

THIRD WORLD PERSPECTIVE ON GLOBAL COMMONS: A FOCUS ON BIODIVERSITY

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Certificate

This is to certify that the dissertation, "Third World Perspective on Global Commons : A Focus on Biodiversity", submitted by Mr. KAILASH CHANDRA MISHRA, is partial fulfilment of the requirements for the award of the degree of Master of Philosophy. It has not been previously submitted for any other degree of this or any other University and it is his own work.

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PREFACE

The equation in international power politics are mirrored in the diversity of perceptions which constitute the global perspective on the common heritage of mankind, in this case such resources as the seabed, outer space Atmosphere, Antarctica and biodiversity have got significance. The blanket term "environment" encompasses may be used for all the above. But the present study has focused on biodiversity and its importance as a global commons, because of its immense significance for human beings. But in many parts of the earth it has been severely threatened by human activities. And there is a conflict between developed and developing countries regarding its conservation. It is in this context study of biodiversity has acquired so much significance in contemporary global environmental policies. Though there has been vast amount of literature on the issue of biodiversity loss and conservation, a systematic study on the dynamics of biodiversity is lacking. This study seeks to examine the significance of biodiversity at international as well as national level.

Methodology:

Apropos methodology, extensive use of the secondary source materials have been made which include literature on the subject, articles in journals and periodicals devoted to the relevant themes. Apart from these primary sources like testimonics and statements of various leaders at UN and

other international conventions have been given due importance. Besides these published documents have also been used.

Objectives:

1. The main objective is to examine the existing relationship between the developing and the developed nations as regards the issue of global commons in general and biodiversity in particular.
2. The overall examination of biodiversity as a global commons and its present scinario.
3. To examine the on going controversy as regards the biodiversity and the parameters of negotiation between the north and the South.
4. To examine the threats to India's enrich biodiversity and measures to conserve it.

Chapterization: So far as the chapters are concerned, chapter I is concerned with introtuction of all global commons. In which we have given a brief analysis of all global commons with their future importance. Chapter II examine all aspects related to biodiversity, viz., value, typology, processes, forces behind extinction of species, significance of extinction, its conservation and the role of indigenous people in its conservation. Chapter III deals with biodiversity convention and politics within. There are

sharp difference between opinions of developed and developing nations on biodiversity conservation and making it a genuine global commons. A new perspective has been taken of the major issue which is bone of contention between north and South i.e. technology transfer and financial aid to developing countries for biodiversity conservation. Chapter IV is devoted to the India's situation on biodiversity. We have discussed here every aspect relating to India's biodiversity. Finally, Chapter V which constitute the concluding part of the study, arguments have been put forward to go beyond the paradigms of biodiversity convention. Instead of controlling the process of extinction of species, the biodiversity convention has got embroiled in politics between North and South. Need of the hour is to challenge the western hegemony on technology and financial management, and It is existential imperative to conserve the steadily depleting biodiversity in developing countries.

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CHAPTER - I

INTRODUCTION

With the advancement of science and technology the traditional concept of sovereign nation-state is taking new dimension. The West Phalian system of sovereign nation inherited since 1648 has no relevance to the modern world of interdependence. The concept of sovereignty as existed before has been pluralised because of the emergence of various governmental and nongovernmental international entities. National territorial boundaries have extended deep into the sea, the air space and outer space above and farther continent of Antarctica.

"Global Commons" have been evolved as a result of human greed and wants. The concept of global Commons is gradually being accepted as a subject of international public policy. Legal principles from the Law of sea, like the deep sea bed and the vast stretch of high sea, Antarctica, Atmosphere and outer space have been accepted as the common heritage of mankind. The need of the hour is an optimum utilization of the world's living and nonliving resources. The threat to mankind and his very existence is at stake. Problems such as radioactive dumping into the sea, carriage of highly noxious substances, transboundary movement of hazardous wastes,

depletion of the ozone layer and global warming are some of the common hazard faced by developed and developing countries alike. A crisis management situation has arisen. Multilateral and regional efforts are needed to chalk out a common strategy for abatement of these ills. International cooperation among states cutting a cross barriers of ideology and economic systems is needed to preserve there global commons. But competition and non-cooperation remains facts of international relations. It has become evident that "the more advanced industrial societies have the power to exploit the international commons to the point of severe depletion of many critical resources. Some forms of international cooperation in protection of the global common's may be the ultimate requirement of human survival. As more is learned about geosphere-biosphere interaction, the need for concerted international cooperation becomes ever more evident."¹

ATMOSPHERE: "Untile the advent of large scale aeronautical technology air space was essentially beyond political control".² Today atmospheric commons' is a preserve which is fast depleting. The developed and developing world have

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1. L.K. Caldwell, International Environmental Policy : Emergence and Dimensions; 1991, (East-West Press, New Delhi), p.258.
 2. F.K. Here, The Restless Atmosphere; 1978 (New York; Harper and Row), p.119.

contributed equally to its degeneration. The major concerns of atmospheric pollutions are ozone depletion, acid precipitation, green house effect (global warming) and transboundary air pollution. The release of chlorofluoro carbons (CFCs) which are used in refrigeration system and as propellants in household aerosols find their ways in the upper atmospheric layer. They chemically react with the ozone layer and deplete it. The ozone layer acts as a protective shield against ultraviolet radiation reaching the earth surface. Scientific evidence has gone to prove that the growing incidence of skin cancer is due to the exposure to ultraviolet radiation. The use of refrigerator is no more a luxury item. Alternatives to CFCs have been found but they are patented by multinationals like Dupont and others. International effort by UNEP and by other international organization is continuing to gradually phaseout the use of CFCs. The Vienna Convention for the protection of the Ozone layer 1985, and the Montreal Protocol signed in this regard provide for exchange of information monitoring and research. By and large the Helsinki Declaration on the protection of the ozone layer, 1989 which calls for a total phaseout of production and consumption of CFCs by the year 2000 is the most comprehensive treaty for protection of the ozone layer.

Similarly the International Treaty on Long Range Transboundary Air Pollution, 1983 sponsored by the EEC provides

for exchange of information notification consultation for abatement of air pollution cost by noxious gases. The growing incidence of CO₂ gas has been responsible for the 'green house effect'. Increasing human activities burning of wood use and thermal energy have led to this greenhouse effect. The dangers of this effect are unusual rise in global temperature, the rising of the sea level due to melting of ice caps and destruction of various life forms and genetic varieties. Scientist says if international efforts are not immediately --forthcoming countries like Bangladesh and Maldives, will be wiped off the World map.

Western industrialised nations face an acute problem of atmospheric acidic rain. The growing incidence of vehicular pollution especially nitrogen oxides, Sulphur dioxide emitted from coal fired electric power plants combine with natural rainfall and come down as sulphuric and nitric acid. Transboundary pollution by acidic rain is on the increase.

One needs to understand the scientific nature of air to solve the problem of atmospheric pollution. Ecological imbalances are created due to deforestation, overgrazing, ensuing desertification and destruction of fauna and flora. The possible effects of the above mentioned are global climate change. There is a growing international opinion that climate is also a global commons. "Because the

deliberate modification of climate could be far more serious. But there are other causes for concern, especially the inadvertent modification of the atmosphere and weather for example, by dust and gaseous emission"³

OUTER SPACE:

A necessary fallout of advancement of science and technology was space adventurism. During the pre cold war era the international community especially the developing world, were wary of super power space dominance. Their concerns were codified when the United Nation's General Assembly adopted the declaration of the Legal Principles governing Activities of States in the Exploitation and Use of Outer Space (Resolution 1962, Dec. 1963), and the United Nation Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer space including the Moon and other Celestial Bodies (1967). The essential principles of these two are non militarisation, non exploration except for scientific experimentation, non appropriation, non-nuclearisation and use of outer space, moon and other celestial bodies, for peaceful purposes and benefit of mankind. The use of satellites for telecommunication, remote sensing, satellite imagery and

3. T.L. Pewe, ed., Desert Dust, Origin Characteristics and Effect on Man; Special paper No 186, (Boulder, colo. : Geological Society of America, 1981).

some of the positive contribution of scientific experimentation in outer space. "Issues of satellite broadcasting and remote sensing surveillance were among those raised in the general debate with the positions of the delegations following the customary North-South divisions."⁴ At the height of the cold war era the spectre of star war's programme in outer space is no more a reality.

The outer space is still a virgin land, totally unexplored. Science can often create dissent among the underprivileged. The developing world without the necessary scientific know how can not aspire to capture the outer space. It is through United Nations programmes like the UNISPACE' 1982 that some parity has been restored between the developed and developing countries.

