligned countries of Asia, Africa and Latin America. These countries were industrially backward at the time of liberation. These countries witnessed wide diversity in terms of their socio-cultural and political settings and historical

experiences and levels of technological and economic development. These countries were economically and technologically underdeveloped, and were undergoing the process of nation-building and fast social transformation in the post-colonial era. As against these backdrops, these countries have been experimenting with diverse models of development. For example, India has followed the path of “mixed economy” by adopting a path of development in between the capitalist and socialist models. With the process of Globalization and the subsequent structural adjustment policies this model is tending to take a capitalist trend of development.

It is difficult to specify the model of development, adopted by the majority of the Third World countries as there are variations among them, dictated mainly by their historical and socio-cultural circumstances. What they seem to share in common is that: a) They are economically and technologically underdeveloped in comparison to the countries of the so called developed world. b) Social planning is a key element in their development process. Their plans of development incorporate not only economic concerns, especially removal of poverty but also concerns regarding nation-building, national culture and social transformation. c) They have been seeking technological and economic aid from the developed countries. The developed countries have given them economic assistance, but they have also been increasingly attempting to extend their political influence in the developing countries. It has been noted that the global military defence strategy is, the major consideration of the developed countries, in extending their economic and political influence to the developing countries.

In fact, the idea of the Third World is associated with the emergence of consciousness among developing countries, of being exploited by the developed countries in the garb of

monetary help and expert advice. Some nations had become conscious of exploitation much earlier, but others, understood this fact only after seeing the disastrous role of big powers in the developing countries, e.g., the role of the USA in Vietnam or the USSR in Afghanistan. The social analysts have played a very significant role both in appreciating the help, as well as analysing the “games” of the big powers in the developing countries.

Gandhian View on Development:

The quintessence of Gandhian philosophy is that the human values and not the market should govern life. Service of the teeming millions, the poor - Daridranarayan - is of the utmost importance. Gandhi presents the 'humane face of development. Ghosh brings out the following basic objectives of the Gandhian scheme of holistic development-(1) human development for capability expansion, (2) development in a balanced way through manual and intellectual labour (development of body, mind and soul), (3) development with social justice, rights and freedom. This is in accordance with the principle of social and human development. (4) attainment of self-sufficiency and self-reliance through rural development, (5) reduction in poverty through the generation of additional income and employment.

Gandhi aims at what we may call sustainable development, balanced development of body, mind and soul. Gandhi had realized that human development is not just material or economic; it has to be moral, it should be able to instil the values of equality, liberty and dignity in the people; it must provide the persons with courage to protest against injustice. His emphasis on decentralization, community based economics, self-sufficiency, handicrafts, rural development, and use of low capital intensive appropriate technology indicate his vision for a self-sufficient economy.

According to Gandhi nature provides just enough, and not more, for our daily needs. He opposes exploitation, ruthless drive for economic abundance and personal aggrandizement, massive technological progress, severe competitions, unbridled consumerism and concentration of wealth and power. In his opinion, greed is detrimental to social good and political emancipation without economic equality is hollow. For him, economics stands for social justice. He emphasizes decentralized self- dependent units bound together by the bonds of mutual cooperation and interdependence.

For him the development of the individual and the development of the society are intertwined. His ultimate goal was sarvodaya. The concept of Sarvodaya presupposes the principle of justice. Sarvodaya generates movements for changes, outward as well as inward and strives for egalitarian social order based on truth, nonviolence and purity of means. Gandhi never compromised at the cost of individual freedom, equality and social justice; his principle of nonviolence was not a mere philosophical principle but it was the rule of life. He had visualized an India where all interests not in conflict with the interests of the dumb millions will be scrupulously respected, whether indigenous or foreign.

Gandhi's basic aim was to have an all-round development of the society that included human development along with socio-economic- political development. Gandhian programme is holistic and multidimensional. The objective of his constructive work is the creation of non-violent society. Gandhi envisages a healthy society based on harmony and dialogue, where the ideas of equality and justice are translated in the lives of teeming millions. Commenting on man's social nature, Gandhi wrote that if it is his privilege to be independent it is equally his duty to be independent...It will be possible to reconstruct our villages so that

villages collectively, not villagers individually, will become self-contained.

Gandhi believes in the unity of life and egalitarian values in all spheres of life. According to him life cannot be divided in sphere like social, political, economic, moral and religious. If one part of the society suffers, all parts suffer. Gandhi visualized a society of diverse people based on mutual understanding, mutual cooperation and mutual respect. He wanted freedom and equality for all. Gandhi transcends barriers of religion, rituals, caste, class and colour. Dada Dharmadhikari points out that Gandhi had no business other than life, an integrated life. He never ran away from any situation, he faced it. His concept of life was all comprehensive; for him nothing was separate and everything was harmonized. He added social dimension to morality that was unique. He practiced what he preached and did everything possible to identify himself with the common man, ordinary man, suffering man. When India became independent, he was not in the capital to celebrate but was with the riot-stricken people.

Gandhi maintains that wealth is to be used judiciously, governed by the principle of each according to his need; and emergence of inequality has to be curbed at all levels. According to him, all amassing or hoarding of wealth, above and beyond one's legitimate requirement is theft. His concept of social use of wealth against the prevailing ethos of consumerism demands our serious attention. Values of truth, non-violence and non-accumulation of wealth are to be cherished for the very survival of the society, where the weakest has the same rights as the strongest.

Trusteeship for Gandhi is a dynamic concept that can bring change in the established institutions. It is a means of transforming the present capitalist order of society into an egalitarian one. An individual is not free to hold or use his wealth

for selfish satisfaction. The common property is to be used for the good of one and all, all including the rich have to work for the society according to his/her capacity and they will receive as per needs. Property owners are caretakers of the property for the common good. Trusteeship aims at some realizable outcomes like capital-labour cooperation, formation of social capital, reduction in concentration of economic power in a few hands, and voluntary cutting down the wants.

Gandhi did not approve the use of machines that replaces men or makes them subservient to machines. He advocates judicious use of machines; and simple, indigenous technology of non-exploitative nature in tune with nonviolence. He emphasizes the importance of whatever can be produced locally and thinks about a decentralized economy. He propagated the use of the spinning wheel and Khadi for self-reliance as well as moral and economic regeneration.

Gandhi visualized exploitation free society, based on cooperation and ethics. His vision included productive employment for India's millions, schemes for rebuilding villages and creating communities of care and concern, promotion of khadi and local handicrafts, production of need-based basic goods, empowering people by imparting basic education and required skills to enable them to create decentralized structures of power, and ensuring equality of opportunity for all. He believed that human wants have to be limited, and no one should suffer from deprivation and want of basic necessities. And for that, the required means of production should be socially controlled. His emphasis is on collectivity and not on individual needs and greed. Wealth has to be created collectively and enjoyed collectively.

For Gandhi rebuilding villages, in accordance with the principles of self-sufficiency and decentralization, was very important.

According to him, cities have so far exploited the villages, and that has resulted in the gap between villages and cities in education, culture, facilities, employment. Now a new partnership between cities and villages is needed. Gandhi insists on regulation of wants and use of the goods and material not imported, but made in one's own country. His concept of Swadeshi, a dynamic concept of self-reliance, is closely connected with Swaraj, political freedom. Another of his important concept is that of 'bread labour', that propagates that some amount of physical labour has to be done by every person every day. Physical labour is a great equalizing force, and the need for socially useful manual labour is obvious.

The rift between the rich and the poor is increasing in our times and the exploitation involved in the process of the amassing wealth is blatant. Gandhi was sure that too much emphasis on materialism leads to violence and unhappiness. He criticized the exploitative and materialistic Western civilization and believed that India cannot be a replica of that. Many western thinkers also have noticed trends of exploitation and dehumanization trends of industrialization. Gandhi's critique of the exploitative and dehumanizing modern western civilization is relevant today, as it makes us aware of the fact that economic progress devoid of moral elements will not ultimately help the people but will make internal divisions and dissensions more intense.

He firmly believed that unless there is a complete transformation in our economy and our style of life, peace will elude us, however hard we may strive for it. His relentless struggle against inequality and poverty, exploitation and suppression has many lessons for contemporary times. It is important to realize that he is opposed to the concentration of power and the system that makes the individual subservient to the material. Gandhi draws our attention to the need to protect the environment and to guard against the

abuse of natural resources. Our mindless destruction of natural wealth is alarming. Mighty projects, big dams, giant industries and other massive ventures raise questions about the quality of life affected by them. The quest for the mirage of material development often leads to the destruction of forests, ecological imbalances, scarcity of water, soil erosion, silting of rivers and desertification pose grave dangers to environment. Gandhi encourages us to rethink about our inadequate and risky development model putting too much stress on economic prosperity. He does not believe in survival of the fittest, but survival and good survival of all, not greatest good of all, but greatest good of all.

North-South Divide

In the 1980s, the Brandt Line was developed as a way of showing the how the world was geographically split into relatively richer and poorer nations. According to this model: Richer countries are almost all located in the Northern Hemisphere, with the exception of Australia and New Zealand. Poorer countries are mostly located in tropical regions and in the Southern Hemisphere. However, over time it was realised that this view was too simplistic. Countries such as Argentina, Malaysia and Botswana all have above global average GDP (PPP) per capita, yet still appear in the ‘Global South’. Conversely, countries such as Ukraine appear to be now amongst a poorer set of countries by the same measure.

Despite very significant development gains globally which have raised many millions of people out of absolute poverty, there is substantial evidence that inequality between the world’s richest and poorest countries is widening. In 1820 Western Europe's per capita income was three times bigger than Africa’s but by 2000 it was thirteen times as big. In addition, in 2013, Oxfam reported

that the richest 85 people in the world owned the same amount of wealth as the poorest half of the world's population. Today the world is much more complex than the Brandt Line depicts as many poorer countries have experienced significant economic and social development.

However, inequality within countries has also been growing and some commentators now talk of a 'Global North' and a 'Global South' referring respectively to richer or poorer communities which are found both within and between countries. For example, whilst India is still home to the largest concentration of poor people in a single nation it also has a very sizable middle class and a very rich elite. There are many causes for these inequalities including the availability of natural resources; different levels of health and education; the nature of a country's economy and its industrial sectors; international trading policies and access to markets; how countries are governed and international relationships between countries; conflict within and between countries; and a country's vulnerability to natural hazards and climate change.

Brandt Report and the Bretton Woods System

The Brandt Report is the report written by the Independent Commission, first chaired by Willy Brandt in 1980, to review international development issues. The result of this report provided an understanding of drastic differences in the economic development for both the East and West of the world. The Brandt Report is a broad based analysis of the state of the world, with a necessary emphasis on the failure of the world economic system to provide social and economic equality for humanity. It highlights the economic trends that need to be reversed, and the solutions and strategies that urgently need to be implemented to resolve the income disparity between the Northern and Southern

Hemispheres, financial and economic instability, and the growing problem of global poverty.

Comprised of a remarkable group of accomplished, international leaders and statesmen, the Brandt Commission emphasise the mutual interest for developed and developing countries to deal with, once and for all, the most urgent challenges of our time in order to survive the immense risks threatening mankind. Cooperation was the tool to create change and facilitate worldwide growth and development, the main objective of development being to lead to self-fulfilment and creative partnership in the use of a nation's productive forces and its full human potential. To enforce one nation's model of development onto another was deemed unnecessary.

The commission wanted to make it quite clear that the world cannot continue with a "business as usual" approach to pressing global issues. Their aim was to "...organise as rapidly as possible...an international meeting at the highest level...to discuss North-South emergency matters and...to reach agreements as concrete as possible, on how to turn certain mutual interests into creative partnerships, immediately and for the longer term." Above all the report was an appeal to all world leaders and people from every strata of life to participate in the shaping of our common future.

The commission broadly categorise developing countries as those which occupy the southern hemisphere and developed countries as those which occupy the northern hemisphere, while acknowledging exceptions to this generalisation and emphasising the common global economy that all countries function within. A distinction is drawn between the comparatively large human population that lives in relative poverty in the South, compared to the smaller and more affluent population of the North. The

determining factor here being economic power, with the North's domination of the international economic system, its rules and regulations, and its international institutions of trade money and finance.

Analysing the mutual interplay of manufacturing, trading and other priorities between the North and South, the commission advocates a large scale transfer of resources from North to South in order to revive a failing world economy. However, the view that the rich nations' main role in the struggle to end poverty is to supply aid is strongly rejected by the commission, in favour of restructuring the global economy to allow developing countries to facilitate their own economic growth and development. An historical outline of the establishment of the United Nations, the IMF, the World Bank and the WTO, and their development since Bretton Woods helps to put into perspective the current trends and issues affecting the global economy. The commission charts the recognition in the 1950s that international trade occurred on unequal terms and hindered economic development in poor countries. This spurred numerous attempts by allied groups of developing countries to challenge the trade regime and demand for a restructuring of the international financial system. It also becomes clear that the South's attempts to pursue such change were ultimately futile.

The 70's saw high inflation, modest recession and the crumbling of the Bretton Woods system with the divorce of the dollar from the stability of gold. Since 1973, after the price of crude oil quadrupled, the economic growth fell by around 50% in many industrialised countries and has struggled ever since to regain its earlier buoyancy. By 1979 unemployment soared to over 18 million in OECD countries, exchange rates were erratic and protectionism was on the increase. Barriers and tariffs went up in the major markets and commodity prices and earnings were extremely unstable.

The world economy clearly needed reforming. In particular, countries in the South needed to secure political and economic independence and to trade on fairer terms with rich countries. The Commission outlines how transnational corporations were able to survive at the expense of developing countries. Levels of international aid to developing countries were low and government borrowing increased dramatically, although the finance raised was not used where it was most needed for developing countries to achieve greater self-sufficiency. There were many international conferences on structural reform, efforts to stabilise commodity prices and deal with debt problems, but progress was minimal.

Bretton Woods System

The Bretton Woods Agreement was reached in a 1944 summit held in New Hampshire, USA on a site by the same name. The agreement was reached by 730 delegates, who were the representatives of the 44 allied nations that attended the summit. The delegates, within the agreement, used the gold standard to create a fixed currency exchange rate. The agreement also facilitated the creation of immensely important structures in the financial world: the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD), which is known today as the World Bank.

The Bretton Woods Agreement established a system through which a fixed currency exchange rate could be created using gold as the universal standard. The agreement involved representatives from 44 nations and brought about the creation of the International Monetary Fund (IMF) and the World Bank. The fixed currency exchange rate system eventually failed; however, it provided much-needed stability at the time of its creation. As mentioned above, 44 allied nations met in Bretton Woods, NH in

1944 for the United Nations Monetary and Financial Conference. At that time, the world economy was very shaky, and the allied nations sought to meet to discuss and find a solution for the prevailing issues that plagued currency exchange.

The summit was also looking for policies and regulations that would maximize the potential benefits and profits that could be derived from the global trading system. What resulted from the conference were the Bretton Woods Agreement and the Bretton Woods System. The Bretton Woods System is a set of unified rules and policies that provided the framework necessary to create fixed international currency exchange rates. Essentially, the agreement called for the newly created IMF to determine the fixed rate of exchange for currencies around the world. Every represented country assumed the responsibility of upholding the exchange rate, with incredibly narrow margins above and below. Countries struggling to stay within the window of the fixed exchange rate could petition the IMF for a rate adjustment, which all allied countries would then be responsible for following.