THE OCEAN: HIGH SEAS AND DEEP SEA BED:

The oceans from time immemorial have been the major life support systems of our planet. Marine flora and fauna has a close ecological link with human society. With the growth of science and technology the quest for exploring the ocean got a new fillip. The oceans' commons consists of the deep sea,

4. Report of the Second United Nations Conference on the Exploration and Peaceful Uses of outer Space, Vienna, 9-21 August 1982, A/CONF. 101/10 (New York : UN 1982).

the high sea and general marine environment. The oceans' as commons has been a part of traditional law of sea. The rights of navigation, fishing and other related interests have been there from the time of the Romans.

The Area of 'deep sea bed' is said to be rich in phosphatic nodules, Cobalt, Copper and manganese. The continuing exploitation of mineral resource on land led to their exhaustion and other avenues have to be searched. The deep sea bed provided such an opportunity. The developed countries with their technology, manpower and resources were ready to begin exploitation. The developing countries strongly objected to this unilateral move. They argued for setting up of an international body which shall be responsible for every mining activity and control economic resource. The general Assembly also declared that "the sea bed must be exploited under an international regime including appropriate machinery". Until such a regime was established it declared a moratorium on all exploitation activities in the sea bed beyond national jurisdiction."⁵

They also asked for cheap transfer of technology and resources. They conceptualised the sea to be a common

5. United Nations General Assembly Resolution 2574D (XXIV).

heritage of mankind. The preservation of such an Area was the common concern of all men. The United Nations Law of sea provided for such a body. United Nations General assembly in 1970 unanimously adopted a declaration of Principles Governing the sea bed and ocean Floor which said that the sea bed beyond national jurisdiction was not subject to national sovereignty but was the "common heritage of mankind" and that it must be "exploited for the benefits of mankind as a whold, and taking into perticular Consideration to the interests and needs of the developing countries."⁶ The developed countries went ahead by creating a Mini regime for exploitation of mineral resources, with the coming into effect of UN law of sca 1982, on 16 nov. 1994, will bring in the necessary changes as argued by the developing world. Because most of the developing countries have been insisting that the sea bed should be exploited exclusively by an international authority governed by all state, voting equally, with all the resources going to international development.

The 'High Seas' are those water areas which do not fall within the definition of territorial sea, exclusive economic zone, continental shelf and inland lakes. Hence high seas do not fall within the national jurisdiction of any state. The

6. United Nations General Assembly Resolution 2749 (XXV).

high seas have become the dumping ground of the world. They are rich in marine organism. Various international instruments have been signed and ratified for preserving a clean marine environment. The convention on Intervention in the High seas 1958. UN Law of Sea 1982 give the high seas the status of protected zones. As regard general marine environment various instrument have been drafted by Maritime Organization, UNEP and UNESCO. The Convention on International Marine Pollution 1983, the London dumping convention 1972 and the international Whaling commission have framed detailed rules and regulations for protection of marine environment. Marine pollution is on the top most agenda of all international environmental organization. The preservation of a fragile marine environment is an obligation of all states. "Because the sea is the ultimate sink for planetary wastes, the vast increase in human activities upon and around it, and the resulting pollution, are a matter of international concern."⁷

ANTARCTICA:

"Because of their remoteness from populous centres and the severity of their climates, the polar regimes of the

7. J. Barros and D.M. Johnston, The International Law of Pollution; (New York : The Free Press, 1974), p.240.

earth present unique problems of international environmental policy."⁸ Antarctica, the southern most continent of this planet is a vast and fascinating storehouse of information. It stretches from the tip of Latin America to southern Australia.

The physical factors have made this continent advance to exploration and occupation, and until recently the territorial claims of nations upon the continent were largely symbolic. Although the Antarctic continent is believed to contain significant mineral deposits, and the waters of the Antarctic have abundant marine life, the principal importance of Antarctica to modern society has been through the opportunities for scientific observation and research.

The first international environmental policy for Antarctica began with the International Geophysical year 1957-58. There after the international community came together to sign the Antarctic Treaty, 1959. The Arctic Water Pollution Act, 1970 was the unilateral piece of legislation by Canada for preserving its surrounding environment. The other conventions with regard to Antarctica are the convention of Antarctic seals 1972, and the convention on the

8. J.D. Myhre, The Antarctic Treaty System : Politics, Law and Diplomacy. (Boulder, Colo. : West-View Press, 1986).

conservation of Antarctic Marine Living Resources 1982. Some committees and commissions on Antarctica are also important i.e. the scientific committee on Antarctic Research(SCAR), the Scientific Committee on Oceanic Research (SCOR), FAO, and the Intergovernmental oceanographic commission to organized an international cooperative research program under the title of BIOMASS (Biological investigation of Marine and Antarctic System and Stocks). "The principal objective of this undertaking is a study of the structure and dynamics of the antarctic and marine ecosystems. Particular emphasis upon krill, as a key factors in the Antarctic fishery and the food Chain of Antarctic animals."⁸ BIOMASS is also planning to study other living organisms of the Antarctic ocean including seaweeds, birds, fish, Squid, seals and whales.

The basic principles of the above mentioned conventions are non-militarisation, non-nuclearisation, appropriation based on equitable basis provided the ecosystem is not disturbed and the scientific observation and research for the benefits of mankind. In 1981 the developed world set up a mini regime for mineral exploitation. This came as a non starter because of heavy opposition from the developing

9. D.L. Aluerson., "Tng-of-war for the Antarctic Krill", Ocean Development and International Law, vol.8, No.2 (1980): p.175.

world, and lack of scientific knowledge regarding location of minerals.

Antarctica with its clean pristine environment offers to the world a variety of living and non living items but above all an opportunity to save this last remaining pure and clean environment. "On 2 June 1988 at Wellington, Newzealand, representatives of nineteen Ataractic Treaty consultative Parties, and of thirteen contracting (nonparty) states adoped a convention on the Regulation of Antarctic Mineral Resource Activities. This agreement would in effect legalize development activities in Antarctica and making it a scientific reserve"¹⁰ Though two consultative party members: Australia and France rejected this convention, yet this was a step forward to protect the environment of Antarctica with appropriate legal instruments.

BIODIVERSITY: Biodiversity simply means the immense variety in form of life on the earth. Scientist consider this mindboggling variety to be a precious natural resources which must not be lost.

As per current international situation the gene bank are being considered a part, of global commons. The politics

10. L.K. Caldwell, International Environmental Policy : Emergence and Dimensions; 1991, (East-West Press, New Delhi), p.300.

of the developed world, which has lost totally their gene banks in both flora's and fauna's responsible for having a biodiverse system is to have a convention by which the forests, the storehouse of these genes, mostly available now in India, Brazil and China, should be governed by a international body instead of national governments and their policies. This way the forests, now one of the greatest link in the age of global green house, could be preserved.

Developing countries would not consider it a global commons because on one hand they would loose control over their own natural resources and on the other hand they are not being provided with sufficient finance to find alternate ways to fulfill their emerging needs by saving forests. But the contemporary environmental consideration has compelled the developing countries to think over their present stand on biodiversity. The later chapters deal in detail about many aspects of biodiversity.

Thus international (global) commons are the proving ground for testing humanity's belief about its relationships with the earth and the biosphere. It nations cannot cooperate effectively in areas belonging to none of them, if they cannot refrain from predatory extensions of national economic and military ambitions into the common spaces, it is difficult to see how they will fulfill environmental

commitments already made in which economic and ideological interests are in conflict. "The call by the president of the United States on 11 May 1990 to plant the American flag on Mars by the year 2018 reveals a mind-set that does not augur well for commitments on behalf of planet earth."¹¹ Finally, in a world in which not all things are possible, some fundamental choices must be made soon. These choices will inevitably shape the future of humanity on earth.

11. Washington Post (12 May 1990), A6, and Weekly compilation of Presidential Documents, vol.26, No.10, pp.381-82 and vol.26, No.20, pp.748-49.

CHAPTER - II

Biodiversity : An Overview

Biodiversity is the new international buzzword in the environmental jargon which has not attracted as much attention as global warming and ozone depletion. But it has certainly catapulted the centre-stage of world-wide environmental politics in the last few years.

The most important definition of biodiversity is as, "Biodiversity is the variety of the world's organisms, including their genetic diversity and the assemblages they form. It is the blanket term for national biological wealth that undergirds human life and well being. The breadth of the concept reflects the interrelatedness of genes, the components of species and ecosystems. Because genes, the components of species and species are the components of ecosystems, altering the making up of any level of this hierarchy can change the others.....species are central to the concept of biodiversity."¹

Another definition is as, "biodiversity is the array of populations and species of other organisms with which Homo

1. W.V. Reid and K.R. Miller, Keeping Options Alive : The Scientific Basis for Conserving Biodiversity, World Resource Institute, Washington, DC, 1989, p.2.

sapiens share Earth and the communities, ecosystems, and land scapes of which they are component parts."²

On the basis of above definitions it can be understood that biodiversity is the variety of biological entities inhabiting the earth wild plants, animals, micro-organisms, domesticated animals and cultivated plants and even genetic materials like seeds and germplants. It is that vast class of things from which comes most of our food and medicine, much of our clothing and housing, most of our cultural heritage and much of our intellectual and spiritual learning. It is, without any doubt the very basis of our living.