The system was depended on and was used heavily until the beginning of the 1970s. Backing currency by the gold standard started to become a serious problem throughout the late 1960s. By 1971, the issue was so bad that US President Richard Nixon gave notification that the ability to convert the dollar to gold was being suspended temporarily. The move was inevitably the final straw for the system and the agreement that outlined it. Still, there were several attempts by representatives, financial leaders, and governmental bodies to revive the system and keep the currency exchange rate fixed. However, by 1973, nearly all major currencies had begun to float relatively toward one another, and the entire system eventually collapsed.

Despite falling apart, the Bretton Woods's summit and agreement are responsible for a number of notably important aspects in the financial world. First and foremost is the creation of the IMF and the World Bank. Both institutions remain vital to the global economy to this day. On a larger scale, however, the agreement unified 44 nations from around the world, bringing them together to solve a growing global financial crisis. It helped to strengthen the overall world economy and maximize international trade profit.

Global Environment Governance

Global Environmental Governance (GEG) is the sum of organizations, policy instruments, financing mechanisms, rules, procedures and norms that regulate the processes of global environmental protection. Since environmental issues entered the international agenda in the early 1970s, global environmental politics and policies have been developing rapidly. The environmental governance system we have today reflects both the successes and failures of this development. It has become increasingly clear that the GEG system, as we know it, has outgrown its original design and intent.

Effective environmental governance at all levels is critical for finding solutions to these challenges. Environmental Governance comprises the rules, practices, policies and institutions that shape how humans interact with the environment. Good environmental governance takes into account the role of all actors that impact the environment. From governments to NGOs, the private sector and civil society, cooperation is critical to achieving effective governance that can help us move towards a more sustainable future. United Nations Environmental Planning's mandate is to be the leading global environmental authority. From delivering expert scientific assessments to providing international platforms

for negotiation and decision making, UNEP has been fulfilling this mandate since 1972. UNEP's Environmental Governance sub-programme promotes informed environmental decision-making to enhance global and regional environmental cooperation and governance. Working with States and all major groups and stakeholders, UNEP helps to bridge the science and policy gaps by keeping the state of the global environment under review, identifying threats at an early stage, developing sound environmental policies, and helping States successfully implement these policies.

Role of UN Agencies: Stock Home Conference

The 1972 United Nations Conference on the Environment in Stockholm was the first world conference to make the environment a major issue. The participants adopted a series of principles for sound management of the environment including the Stockholm Declaration and Action Plan for the Human Environment and several resolutions. The Stockholm Declaration, which contained 26 principles, placed environmental issues at the forefront of international concerns and marked the start of a dialogue between industrialized and developing countries on the link between economic growth, the pollution of the air, water, and oceans and the well-being of people around the world. The Action Plan contained three main categories: a) Global Environmental Assessment Programme (watch plan); b) Environmental management activities; (c) International measures to support assessment and management activities carried out at the national and international levels. In addition, these categories were broken down into 109 recommendations. One of the major results of the Stockholm conference was the creation of the United Nations Environment Programme (UNEP).

As set out in Article 1, the objective of the Stockholm Convention is to protect human health and the environment from persistent organic pollutants.

Among others, the provisions of the Convention require each party to prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annexure A to the Convention (Article 3). Annexure A allows for the registration of specific exemptions for the production or use of listed POPs (Persistent Organic Pollutants), in accordance with that Annex and Article 4, bearing in mind that special rules apply to PCBs (Polychlorinated Biphenyls). The import and export of chemicals listed in Annex A can take place under specific restrictive conditions, as set out in paragraph 2 of Article 3. Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention (Article 3)

Annex B allows for the registration of acceptable purposes for the production and use of the listed POPs, in accordance with that Annex, and for the registration of specific exemptions for the production and use of the listed POPs, in accordance with that Annex and Article 4. The import and export of chemicals listed in Annex B can take place under specific restrictive conditions, as set out in paragraph 2 of Article 3. Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention (Article 5)

The Convention promotes the use of best available techniques and best environmental practices for preventing releases of POPs into the environment. Ensure that stockpiles and wastes consisting of, containing or contaminated with POPs are managed safely and in an environmentally sound manner (Article 6) The Convention requires that such stockpiles and wastes be identified and

managed to reduce or eliminate POPs releases from these sources. The Convention also requires that wastes containing POPs are transported across international boundaries taking into account relevant international rules, standards and guidelines. Another aim is to target additional POPs (Article 8).

The Convention provides for detailed procedures for the listing of new POPs in Annexes A, B and/or C. A Committee composed of experts in chemical assessment or management - the Persistent Organic Pollutants review Committee, is established to examine proposals for the listing of chemicals, in accordance with the process set out in Article 8 and the information requirements specified in Annexes D, E and F of the Convention. Other provisions of the Convention relate to the development of implementation plans (Article 7), information exchange (Article 9), public information, awareness and education (Article 10), research, development and monitoring (Article 11), technical assistance (Article 12), financial resources and mechanisms (Article 13), reporting (Article 15), effectiveness evaluation (Article 16) and non-compliance (Article 17).

United Nations Environmental Programme (UNEP)

Since its inception in 1972, the United Nations Environment Programme (UNEP) has been the global authority that sets the environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment. UNEP's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

Headquartered in Nairobi, Kenya, UNEP works through its divisions as well as regional, liaison and out-posted offices and a growing network of collaborating centres of excellence. UNEP works closely with its 193 Member States and representatives from civil society, businesses, and other major groups and stakeholders to address environmental challenges through the UN Environment Assembly, the world's highest-level decision-making body on the environment. The organization hosts the secretariats of many critical multilateral environmental agreements and research bodies. The Executive Director and Senior Management Team lead the implementation of UNEP's Medium-Term Strategy (MTS). The four-year MTS articulates UNEP's role in delivering the promises of the 2030 Agenda for Sustainable Development and the United Nations Conference on Sustainable Development (Rio+20) as well as its outcome document, "The Future We Want."

UNEP supports Member States to ensure that environmental sustainability is reflected in development and investment planning and provides countries with the necessary tools and technologies to protect and restore the environment. Through its campaigns, particularly World Environment Day, UNEP raises awareness and advocates for effective environmental action. UNEP categorizes its work into seven broad thematic areas: climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and waste, resource efficiency, and environment under review. Its work is made possible by partners that fund and champion the mission. UNEP depends on voluntary contributions for 95 per cent of its income.

SIX AREAS OF CONCENTRATION

UNEP re-organised its work programme into six strategic areas as part of its move to results based management. The selection of six areas of concentration was guided by scientific evidence, the UNEP mandate and priorities emerging from global and regional forums.

1. **CLIMATE CHANGE** UNEP strengthens the ability of countries to integrate climate change responses by providing leadership in adaptation, mitigation, technology and finance. UNEP is focusing on facilitating the transition to low-carbon societies, improving the understanding of climate science, facilitating the development of renewable energy and raising public awareness.

2. **POST-CONFLICT AND DISASTER MANAGEMENT** UNEP conducts environmental assessments in crisis-affected countries and provides guidance for implementing legislative and institutional frameworks for improved environmental management. Activities undertaken by UNEP's Post-Conflict & Disaster Management Branch (PCDMB) include post-conflict environmental assessment in Afghanistan, Côte d'Ivoire, Lebanon, Nigeria and Sudan.

3. **ECOSYSTEM MANAGEMENT** Facilitates management and restoration of ecosystems in a manner consistent with sustainable development and promotes use of ecosystem services. Examples include the Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-Based Activities.

4. **ENVIRONMENTAL GOVERNANCE** UNEP supports governments in establishing, implementing and strengthening the necessary processes, institutions, laws, policies and programs to achieve sustainable development at the country, regional and

global levels, and mainstreaming environment in development planning.

5. **HARMFUL SUBSTANCES** UNEP strives to minimise the impact of harmful substances and hazardous waste on the environment and human beings. UNEP has launched negotiations for a global agreement on mercury, and implements projects on mercury and the Strategic Approach to International Chemicals Management (SAICM) to reduce risks to human health and the environment.

6. **RESOURCE EFFICIENCY/SUSTAINABLE CONSUMPTION AND PRODUCTION** UNEP focuses on regional and global efforts to ensure natural resources are produced, processed and consumed in a more environmentally friendly way. For example, the Marrakesh Process is a global strategy to support the elaboration of a 10-Year Framework of Programs on sustainable consumption and production.

Brundtland Report

In 1987 the Brundtland Report, also known as Our Common Future, alerted the world to the urgency of making progress toward economic development that could be sustained without depleting natural resources or harming the environment. Published by an international group of politicians, civil servants and experts on the environment and development, the report provided a key statement on sustainable development, defining it as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The Brundtland Report was primarily concerned with securing a global equity, redistributing resources towards poorer nations whilst encouraging their economic growth. The report also

suggested that equity, growth and environmental maintenance are simultaneously possible and that each country is capable of achieving its full economic potential whilst at the same time enhancing its resource base. The report also recognised that achieving this equity and sustainable growth would require technological and social change.

The report highlighted three fundamental components to sustainable development: environmental protection, economic growth and social equity. The environment should be conserved and our resource base enhanced, by gradually changing the ways in which we develop and use technologies. Developing nations must be allowed to meet their basic needs of employment, food, energy, water and sanitation. If this is to be done in a sustainable manner, then there is a definite need for a sustainable level of population. Economic growth should be revived and developing nations should be allowed a growth of equal quality to the developed nations.

The Brundtland Report stated that critical global environmental problems were primarily the result of the enormous poverty of the South and the non-sustainable patterns of consumption and production in the North. It called for a strategy that united development and the environment – described by the now-common term «sustainable development». Sustainable development is defined as follows: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In 1989, the report was debated in the UN General Assembly, which decided to organize a UN Conference on Environment and Development.

The Brundtland Report highlighted the three fundamental components of sustainable development, the environment,

the economy, and society, and highlighted a number of major proposals for sustainable development:

Environment: We should conserve and enhance our resource base, by gradually changing the ways in which we develop and use technologies. **Social Equity:** Developing nations must be allowed to meet their basic needs of employment, food, energy, water and sanitation. If this is to be done in a sustainable manner, then there is a definite need for a sustainable level of population. **Economic Growth:** Economic growth should be revived and developing nations should be allowed a growth of equal quality to the developed nations.

Earth Summit

The United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit', was held in Rio de Janeiro, Brazil, from 3-14 June 1992. This global conference held on the occasion of the 20th anniversary of the first Human Environment Conference in Stockholm, Sweden, in 1972, brought together political leaders, diplomats, scientists, representatives of the media and non-governmental organizations (NGOs) from 179 countries for a massive effort to focus on the impact of human socio-economic activities on the environment. A Global Forum of NGOs was also held in Rio de Janeiro at the same time, bringing together an unprecedented number of NGO representatives, who presented their own vision of the world's future in relation to the environment and socio-economic development.

The Rio de Janeiro conference highlighted how different social, economic and environmental factors are interdependent and evolve together, and how success in one sector requires action in other sectors to be sustained over time. The primary objective of

the Rio 'Earth Summit' was to produce a broad agenda and a new blueprint for international action on environmental and development issues that would help guide international cooperation and development policy in the twenty-first century.

The Earth Summit concluded that the concept of sustainable development was an attainable goal for all the people of the world, regardless of whether they were at the local, national, regional or international level. It also recognized that integrating and balancing economic, social and environmental concerns in meeting our needs is vital for sustaining human life on the planet and that such an integrated approach is possible. The conference also recognized that integrating and balancing economic, social and environmental dimensions required new perceptions of the way we produce and consume, the way we live and work, and the way we make decisions. This concept was revolutionary for its time, and it sparked a lively debate within governments and between governments and their citizens on how to ensure sustainability for development.

One of the major results of the UNCED Conference was Agenda 21, a daring program of action calling for new strategies to invest in the future to achieve overall sustainable development in the 21st century. Its recommendations ranged from new methods of education, to new ways of preserving natural resources and new ways of participating in a sustainable economy. The Earth Summit had many great achievements: the Rio Declaration and its 27 universal principles, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity; and the Declaration on the principles of forest management. The 'Earth Summit' also led to the creation of the Commission on Sustainable Development, the holding of first world conference on the sustainable development of small island developing States in 1994, and negotiations for the establishment of the agreement on straddling stocks and highly migratory fish stocks.

Earth Summit 1992 produced several long-range reports and implementation plans that continue to serve as blueprints for international action on environmental issues, including the World Summit on Sustainable Development (Earth Summit 2002) and the Kyoto Protocol. Earth Summit 1992 produced the Rio Declaration on Environment and Development, the Statement of Forest Principles, and Agenda 21. The Earth Summit also led to the establishment of the Convention on Biological Diversity, and the United Nations Framework Convention on Climate Change (UNFCCC). The Rio Declaration on Environment and Development is a set of principles that defines the rights and responsibilities of nations in the areas of environmental protection and sustainable development. The Rio Declaration states that nations have the right to exploit natural resources within their borders if their actions do not affect the environment in other nations. It also calls on all national and local governments to develop and implement plans that preserve the environment and natural resources for future generations.

The Statement of Forest Principles called for sustainable management of forests worldwide. It is a nonbinding document produced through compromise after developed nations refused to pay for the setting aside of national forests by developing nations. Agenda 21 is a comprehensive plan for intergovernmental agencies, national governments, local governments, and NGOs to work together to protect the environment through sustainable development. It contains four categories: Social and Economic Dimensions, Conservation and Management of Resources for Development, Strengthening the Role of Major Groups, and Means of Implementation. The United Nations Commission on Sustainable Development is primarily responsible for the implementation of Agenda 21.

Agenda 21 recognized that developing nations and developed nations both contribute to environmental degradation. Poorer nations often have less restrictive environmental regulations and focus on economic development. Despite stronger environmental regulations, developed nations have patterns of production and consumption that pollute the environment. Agenda 21, therefore, addressed environmental issues through detailed social and economic proposals. Agenda 21 proposed addressing environmental issues through combating poverty, conserving and managing natural resources, preventing deforestation, promoting sustainable agriculture, addressing production and consumption patterns, and protecting the atmospheres and oceans.

The Rio Earth Summit also produced two international environmental treaties, Convention on Biological Diversity and the United Nations Framework Convention on Climate Change. The Convention on Biological Diversity was the first international treaty to address preservation of biological diversity. Over 180 countries have signed the Convention on Biological Diversity.

The Convention on Biological Diversity has three primary goals: conservation of biodiversity; sustainable use of the components of biodiversity; and a fair and equitable sharing of the benefits that arise from using biological resources.

The United Nations Conference on Sustainable Development (UNCSD/WCSD)

Twenty years after the 1992 Earth Summit in Rio de Janeiro, the 2012 United Nations Conference on Sustainable Development in Rio (also known as Rio+20) resulted in a document containing clear and practical steps for the implementation of sustainable development. At the Conference, Member States decided to

launch a process to develop a set of Sustainable Development Goals (SDGs), building on the Millennium Development Goals (MDGs) and converging with the post-2015 development agenda.

The Conference also adopted innovative guidelines on green economy policies and put in place a strategy for financing sustainable development. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. Seen as the guiding principle for long-term global development, sustainable development consists of three pillars: economic development, social development and environmental protection. Governments adopted a 10-year framework of programmes on sustainable consumption and production patterns. The Conference also took forward-looking decisions in a number of thematic areas, including energy, food security, oceans and cities, and decided to convene a third international conference on small island developing States in 2014.

The Rio+20 Conference caught the attention of thousands from the UN system and beyond. Over 700 voluntary commitments were announced and the formation of new partnerships to advance sustainable development were initiated.

The Conference focused on two themes:

- (a) A green economy in the context of sustainable development poverty eradication; and
- (b) The institutional framework for sustainable development.

Seven priority areas

The preparations for Rio+20 highlighted seven areas which needed priority attention; these included:

Decent jobs

Energy

Sustainable cities

Food security and sustainable agriculture

Water

Oceans and disaster readiness

How was Rio+20 organized

Rio+20 represented a joint endeavor of the entire UN System. A dedicated Secretariat was responsible for coordinating and facilitating inputs to the preparatory process from all UN bodies. The Rio+20 Secretariat was housed in the UN Department of Economic and Social Affairs and headed by Conference Secretary-General Sha Zukang, who was supported by two Executive Coordinators: Elizabeth Thompson (former Minister of Environment of Barbados) and Ambassador Brice Lalonde (Former Minister of Environment of France). The preparatory process was led by an 11-member Bureau composed of UN Ambassadors from all regions of the world. The host country, Brazil, led the logistical preparations on the ground.

Module -III

Issues of Environment and Development in India

EVOLUTION OF LEGAL FRAMEWORK FOR ENVIRONMENTAL PROTECTION

I. Pre-independence period

The ancient Indian religious literature, for example, Vedas, Upanishads, Smiritis and Dharmas preached a worshipful attitude towards earth, sky, air, water, plants, trees, and animals and enshrined a respect for nature and environmental harmony and conservation. It regarded sun, air, fire, water, earth and forest as God and Goddesses. Many animals, birds, trees and plants were associated with the names of God and Goddesses.

The country has had a long history of environmentalism with the passage and codification of Acts such as the Indian Penal Code of 1860, The Indian Easements Act of 1882, The Fisheries Act of 1897, The Bengal Smoke Nuisance Act of 1905, The Indian Motor Vehicle Act, The Factories Act, The Indian Forest Act, The Mines and Minerals (Regulation and Development) Act, The Industries (Development and Regulation) Act, The Forest (Conservation) Act, The Merchant Shipping Act.

The Indian Penal Code, passed in 1860, penalizes person(s) responsible for causing defilement of water of a public spring or reservoir with imprisonment or fines. In addition, the code also penalized negligent Acts with poisonous substances that endangered life or caused injury.

The Indian Fisheries Act of 1897 penalized the killing of fish by poisoning water and by using explosives. The Indian Forest Act was a product of British rule in 1927. The legislation granted the Government uncontested rights over natural resources, with State Governments authorized to grant licenses to lumber contractors and oversee protection of the forests.

Until 1947, the environmental problem was not serious because of the low rate of population growth and lack of industrialisation, except in and around a few big cities.

II. From Independence to the Stockholm Conference, 1947 – 1972

Two early post-independence laws touched on water pollution. Section 12 of the Factories Act of 1948 required all factories to make effective arrangements for waste disposal and empowered State Governments to frame rules implementing this directive. As a result, a number of States passed versions of the Factory Act, including Uttar Pradesh in 1950, Tamil Nadu in 1950, West Bengal in 1958, Maharashtra in 1963 and Mysore in 1969. Each tailored the Act to suit its particular situation. In Uttar Pradesh, disposal of effluents had to have the approval of the State's Effluents Board.

Second, river Boards, established under the River Boards Act of 1956 for the regulation and development of inter-State rivers and river valleys, were empowered to prevent water pollution. In both these laws, prevention of water pollution was only incidental to the principal objective of the enactment.

During the 1950s and early 1960s marked the Constitution permitting the State to control water-related issues, several States had taken steps on water protection. Laws passed included The Orissa River Pollution Act of 1953, The Punjab State Tube well

Act of 1954, West Bengal Notification No. 7 Regulation - Control of Water Pollution Act of 1957, Jammu and Kashmir State Canal and Drainage Act of 1963 and The Maharashtra Water Pollution Prevention Act of 1969.

III. Environmental Legislations in the 1970s to 1984(Stockholm Conference to *Bhopal Tragedy*)

Two international conferences-one at Stockholm in 1972 and another at Rio de Janeiro in 1992 on Environment and Development have influenced environmental policies in India. Many countries have followed the 'polluter pays' principle, the precautionary principle and the concept of intergenerational equity as guidelines for framing environmental policies.

The watershed event in the environmental movement was the Stockholm Conference on Human Environment in June 1972. The conference made it apparent to all attendees that each nation needed to adopt comprehensive legislation addressing health and safety issues for people, flora and fauna. It has also been suggested that international events such as Stockholm provided the cover Indian officials needed to implement national environment policy without the vitriolic backlash normally expected from industry.

The year 1972 was a landmark in the history of environmental management in India. Prior to 1972, environmental issues such as sewage disposal, sanitation and public health were dealt with independently by the different Ministries without any co-ordination or realization of the interdependence of the issues. In February 1972, a National Committee on Environmental Planning and Coordination (NCEPC) was set up in the Department of Science and technology, which was established as National Committee on

Environmental Planning (NCEP) in April 1981, based on the recommendations of the Tiwari Committee.

The NCEPC functioned as an apex advisory body in all matters relating to environmental protection and improvement. However, due to bureaucratic problems, that NCEPC faced in coordination with the Department of Science and Technology, it was replaced by a National Committee on Environmental Planning (NCEP) with almost the same functions.

Constitutional Amendments

The Constitution of India provides a number of Directive Principles of State Policy. Until 1976 environment protection did not appear anywhere in the Constitution. However, in the 42nd amendment of the Constitution in 1976, certain environmental provisions were introduced. Article 48A was added to the Directive Principles of State Policy and stated “The state shall endeavor to protect and improve the natural environment and safeguard the forests and wildlife in the country.” The Article 51 A (g) of Fundamental Duties states that “It shall be the duty of every citizen in India to protect and improve the natural environment including forests, lakes rivers and wildlife and to have a compassion for living creatures”. With this ‘Forests’ and ‘Wildlife’ were dropped from the State list in order to incorporate in the Concurrent (Centre) list.

Legislations

i) The Wildlife (Protection) Act, 1972

This Act was enacted under the provisions of Article 252 to prevent the decline of wild animals and birds. The Act prohibits the poaching of certain animals except for the purpose of

education or scientific research. Under this Act a state government may declare any area to be a sanctuary

or as a national park if it considers that such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance for protecting, propagating or developing wild-life or its environment.

ii) *Water (Prevention and Control of Pollution) Act, 1974*

This Act paved the way for the creation of Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) in order to promote cleanliness of streams and wells in different areas of the states.

iii) *Air (Prevention and Control of Pollution) Act, 1981*

This Act defines air pollutant as ‘any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment’. The CPCB and the SPCBs created under the Water Act 1974 are entrusted with the implementation of the provisions of the Act.

iv) *The Forest (Conservation) Act, 1980*

This Act prevents deforestation, which results in ecological imbalance and environmental deterioration. The Act prohibits even the state governments and any other authority to de-reserve a forest which is already reserved. It prohibits forestland to be used for non-forest purposes, except with the prior approval of the central government.

The Tiwari Committee, 1980

The Government of India set up a Committee in January 1980, under the Chairmanship of Shri N.D. Tiwari, then Deputy Chairman of the Planning Commission, to review the existing environmental legislation and to recommend legislative measures and administrative machinery for environmental protection. This Committee stressed the need for the proper management of the country's natural resources of land, forest and water in order to conserve the nation's ecological base. Its major recommendations are:

(a) Creation of a comprehensive environmental code to cover all types of pollution and environmental degradation;

(b) Creation of a Department of Environment;

(c) Setting up of a Central Land Commission;

(d) provision of economic incentives to industries to encourage environment friendly products, income tax and sales tax benefits for adopting clean technology, investment tax credits for purchases of purification devices, inclusion of replacement cost of purification equipment in annual operating costs, and minimal tax or no tax on the manufacture of pollution control devices; and

(f) Environmental impact assessment (EIA) not only be a prerequisite for industry to start, but also must be repeated periodically.

The Government had constituted the Department of Environment in 1980, which was transferred to the newly created Ministry of Environment & Forests (MoEF) in 1985. It had also set up the Land Commission. Fiscal incentives such as rebates on

excise/customs duties for pollution control equipments, accelerated depreciation allowance on selected pollution control equipment, financial and technical assistance to small scale units in industrial clusters to set up common effluent treatment plants are now available¹⁰. EIA has become mandatory for highly polluting industries since 1994.

IV. Bhopal Tragedy to 2006 (1984-2006)

The Bhopal gas tragedy in 1984 had a deep impact in the minds of policy makers to deliver comprehensive environment legislation in 1986.

(i) Environment (Protection) Act, 1986 (EPA)

The Environment (Protection) Act, 1986 extends to the whole of India and it came into force on

November 19, 1986. After the enactment of Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981, it was decided that there should be a general legislation for environmental protection as well as for coordinating the activities of various regulatory agencies. Need was also felt to create authority with adequate power for environment protection, regulation of discharge, handling of hazardous substances, speedy response to accidents threatening environment and deterrent punishment to those who endanger human environment, safety and health.

(ii) The Motor Vehicles Act, 1988.

(iii) The National Environment Appellate Authority Act, 1997.

(iv) National Environment Tribunal Act, 1995.

The new economic policy initiated in 1991 led Constitutional amendments in 1994 to facilitate decentralisation of powers and resources to local bodies. This period also witnessed:

- a. The Policy Statement for Abatement of Pollution and the National Conservation Strategy and Policy Statement on Environment and Development were brought out by the Ministry of Environment and Forests (MoEF) in 1992.
- b. The Environmental Action Programme (EAP) was formulated in 1993 with the objective of improving environmental services and integrating environmental considerations into development programmes.

NATIONAL ENVIRONMENTAL POLICY (NEP)

Background of ‘The National Environment Policy, 2006’:

- a. The first initiative in strategy-formulation for environmental protection in a comprehensive manner.
- b. It takes into account of factors responsible for land degradation and suggests remedial measures required in this direction. Factors including fiscal, tariffs and sectoral policies for their unintentional impacts on land degradation.
- c. The remedial measures offered to tackle the problem comprises of traditional land-use practices in combination with science-based techniques like pilot-scale demonstrations, large scale dissemination, adoption of multi-stakeholder partnerships, promotion of agro-forestry, organic farming, environmentally sustainable cropping patterns and adoption of efficient irrigation techniques.

d. Mandatory of EIA and environment management plan, details of the public hearing and a project report to the impact assessment agency for clearance, further review by a committee of experts in certain cases and public hearing.

The current national policy can be put into two categories from the standpoint of

A) overall environmental management which includes:

- i. National Forest Policy, 1988,
- ii .National Conservation Strategy and Policy Statement on Environment and Development, 1992, and
- iii. Policy Statement on Abatement of Pollution, 1992.

B) Sector based policies include

- i) National Agriculture Policy, 2000
- ii) National Population Policy, 2000, and
- iii) National Water Policy, 2002 have equally contributed to manage the environment.

The common focus of all these policies is on the need for sustainable development in their specific contexts. The National Environment Policy seeks to extend the coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience (NEP, 2006).

Recent Developments

According to State of India's Environment (SoE) report, India's position of **Global Environment Performance Index** fell from **141 in 2016** to **177 in 2018**. **Government**

initiatives have played a huge role in helping find solutions to the problem. From building toilets to ramping up cleanliness through the **Swachh Bharat Mission**, the **government** has time and again garnered people's attention and support for the right cause.

Swachh Bharat Abhiyan

Swachh Bharat Abhiyan is one of the most popular and significant missions in the History of India. This campaign was introduced by the Prime Minister, Narendra Modi, and was launched on 2nd October 2014 to honour Mahatma Gandhi's vision of a Clean country. Initially, this Swachh Bharat Abhiyan campaign was run on a national level in all the towns, rural and urban areas. The major objective of the Swachh Bharat Abhiyan is to spread the awareness of cleanliness and the importance of it. The concept of Swachh Bharat Abhiyan is to provide basic sanitation facilities like toilets, solid and liquid waste disposal systems, village cleanliness, and safe and adequate drinking water supply to every person.

Namami Gange Programme

- Namami Gange Programme is an Integrated Conservation Mission, approved as a 'Flagship Programme' by the Union Government in June 2014 to accomplish the twin objectives of effective abatement of pollution and conservation and rejuvenation of National River Ganga.
- It is being operated under the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti.
- The program is being implemented by the National Mission for Clean Ganga (NMCG), and its state counterpart

organizations i.e State Program Management Groups (SPMGs).

- NMCG is the implementation wing of National Ganga Council (set in 2016; which replaced the National Ganga River Basin Authority - NGRBA).
- It has a Rs. 20,000-crore, **centrally-funded, non-lapsable corpus** and consists of nearly 288 projects.

Green Skill Development Programme (GSDP)

The Government has taken up an initiative for skill development in the environment and forest sector. It is done so to enable India's youth to get gainful employment and/or self-employment, called the Green Skill Development Programme (GSDP). The programme aims to develop green skilled workers having technical knowledge and commitment to sustainable development to attain

- Nationally Determined Contributions (INDCs)
- Sustainable Development Goals (SDGs)
- National Biodiversity Targets (NBTs)

GSDP has been conceptualized and developed by MoEF&CC in consultation with National Skill Development Agency (NSDA). It aims to train over 5.5 lakh workers in environment and forest sectors in the country through 30 courses by 2021. The ministry will take up skill development of youth in the environment and forest sectors through 30 courses. It will do so through its Environment Information System (ENVIS) hubs and

resource partners as well as other institutions across the country.

Compensatory Afforestation Fund Act (CAMPA)

The Modi-led government introduced Compensatory Afforestation Fund Act (CAMPA) in 2016. It also established **National Compensatory Afforestation Fund** and **State Compensatory Afforestation Fund** the same year. Under this act, any individual or organisation intending to use forest lands for non-forest purposes will be charged.

SUSTAINABLE DEVELOPMENT

The United Nations defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Previous dialogues on sustainability have more or less focused on climate change and environmental issues, but the new paradigm of sustainability includes all efforts towards an inclusive, sustainable and resilient future for people and the planet. There is a significant departure from the previous framework to now include a “harmonising” of three elements: economic growth, social inclusion and environmental protection.. Sustainable development should be free of environmental degradation and a balance between demands of economic development and need for protection of environment should be attempted.