But unfortunately this life-support system is facing the greatest threat today. Habitat destruction, hunting, pollution, displacement by exotics, and a host of other human made forces have already pushed thousands of species and varieties into the threshold of extinction, with many more following day by day. Of the five to fifty million species cohabiting the earth with humans, one to ten million may be lost forever within the next two to three decades. It represents an unprecedented erosion in humanity's food, medicinal, economic and cultural resource

2. E.O. Wilson, "The Current State of Biodiversity", Biodiversity, ed. E. Wilson, National Academy Press, Washington, DC, 1988, pp.3-18.

base over centuries, knowledge and materials from wild plants and animals have revolutionalised agriculture, industry, medicine and other fields of human endeavour. "Agriculture provides 32 per cent of the gross domestic product in low income countries and fisheries contribute about 100 million tons of food worldwide. Three out of every four person on earth depend on traditional medicine, most of which are derived from plants and animals. Even in that most synthesised of societies, the US, about 4.5 per cent of GDP is made up of economic benefits derived from wild species and one fourth of all medicines contain active ingredients from plants."³

The Value of Biodiversity As a Resource:

Biodiversity, the vast array of non-human organisms of our planet, should be valued for four general reasons. First we believe that, as the dominant species on Earth, Homo sapiens has an ethical, stewardship responsibility towards humanity's only known living companions in the universe. Second, as attested to by activities as diverse as gardening, making of nature films, and ecotourism, biodiversity has aesthetic values. Third, humanity has derived many direct economic values from biodiversity, including all of its food and many of its medicine and

3. Ashish Kothari, "The Biodiversity Convention : An Indian View point", Economic and Political Weekly, June, 1992, p.9.

industrial products. The potential of nature's genetic library for providing more of these benefits is enormous. Fourth, and most important from an anthropocentric perspective, plants, animals, and micro-organisms help to supply human beings with an array of free ecosystem services, without which civilization could not persist. These include such things as controlling the gaseous mix of the atmosphere, generating and maintaining soils, controlling pests, and running biochemical cycles. The present extinction episode caused by human activity seriously jeopardizes the ethical, aesthetic, direct economic and life-support values of biodiversity; it may be the single most important externality associated with human economic activity.

Economists and ecologists agree that biodiversity has value to humanity, although whether it has value independent of human needs is less clear. Both groups also agree that the value of biodiversity to humanity has both use and non-use components. Biodiversity can be important because it supplies us with food, direct enjoyment, or ecosystem services: all use values. It also provides non-use value, especially so-called existence values. We can conveniently divide these values into four categories: ethical; aesthetic; direct economic; and indirect economic.

The ethical values of biodiversity are based on the

religions or quasi-religions feelings of many people in many cultures that other life forms have intrinsic value and deserve some degree of protection from destruction by humanity. These views differ from society to society and are not applied equally to all organisms. Buddha questioned whether human beings have a right to kill other animals at all. A religions Buddhist may strive to avoid stepping on ants when he walks, since he considers all life sacred. There has been a historic precedent for extending the notion of rights to include animals other than human beings. Many biologists and environmentalists are of the opinion that, "as the dominant species on the planet, Homo sapiens has an ethical responsibility to preserve biodiversity. This means opposing intentional exterminations of other species and supporting conservation efforts."⁴ one cannot assert this ethical responsibility on scientific grounds. It clearly arises from essentially religious feelings; we believe that our only known living companions in the universe have a right to exist. We suspect that the basic problem of conserving biodiversity is not likely to be solved until and unless a much larger proportion of the human population comes to share this view.

The aesthetic values of biodiversity in terms of the

4. P.R. Ehrlich and A.H. Ehrlick, "The value of Biodiversity", AMBIQ, vol.21, no.2, May 1992, p.220.

deauty of birds, tropical fishes, butterflies, and flowering plants are widely acknowledged. They support extensive economic activity including birdwatching and feeding, scuba diving, butterfly collecting, photography, and the making of nature films. But many less familiar organisms have a little-appreciated beauty. The algae known as diatoms have glass like shells that are as exquisite and varied as snowflakes. Thus, all organisms at least exhibit the beauty of design. Some insects show a degree of sophisticated miniaturization as yet unapproached by human engineers. They also exhibit complicated behaviours and intricate relationships with other organisms. In fact insects display the kind of beauty, intricacy, and diversity that captivates gun collectors, airplane and railroad buffs, philatelists, computer hackers, bibliophiles and so on. So even if insects didn't play critical roles in the ecosystems that support humanity, to the degree that we lose their diversity, the world becomes a less interesting place. Each species of bug is, as the great French authropologist claude Levi Strauss Wrote, "an irreplaceable treasure, equal to the works of art which we religiously presence in museums."⁵

Natural ecosystem, of course, also directly provides people with food and innumerable materials of all sorts,

5. Discussion of the Special Commission on Internal Pollution, London, October, 1975.

from maple syrup and truffles to teak. Most notably, a crucial portion of the protein in our diets comes straight from nature in the form of fishes and animals harvested from the seas. This service is provided by the oceans in conjunction with coastal wet land habitats, which serve as crucial nurseries for marine life that is either harvested directly or serves as a food supply for sea life that we eat.

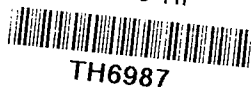
The timber and other wood products that we harvest from forests are also provided free by natural ecosystems. Rubber, many kinds of oils and organic chemicals, species and herbs, wild berries and game are provided by natural ecosystems.

Natural ecosystems maintain a vast genetic library from which Homo sapiens has already withdrawn the very basis of civilization and which promises future benefits. "That library of millions of different species and billions of genetically distinct populations is what biologists are referring to when they speak of biotic diversity, or biodiversity. All crops and all domestic animals, of course, originated from that library."⁶

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6. P.R. Ehrlich and A.H. Ehrlich, "The Value of Biodiversity", AMBIQ, vol.21, no.3, May 1992, p.220.

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Wild plants and animals could be sources of new foods to augment the human food supply. Which have shifted to the big three (Wheat, rice and maize) and other widely grown and improved crops at the expense of many traditional varieties and species. The narrowing down of the genetic base of major crops is a serious concern that has been addressed. But the neglect of potential food plants that have never been domesticated and of many traditional foods in tropical regions is also a serious matter; as the tropical forests, the prime potential source of new foods, drugs, and other useful materials are vanishing at an accelerating pace. Furthermore, the tropical regions where such new foods might be found are the regions where people are hungriest and very much in need of new food resources. As two Scholars put it.

"Species of habitat offer the Substantial products of biological evolution. Species provides direct use values as materials for food, clothing and shelter, and as feedstocks for medicines, genetic research and crossbreeding to improve crop characteristics. Biodiversity also produces amenity and existence values."⁷

Overtime, all these values from biodiversity are likely to be strong "growth industries." With the help of modern

7. J.A. Sweeney and Paulette I. Olson, "The Economics of Biodiversity Lives and Life Styles", Journal of Economic Issues, vol.26, no.1, March 1992, p.2.

computer and other informations technologies, genetic and related sciences offer tremendous, almost unimaginable potential for creating values from biodiversity.

Humanity, of course, is dependent for its very existence on other organisms. These organisms in all their extraordinary variety are part and parcel of a global life-support system that benefits them and humanity as well. Perhaps the most basic dependence of humanity on other organisms is through the process of photosynthesis. That is the process through which green plants, algae, and some microorganisms bind solar energy into chemical bonds of carbohydrate molecules (sugars, starches, cellulose). That chemical energy can be used to drive the life processes of organisms, mostly by combining it with oxygen in a slow burning process known as cellular respiration. Human beings must obtain their energy from photosynthesizers, either by eating them or by eating other animals.

Members of biological communities, "the collection of organisms living in an area interact continuously with their non-living surroundings, and the interacting complexes are what biologists call ecosystems. Every kind of organisms exchange gases with its physical environment."⁸

8. P.R. Ehrlich and A.H. Ehrlich, "The value of Biodiversity", *AMBIO*, vol.21, no.3, May 1992, p.220.

Rooted plants remove a steady stream of water from the soil and release it into the atmosphere as water vapour. Plants also help to break apart rocks and form soil, and change patterns of low-level winds. Various organisms especially bacteria, help run vast chemical cycles in which elements such as carbon nitrogen, sulfur, and phosphorus circulate on a global scale.

Because of the crucial importance of interactions between living and non-living portions of the biosphere, they can be viewed as two components of a single worldwide ecosystems. That is why ecologists consider the entire biosphere to be an ecosystem.