Sustainable Development in India

From India's point of view, Sustainable Development Goals need to bring together development and environment into a single set of targets. The fault line, as ever in global conferences, is the inappropriate balance between environment and

development. Natural ecosystems are under stress and decline across most of the country; some 10 per cent of the country's wildlife is threatened with extinction; agricultural biodiversity has declined by over 90 per cent in many regions; well over half the available water bodies are polluted beyond drinking and often beyond even agricultural use; two-thirds of the land is degraded to various levels of sub-optimal productivity; air pollution in several cities is amongst the world's worst; 'modern' wastes including electronic and chemical are being produced at rates far exceeding our capacity to recycle or manage. A 2008 report by the Global Footprint Network and Confederation of Indian Industries suggests that India has the world's third biggest ecological footprint, that its resource use is already twice of its bio-capacity, and that this bio-capacity itself has declined by half in the last few decades.

Step Taken by Indian Government

1. Ratifying Paris Agreement

The 21st Conference of Parties (COP 21) under the United Nations Framework Convention on Climate Change (UNFCCC) successfully concluded in Paris after intense negotiations by the Parties followed by the adoption of the Paris Agreement on post-2020 actions on climate change. This universal agreement will succeed the Kyoto Protocol. Unlike the Kyoto Protocol, it provides a framework for all countries to take action against climate change. Placing emphasis on concepts like climate justice and sustainable lifestyles, the Paris Agreement for the first time brings together all nations for a common cause under the UNFCCC. One of the main focus of the agreement is to hold the increase in the global average temperature to well below 2°C above pre- industrial level and on drive efforts to limit it even further to 1.5°.

2. State Action Plans on Climate Change:

The State Action Plans on Climate Change (SAPCC) aim to create institutional capacities and implement sectoral activities to address climate change. These plans are focused on adaptation with mitigation as co-benefit in sectors such as water, agriculture, tourism, forestry, transport, habitat and energy.

4. Coal Cess and the National Clean Energy Fund

India is one of the few countries around the world to have a carbon tax in the form of a cess on coal. Not only has India imposed such a cess but it has also been progressively increasing it. The coal cess which was fixed at R50.00 per tonne of coal since 22 June 2010 and increased to R100.00 per tonne of coal in Budget 2014-15, was further doubled to R 200.00 per tonne in the 2015-16 Budget. 8.46 The National Clean Energy Fund (NCEF) which is supported by the cess on coal was created for the purposes of financing and promoting clean energy initiatives, funding research in the area of clean energy and for any other related activities.

5. National Adaptation Fund for Climate Change

A National Adaptation Fund for Climate Change (NAFCC) has been established with a budget provision of I350 crore for the year 2015-2016 and 2016-2017. It is meant to assist in meeting the cost of national- and state-level adaptation measures in areas that are particularly vulnerable to the adverse effects of climate change. The overall aim of the fund is to support concrete adaptation activities that reduce the adverse effects of climate change facing communities, sectors and states but are not covered under the ongoing schemes of state and central governments. The adaptation projects contribute towards reducing the risk of vulnerability at community and sector level.

Sustainable Development Goals and India

The 2030 Agenda for Sustainable Development, was adopted by all United Nations Member States in 2015, which provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. There are 17 SDGs which are an urgent call for action by all countries - developed and developing - in a global partnership.

The 17 SDGs adopted by UN member states are

- 1- no poverty
- 2- zero hunger
- 3- good health and well-being
- 4- quality education
- 5- gender equality
- 6- clean water and sanitation
- 7- affordable and clean energy
- 8- decent work and economic growth
- 9- Industry, innovation and infrastructure.
- 10- reduced inequalities,
- 11- sustainable cities and communities,
- 12- responsible consumption and production,
- 13- climate action,
- 14- life below water

15- life on land,

16- peace, justice and strong institutions and lastly

17- Strengthening global partnerships for the goals.

The State of India's Environment Report 2021 revealed that India's rank was 115 last year and dropped by two places primarily because major challenges like ending hunger and achieving food security (SDG 2), achieving gender equality (SDG 5) and building resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation (SDG 9) remain in the country.

India ranked 168 out of 180 countries in terms of Environmental Performance Index (EPI) which is calculated on various indicators, including environmental health, climate, air pollution, sanitation and drinking water, ecosystem services, biodiversity, etc.

India's rank was 172 in the environmental health category, which is an indicator of how well countries are protecting their populations from environmental health risks.

According to the EPI 2020 report by Yale University, India ranked 148, 21 positions which was at 127th position in the category of biodiversity and habitat which assesses countries' actions toward retaining natural ecosystems and protecting the full range of biodiversity within their borders.

Conclusion

Shepherding the achievements of the SDGs is an enormous task that requires the involvement of every sector and each level of society. The experiences of the pilot countries illustrate the

opportunities the platform can create for India to build meaningful and lasting state-philanthropy partnerships to achieve the prime minister's vision of "sabka saath, sabka vikas (collective effort, inclusive growth).

ENVIRONMENTAL MOVEMENTS

1. Chipko Movement

It is an environment protection movement that took place in Chamoli district and later at Tehri-Garhwal district of Uttarakhand under the leadership of Sundarlal Bahuguna, Gaura Devi, Sudesha Devi, Bachni Devi, Chandi Prasad Bhatt, Govind Singh Rawat, Dhoom Singh Negi, Shamsher Singh Bisht and Ghanasyam Raturi. The objectives of the movement was to protect the trees on the Himalayan slopes from the axes of contractors of the forest. Mr. Bahuguna enlightened the villagers by conveying the importance of trees in the environment which checks the erosion of soil, cause rains and provides pure air. The women of Advani village of Tehri- Garhwal tied the sacred thread around trunks of trees and they hugged the trees, hence it was called 'Chipko Movement' or 'hug the tree movement'. The main demand of the people in these protests was that the benefits of the forests (especially the right to fodder) should go to local people. The Chipko movement gathered momentum in 1978 when the women faced police firings and other tortures. The then state Chief Minister, Hemwati Nandan Bahuguna set up a committee to look into the matter, which eventually ruled in favor of the villagers. This became a turning point in the history of eco-development struggles in the region and around the world.

Narmada Bachao Andolan

Narmada Bachao Andolan (NBA) is a movement to save the river valleys of the Narmada River in central India. It was mobilized

people at the grass root level on a scale unprecedented for an environmental movement in post-independent India. This most powerful mass movement, started in 1985, against the construction of a huge dam on the Narmada river. The movement is primarily against the contraction of the Sardar Sarovar Dam which is estimated to displace 300,000 people—largely peasants and tribal people –and inundate farming land and forest area which is inhabited by rare species. The NBA and its supporters argue that projected, benefits, given past experiences, are unlikely to be realized and are far outweighed by the social and environmental costs.

The NBA has succeeded in provoking a larger public debate on development and the environment within India. It has initiated discussion about which model of development is appropriate for India; one of large-scale industrialization on the lines of the west, which has done irreparable damage to the natural environment, or one based on small-scale enterprise and sensitivity to the needs of local communities and ecology. NBA argues for the later, nothing the idea of precaution in environmental matters, as well as the social-cultural and economic rights of the displaced. It encouraged of traditional water harvesting systems in villages and improving dry farming techniques, which will also promote social and ecological harmony. As a last resort, NBA also advises improvement of efficiency of existing dam projects.

Medha Patkar, a central organizer of NBA, stated that the model of development symbolized by projects like the Sardar Sarovar Dam represent the ‘epitome of unsustainable development’, and there is no other way but to redefine ‘modernity ‘and goal of development , to widen it to a sustainable , just society based on harmonious, non-exploitative relationships between people and nature”. The movement has drawn attention to the

conflicts between environment and development at a popular level. The NBA was instrumental in the World Bank's decision to withdraw its funding and participation from the project on the basis of human and environmental concerns.

The Progress and movements of NBA

After the independence, India's first Prime Minister, Jawaharlal Nehru, called for the construction of dams on Narmada river to arrest excess water flowing into Arabian sea passing through Madhya Pradesh and Gujarat to aid local people and development of the nation.

Two of the largest proposed dams were Sardar Sarovar and Narmada Sagar.

The Narmada Water Disputes Tribunal approved the Narmada Valley Development Project, which included 30 large dams, 135 medium dams, and 3,000 small dams including raising the height of Sardar Sarovar dam.

In 1985, after hearing about the construction of Narmada Dam Project, Medha Patkar and her colleagues visited the project site and noticed that project work was being checked due to an order by the Ministry of Environment and Forests, Government of India.

In 1987, construction began on the Sardar Sarovar Dam and the people who were going to be affected by the construction of the dam were given no information but the offer for rehabilitation.

In May 1990, Narmada Bachao Andolan organized a 2,000-person, five-day sit-in at PM V. P. Singh's residence in New Delhi, which convinced the Prime Minister to 'reconsider' the project.

In December 1990, approximately 6000 men and women began the Narmada Jan Vikas Sangharsh Yatra (Narmada People's Progress Struggle March), marching over 100 kilometres.

In January 1991, Baba Amte and the seven-member team began an indefinite hunger strike (continued for 22 days) and committed to a sit-in unto death.

The Sardar Sarovar Dam's construction began again in 1999 and was declared finished in 2006. The height of the project was increased from 138 meters to 163 meters. It was inaugurated in 2017 by PM Narendra Modi.

World Bank in NBA

In 1985, the World Bank agreed to finance the Sardar Sarovar Dam with a contribution of \$450 million without consulting the indigenous communities that were to be displaced.

Medha Patkar and other protesters testified on the Bank's role in Washington D.C in 1989. This led to a build-up of pressure on the Bank to set an independent review to assess the situation at hand. A lot of support was withdrawn from the project after this.

World Bank, the financing agency for this project, announced it would institute an Independent Review of the Narmada Dam Project.

The Morse Commission was established to look into the construction of the dam, and the environmental cost and human displacement in 1991. Their report clearly stated that the Bank's policies on environment and resettlement were being violated.

The World Bank's participation in these projects was cancelled in 1993 because of the movement.

There were many groups supporting NBA such as Gujarat-based Narmada Asargrasta Samiti, Madhya Pradesh-based Narmada Ghati Nav Nirman Samiti (Committee for a New Life in the Narmada Valley) and Maharashtra-Based Narmada Dharangrasta Samiti (Committee for Narmada Dam-Affected People). NBA's slogans include – Vikas Chahiye, Vinash Nahin! (Development wanted, not destruction) and “koi nahi hatega, bandh nahi banega!” (We won't move, the dam won't be constructed).

Appikko Movement

Appiko Movement is one of the forest-based environmental movements in India which started in 1983. The movement took place in North Kannada and Shimoga districts of Karnataka in the Western Ghats. The movement created awareness among the villagers throughout the Western Ghats about the ecological danger posed by the commercial and industrial interests to their forest which was the main source of sustenance.

Objectives of the Movement

There were three main objectives behind the movement.

First, to protect the existing forest cover,

Second, to regenerate trees in denuded lands and,

Third, to utilize forest wealth with due consideration to conservation.

The Appikko movement (Appiko Chaluvali) is another version of Chipko movement led by Padura Hedge. The protest within the

forest continued for 38 days and used various techniques to raise awareness such as foot marches in the interior forest, slide shows, folk dances, street plays etc. The movement extended to promote afforestation on denuded lands. It later focused on the rational use of the ecosphere by introducing alternative energy resource to reduce pressure on the forest. The movement became a success when the project is stopped.

The Silent Valley Issue

Another significant anti-dam movement started in 1978. The Kerala State Electricity Board (KSEB) proposed a hydroelectric dam across the Kunthipuzha River that runs through Silent Valley. In February 1973, the Planning Commission approved the project at a cost of about Rs 25 crores. Many feared that the project would submerge 8.3 sq km of untouched moist evergreen forest.

Role of NGOs in the issue

Several NGOs strongly opposed the project and urged the government to abandon it. An NGO led by teachers and the Kerala Sastra Sahithya Parishad (KSSP) began in 1973 to spare the Silent Valley from being overflowed by a hydroelectric plant. Soon the apex policy-making bodies NCEPC, DOEn and IUCN (International Union for Conservation of Nature and Natural Resources) supported the protection of Silent Valley.

As we mentioned, the movement was against the Kerala Government's proposal to construct a dam across the river Kunthi in the Silent valley. The government has argued that it is a viable alternative to the more expensive and polluting sources of the thermal power. However, environmental and citizen groups opposite it, due to a threat that it may upset the delicate ecological balance of the bio-diversity reserve, inhabited by

some rare species in the Silent Valley. In addition, the river has traditionally been a source of drinking water for villagers and tribes inhabiting the region; activists have charged that diverting the water amounts to 'state sponsored robbery of resources.

In January 1981, bowing to unrelenting public pressure, Indian Prime Minister Indira Gandhi declared that Silent Valley will be protected. In June 1983 the Central government of India re-examined the issue through a commission chaired by Prof. M.G.K. Menon. In November 1983 the Silent Valley Hydroelectric Project was cancelled. In 1985, Prime Minister Rajiv Gandhi formally inaugurated the Silent Valley National Park. Thus NGO's succeeded in protecting an important biosphere reserve.

Module - IV

Environment Management

Eco Managerialism

The term Eco-Managerialism coined by Timothy Luke, Distinguished Professor of Political Science at Virginia Polytechnic Institute. Eco-managerialism refers to a particular type of environmental management carried out by ‘professional-technical workers’ who are trained in environmental science and policies. It emphasize scientific and technical solutions to environmental crises. According to Luke specially trained environmental experts define their managerial goals in relation with ecosystem as goods and services, which necessitate a treatment of the physical environment primarily in terms of natural resource. More specifically, it means that environmental managers very much concerned with the protection and conservation of the physical environment as well as protect the dominant economic and political interests that surround those resources.

This notion of eco-managerialism favors a capitalistic and technocratic approach to environmental management, where efficiency and economic development are the primary motivations for environmental policy and management, rather than other potential solutions to environmental concerns such as behavioral changes, economic restrictions, or alternative technologies. In fact, eco-managerialism attempts to acknowledge and understand how modern resource management

primarily as an economic and political *asset* that can only properly be managed by technical environmental experts. Furthermore, the material and discursive practices of eco-managerialism constitute a form of power that refers to as *geopower*, where only ecomanagers are employed for resource management and to solve impending ecological crises. This requires that the goals of environmental management employed by eco-managers are defined in terms of modernization, where the average citizen is made to think that he or she cannot fully understand the complexities of the natural environment.

The basis of eco-managerialism lies in the discursive transformation of ecological processes and systems into economic commodities or natural resources. In this, students learn to manage, manipulate, and control nature as ‘a sanding reserve, a resource supply center and a waste reception site.’ This is essential for making nature and the physical environmental in terms of legible and comprehensible to various policy-makers and engineers, but also makes the physical world politically relevant. In his analysis, Luke identifies three primary forms of eco-managerialism which are;

- A. Resource managerialism (where ecosystem services are protected and supplied for economic production).
- B. Risk managerialism (which calculates and oversees the amount of destruction on natural systems to sustain a minimum level of economic and social health).
- C. Recreationist managerialism (which manages the natural environment for recreational consumption as a resource, such as public parks).

Role of Panchayath Raj Institution

India is a country of villages as its 69% population is living in villages. Panchayati Raj is the constitutionally sanctioned local government system of rural India that exists all over rural India. The history of local government institutions in India has witnessed many ups and downs. The 73rd Constitutional Amendment changed its fate by assigning a constitutional status. A wide range of powers have been entrusted to local governments (Panchayati Raj Institutions) to fulfil the objective of democratic decentralization. The 3-tier system of Panchayati raj provides opportunities of decentralized planning and action at various levels including district, block and village level. Panchayati Raj also provides for the participation of all the adult population in consultation and decision-making process in the form of Gram Sabha (an assembly of all adults in a village hamlet).

In fact, the 73rd Constitution Amendment Act, making Panchayaths at three levels 'Institutions of Self-government' has also provided a list of subjects to be brought under the Panchayaths. Among the 29 subjects mentioned in the Eleventh Schedule, land improvement, land consolidation, soil conservation, water management, social forestry, minor forest produce, non-conventional energy sources, sanitation, and maintenance of assets, are subjects related to environmental management. Over the years, Panchayath Institutions are playing very important role in the area of environmental management. Some of the major areas – water conservation, agriculture, droughts, heat waves, floods, forestry, water and renewable energy.

Water Conservation: Permanent availability of drinking water and quality of drinking water are two major issues that have

affected various Gram Panchayaths varying with factors such as population, location of Gram Panchayaths. The local governments are no doubt introduced for the benefit of the local people, however, their responsibilities are prolonged far and beyond. Regarding water conservation, the specific roles of the Gram Panchayaths include:

- A. Forming, nurturing and strengthening institutions to undertake different issues and challenges related to water.
- B. Broad basing water-related decision-making through active participation in Gram Sabha's arranging and conducting Gram Sabha for taking important decisions.
- C. Creating and maintaining ownership of every citizen of the Gram Panchayath over water resources by involving them in decision-making.
- D. Protection/conservation of water bodies from encroachment.

Sustainable Agriculture: Agriculture in India primarily based on marginal farmers. These farmers have been experiencing a critical situation from several years linked to increasing costs of cultivation, ecologically destructive farming practices and decline in support from the government. Climate change related problems stands on the top of these already existing serious problems can be very disruptive. This situation can be seen today clearly in many villages across India. In order to support farmers, Panchayaths are very helpful by providing support and guidance to farmers. The Panchayath ensure watershed management, drip irrigation which conserves water and moisture while increasing greenery and can provide the base for organic farming.

Forest Conservation and Management: Preventing deforestation and advancing afforestation with blended/mixed, indigenous types of trees, accentuating wide leaf species, decreases greenhouse gases (GHG) outflows and check environmental change. Panchayaths which make critical progress in this on practical premise ought to be appropriately compensated. This exertion ought to be connected to improving sustainable livelihood of individuals, especially those from tribal areas. This incorporates especially employments identifying with gathering and processing of non-timber forest produce as well as afforestation work. The step of the government in engaging Gram Sabha's with the ownership for minor forest produce (MFP) and right to secure, recover and conserve community forest resources have resulted in overlapping jurisdiction of forest by Gram Sabhas. Since the Gram Sabha's don't have a lawful device for the protection of forests, in this manner, the 2006 Act approves Gram Sabha to take help from any administration division. It additionally needs ability to moderate and oversee forests logically, regardless of having conventional information only.

Mines and Minerals: The central government had asked the Finance Commission to recommend the quantum of funds to be devolved to the local bodies from the Tenth Financial Commission and onwards. The major sources for which the local bodies were assigned such shares were from lease number of mines and minerals. Previously the same was with Revenue Department but it was subsequently entrusted to the Department of Geology and Mining. One of the most comprehensive guidelines on implementation of Panchayaths (Extension to Scheduled Areas) Act, 1996 (PESA Act) were issued on 21st May 2010 which included advice to the States to Amend laws, rules, executive instructions on mines & minerals. In PESA, the devolution to the Panchayaths express that earlier consent of the Panchayath or the Gram Sabha at the

suitable dimension will be obligatory for allowing of mining permit or digging lease for minor minerals. Today many villages are well functioning and much developed due to such environmental protection. With sufficient support, resources and training, local governments in India can play a significant role in climate change adaptation and management of environment in rural areas.

Indigenous Knowledge systems

Indigenous knowledge (IK) and indigenous knowledge systems (IKS) refer to knowledge and knowledge systems that are unique to a given culture. Indigenous knowledge can be differentiated from the modern scientific knowledge system (MSKS) and international knowledge systems. The roots of MSKS rest on scientific research conducted and generated in institutions of higher learning such as universities and research institutions. At its most elemental level, IKS can be considered the foundation upon which local communities make determinations about local issues. These decisions pertain to various areas of endeavor, including water and other resource use, conservation and management, agriculture, health care issues, as well as providing information and public outreach and education within a local community.

There are several terms and meanings in use to describe the body of expertise and knowledge held in indigenous communities. And it is important to first understand what this knowledge is all about and the terms used to describe it. However, what is meant by 'indigenous knowledge' is not very clear at the moment when it is rapidly coming into current use with development planners. Many terms have been developed in literature to refer to the collective knowledge of local people. Indigenous knowledge can be defined as a body of knowledge

built up by a group of people through generations of living in close contact with nature. A broader definition is that indigenous knowledge is the knowledge used by local people to make a living in a particular environment. These are simple but convenient definitions. However, indigenous knowledge is much more complex. In fact, a variety of terms have been used to describe this form of unique knowledge. These have included such terms as local knowledge, traditional knowledge, indigenous traditional knowledge, indigenous technical knowledge, traditional environmental knowledge, indigenous environmental knowledge, rural knowledge, traditional ecological knowledge, folk knowledge, peoples' science and so forth.

However, these terms have similar meanings. All terms for knowledge belonging to various groups of ethnic grassroots people. Nonetheless, they all share a certain common idea and address the same broad issues, which are used interchangeably to refer to that knowledge which is generated and transmitted by local communities, over time, in an effort to cope with their own agro-ecological and socio-economic environments. However, the term "indigenous" has become so politicized over recent campaigns on "the rights of indigenous peoples" that it tends to exclude such local communities who may have lived in an area for a long period of time and developed their own system of local knowledge but are not the original inhabitants.

Indigenous knowledge as a term has emerged over the two decades to describe the knowledge of a group of people local to a given situation, sometimes used interchangeably with 'local' knowledge. In the 50's and 60's, theorists of development saw indigenous knowledge as inefficient, inferior and an obstacle to development. Recently, the scholars and researchers has been realized that indigenous knowledge systems should constitute the core of development models in the world. Because indigenous

knowledge has permitted its holders to exist in ‘harmony’ with nature, allowing them to use it sustainably, it is seen as especially pivotal in discussions of sustainable resource use. At present indigenous knowledge is seen as a pivotal in discussion on sustainable resource use and balanced development. In contrast to modernization theorists, advocates of indigenous knowledge underscore the promise it holds for sustainable development.

The use of the term ‘indigenous’ began with Robert Chamber’s group at the Institute of Development studies, University of Sussex, in 1979. Thirty years ago, most of the academics working in the area of indigenous knowledge represented Anthropology, Development Sociology and Geography. Today, important contributions are also being made in the fields of many other disciplines. It is a fact that contemporary research and advocacy of indigenous knowledge is founded upon the earlier pioneering writings of anthropologists like Conklin and Lewis. It is also true that many of the early researchers who identified themselves as ethno-scientists continue the current work on indigenous knowledge and people. These knowledge systems have been variously described as ‘People’s Knowledge’, ‘ethno-science’, and ‘folk-ecology’.

According to Gadgil, indigenous knowledge and resource use practice has been defined as a cumulative body of knowledge and beliefs handed down through generations by cultural transmission about the relationship of living beings, (including human) with one another and with their environment. In general, indigenous knowledge is local knowledge unique to a given culture or society, it contrasts with the international knowledge system generated by universities, research institutions and private firms. It is regarded as the basis for local –level decision making in agriculture, pastoralism, food preparation, health care, natural resource management, and a host of other activities in rural

communities staying very close to the nature. It mostly highlights the knowledge possessed by the poor and marginalized population, and emphasizes on empowering people like farmers.

Indigenous communities have an intimate knowledge of many aspects of their surroundings and various resources in their daily lives. The communities' dependence on the environment around made them acquire the knowledge and value of many plants, animals and other natural resources by trial and error. From many centuries these communities have learned how to grow food and to survive in a sometimes difficult environment. They know what varieties of crops to cultivate, when to sow and weed, which plants are poisonous and which can be used for medicine, how to cure diseases and how to maintain their environment in a state of equilibrium. For thousands of years, aboriginal/indigenous peoples around the world have used knowledge of their local environment to sustain themselves and to maintain their cultural identity. Only in the past decade, however, has this knowledge been recognised by the Western scientific community as a valuable source of ecological information. Today, a growing body of literature attests not only to the presence of a vast reservoir of information regarding plant and animal behaviour but also to the existence of effective indigenous strategies for ensuring the sustainable use of local natural resources. Indigenous knowledge refers to the multi-dimensional understandings developed by a culture based on its local environment and its long history of inhabiting that environment.

The systematic investigation of traditional environmental knowledge began with a series of studies on the terminologies that people of different cultures use to classify objects in their natural and social environments. These early studies by anthropologists and natural scientists revealed that all cultures

recognize natural classes of animals and plants, and that traditional cultures are as much concerned with classifying their world as are Western scientists. Much of this knowledge appeared to be clearly esoteric: many of the named species served no obvious useful purpose. It also gained international recognition after the United Nations Conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro. Agenda 21, one of the environmental agreements signed at UNCED, emphasizes that governments and intergovernmental organizations should respect, record, and work toward incorporating indigenous knowledge systems into research and development programs for the conservation of biodiversity and sustainability of agricultural and natural resource management systems. Other international documents, such as the 1980 “World Conservation Strategy” by the International Union for the Conservation of Nature and Natural Resources (IUCN), also paved the way for the recognition of the important role played by indigenous knowledge in biodiversity and human development. The value of indigenous knowledge systems in facilitating development is now gradually being recognized by governments and development agencies. Today, indigenous environmental knowledge is a growing field of inquiry, both nationally and internationally, particularly for those interested in educational innovation.

The major problem with indigenous knowledge and indigenous knowledge systems reside in the difficulty encountered in establishing what constitutes ‘indigenous’ in particular social, geographical and cultural contexts. The difficulty for a society to come to agreement on what and who is indigenous can be quite high, especially because of establishing a socially and culturally accepted identification of what constitutes the indigenous groupings within a given country or region. The conflict can range from groups that desire to be recognized as

indigenous to groups that find paternalistic offense in that identification. Global transcontinental migration drives the mix of peoples of different backgrounds and ethnicities towards greater complexity and the discourse has to dissect whether only communities that are native, aboriginal or tribal should be included or the scope expanded to include other types of residents or migrants. The process of classifying and providing tangible examples of indigenous knowledge systems, researchers, educators and practitioners have developed a plethora of terms that can be linked closely to IKS. These include such labels as traditional knowledge (TK), indigenous technical knowledge (ITK), folk and local knowledge, environmental or ecological knowledge (EK), and sometimes it has also been called people's science.

The main characterizing feature of an IKS is that it is locally based, grounded in a particular culture and geography. The oral tradition is strong in IKS, most of the knowledge being passed on orally, and through mimicry and practical application. In general, IK can be considered the cultural and technological product, or knowledge product, from a society or culture's interaction and engagement with daily living. Theoretical grounding is not IKS's hallmark—that is, the foundation of the MSKS. On the other hand, IKS is developed through daily engagement and through trial and error to see what meets a particular community's needs.

IKS is often maintained and propagated through community members who are experts recognized and accepted as such by the community. This standing may obtain from political authority, particular ritualistic standing an individual may possess, or simply from being the most respected authority with the most experience and acknowledged as such within a particular community. In terms of knowledge organization and

management, indigenous knowledge is broadly seen as based in its function, which may include both technical and non-technical aspects within a particular field of application. An excellent illustrative example of IKS being employed in decision-making at the local level is the Panchayath raj form of local government that involves all stakeholders at the grass roots level in governance decisions at the village level.

To summarize, indigenous knowledge and indigenous knowledge systems are based in communities at the very grass roots level; this knowledge provides the critical socio-cultural capital that is essential for communities to not only survive but also to go beyond and flourish within the given contexts of that community's geography, environment, culture and economy. At the same time, IKS is not static-it changes as is required and in response to the various stressors that a community faces, including environmental, social, public health and safety; IKS is also informed through external interchanges and interactions that any community undergoes through trade, exchange and other cross-boundary type interactions.

Appropriate technology

It is important to clearly define what an Appropriate Technology (AT). The most important for AT is the underlying philosophy and ethic that focuses on empowerment of communities at the grassroots through the development and implementation of appropriate technologies that address basic needs of clean air, water, shelter, safe and nutritious food, relevant education, and pertinent information and communication technologies among other needs. Some of the tenets generally applicable to ATs include: require little capital, utilize local materials and resources, be relatively labour intensive, be small scale and be affordable. Nevertheless, there has recently emerged the notion of micro-AT

and macro-AT, challenging some of the previously mentioned tenets of AT. It is clear that many long held presumptions about AT are now being debated and questioned. AT philosophy does emphasize grounding in specific communities, implementation within the constraints of local community-specific socio-cultural and geographical contexts. Perhaps most important, the end result of development and implementation of ATs within communities must result in building community capacity and empowering the community at the local grass roots level.

The most critical feature of the appropriate technology ethic speaks to the holistic inclusion of the local targeted community in the entire development process. This has to begin with the actual technology conceptualization stage, going on right through to technology innovation, development, implementation and execution, followed by monitoring and evaluation. Any technology that claims the mantle of ‘appropriate’ should also be adaptable and flexible, while eliminating adverse environmental impacts. An earlier paper provided a broad over view of appropriate technologies available for water collection, treatment and storage in the context of land reform and a more recent version updated appropriate water technologies in the context of public health.

Indigenous Knowledge and Appropriate Technology

Appropriate technology is an essential a community to survive and flourish, elementary community necessities for survival such as clean water and air, safe and healthy food, renewable energy, accessible and affordable healthcare, relevant and topical education. The focus of appropriate technologies being developed across the planet is the development of sustainable technologies to satisfy these fundamental needs. Communities focus on the development of the technologies appropriate to the satisfaction of

these community needs. Often, it is the indigenous knowledge of these communities that was the basis for the community's technological development.

A launching point for the analysis of how indigenous knowledge and IKS might contribute to the development of appropriate technologies would be to address these identified needs. More importantly, after identifying relevant and applicable needs, IKS that include appropriate technologies for these targeted efforts must be identified through engagement of the local community. A broad and diverse spectrum of appropriate technologies can be called upon as a resource base, allowing communities to self-select and focus on those areas that are of critical immediate need for the community. This drawing from IKS for the development of ATs will promote and enhance sustainability practices and principles within the community.