Two kinds of ecosystems are crucial to the functioning of human society today. "The first kind is agricultural ecosystems, whose importance to society is obvious. Basically, they are simplified versions of natural ecosystems, antificially maintained by humanity to increase the production of commodities that people need and desire. The importance of natural ecosystems is which less widely appreciated, but society depends upon them every bit as much as it depends on agricultural ecosystems."⁹ This is true because agricultural ecosystems are embedded in natural ones and depend on the natural components for their sustained productivity.

9. Ibid. p.221.

Other values from biodiversity include ecosystems life-support services, from watershed maintenance to rainfall to clean air to temperature moderation to healthy soils. Generally a more diverse ecosystem is more stable and, in ecosystem services more productive. Overtime, the preservation of biodiversity will provide the genetic, biological and ecosystem feedstock for solution to all sorts of an yet unposed human problems. In-short, there are plenty of anthropocentric values to be realised from protecting biodiversity.

Therefore, on the basis of above discussion we can say that biodiversity is a resource for which there is absolutely no substitute; its loss is irreversible on any time scale of interest to society. The loss can be viewed as one of the most single serious externality associated with human economic activity.

Concepts of Biodiversity: Preserving biodiversity is regarded as one of the major issues for enabling sustainable use of natural resources. The major features of diversity are species diversity, genetic diversity, functional diversity and spatial and temporal diversity. Biodiversity is seen as an interdependent parts of a cluster of diversities in the human society and in the ecological systems.

"All self-organising living systems require a minimum

diversity of species to capture the solar energy and develop the cyclic relations between the fundamental components of the system; the producers, the consumers and the decomposers."¹⁰

The concept of biodiversity is complex, sometimes confusing and beyond full comprehension. We emphasize the importance of recognizing that there exist several interdependent diversities at different hierarchical levels in the ecological systems.

1. "The species diversity of an ecosystem is often related to the amount of living and non-living organic matter present."¹¹ "Positive correlation between energy flow, biomass production, and species abundance have been recorded."¹²

It appears, however, that species diversity depends less on the characteristics of a single ecosystem than on interaction between ecosystem, e.g. transport, passive or active, of living animals across the land-Water interface or the coastal offshore boundary.

10. M.Hanner, A. Jansson and B-owe Jansson, "Diversity Change and Sustainability : Implications for Fisheries", AMBIO, vol.22, no.2-3, May 1993, p.97.

11. Ibid., p.97.

12. Ibid., p.97.

2. The effect of such transport is an important "information" exchange enhancing the "genetic diversity". The genetic diversity of various population of offshore fish and crustacean species on specific coastal nursery areas is essential since estuaries and inshore areas constitute crucial parts of their life support system by providing nursing grounds for feeding areas.
3. Functional diversity is a property at the population level where as species diversity exist. It denotes the variety of responses to environmental change by organisms, especially the diverse space and time scales to which organisms react to each other and the environment is a property of the ecosystem. The functional diversity concept is more strongly related to ecosystem stability and stresses physical forces for determining population densities, such as the water effects of water movement and a proper timing on larval recruitment in marine environment.
4. The functional diversity is enhanced by the topography of an area as well as the occurrence of varied geological, climate and meterological features giving rise to a spatial and temporal diversity. It directs the distribution of living organisms. A high spatial diversity provides niches for a larger number of

species than monotonous environment. There exist a high functional diversity in coastal ecosystems because of complex interaction of shortwave and long wave pulses. However, very strong physical forces like ice-cover and winds may counteract the establishment of a diverse flora and fauna as is the case is the northern part of the Baltic Sea.

Population Depletion (Species extinction): In the past decade a great deal of attention has been focused on the problems of protecting endangered species. Leading Biologist, Economist and others do reasonably conclude that conserving earth species diversity is the crucial task before us. But the loss of species is only one aspect of the extinction crisis, and in many parts of the world may not be the most important facet of the decay of biological diversity.

"A species cannot go extinct unless all of its population are extinct and the extinction of component populations influences the probability of the entire species disappearing. Similarly the loss of population and species cannot be separated from the degradation of the higher order units."¹³

The vulnerability of a species to extinction may be

13. P.R. Ehrlich and G.C. Daily, "Population Extinction and Saving Biodiversity", *AMBIO*, vol.22, no.2-3, May, 1993, p.64.

difficult to assess from the number and sizes of its populations. For example, a species may suffer the loss of a great many of its components populations without itself becoming threatened. This is the case of bay checkerspot butterfly, which appears globally secure even though its San Francisco Bay area subspecies is threatened with extirpation. In other case, however, "reduction in number and sizes of population may doom a species to extinction long before it becomes scarce in nature, as was true for the passenger pigeon."¹⁴

Rates of Population Loss: In many parts of the world the extinction of population, rather than of species, may be the most important facet of the decay of biological diversity. Therefore, consideration only of species extinction may greatly underestimate the rate of loss of organic diversity as a whole. Although the rates of population and species extinction are related; at the moment it appears that extinction of animal populations are more frequent in proportion to species extinction in temperate and polar regions than they are in the tropics. The average extra-tropical species could suffer many more population extinction before becoming threatened globally than could the average tropical species. This would account for the relatively few species that have been observed to become

14. D.E. Blockstein and H.B. Tordoff, "Gone Forever: A contemporary look at the extinction of the passenger pigeon", Amer. Bird, 1985, vol.39, p.848.

extinct in temperate-zone mainlands. "Even after losing a substantial fraction of their population organisms like gray wolf, the brow bear and the Machaon Swallowtail are in no danger of species extinction at present. Much attention in developed nations is focussed on the disappearance of entire species, especially those living in distant tropical rainforests. Meanwhile, population extinction are usually ignored in those same nations where they are the most serious, causing the erosion of biodiversity."¹⁵

If species alone are considered, the rate of loss of diversity in the temperate zones may seem no cause for alarm. On the other hand if population extinction are considered, than an entirely different picture emerges. For example, the history of butterfly fauna of Great Britain is the best single group of animals to be used as indicators of ecosystem health.

A strong concensus of biologist opinion believe a mass extinction of species is underway. It has been calculated that we are losing at least 27,000 species per year in tropical forests alone. "Biodiversity is being reduced in other biomes as well, notably coral reefs, wet lands, islands and montane environments. These areas put together

15. P. Ehrlich, D. Dobkin and D. Wheye, Birds in Jeopardy : The Imperiled and Extinct Birds of the United States and Canada Including Hawai and Puerto Rico, Stanford University Press, Stanford, CA, 1992, p.113.

do not remotely match tropical forests in terms of numbers of species disappearing. but they push the current extinction total beyond 30,000 species per year. This contrasts with the natural rate of extinctions before the advent of the human era, reckoned to be an average of one species every 4 years or so."¹⁶ So the present rate is at least 1,20000 times higher. In the future, and in the absence of greatly expanded conservation efforts, a number of independent analyses propose that we face the prospect of losing 20% of all species within 30 years and 50% or more by the end of next century. All these estimates are explicitly conservative.

The disappearance of many important species has been noticed. The disappearance of lion and European bison populations from Europe was recorded. "Much of the Europe is now biologically fragile; the trend that began with the biological destruction of the Mediterranean basin in ancient times is continuing today."¹⁷ Much of temperate Asia, especially China, is in even worse condition.,

The avifauna serves as a sort of "miner's canary."
Signalling the habitates in both temperate North America

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16. D.M. Raup, "Extinction : Bad genes or Bad Luck"? Palaeobiology, vol.17, 1991, p.37.
 17. J.D. Hughes, Ecology of Ancient civilization, University of New Maxico Press, Albuquerque, 1975, p.43.

itself and in central and South American breeding grounds. The story is one of populations largely in decline. "Physical habitate destruction and modification is a prime factor in the decline of roughly 80% of the some 150 avian species and sub-species recognized as imperiled and is involved to one degree or another in the declines of about 90% of those and numerous other species not yet registered as imperiled."¹⁸

Species are being eliminated today almost entirely through the direct effects of human activities. But, in future, many species could be made extinct through impacts of more indirect sort. Already "human engage in so much exploitation, diversion, waste and other significant misuse of plant growth that they are effectively appropriating 40% of all such growth on land each year leaving 60% for the millions of other species."¹⁹ What will happen when human number double as is projected within another few decades? Even if this means that human impact an plant growth merely doubles, it is likely to be more as people demand more products from plants, the reminder of Earth's species could hardly survive with only 20% of plant growth per year.

18. See P. Ehrlich, D. Dobkin and D. Wheye, p.113.

19. P.M. vitousek, P.R. Ehrlich, A.H. Ehrlich and P.M. Matson, "Human appropriation of the Products of Photosynthesis", Bioscience, vol.36, 1986, p.369.