Numerous and diverse examples exist of appropriate technologies that are being implemented and practiced that originate in indigenous knowledge. The application of the prolific and multifaceted neem tree in a broad array of rural sustainability practices such as health and agriculture is an excellent and pertinent example. The spice turmeric has been utilized for centuries by indigenous communities in agriculture, animal husbandry and health and medicinal applications. Turmeric is also widely employed in the Ayurvedic medical practices, as well; indeed, medical systems for health management such as acupuncture and *Unani* are examples of IKS on a much larger and deeper social milieu.

Among the rich resources that originate from IKS, agricultural knowledge and management systems also abound. An example that has particular relevance in the age of synthetic fertilizers and large-scale pesticide inputs into industrial scale

agriculture and the various problems that ensue is *vrikshaturveda*. This is an old IKS that focuses on agricultural practices that only call for organic and natural interventions into the farming process and cycle. Thus, in *vrikshaturveda*, traditional agricultural outputs such as cow dung and biomass waste are manipulated to create sustainable and naturally and organically renewable input. Thus, a spray for plants is created out of cow urine, yogurt, milk and *ghee* (clarified butter), and this can displace synthetic pesticide and foliar sprays that might have large negative impacts on the environment.

Alongside food and agriculture, water is a critical natural resource that needs to be managed sustainably for the community. Various indigenous knowledge systems have developed water sourcing, conservation, storage and treatment techniques and practices that are sustainable in the context of that local community. As part of the natural hydrological cycle and the seasonal variations in rainfall, indigenous knowledge systems developed such as the various water tank systems of India including the *ery*, *kere* and *cheruva* water tank systems of Tamil Nadu, Karnataka and Andhra Pradesh, respectively. Indigenous knowledge systems are being supported by some governments such as those of India (*Ayurveda* and *Unani*) and China (*Accupuncture*), with the aim of undergirding the IKS with scientific backing and support. Turmeric, as utilized and implemented in indigenous knowledge practices. As something that has widespread use in *Ayurvedic* practices as well as in traditional Chinese medicine (TCM) for numerous ailments. Turmeric has been indicated for use to treat wounds, skin diseases and liver problems. It has also been used extensively as an anti-inflammatory agent, not just in human medicine but in animal husbandry as well. Turmeric's anti-bacterial properties are well known; nevertheless, it is also being investigated for beneficial therapeutic effects in the treatment of atherosclerosis, stomach

ulcers, ulcerative colitis and cancer. It has also been employed as an anti-viral agent. The tremendous breadth of research that is now on-going and being initiated to explore the diverse therapeutic potential of turmeric is what can drive the engagement of appropriate technologists with local medical technologies to develop sustainable solutions to public health issues.

Although much of the world's attention has been focused on Asia, many African Indigenous Knowledge systems (AIKS) are now being documented and described and are becoming the focus of study, especially as these indigenous practices pertain to development in the African context. Indigenous knowledge from Africa can be a central vehicle by which education for all (EFA) target and goals can be met. It has been argued that formal schooling and regular school education may not be the appropriate vehicle for delivery of the outcomes that are being visualized in the EFA context. Formal schooling, with more traditional educational practices, may need to be integrated with and into these practices to enhance their impact and expand their reach.

Another critical area that needs to be paid attention to is the issue of 'intellectual property (IP)', as it impacts the articulation, development and implementation of indigenous knowledge system-based technologies. It is important to be able to protect the IKS as well as the knowledge bearers and practitioners. To do this, it may be critical to grant legal effect to existing indigenous protocols for the preservation, as well as protection, of indigenous knowledge possessed by native healers. A good first step is to identify indigenous knowledge and to ensure that indigenous knowledge practices must be researched and given due credit when reviewing and considering IP and patents that have their origins in that indigenous understanding. It

is clear that support for indigenous knowledge and systems must emanate from the state.

In India, there is the National Mission for Manuscripts that seeks to document and catalogue a rich trove of indigenous knowledge that spans the diverse country. The issues that need to be addressed by such institutions include access, documentation and sharing and the incorporation of appropriate digital technologies for the knowledge management, sharing and dissemination. The underlying philosophical approach that most indigenous knowledge systems take is a holistic one. The ‘disciplinary’ approach, which seeks to break everything down to some elemental constitutive components and study these individually, is the opposite of the indigenous approach, which takes a systemic perspective in its approach to developing solutions to particular problems.

Module - V

Environmental Issues and Disasters

Politics of Water

Water is a social fact which plays a life sustaining role in ecological functioning, food production, economic activities, health and recreation etc. The dramatic expansion of irrigation in the 1960s and early 1970s was followed by the recognition that many large-scale public irrigation schemes did not function well, that drainage and maintenance had been neglected, and that institutional reforms were needed to ensure better management and physical and financial sustainability. These reforms included the introduction of water fees expected to make agencies financially autonomous and accountable to users. The UNDP *Human Development Report 2006* explicitly describes the situation in the Water Supply and Sanitation (WSS) sector; “Whether measured against the benchmark of human suffering, economic waste or extreme poverty, the water and sanitation deficit inflicts a terrifying toll”. Moreover, the United Nations World Water Development Report once again highlighted how the growing gap between supply and demand could create conflict. The World Economic Forum has ranked water crises as the most worrying global threat, more dangerous than terrorist attacks or financial meltdowns, and more likely to occur than the use of weapons of mass destruction.

The field of water politics is a very recent addition to the disciplines of political science and international relations - not more than 30 years young. With any new field of enquiry within a discipline a number of definitions will be developed. Water

politics, sometimes called hydropolitics, is politics affected by the availability of water and water resources, a necessity for all life forms and human development. One of the least known definitions in the field is that of water politics itself. One of the initial definitions of water politics was coined by Elhance (1997). He noted that water politics is the systematic analyses of interstate conflict and cooperation regarding international water resources. A more comprehensive definition of water politics should read as follows: the study of water politics is the systematic investigation with respect to the interaction between states, non-state actors and a host of other participants, like individuals within and outside the state, regarding the authoritative allocation and/or use of international and national water resources.

Today, water security has become a central feature of the global policy agenda. Climate change, population growth, and pollution are altering the distribution of water resources and the political control of these resources is becoming increasingly contested. These and other water security threats are a source of conflict not only within countries but across international boundaries. International water politics describes the interactions between governments, non-government organizations, researchers, and other actors that determines how and whether water management issues are addressed.

On the one hand, India has several major water related issues like the rapid groundwater depletion, continuous increase in all types of water pollution and illegal dumping of waste in rivers and oceans, and finally, the overuse and storage of river water is endangering the environment in lower riparian states. The drastic damages of the ecological system could be witnessed due to construction of numerous dams. On the other side, since the mid-1980s, the opening up of the Indian economy and associated policies of deregulation and privatization affected vast sectors of the economy, including key sectors like banking,

power, and water. The Coca-Cola Company, PepsiCo, and other water giants like Suez, Vivendi, and Bechtel soon made their arrival into highly profitable water market. It covered everything from the absolute privatization of urban water supplies and waste water management to joint contracts with cities and public sector entities for improving and managing water infrastructure and water delivery to industries and consumers.

The growing demands by urban middle class residents for better infrastructure and service provision also smoothed the way for increased privatization of sectors that had previously been handled by government entities. The soft drink and bottled water industry also held promise of massive profits because of the growth of a sizeable urban middle class in the 1990s, and both The Coca-Cola Company and PepsiCo sought to capture this market. Soft drink sales have zoomed and India's market now stands at around \$2 billion a year; quite a few studies predict that in the next few years, India and China will soon eclipse the United States in soft drink consumption.

Similarly, many scholars and technical experts have claimed that the water issue in India and among its states is due to the scarcity. However, there is a difference between water stress and water scarcity. Water stress is when a country's annual water supply is below 1700 cubic meters per person. We call a state water stressed when the water supply is between 1700 to 1000 cubic meter per person. However, when water supply drops below 1000 cubic meters per person then it is called scarcity and it can threaten food production. India is not have water scarcity, nevertheless it is water stressed due to disorganized planning, mismanagement and inefficient and over usage. Interstate conflicts over the allocation of water in India have triggered many protests, violence and destructive actions. A severe criticism has erupted that the water policy of Indian government is poor in nature. Inadequate availability of water is criticized, and often

blames are laid upon each other. At present water conflicts among states are the biggest challenges. These challenges are considered a threat and hindrance to the economy and social solidarity of India. Politicians and media use the water issue to criticize states and the federal government. States governments also use water related problems against the federal government.

Politics of Global Warming

Very recently, United Nation observe that *Climate Change* is a crucial issue of our time and we are at a defining moment. From shifting weather patterns that threaten food production, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. Without drastic action today, adapting to these impacts in the future will be more difficult and costly. The Intergovernmental Panel on Climate Change (IPCC) (United Nations body for assessing the science related to climate change) issued a special report (2018) on the impacts of global warming of 1.5°C, finding that limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society. With clear benefits to people and natural ecosystems, the report found that limiting global warming to 1.5°C compared to 2°C could go hand in hand with ensuring a more sustainable and equitable society. While previous estimates focused on estimating the damage if average temperatures were to rise by 2°C, this report shows that many of the adverse impacts of climate change will come at the 1.5°C mark.

The report also highlights a number of climate change impacts that could be avoided by limiting global warming to 1.5°C compared to 2°C, or more. For instance, by 2100, global sea level rise would be 10 cm lower with global warming of 1.5°C compared with 2°C. The likelihood of an Arctic Ocean free of sea ice in summer would be once per century with global warming of

1.5°C, compared with at least once per decade with 2°C. Coral reefs would decline by 70-90 percent with global warming of 1.5°C, whereas virtually all (> 99 percent) would be lost with 2°C. The report finds that limiting global warming to 1.5°C would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of carbon dioxide (CO₂) would need to fall by about 45 percent from 2010 levels by 2030, reaching ‘net zero’ around 2050. This means that any remaining emissions would need to be balanced by removing CO₂ from the air.

Little more than a decade, global warming has been transformed from an obscure technical concern into a subject of widespread public anxiety and international regulatory interest. The World Meteorological Organization’s 1985 Villach conference give first widely publicized warnings about an anthropogenically enhanced greenhouse effect due to rising concentrations of carbon dioxide (CO₂) and other radiatively sensitive greenhouse gases (GHGs). In recent Kyoto Protocol to United Nations Framework Convention on Climate Change (UNFCCC), which politicians hammered out a package of legally binding targets for reducing the GHG emissions of industrialized countries. The speed with which scientific knowledge of climate change has been translated into an international diplomatic consensus is remarkable. It is testimony to the authority of science to provide legitimacy for political action.

A variety of powerful political interests served as midwives to the birth in the late 1980s of climate change as a pressing global environmental problem. Since the leading cause of increasing atmospheric GHG concentrations is fossil fuel consumption, which is rapidly increasing worldwide, the politics of climate change are closely intertwined with the politics of energy and the politics of development. Political analysis has focused primarily on the powerful interests competing to set

climate change policy. Political scientists and geographers have charted the fate of local climate change mitigation and energy conservation initiatives and intrastate struggles to fashion coherent national energy and environmental policy responses to global warming.

Students of politics and international relations have studied the geopolitics of negotiating international environmental agreements on climate change. It has highlighted the difficult issues of international political economy—differential North-South responsibility for and vulnerability to climate change, international and intergenerational equity, technology transfer and property rights, national sovereignty and treaty enforcement, and economic competitiveness. One consequence of this rather conventional view of science always separated from politics. It give very little attention has been paid to the cultural politics of scientific practice and its consequential role in framing and, in that sense, constructing for us the problem of global warming.

The matter of scientific consensus on global climate change is not as important as the fact that agreement among an international community of scientific investigators has enabled them to enroll governments around the world to binding GHG emission reductions. Theoretically, realist and liberal institutional approaches to international relations like those inspired by political economy take both the nature of global climate change itself and our scientific knowledge of it for granted in their study of the state, nongovernmental, and other actors shaping international climate change policy. Those who have addressed the politics of scientific knowledge have largely done so in an instrumental way, arguing that political interests of one sort or another have distorted the science to serve their own ends. Such conspiratorial charges have come from both the political right and the left. In the United States, the right-wing opponents of the Kyoto Protocol, claim that the threat of climate change has

been exaggerated by scientists “with a financial stake in adopting an alarmist attitude about global warming.”

The causes of global warming are varied, including carbon dioxide, methane, and nitrous oxide. As the climate warms, it affects glaciers, sea levels, water supply, rainfall, evaporation, wind, and a host of other natural phenomenon that affect weather patterns. Unlike an earlier generation of environmental problems, it is hard to see the connections between coal plants in one part of the world and storms in another. In contrast, when the water in your river smells and turns a disgusting color and dead fish float on top of it, no sophisticated scientific training is required to understand the link between what’s happening in the river and the chemical plant dumping things into it. The first generation of the environmental movement had an easier time making the connection between cause and effect.

We currently attribute greenhouse gas emissions to individual countries under the United Nations Framework Convention on Climate Change. In fact, nationally and internationally there is no legal architecture that allows us to reward and/or punish those who decrease or increase their greenhouse gas emissions. Even the Paris Agreement—which President Trump pulled the U.S. out of—is only a set of pledges from individual countries. Measurement is a first step toward accountability, and measurement needs constant improvement. But measurement in the absence of accountability is meaningless, especially in situations where many people are skeptical of cause and effect. Combating climate change requires collective action on many fronts, and it requires collective action both nationally and internationally. But this is extremely difficult in democracies like the U.S., which face strong individualist traditions in the culture along with a lack of trust in government. In fact, it is the lack of trust in government that may be one of the foundational

barriers to effective environmental action. Writing in the journal *Global Environmental Change*, E. Keith Smith and Adam Mayer looked at 35 different countries. They found that a lack of trust in institutions blunts the public's risk perceptions and therefore their willingness to support behaviors or policies to address climate change.

Some people, recognizing the political problem, hope for a technological fix such as carbon capture or some other geoengineering fix. The problem with technological fixes is that they are remote and may very well not be effective in time to stave off massive amounts of social and economic disruption. But it is clear that climate change is only one of many complex scientific issues that average citizens will be called upon to understand and act on in the future. Nationally and internationally, we need to be able to reward and punish private and public actors for their environmental actions. The condemnation of Brazil's government for deforestation and fires in the Amazon was largely without consequences. Until there are penalties for things like greenhouse gas emissions, they will not be reduced in sufficient amounts.

Problems of Population and Pollution

Increasing population growth and continuous economic development have caused serious environmental problems in the world. The recent experience is that the pace of environmental depletion and degradation is much faster in developing countries like India than the developed countries. One of the primary causes of environmental degradation in a country could be attributed to rapid growth of population, which adversely affects the natural resources and environment. The uprising population and the environmental deterioration face the challenge of sustainable development. The existence or the absence of favorable natural resources can facilitate or retard the process of socio-economic development. The three basic demographic factors of births,

deaths, and human migration, and immigration produce changes in population size, composition, distribution and these changes raise a number of important questions of cause and effect.