The Driving Force Behind Diversity Loss: The forces behind diversity loss can be divided into two parts. These are proximate and underlying causes. The proximate causes lying partly within the domain of ecology and the other biological sciences and partly within economics; the underlying causes lying largely within the domain of economics and the other social sciences. The first set of causes includes both the direct extermination of species and the ecosystemic changes that lead to the collapse of species population. The second concerns the factors that lie behind economic activities which lead to species depletion directly or, through the destruction of habitat.

At present ecologists estimate that less than one tenth of 1% of naturally occurring species are directly exploited by humans. It is therefore argued that the major threat to the loss of species is not caused by direct human exploitation of species, but by the habitat alteration and destruction that result from the expansion of human population and human activities. Habitat change by human is caused directly through landuse changes, urbanization, infrastructure development and industrialization, and indirectly through environmental effects caused by the use and extraction of resources from the environment, and the discharge of various wastes to air, soil and water. These include global changes due to fossil fuel burning and the

emission of greenhouse and ozone depleting gases. In all these cases, the alteration of primary productivity, nutrient availability, and hydrological cycles, changes the living conditions of organisms, and hence the composition and size of communities of organisms and thereby, the quantity and quality of the ecological services associated with those communities.

The most frequently cited proximate cause of the destruction of habitat which lies behind biodiversity loss is the growth of human population. The sustainability of the ecological system of which human are parts and welfare depends does not imply a unique equilibrium level of human population or a unique rate of human population growth. However, the resilience of an ecosystem does depend on the level of stress to which it is subjected, and the level of stress is a function of human population density and behaviour. Increasing human population may imply increasing levels of stress and this may in turn imply loss of resilience. The notions of carrying and assimilative capacity are indirect measures of the level of stress that is consistent with a tolerable level of resilience. "Since, for a given technology, human population growth implies an increasing level of stress on the ecosystems exploited under that technology, there is necessarily some point at which the associated loss of ecosystem resilience will become

critical. Human population growth will at some point cause the collapse of those ecosystem".²⁰

The main points here are, first, that "the relationship between population growth in any given environment and the degradation of that environment is not necessarily monotonic. It is mediated by the institutional and economic environments within which resources users operate, and there is no systematic relationship between population growth and either institutional or economic conditions."²¹ This shows that population growth is not always and everywhere environmental damaging. Second, the impact of population growth on resource degradation is highly sensitive to the technology used. Third, the impact of resource degradation on population growth is more complex than a simple Malthusian argument would suggest. "The extreme poverty of resource users in many degraded environments has itself been a spur to fertility growth. It is not, therefore, helpful to treat human population growth as if it were exogenously determined, or to seek to change the fertility rate amongst resource users without addressing the motivation for increasing rates. If we are interested in the prevention of future biodiversity loss it would seem to be most important

20. Charles Perrings, Carl Folk and Karl-Goran Maler, "The Ecology and Economics of Biodiversity Loss : The Research Agenda", *AMBIQ*, vol.21, no.3, May 1992, p.205.

21. See Charles Perrings, p.206.

to understand and address the incentives that lie behind human population trends."²² It is certainly not helpful to assume that the above trends are simply the product of social ignorance, and institutional irresponsibility.

What is ultimately driving biodiversity loss are the independent decisions of the billions individual users of environmental resources world wide. The underlying cause for the loss of any particular species as a result of human activity accordingly rests somewhere in this information set. The problem is that while those decisions have been privately rational, given the information available to the decision maker, it is most doubtful whether they represent the best outcome of society. That is, the private and social value of species conservation are different. "Divergence between the private and social costs of ecological services, and the biodiversity on which those science depend, may be due to a number of factors: ignorance, uncertainty, the incompleteness of markets, the distribution of income and assets, the strategic market behaviour of economic agents and a range of policy interventions "²³

Three of the above factors are especially important. The first is the role of government. There is by now a

22. "Population, Natural Resonces and Development", AMBIQ, vol.21, no.1, 1992.

23. See Charles Perrings, p.207.

considerable literature on the impact of government policy in distorting the private cost of environmental resources. "Destumping subsidies in agriculture and stumpage fees or royalties in forestry are argued to have encouraged deforestation at excessive rates both in terms of rates of felling in timber concessions and the clearance of ever more marginal land for agricultural purposes."²⁴

Subsidies designed to promote cash cropping as a means of increasing export revenue are argued to have resulted in leaching, soil acidification, and loss of soil nutrients, and to the reduction in the resilience of key ecosystems. There is, in fact, still a great deal to be done to establish where the biases in the set of prices confronting resource users lie.

The second factor in the divergence of private and social costs is poverty. The problem with respect to information as Dasgupta has remarked, is that it is not costless. The poor, by definition are able to command less information than the rich. The problem with respect to the discount rate is that because what matters is consumption today, people in poverty will tend to discount the future costs of resource use at a very high rate. The major issues

24. E.B. Barbier, J.C. Burgess and A. Markandya, "The Economics of tropical deforestation", AMBIO, vol.20, no.2-3, p.55-58.

here concern that causes and environmental effects of poverty. One interested set of causes is the pricing mechanisms already referred to. A second set of causes concerns the distribution of assets, whether market or non marketed.

The third factor in the divergence of private and social costs concerns the effects of the absence of markets or the existence of externalities. In the present context externalities may be taken as a consequence of two things: the dependence of all those affected by the transaction on a common environment and the absence of some market in which to negotiate the value of those effects. There are two types of externalities, i.e., reciprocal and unidirectional. Reciprocal externalities are those in which all parties having rights of access to a resource are able to impose costs on each other, while unidirectional externalities are the case when, for example, deforestation by the users of an upper watershed inflicts damage on the users of the lower watershed. The point is that the external costs and benefits of resource use in the two cases will be asymmetrical, and the solution to each type of externality is rather different. What is important here is that while biodiversity in the large is very much a public good, i.e., part of the global commons, most of the local biodiversity loss resulting from the destruction of habitat represents unidirectional externality.

Externalities are prevalent where ever the structure of property rights in such that individual users are authorized to ignore the costs they impose on others. It is clear that there in a very wide range of rights currently conferred by law or custom on the users of biotic resources and that these rights vary widely both from one country to another and from one species to another.

The last cluster of issues concerns the question of what can be done about biodiversity loss. The ecological side of the above discussion has suggested that the proximate causes are to be found in the direct or indirect destruction of the resilience of those systems which constitute the habitat of species. The economic side has suggested that if biodiversity loss is indeed contrary to the interests of society, the underlying cause is to be found in the divergence between the private and social costs of resource use. This suggests two broad categories of issues. "The first concerns the scope for species preservation despite existing loss of habitat. The second concerns the scope for modifying the structure of incentives governing the decision of individual resource users."²⁵

The potential for preserving genetic resources in botanical gardens, arboreta, national parks, zoos, wildlife

25. See Charles Perrings, p.207.

reserves, farms, aquaria, captive fisherie and the dangers. The economic aspects of these forms of preservation have not been thoroughly explored as yet, but these are beginning to attract attention. The second set of issues on the scope for modifying the structure of incentives to assure the conservation of biodiversity have been largely ignored. The task here is to ensure that it is the social valuation of species, both in terms of their direct use value and the indirect value they have as component parts of a wider ecosystem, which directs the private decision of resource users.

The Process of Global Biodiversity Depletion: The ongoing process of land use conversion and habitat alteration will undoubtedly continue apace without a proper management process. This is because these conversions are largely the consequence of substantial economic forces (Substitution, specialization and globalization); forces that have been reshaping the face of the globe in a very systematic way for many centuries. Each of the economic forces mentioned above operates by creating the impression that non-diverse resources are relatively advantageous. Collectively they are the engine underlying the process of global biodiversity depletion.

Diversity Losses From Substitution: "Human makes the choice regarding whether to hold resources in their original form,

or in substitute another."²⁶ Economic development derives, in part, from the substitution of more productive assets for the less productive. This even applies to biological resources.

The application of economic process on a global basis is one of the primary forces contributing to biodiversity losses in the recent past. The existing range of life forms, in many parts of the earth was the result of a natural equilibrium determined only in small part by human Choice. Global development and population growth have altered this situation radically in a very short amount of time. Almost all of the countries with rich biodiversity resources are poor (Table-1), and they are often in the stage of massive demographic and economic change (Table-2,3). The nature of these changes threatens mass extinctions of species.

Conservative projections place the developing world's population at 8.5 billion people by the year 2100, i.e. 85% of the world's total population. Demographic changes will create tremendous pressure for the acquisition of maximum value from available resources.