Population growth and economic development are contributing many serious environmental calamities in India. These include heavy pressure on land, land degradation, forests, habitat destruction and loss of biodiversity. Changing consumption pattern has led to rising demand for energy. The final outcomes of this are air pollution, global warming, climate change, water scarcity and water pollution. The rapid growing population and economic development is leading to a number of environmental issues in India because of the uncontrolled growth of urbanization and industrialization, expansion and massive intensification of agriculture, and the destruction of forests. Major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor.

Population Reference Bureau estimated the 6.14 billion world's population in mid-2001. Contribution of India alone to this population was estimated to be 1033 million. The projected population indicates that India will be a first most populous country in the world and China will be second in 2050. India having 18% of the world's population on 2.4% of world's total area has greatly increased the pressure on its natural resources. Water shortages, soil exhaustion and erosion, deforestation, air and water pollution afflicts many areas. If the world population continues to multiply, the impact on environment could be devastating. The rapid population growth in a developing country like India are frightening the environment through the expansion and intensification of agriculture, the uncontrolled growth of urbanization and industrialization and the destruction of natural

habitats. The pressures on the environment intensify every day as the population grows.

The growing trends of population and consequent demand for food, energy, and housing have considerably altered land-use practices and severely degraded India's forest vis-à-vis environment also. The growing population put immense pressure on land intensification at cost of forests and grazing lands because the demand for food could not increase substantially to population. Thus, horizontal extension of land has fewer scopes and relies mostly on vertical improvement that is supported by technical development in the field of agriculture i.e. HYV seeds, Fertilizers, Pesticides, Herbicides, and agricultural implements. All these practices causing degradation and depletion of environment with multiplying ratio.

Poverty is amongst the consequences of population growth and its life style play major role in depleting the environment either its fuel demands for cooking or for earning livelihood for their survival. The unequal distribution of resources and limited opportunities cause push and pull factor for people living below poverty line that in turn overburdened the population density and environment get manipulated by manifolds. Population is an important source of development, yet it is a major source of environmental degradation when it exceeds the threshold limits of the support systems. Unless the relationship between the multiplying population and the life support system can be stabilized, development programs, howsoever, innovative are not likely to yield desired results. Population impacts on the environment primarily through the use of natural resources and production of wastes and is associated with environmental stresses like loss of biodiversity, air and water pollution and increased pressure on arable land.

Human population issues are extremely important when it comes to our way of life and our future on this planet. Poverty is said to be both cause and effect of environmental degradation. The circular link between poverty and environment is an extremely complex phenomenon. Inequality may foster unsustainability because the poor, who rely on natural resources more than the rich, deplete natural resources faster as they have no real prospects of gaining access to other types of resources. Moreover, degraded environment can accelerate the process of impoverishment, again because the poor depend directly on natural assets. Lack of opportunities for gainful employment in villages and the ecological stresses is leading to an ever-increasing movement of poor families to towns. Mega cities are emerging and urban slums are expanding. Such rapid and unplanned expansion of cities has resulted in degradation of urban environment.

It has widened the gap between demand and supply of infrastructural services such as energy, housing, transport, communication, education, water supply and sewerage and recreational amenities, thus depleting the precious environmental resource base of the cities. The result is the growing trend in deterioration of air and water quality, generation of wastes, the proliferation of slums and undesirable land use changes, all of which contribute to urban poverty. Direct impacts of agricultural development on the environment arise from farming activities which contribute to soil erosion, and loss of nutrients. The spread of green revolution has been accompanied by over exploitation of land and water resources, and use of fertilizers and pesticides have increased many fold. Shifting cultivation has also been an important cause of land degradation.

Environmental degradation is a result of the dynamic inter-play of socio-economic, institutional and technological

activities. Environmental changes may be driven by many factors including economic growth, population growth, urbanization, intensification of agriculture, rising energy use and transportation. Poverty still remains a problem at the root of several environmental problems. In India, 38 percent of households were access to safe drinking water facilities in 1981, which was increased to 62 percent of households in 1991 In India, almost all surface water resources are contaminated and unfit for human consumption. The impact of drinking water pollution is more severe on the poor. The problems have become more acute in the slum areas where such basic necessities of life are either non-existent or are inadequate and very low in standard. The diseases commonly caused due to contaminated water are diarrhoea, trachoma, intestine worms, and hepatitis. Inadequate access to safe drinking water leads to intestinal mortality and intestinal diseases.

Most of India's poor live in rural areas and are engaged in agriculture. India, with a high density of population relative to resources, faces developmental challenges in alleviating massive poverty and deprivation, and in raising the quality of life of poor people. The growth performance of states has crucial implications in poverty reduction, which is an important objective of the economic policy. India's poverty reductions through the anti-poverty and employment generation programmes along with overall economic growth-planning efforts have helped to reduce the poverty ratio in the country. The people below the poverty line have declined from 55 percent in 1973 to 26 percent in 1999-2000 for India as a whole.

The economic and industrial development is inevitably accompanied by changing patterns of consumption. The number of registered motor vehicles in India provides one useful indicator of expanding consumption and economic growth. The increasing vehicles in country, producing more air pollution, fuel

consumption, traffic jams and demands for road construction—often at the cost of agricultural land. The total number of registered vehicles in India has increased from 3 million in 1950-51 to 55 million in 2001-2002. The major share is contributed by metropolitan cities in all registered vehicles in the country. The population of India in 2000 was just over 1 billion, and there were about 10 motor vehicles for every 1000 people or a total of roughly 10 million motor vehicles in the country. An increase in vehicular pollution is associated with a number of environmental problems like air pollution and global warming. In most urban areas of India, air pollution has worsened due to traffic congestion, poor housing, poor sanitation and drainage and garbage accumulation.

Bhopal Gas disaster

Bhopal disaster, chemical leak in 1984 in the city of Bhopal, Madhya Pradesh state, India. At the time, it was called the worst industrial accident in history. On December 3, 1984, about 45 tons of the dangerous gas methyl isocyanate escaped from an insecticide plant that was owned by the Indian subsidiary of the American firm Union Carbide Corporation. The gas drifted over the densely populated neighborhoods around the plant, killing thousands of people immediately and creating a panic as tens of thousands of others attempted to flee Bhopal. The final death was estimated to be between 15,000 and 20,000. Some half a million survivors suffered respiratory problems, eye irritation or blindness, and other maladies resulting from exposure to the toxic gas; many were awarded compensation of a few hundred dollars.

History of Disaster: In the 1970s, the Indian government initiated policies to encourage foreign companies to invest in local industry. Union Carbide Corporation (UCC) was asked to build a plant for the manufacture of Sevin, a pesticide commonly used throughout Asia. As part of the deal, India's government insisted

that a significant percentage of the investment come from local shareholders. The government itself had a 22% stake in the company's subsidiary, Union Carbide India Limited (UCIL). The company built the plant in Bhopal because of its central location and access to transport infrastructure. The specific site within the city was zoned for light industrial and commercial use, not for hazardous industry. The plant was initially approved only for formulation of pesticides from component chemicals, such as MIC imported from the parent company, in relatively small quantities. However, pressure from competition in the chemical industry led UCIL to implement *backward integration*-the manufacture of raw materials and intermediate products for formulation of the final product within one facility. This was inherently a more sophisticated and hazardous process.

In 1984, the plant was manufacturing Sevin at one-quarter of its production capacity due to decreased demand for pesticides. Widespread crop failures and famine on the subcontinent in the 1980s led to increased indebtedness and decreased capital for farmers to invest in pesticides. Local managers were directed to close the plant and prepare it for sale in July 1984 due to decreased profitability. When no ready buyer was found, UCIL made plans to dismantle key production units of the facility for shipment to another developing country. In the meantime, the facility continued to operate with safety equipment and procedures far below the standards found in its sister plant in Institute, West Virginia. The local government was aware of safety problems but was reticent to place heavy industrial safety and pollution control burdens on the struggling industry because it feared the economic effects of the loss of such a large employer.

On December 2 1984, while most of the one million residents of Bhopal slept, an operator at the plant noticed a small leak of methyl isocyanate (MIC) gas and increasing pressure inside a storage tank. The vent-gas scrubber, a safety device

designer to neutralize toxic discharge from the MIC system, had been turned off three weeks prior. Apparently, a faulty valve had allowed one ton of water for cleaning internal pipes to mix with forty tons of MIC. A 30 ton refrigeration unit that normally served as a safety component to cool the MIC storage tank had been drained of its coolant for use in another part of the plant. Pressure and heat from the vigorous exothermic reaction in the tank continued to build. The gas flare safety system was out of action and had been for three months. At around 1.00 AM, December 3, loud rumbling reverberated around the plant as a safety valve gave way sending a plume of MIC gas into the early morning air. Within hours, the streets of Bhopal were littered with human corpses and the carcasses of buffaloes, cows, dogs and birds. An estimated 3,800 people died immediately, mostly in the poor slum colony adjacent to the UCC plant.

Local hospitals were soon overwhelmed with the injured, a crisis further compounded by a lack of knowledge of exactly what gas was involved and what its effects were. It became one of the worst chemical disasters in history and the name Bhopal became synonymous with industrial catastrophe. Estimates of the number of people killed in the first few days by the plume from the UCC plant run as high as 10,000, with 15,000 to 20,000 premature deaths reportedly occurring in the subsequent two decades. The Indian government reported that more than half a million people were exposed to the gas. Several epidemiological studies conducted soon after the accident showed significant morbidity and increased mortality in the exposed population.

Impacts of Disaster: The events in Bhopal revealed that expanding industrialization in developing countries without concurrent evolution in safety regulations could have catastrophic consequences. The disaster demonstrated that seemingly local problems of industrial hazards and toxic contamination are often tied to global market dynamics. UCC's Sevin production plant

was built in Madhya Pradesh not to avoid environmental regulations in the U.S. but to exploit the large and growing Indian pesticide market. However, the manner in which the project was executed suggests the existence of a double standard for multinational corporations operating in developing countries. Enforceable uniform international operating regulations for hazardous industries would have provided a mechanism for significantly improved safety in Bhopal.

Even without enforcement, international standards could provide norms for measuring performance of individual companies engaged in hazardous activities such as the manufacture of pesticides and other toxic chemicals in India. National governments and international agencies should focus on widely applicable techniques for corporate responsibility and accident prevention as much in the developing world context as in advanced industrial nations. Specifically, prevention should include risk reduction in plant location and design and safety legislation. Local governments clearly cannot allow industrial facilities to be situated within urban areas, regardless of the evolution of land use over time. Industry and government need to bring proper financial support to local communities so they can provide medical and other necessary services to reduce morbidity, mortality and material loss in the case of industrial accidents.

Following the events of December 3, 1984 environmental awareness and activism in India increased significantly. The Environment Protection Act was passed in 1986, creating the Ministry of Environment and Forests (MoEF) and strengthening India's commitment to the environment. Under the new act, the MoEF was given overall responsibility for administering and enforcing environmental laws and policies. It established the importance of integrating environmental strategies into all industrial development plans for the country. However, despite greater government commitment to protect public health, forests,

and wildlife, policies geared to developing the country's economy have taken precedence in the last 20 years. India has undergone tremendous economic growth in the two decades since the Bhopal disaster. Gross domestic product (GDP) per capita has increased from \$1,000 in 1984 to \$2,900 in 2004 and it continues to grow at a rate of over 8% per year.

Rapid industrial development has contributed greatly to economic growth but there has been significant cost in environmental degradation and increased public health risks. Since abatement efforts consume a large portion of India's GDP, MoEF faces an uphill battle as it tries to fulfill its mandate of reducing industrial pollution. Heavy reliance on coal-fired power plants and poor enforcement of vehicle emission laws have resulted from economic concerns taking precedence over environmental protection. With the industrial growth since 1984, there has been an increase in small scale industries (SSIs) that are clustered about major urban areas in India. There are generally less stringent rules for the treatment of waste produced by SSIs due to less waste generation within each individual industry. This has allowed SSIs to dispose of untreated wastewater into drainage systems that flow directly into rivers.

New Delhi's Yamuna River is illustrative. Dangerously high levels of heavy metals such as lead, cobalt, cadmium, chrome, nickel and zinc have been detected in this river which is a major supply of potable water to India's capital thus posing a potential health risk to the people living there and areas downstream. Land pollution due to uncontrolled disposal of industrial solid and hazardous waste is also a problem throughout India. With rapid industrialization, the generation of industrial solid and hazardous waste has increased appreciably and the environmental impact is significant. India relaxed its controls on foreign investment in order to accede to WTO rules and thereby attract an increasing flow of capital. In the process, a number of

environmental regulations are being rolled back as growing foreign investments continue to roll in.

The Bhopal disaster could have changed the nature of the chemical industry and caused a reexamination of the necessity to produce such potentially harmful products in the first place. However the lessons of acute and chronic effects of exposure to pesticides and their precursors in Bhopal has not changed agricultural practice patterns. An estimated 3 million people per year suffer the consequences of pesticide poisoning with most exposure occurring in the agricultural developing world. It is reported to be the cause of at least 22,000 deaths in India each year. In the state of Kerala, significant mortality and morbidity have been reported following exposure to Endosulfan, a toxic pesticide whose use continued for 15 years after the events of Bhopal. Aggressive marketing of asbestos continues in developing countries as a result of restrictions being placed on its use in developed nations due to the well-established link between asbestos products and respiratory diseases. India has become a major consumer, using around 100,000 tons of asbestos per year, 80% of which is imported with Canada being the largest overseas supplier.

The tragedy of Bhopal continues to be a warning sign at once ignored and heeded. Bhopal and its aftermath were a warning that the path to industrialization, for developing countries in general and India in particular, is fraught with human, environmental and economic perils. Some moves by the Indian government, including the formation of the MoEF, have served to offer some protection of the public's health from the harmful practices of local and multinational heavy industry and grassroots organizations that have also played a part in opposing rampant development. The Indian economy is growing at a tremendous rate but at significant cost in environmental health and public safety as large and small companies throughout the subcontinent

continue to pollute. Far more remains to be done for public health in the context of industrialization to show that the lessons of the countless thousands dead in Bhopal have truly been heeded.

Nuclear disasters

Nuclear fission was first observed on December 17th 1938 by the German Scientists Otto Hahn and Fritz Strassmann. In 1942, the first nuclear reactor had been constructed in Chicago by Enrico Fermi, in cooperation with Leo Szilard and other scientists. A nuclear disaster has a wider implications since it involves long term radiation effects. A nuclear and radiation accident is defined by the IAEA as *an event that has led to significant consequences to people, the environment or the facility*. Examples include lethal effects to individuals, large radioactivity release to the environment, or reactor core melt. The likelihood and potential impact of the release of nuclear radiation in the environment has been the subject of discussion ever since the first nuclear weapon was used and the first nuclear reactor was installed. Nuclear disasters are a matter of serious public concern due to the long term environmental and biological damages that they can cause.

Some of the major nuclear accidents have been reported by five countries. These nuclear accidents are the following:

Hiroshima and Nagasaki, Japan-August1945

Fukushima, Japan - March 2011

Kashiwazaki, Japan - July 2007

Mihama, Japan - August 2004

Blayais, France - December 1999

Tokaimura, Japan - September 1999

Tokaimura, Japan - March 1997

Chernobyl, Ukraine - April 1986

Three Mile Island, USA - March 1979

The Urals, USSR - October 1958

Windscale, UK – October 1957.

Among these major nuclear accidents, four had serious negative consequences for the environment, human health, and public opinion. These accidents are the following:

- A. Hiroshima and Nagasaki
- B. Three Miles Island
- C. Chernobyl
- D. Fukushima

The first accident occurred during the normal operation of the nuclear power plant and was caused by serious malfunctioning of equipment and serious human errors; the second accident occurred during a test designed to assess the reactor's safety margin in a particular set of circumstances and it occurred due to serious errors in the reactor design and a lack of appropriate training of the staff; and the third accident occurred as result of a natural disaster (an earthquake of magnitude 9 and a tsunami) in addition to an inappropriate selection of the plant site.

Hiroshima and Nagasaki: Mankind was first exposed to the horrors of mass destruction caused by nuclear strikes on the Japanese cities of Hiroshima and Nagasaki in August 1945. People and property located at Ground Zero (GZ) instantly vaporised. The casualty estimates during the first two to four

months of the bombings were between 90,000–166,000 people in Hiroshima and 60,000–80,000 in Nagasaki. Roughly half of these deaths had occurred on the first day. Out of the people who died on the day of the explosion, 60 per cent died from flash or flame burns, 30 percent from falling debris and 10 per cent from other causes. During the following months, large numbers died from the effect of burns, radiation sickness and other injuries, compounded by illness. Out of the total immediate and short term causes of death, 15-20 per cent died from radiation sickness, 20-30 per cent from flash burns, and 50-60 per cent from other injuries, compounded by illness. In both cities, most of the dead were civilians.

Since 1945, there has been no further employment of atomic weapons but accidents have taken place in the military and civilian applications of nuclear technology, severely endangering and in certain cases destroying life and property, and causing immense environmental damage. Emergencies at nuclear power plants (NPPs) have attracted wide media attention. NPPs are vulnerable because they hold huge amounts of explosive inventory on their premises, comprising nuclear cores and spent fuel e.g. the six reactor cores at the Fukushima Daiichi held 487 tonnes of uranium.

The Three Mile Island Nuclear Accident: A combination of equipment failure, human error, and bad luck, the nuclear accident at Three Mile Island (TMI) stunned the nation and permanently changed the nuclear industry in the USA and Europe. The TMI nuclear accident had a devastating impact on the US nuclear power industry - the Nuclear Regulatory Commission (NRC) has not reviewed an application to build a new nuclear power plant in the USA until recently. It also brought about sweeping changes involving emergency response planning, increase safety measures, reactor operator training, human factors engineering, radiation protection, and many other areas of nuclear

power plant operations (Powell). The TMI nuclear accident was the most significant nuclear accident in the history of the US commercial nuclear power generating industry. It resulted in the release of limited amount of radioactive noble gases and iodine to the environment. However, there have been no deaths or injuries to plant workers or members of the nearby community, which can be attributed to the accident.

The Chernobyl Nuclear Accident: The Chernobyl nuclear power plant is located in Ukraine, near the town of Pripyat, which had been built to house power plant employees and their families. The nuclear power plant was constructed in a wooded, marshy area near the Ukraine-Belarus border, approximately 18 km northwest of the city of Chernobyl and 100 km north of Kiev, the capital of Ukraine. The Chernobyl nuclear power plant included four nuclear power reactors (RMBK type), each capable of producing one gig watt of electric power. At the time of the accident, the four reactors produced about 10 % of the electricity used in Ukraine. Construction of the Chernobyl nuclear power plant began in the 1970s. The first of the four reactors was commissioned in 1977, and Unit 4 began producing power in 1983. When the accident occurred in 1986, two other nuclear reactors were under construction.

According to Morales Pedraza (2012), the Chernobyl nuclear accident is the worst nuclear accident ever occurred in a nuclear power plant, considering the area contaminated, the number of countries involved, and the amount of people affected by the accident. Initially, the accident at Unit 4 of the Chernobyl nuclear power plant was considered as resulted from a combination of design and technical deficiencies with a grave operator error. However, in a later report the IAEA put the main cause of the accident to the reactor's design. According to WNAO's report, on 25 April prior to a routine shut down, the reactor crew at Unit 4 of the Chernobyl nuclear power plant began

preparing for a test to determine how long turbines would spin and supply power to the main circulating pumps following a loss of main electrical power supply.

The Fukushima Daiichi Nuclear Accident: The Fukushima Daiichi nuclear accident, considered the second world major nuclear accident after Chernobyl, is the third major accident that has been affected the world nuclear industry in the last thirty five years. The accident is the result of a severe climate disaster (that kills around 20000 persons) that was not foreseen that could happen by the constructor of the nuclear power plant, putting out of service important components of the safety system of the plant. The type of nuclear power reactors in operation in the Fukushima nuclear power plant was of the boiling water reactor type (BWR) constructed in the 1970s (Generation II). According to the IAEA Briefing on Fukushima Nuclear Accident and the Japan's Nuclear and Industrial Safety Agency, the most relevant events associated to the Fukushima Daiichi nuclear accident are described that at 05:46 UTC (coordinated universal time) on 11 March 2011 an earthquake of magnitude 9 occurred off the east coast of Honshu, Japan. At 06:42 UTC, the IAEA Incident and Emergency Centre (IEC) was activated following notification from the Agency's International Seismic Safety Centre (ISSC) of the earthquake and of the potential for damage at four nuclear power plants located on the north-east coast of Japan as well as the potential for a tsunami. At 8:15 CET on the same day, the IEC received information from the ISSC confirming information about the earthquake of magnitude 9 that hit the east coast of Honshu. The Fukushima incident has triggered global panic. It also renewed demands by anti-nuclear lobbyists for a closure of the nuclear industry.

In fact, an uncontrolled nuclear reaction in a nuclear reactor could result in widespread contamination of air and water. A major environmental concern related to nuclear power is the

creation of radioactive wastes such as uranium mill tailings, spent (used) reactor fuel, and other radioactive wastes. These materials can remain radioactive and dangerous to human health for thousands of years. Radioactive wastes are subject to special regulations that govern their handling, transportation, storage, and disposal to protect human health and the environment. Radioactive wastes are classified as low-level waste or high-level waste. The radioactivity of these wastes can range from a little higher than natural background levels, such as for uranium mill tailings, to the much higher radioactivity of used (spent) reactor fuel and parts of nuclear reactors. The radioactivity of nuclear waste decreases over time through a process called radioactive decay.

The amount of time it takes for the radioactivity of radioactive material to decrease to half its original level is called the radioactive half-life. Radioactive waste with a short half-life is often stored temporarily before disposal to reduce potential radiation doses to workers who handle and transport the waste. This storage system also reduces the radiation levels at disposal sites. By volume, most of the waste related to the nuclear power industry has a relatively low level of radioactivity. Uranium mill tailings contain the radioactive element radium, which decays to produce the radioactive gas radon. Most uranium mill tailings are placed near the processing facility, or *mill*, where they come from. Uranium mill tailings are covered with a sealing barrier of material such as clay to prevent radon from escaping into the atmosphere. The sealing barrier is covered by a layer of soil, rocks, or other materials to prevent erosion of the sealing barrier.

Nuclear radiation exposed in the environment can disrupt our ecological balance. Nucleo-synthesis processes produce both stable and unstable nuclides while the unstable nuclides with very long half-lives, together with their radioactive progeny, constitute

the natural radioactivity on earth today. To be precise nuclear radiation intensely affects the following environmental elements:

Animals: An exposure to radiation in the wild can lead generations of difficulties throughout an entire ecosystem. Based on the dose of radiation exposures animals can be affected with fetus before birth, of mental retardation, even death.

Plant reproduction: Nuclear radiation can damage reproductive cells of plants and can recess reproduction system.

Liquids: Radiation can cause water, oil and other liquids to go under radiation effects and make these unusable. Even after two years of disaster, radioactive water was found leaking from the Fukushima plant, Japan last year.

Nuclear Radiation's effect on health: For any potential harm from radioactivity, radiation must interact with the cells and tissues of the human body and deliver a dose. In general, radiation might have the following three discrete outcomes:

1. Injured or damaged cells repair themselves, resulting in no residual damage
2. Cells die, much like millions of body cells do every day, being replaced through normal biological processes
3. Cells incorrectly repair themselves, resulting in a biophysical change that can cause defective offspring

Effect of war on environment

War leads to disastrous effects on people and the physical, biological, economic, and social environment. Environmental effects include;

- A. Direct contamination of air, land, and water
- B. Disruption of the infrastructure of society, which, in turn, leads to further environmental damage
- C. Use of non-renewable sources of energy; and
- D. Diversion of resources that might otherwise be used for promoting health and protecting the environment

War has immediate and deadly impact on human life and health. Since at least the time of the Roman Empire, burned earth strategies have been used in war to punish an opponent from gaining a military advantage. These tactics specifically and directly damage the environment, affecting soldiers and civilians alike. In 1937, Nazi forces bombed the city of Guernica in the Basque region of Spain, signalling a modern start to military operations that have increasingly killed and maimed civilians through purposeful targeting. Today, armed conflicts largely consist of the civil wars (conflicts within countries) that continue to occur in many parts of the world. During 2002, for example, 21 major armed conflicts occurred in 19 different locations. During the post-Cold War period of 1990–2001, there were 57 major armed conflicts in 45 locations – all but three of which were civil wars.

Since the 9/11 terrorist attacks on the World Trade Center and the Pentagon, there has been increasing concern in the United States and other countries about *terrorism* which has been defined as “politically motivated violence or the threat of violence, especially against civilians, with the intent to instil fear.” The response of the U.S. Government to these attacks has included a pre-emptive war in Iraq, which has resulted in a huge number of deaths and other adverse consequence; violation of human rights, including torture and other forms of cruel punishment of prisoners; restriction of civil liberties; and an overemphasis on

bioterrorism. War and other military activities also cause serious health consequences through their impact on the physical, biological, economic, and social environments in which people live.

The environmental damage affects people -not only in nations directly engaged in war, but in other- and sometimes all-nations. Much of the injury and mortality during war, especially among civilians, has been the result of damage to or disruption of societal infrastructure, including medical-care facilities and public health services, systems to provide safe food and water supply, power plants and electrical grids, and transportation and communication systems. Destruction of infrastructure has led to food shortages and resultant malnutrition, contamination of food and of drinking water and medical-care and public-health deficiencies and resultant disease. Training for war also can adversely affect human health. Some of the impacts are direct, such as injuries and deaths during training exercises; others are indirect.

Damage to the physical environment – water, land, air, and outer space-and use of non-renewable resources may result from war or preparation for war. Lakes, rivers, streams and aquifers, land masses, and the atmosphere may be polluted through testing and use of weaponry. Outer space may be damaged through placement of weapons. Non-renewable resources may be used in weapons production, testing, and use. Governmental and societal preoccupation with preparation for wars -often known as “militarism” -may lead to massive diversion and subversion of efforts to promote human welfare. Many developing countries spend substantially more on military expenditures than on health-related expenditures; for example, in 1990, Ethiopia spent \$16 per capita for military expenditures and only \$1 per capita for health, and Sudan spent \$25 per capita for military expenditures and only \$1 per capita for

health. The social environment may be affected by increasing militarism, by encouragement of violence as a means of settling disputes, and by infringement on civil rights and civil liberties.

The biological environment may be disturbed in many ways as a result of weapons technologies. Nuclear weapons production, testing, use, and disposal may release ionizing radiation; shells hard-bitten with depleted uranium also release ionizing radiation. Conventional and chemical weapons may release toxic substances during production, testing, use, and disposal.

War and Environmental Consequences

Nuclear Weapons: Nuclear weapons pose a unique threat to humans and the environment and an assessment of the potential human health and environmental impacts of such weapons can serve as a good example of the type of assessment necessary to understand the effects of any weapon system. Nuclear weapons have been increasingly widespread since their development in the 1940s. There are approximately 20,000 nuclear warheads in at least eight nations—the United States, Russia, the United Kingdom, France, China, Israel, India, Pakistan and North Korea. The detonation of nuclear bombs over Hiroshima and Nagasaki in August 1945 during World War II led to the immediate deaths of approximately 200,000 people, primarily civilians, as well as lasting injury and later death of many others and massive devastation and widespread radioactive contamination of the environment in these two cities.

Additional widespread health and environmental effects of nuclear-weapons production include massive contamination of land by radioactive materials and toxic chemicals. Radioactive material releases from the Mayak nuclear weapons facility in Russia contaminated the region surrounding the Techa River and

led to an additional risk of leukemias. The health effects of these abnormalities are uncertain. Impacts are not limited to human health, as the physical environment is also affected by nuclear weapons production. From 1945 to 1990, the United States produced approximately 70,000 nuclear weapons; other nations produced many additional nuclear weapons. Production of nuclear weapons has led to major environmental contamination. For example, the area around Chelyabinsk in Russia has been heavily contaminated with radioactive materials from the nuclear-weapons production facility in that area. Leakage of radioactive materials from storage of wastes from nuclear-weapons production at Hanford, Washington, along the Columbia River, has led to extensive radioactive contamination. Open-air testing of nuclear weapons by the United States, the Soviet Union, and other countries in the 1950s and early 1960s resulted in environmental contamination, with increased rates of leukemia and other cancers among populations who were downwind from these tests.

Conventional Weapons: Conventional weapons consist of explosives, incendiaries, and weapons of various sizes, ranging from small arms and light weapons to heavy artillery and bombs. These weapons, the most widely used in conflicts, have accounted for the overwhelming majority of adverse environmental consequences due to war. During World War II, for example, extensive carpet bombing of cities in Europe and Japan accounted not only for many deaths and injuries, but also widespread devastation of urban environments. As another example, the more than 600 oil fires in Kuwait during the Persian Gulf War accounted for widespread environmental devastation as well as acute, and possibly chronic, respiratory ailments among people who were exposed to the smoke from these fires.

Chemicals: A variety of chemical weapons and related materials have the potential for contaminating the environment during war and the preparation for war. The potential for exposure exists not only for military and civilian populations who may be exposed during the use of chemical weapons in wartime, but also for workers involved in the development, production, transport, and storage of these weapons and community residents living near facilities where these weapons are developed, produced, transported, and stored. In addition, disposal of these weapons, including their disassembly and incineration can be hazardous. During the Vietnam War, the United States military used defoliants on mangrove forests and other vegetation, which not only defoliated and killed trees and other plants but may also have led to excessive numbers of birth defects and cases of cancer among nearby residents in Vietnam. In addition, development and production of conventional weapons involve the use of many chemicals that are toxic and can contaminate the environment.

Antipersonnel Landmines: There are now approximately 80 million landmines still deployed worldwide in approximately 78 countries. These landmines have been termed “weapons of mass destruction, one person at a time.” They have often been placed in rural areas, posing a threat to residents of these areas and often disrupting farming and other activities. Civilians are the most likely to be injured or killed by landmines, which continue to injure and kill 15,000–20,000 people annually. Since the entry into force of the Anti-Personnel Landmine Convention (Mine Ban Treaty) in 1997, production of landmines has been markedly reduced and many of those that had been implanted have been removed.