26. R. Sotow, "The Economic of Resources or the resource of Economics", American Economic Review, vol.64, 1974.

TABLE-1

Countries With Greatest Species Richness		
Mammals	Birds	Reptiles
Indonesia (515)	Columbia (1721)	Maxico (717)
Maxico (448)	Peru (1701)	Australia (686)
Brazil (428)	Brazil (1622)	Indonesia (600)
Zaire (409)	Indonesia (1519)	India (383)
China (394)	Equador (1447)	Columbia (383)
Peru (361)	Venezuela (1275)	Equador (345)
Calubia (359)	Bolivia (1250)	Peru (297)
Uganda (311)	India (1200)	Malaysia (294)
India (350)	Malaysia (1200)	Thailand (282)
Tanzania (310)	China (1195)	Papua N.g. (282)

Source: McNeely et. al., 1990. conserving the world's Biological Diversity. International Union for the conservation of Nature. Gland Switzerland.

TABLE-2

GNC Per Capital of the species Rich States (USD).			
Country	1988 GNP P.C.	Country	1988 GNP P.C.
Tanzania	160	Papua NG	810
Zaire	170	Thailand	1000
Uganda	280	Bolivia	1099
Equador	284	Columbia	1138
China/India	340	Peru	1300
OECD Average	17,400		

Source: The world Bank 1990. World Development Report. World Bank. Washington, D.C.

TABLE - III

Population Trends in Developing and Developed Countries

Region	Year				
	1900	1950	1985	2000	2100
(Population in million)					
Developing	1970	1681	3657	4837	8748
Developed	560	835	1181	1284	1437
Total	1630	2516	4837	6122	10185

Source: World Resource institute, world resource - 1988-1989, World Resource institute, Washington D.C.

Even in the absence of population pressure, however, there are substantial forces for change. The average income in the diversity-rich countries ranges from 1% to 7% of the developed Countries (OECD) average. Pressures for economic advancement are in themselves sufficient to require optimal utilization of all available natural resources, irrespective of additional population pressures.

When the diffusion of powerful technologies across the globe is taking place the human kind now has the capacity to alter the qualitative nature of the biosphere on a global basis. Biological diversity losses are being driven in part by the desire for human development gains obtained through Conversion of land to the production of more useful biological resources.

Diversity Losses from specialization: There are also good reasons to believe that prevailing methods of production are biased against the maintenance of a wide range of diversity. The more productive forms of natural resources derives from the importance of specialization in production for achieving cost reductions.

There is an in-built trade-off between diversity and productivity is specialization. It is far less costly to create thousands of units of an indential product than it is to make smaller numbers of differentiated products. This is why handcrafted goods are more expensive than factory-produced ones.

Productivity gains in specialized agriculture go hand-in-hand with diversity losses. For example, farm machinery is developed to work in fields that are planted uniformly. Chemicals are fine-tuned to eliminate all competitors of a single species. These capital goods are effective precisely because of the homogenous environment within which they operate.

"The process of agricultural specialization largely completed throughout the developed world, is beginning to work its way through the developing world."²⁷ The increasing

27. C. Cramer and B. Elliott, "The Consumeris Stake in Food Policy", National Centre you Food and Agricultural Policy Discussion Paper, Resource for the Future, washington, D.C.

numbers of tractors for cultivation in all continents except North America is the extension of this previously successful strategy for development that is also at the base of the concerns about what is presently happening to the biosphere.

Diversity Losses From Globalization

"There will be additional economies realized from the globalization of specialized methods of production."²⁸ This is because there are economies of scale in the production of homogeneous capital good as well. "Designing and constructing a wide range of farm machinery to work with a wide range of different crops can be inefficient. Making a single machine to be employed the world over is the least cost method of producing capital."²⁹ The inertia of specialization applies to the production of capital goods as much as it does to consumption goods.

The Forces for Conversion: "Conversions occur on account of the perceived relative advantages of movements to specialized biological resources."³⁰ Biological diversity losses do not occur only on account of relative differences

28. On globalization and diversity, see R. Norgaard, 1988. *The Rise of the Global exchange economy and the loss of biological diversity*, Biodiversity, ed. E. Wilson, National Academy Press, Washington, D.C.

29. T.M. Swanson, "Economics of a Biodiversity convention", AMBIO, vol.21, no.3, May 1992, p.250.

30. *Ibid.*, p.251.

in natural productivity. Once a particular species has been chosen for capital-intensive production and development, it represents a commitment to a particular technology and mode of production across both space and time. In the context of the biosphere, the forces of specialization are creating natural monopolies in a number of species for use by human beings to appropriate an ever larger share of photosynthetic products. The result of such economies of scale in agricultural specialization is that an increasingly narrow roster of species meets all of the needs of humankind. "Of the thousands of plant species which are deemed edible and adequate substitutes for human consumption, only 20 constitute the worlds food base."³¹ In fact, the four big carbohydrate crops (Wheat, Maize, Rice and Potatoes) feed more people than the next tueenty-six crops together. The same applies with regard to protein sources. "The number of domesticated cattle on the globe (currently over 1.2 billion) continues to increase, while the numbers of almost all other species continue to decline."³²

The forces for conversion substitution, Specialization and globalization, have gone hand-in-hand to generate

31. M. Plotkin, "The outlook for New Agricultural and Industrial Products from the tropics", Biodiversity, ed., E. Wilson, National Academy Press, washington, D.C.

32. See T.M. Swanson, p.252

worldwide losses of diversity in the furtherance of agricultural productivity. From this perspective, global losses of biodiversity have been the predictable result of the human development process. Expanding the human niche has come at the expense of other species.

The Significance of Population Extinction: Why should one care if populations become extinct? First, one might consider the extent and permanence of the destruction of natural habitat for spreading Urban and agricultural areas as morally objectionable. Second, the aesthetic value of a species diminishes as its population disappears. Third, the direct economic value of a species is generally reduced as its populations are exterminated. Fourth, the extinction of population influences the probability of persistence of the entire species. Populations differ in their genetic structure because of adaptation to different environmental conditions and random chance. The genetic variability represented by geographically disparate populations helps assure the ability of the entire species to respond evolutionarily to environmental changes. If, for example, there is rapid climatic change, a widespread species with vast population is more likely to include individuals that are genetically suited to new conditions than a species with just a single local population. Thus, interpopulation genetic variation ordinarily enhances the chances of a species persisting. Furthermore, this genetic variation is

of direct value to humanity. "Interpopulation genetic variability increases the probability that new crops and domestic animals can be extracted from nature's "genetic library", maintaining resistance to draught, pests and disease in present strains and breeds."³³

Fifth, (the most important reason for caring about the extinction of population). There are ecosystem services provided by population on global, regional and local levels, and these services constitute the most important source of benefits received by humanity on a global level. For example, destruction of vast majority of tree population, without wiping out any tree species, might add enough additional carbon dioxide to the atmosphere to make the difference between relatively slow climatic change resulting from global warming and a change that is vary rapid and catastrophic for agriculture. On a regional scale, the specis of microorganisms that once made the Rhine - the self purifying waterways are probably all extent. The continued existence of the tree species whose populations once blanketed the Himalayas, helping to control run-off of precipitation, was irrelevant to the recent devastating flooding of Bangladesh.

33. P. Ehrlich and A. Ehrlich, "The Value of Biodiversit", AMBIQ, vol.21, no.1, p.219.

The importance of total population is provided by the Salinization of the Australian wheatlands. The mediterranean vegetation of much of south western Australia was cleared for wheat cultivation. Because of this, the ground water level climbed, bringing with it the salt that had been spread over the area over millions of years by the winds off the southern ocean. Eventually the salt reached the shallow root zone of the wheat, and the salinized fields had to be taken out of production.

Deforestation And Species Extinction: The loss of species as a result of deforestation and degradation of tropical forests levels has been widely accepted. The state of tropical forests has led to increased interest in the role of timber production and international timber trade in promoting forest depletion and degradation in the tropics. Although the direct and indirect environmental impacts of commercial logging may be significant, particular for a few species regions and countries this is generally not thought to be the predominant cause of tropical deforestation.

"The total area of natural tropical forests was estimated to be 1715 million hectare in 1990; approximately 36% of the total land area in the tropics. Of this, tropical rainforests (656 million hectare) and moist deciduous forests (626 million hectare) constitute the largest portion (38% and 37% respectively).on a regional level, Africa

accounts for 47% of the total land area within the tropics, but contains only 35% of the total tropical forest. Asia is the smallest region within the tropics (15%), but contain the equal proportion of tropical forest (15% of the total tropical forest area). Latin America and caribbean make up the remaining 35% of the tropical zone area, and contain the largest extent of tropical forest resources (50% of the total tropical forest area)."³⁴

"The extent of tropical deforestation reached 16.9 million hactare per annum at an annual deforestation rate of 0.9%, throughout the 1980s. Tropical deforestation was concentrated in latin America (8.3 million ha. p.a.) and Africa (5 million h. p.a.). Asia experienced the lowest extent of tropical deforestation (3.6 million h. p.a.). The highest rate of deforestation at 1.2% of the tropical countries, Brazil and Indonesia incur the highest extent of annual forest loss. However, the rates of tropical deforestation are highest in those countries that have high annual losses of tropical forests recources. Such as Ivory Coast (6.5%), Nigeria (5.1%), Costa Rica (4.1%), Paraguay (4.7%)."³⁵ Due to the vast extent of their forest stocks, the annual rate of deforestation in the Big three tropical

34. J.C. Burgess, "Timber Production, Timber Trade and Tropical Deforestation", AMBIQ, vol.22, no.2-3, May 1993, p.136.

35. Ibid., p.136.

forest countries remains relatively low; in Brazil it is 0.9%; in Indonesia 1.2%; and in Zaire 0.2%.

Evidence on the linkage between tropical deforestation, timber production and the timber trade suggests that the trade is not a major source of tropical deforestation. The major causes behind the tropical deforestations are conversion of forests to other uses such as agriculture and domestic consumption in timber producer countries. This proportion of tropical timber production does not enter the international trade.

For example, "only 17% of the total non-coniferous tropical roundwood production is used for industrial purposes. Of this only 31% is exported in round or product form. Therefore, 6% of total tropical non-coniferous roundwood production enters the international trade. The volume of tropical timber production that actually enters the trade is small and declining."³⁶

Nevertheless, there is genuine cause for concern over the excessive exploitation in many regions, including the indirect impacts of unsustainable harvesting practices and the incentives to convert forest areas into other uses, i.e. agriculture and livestock ranching. Therefore, an important factor in reducing timber related tropical

36. Ibid., p.137.

deforestation is ensuring proper economic incentives for efficient and sustainable management of tropical production forests. Appropriate forest management policies and regulation within producer countries ought to provide these incentives so that the long-run income generated potential of harvesting timber is maximised, and any significant external environmental costs associated with timber harvesting are internalized.

What would be some likely consequences ? Species communities would become grossly reduced in their population. In turn they would become ecologically unstable at best and far less able to maintain homeostaries. In addition, ecosystems would lose much of their biomass and energy flow, hence would become less efficient at mobilising the most basic natural resource of all, sunlight. There would also be a decline in communities resilience to other forms of ecological disruption and environmental degradation.

CONSERVATION: Biological diversity is a global resource, and conserving diversity brings benefits to all nations. The current threats to biodiversity are greatest in developing countries with insufficient financial means for supporting conservation efforts. Conservation brings considerable and sustainable benefits to local communities, but conserving biological resources requires investments, in staff, in infrastructure, in benefits postponed, in education, and in

many more areas. These investments are often very sound, showing high benefit cost ratio; the more complete the economic analysis, the higher such ratios are likely to be.

However, current conservation programs are usually implemented through resource-management agencies whose budgets are generally insufficient to implement their mandates effectively and are subject to considerable fluctuation from year to year. Such funding difficulties severely hamper the effectiveness of conservation agencies. To produce acceptable results and become fully operational, conservation agencies must have sufficient and reliable sources of support. Action is therefore required at both national and international levels to identify ways to provide additional funding for conserving biological diversity.

The convention on Biological diversity was launched in Rio de Janeiro on 5 June 1992 in an affirmation that the conservation of biodiversity was a common concern of Human kind and in due recognition that a fundamental requirement for such action was that conservation of ecosystems and natural habitats.

"The conservation of biodiversity involves the protection of diverse natural habitats, both terrestrial and oceanic, throughout the globe - a globe that is in large part partitioned among some 190 sovereign states. Among the several crucial considerations that arise in conserving

biodiversity are the optimal numbers, sizes and locations, of the natural habitats that need protection."³⁷

Rationale for Protecting Biodiversity: With the increasing scale of human activity the adverse impacts on the environment have prompted a search for development paths that are more 'sustainable'. There are three main types of services provided to mankind by the environment. National habitats and ecosystems play an essential part in all these aspects. We can show the important environmental functions through the following table.

Table iv

Environmental function of forests

Source of material and services	Sink for wastes	General and life support
Timber	Absorption of waste	Genetic pool
Fuel wood	Recycling nutrients	Climatic regulation
Other business Products	Watershed protection	Carbon fixing
Non-wood Products	Protecting soil	Habitat for people
	qualit and	flora & foura
	erosional	Aesthetic, Cultu-
	resistance	ral, and spiritual
		source Scientific
		data
Genetic resource		
Agricultural production		
Recreation and tourism		

Source : Adapted from world wide fund (7).

37. A.H. Westing, "Biodiversity and the Challenge of National Borders", Environmental Conservation, vol.20, no.1, Spring, 1993, p.5.

First, The environment is a source of essential raw materials and inputs that support human activities. In Particular, natural habitates provide the basis for food and cash crops, fish stock, forests, domesticated and wild animals, and other natural assets, all of which benefit the society. "The generation and maintenance of soils is an example of a less obvious yet crucial productive service provided by ecosystems. The living components of soil ecosystems contribute crucially to the support of crops and forests. In another example, ecosystems acts as a natural pest control mechanism, in the form of insects that play on the herbivorous insects that attack crops."³⁸

Second, the environment serves as a sink which absorbs and recycles the waste products of economic activity. The physical and biological systems in natural habitats again play an essential part in accepting and breaking down pollutants and recycling nutrients. For example, decomposers in soil break down wastes into simpler constituents that in turn serve as fresh nutrients (oxygen, phosphorus etc.) that are essential to the growth of green plants.

Third, the environment provides irreplaceable life-support functions without which life on earth would be drastically changed or cease to exist. In this context,

38. Mohan Munasinghe, "Biodiversity Protection Policy : Environmental valuation and Distribution Issues", AMBIO, vol.21, no.3, may 1993, p.228.

ecosystem, play an important role in establishing climate and hydrology, and also in maintaining the essential gene pool whose diversity helps to preserve the resilience and richness of living organisms.

It is the preservation of this global web of life, which underlies the basic concern for the protection of biological diversity. "Only a small portion of plant species have been screened for potential medical value and only 7000 plant species are currently used for food, out of possible total of 75,000 plants reported to have edible parts."³⁹ Tropical moist forests comprise a significant segment of the genetic library. Containing between 50% and 90% of all species.

There are many examples of the welfare gains and economic benefits that accrue from the preservation and sustainable utilization of biodiversity.

- In Asia, by the mid - 1970s, genetic improvements had increased wheat production by USD 2 billion and rice production USD 1.5 billion a year by incorporating dwarfism into both crops.
- Globally, medicine from wild products are worth approximately USD 40 billions a year.

39. Ibid., p.228.

- In 1960, a child suffering from leukemia had only 20% a chance of survival. Now the Child has an 30% Chance, due to treatment from drugs containing active substances from the rosy periwinkle, a tropical forest plant from Madagasker.

Apart from the direct uses of biodiversity, a growing body of environmentalist feel a moral obligation to protect our only known living companions in the universe - many of which provide us with pleasure through the mere knowledge of their existence. Humanity appropriates 25% of global net primary production (NPP) and 40% of all NPP generated on land.

First among the truly global environmental issues, the preservation of biodiversity has been internationally accepted as a priority problem that is comparable with other issues of global and transnational scale like global climatic change, ozone layer deterioration, and water resource degradation. In the same context, ecosystems like forests play a vital role in regulating the planetary climate. Deforestation plays a significant role in altering the albedo or reflectivity of a region which changes the amount of heating of Earth's surface by the sun.

"Degradation of the physical environment has already begun to undermine the longterm basis for sustainable development. More over, the accelerating loss of large

number of species continues to disrupt highly interconnected biological systems, with unforeseen and very likely damaging consequences for humanity."⁴⁰ To avoid the above circumstances, preservation of biodiversity is essential.

The Role of conservation organization and Aid Agencies in Preserving Biological Diversity: It is Universally agreed that biological diversity must be preserved, but the practical responsibility seems to have been left to the countries involved, and to nongovernmental conservation organizations, neither of which are able to cope entirely with this formidable task. The question is whether conservation of biodiversity in Third World Countries is possible at all, as long as these countries are caught in the vicious circle of growing poverty, rapidly growing populations and environmental degradation? Is it possible that we can tackle the last of these problems in isolation and with quite inadequate means?

Today, very few people doubt the necessity for maintaining global biodiversity. But we must know the fact that from the point of view of the countries that still have the greatest biological diversity and where it is most threatened, conservation of biodiversity must necessarily come very low on their list of priorities. These countries

40. Ibid, p.228.

often have other social, political and financial problems that are not only just as important and urgent, but of a more immediate nature. Obviously, if the world community is cognizant of the fact that genetic diversity is of vital importance then the world community must provide the means to preserve this diversity as well.

So far as the major initiatives, in this respect, are concerned, these have mainly come from independent nongovernmental conservation organizations. World Wild life Fund for Nature (WWF) has recently launched a major campaign for the conservation of biodiversity, identifying it as the major conservation issue of today. This, of course, is very positive but the question is whether it is sufficient?

Global conservation problems cannot be solved by private charities however professional they are in raising money and using them to finance numerous projects. The impact of such private projects is insignificant when seen in relation to the problems they are striving to solve. Further more, the role of the private conservation organizations should not be to fund and carry out activities to solve the conservation problems of this world. Their role should be rather as the watchdogs of nature and to raise awareness among the general public and among politicians in the developed as well as in the developing world.

"The governments responsible for conserving; e.g. the genetic diversity of developing countries are not only the poor governments of developing world but the governments of developed countries, those who benefit from the genetic diversity of developing countries."⁴¹

It has been suggested that aid agencies should more actively preserve biological diversity. With their present goal, it is, however, difficult to claim that this type of conservation constitutes a priority for them.

"If the main argument for preserving genetic diversity, especially in the species rich tropics, is that mankind requires a continued source of medical products and wild relatives of crops, we must also realize that those benefiting most by preservation are the developed countries. Even the importance of wild relatives of tropical rice, rarely benefit the local community, where these are found. Supporting preservation of these resources can hardly be termed development aid."⁴²

The scope and mission of aid agencies is currently undergoing rather dramatic change. It is the report of the Brundtland commission which has sparked off this change.

41. Arne Schiotz, "Conserving Biological Diversity : Who is Responsible?" AMBIQ, vol.18, no.8, 1989, p.454.

42. Ibid., p.454.

When development aid was initiated more than a quarter of a century ago, the underlying philosophy was that moderate financial and technical aid would enable Third world countries to develop more rapidly and eventually reach a stage comparable to that of developed countries. One model was that of Marshall Aid from USA to western Europe immediately after world war II. The philosophy was that new initiatives, new technology, and bright ideas, would spread from the project area to the surrounding society. However, this rarely happened for a number of complex reasons.

If aid agencies see their role as accommodating the most immediate needs of the Third World - with inadequate means, then the answer as to whether they should preserve biological diversity would probably be no. But unless aid agencies see their role as that much broader, there is a danger that many of our activities will be a social - welfare type support for the poor which will not help them in the long run; curing symptoms rather than changing the negative direction the countries are taking. After the report of the Brundtland commission "sustainable development became a key word and it was realized that much of the present development is not sustainable; perhaps it is not even development."⁴³

To ensure biodiversity conservation in the parts of the

43. Ibid., p.457.

world which contains one half of the mankind, we will have to go far beyond the concept of development aid and far beyond the present budgets of development aid-agencies and conservation organizations. That is why one of the founders of WWF, Sir Peter Scott has said that one of the reason for preserving biological diversity is to keep options open for future generations. The future generations will need as many options as possible if they are to survive. A reduction in the diversity of this globe means an unacceptable reduction in the options of future generation. That is why the conservation of biological diversity is must and to attain this task conservation organization & aid-agencies need more fund. Therefore, a priority for the world community must be to preserve biological diversity. Under the present circumstances development aid-agencies, development banks, NGO's, and UN-agencies are the obvious main actors.

Indigenous knowledge for Biodiversity conservation:
Indigenous people with a historical continuity of resource use practices often possess a broad knowledge base of the behavior of complex ecological systems in their own localities. This knowledge has accumulated through a long series of observations transmitted from generation to generation. "Such "diachronic" observations can be of great value and complement the "Synchronic" observations on which western science is based. Where indigenous peoples have

depended for long periods of time, on local environments for the provision of a variety of resources, they have developed a stake in conserving and in some cases, enhancing biodiversity."⁴⁴ This is why they are aware that biological diversity is a crucial factor in generating the ecological services and natural resource on which they depend. Some indigenous people manipulate the local landscape to augment its heterogeneity, and some have been found to be motivated to restore biodiversity in degraded landscape. Their practices for the conservation of biodiversity were grounded in a series of rules of thumb which are apparently arrived at through a trial and error process over a long historical time period. This implies that their knowledge base is indefinite and their implementation involves an intimate relationship with the belief system. Such knowledge is difficult for western science to understand. "It is vital, however, that the value of knowledge-practice-belief complex of indigenous peoples relating to conservation of biodiversity is fully recognized if ecosystems and biodiversity are to be managed sustainably. Conserving this knowledge would be most appropriately accomplished through promoting the community-based resource management systems of indigenous peoples."⁴⁵ Therefore, "Indigenous knowledge is

44. M. Gadgil, F. Berkes and Carl Folke, "Indigenous knowledge for Biodiversity Conservation", AMBIO, vol.22, no.2-3, May 1993, p.151.

45. Ibid., p.151.

defined as a cumulative body of knowledge and beliefs handed down through generations by cultural transmission about the relationship of living beings, (including humans) with one another and with their environment."⁴⁶

Many indigenous societies depended on a rather limited resource catchment of a few hundred square kilometers to provide them with a wide diversity of resources. We do not mean that they were isolated societies, many had ongoing trade and social relationship with more complex societies. However, the extent to which the indigenous societies transformed local resource through manufacturing was limited. Thus, there were strong incentives for indigenous people to nurture and sustain diversity in their immediate environments. They may, therefore, be expected not only to conserve locally present natural biodiversity, but also to augment it by manipulating the landscape. Such manipulations could increase landscape patchiness and thereby enhancing diversity in local resource catchments. For example, "it has been the experience of village forest protection committees in the state of West Bengal. Over the last 10 years this state has pioneered involvement of local, mostly tribal communities of Midnapore and Purulia districts in protecting local forests to encourage natural regeneration. This is

46. F. Berke, "Traditional Ecological Knowledge in Perspective", Traditional Ecological Knowledge, UNESCO Canada/MAB, Ottawa.

because of the assurance of a share of local people in the produce of regenerated forest stocks."⁴⁷

The National Wasteland Development Board (NWDB), an agency of the Government of India's Ministry of Environment and Forests, is now planning to seriously encourage such local initiatives for restoring productivity and biodiversity of degraded lands. "NWDB's experiment in microplanning for integrated development of wastelands now calls for preparation of a detailed land and water-management plan at a decentralized level through the agency of local village populations."⁴⁸

The indigenous people are aware of a large variety of uses of local biodiversity including medical use which have been incorporated in the modern pharmacopoeia also. Such knowledge is explicit socially and it is transmitted from one individual to another in the same manner as scientific knowledge. Four kinds of indigenous Conservation practices are of particular relevance. Those include;

(a) Total protection to many individual biological communities including pools along river courses, ponds, meadows and forest.

47. K.C. Malhotra and M. Poffenbarger, ed., "Forest regeneration through Community Protection. Proceedings of the Working Group Meeting on Forest Protection committees. Calcutta June 21-22. 1989. West Bengal Forest Department. p.47.

48. See M. Gadgil,^{F.N. 44,} p.154.

(b) All individuals of certain species of plants and animals may be afforded total protection. It is notable that Ficus is now considered a keystone resource, significant to the conservation of overall biodiversity.

(c) Certain particularly vulnerable stages in the life history of an organism may be given special protection. "The danger of overharvest and depletion of population is clearly far greater if these vulnerable stages are hunted and the protection afforded to them seems a clear case of ecological prudence."⁴⁹

(d) Major events of resource harvest are often carried out as a group effort. Many tribal groups engage once a year in a large scale communal hunt. Such a group exercise may have served the purpose of grouplevel assessment of the status of prey population, and their habitats. This in turn may have helped in continually adjusting resource harvest practices so as to sustain yield and conserve biodiversity.

Many ecologists argue that ecosystem resilience is promoted by biodiversity conservation. Indigenous people with their diachronic data, rather than modern synchronic

49a. L.B. Slobodkin, "How to be Predator", American Zoological Survey, 1968, pp.43-51.

49b. M. Gadgil and R. Guha, "This Fissured Land : A Ecological History of India, Oxford University Press, New Delhi and University of California Press, Berkely.

data, may therefore, have far more valuable knowledge relevant to biological conservation. "Common property theory provides some general guideline and policy prescriptions for the success of such indigenous peoples based conservation."⁵⁰

Integrating Conservation and Development: "A group of pilot schemes called integrated conservation development projects (ICDPs) had been started for biodiversity conservation. These projects include biosphere reserves, multiple-use areas, and a variety of rural development initiatives on the boundaries of national parks as well as regional land use schemes with protected area components. These projects aim to achieve their conservation goals by promoting development and providing local people with alternative income sources which sustain rather than threaten the flora and fauna in natural habitats."⁵¹

The establishment of field-level linkages between conservation and development has been promoted by the 1980 World Conservation Strategy, the 1982 World Parks Congress in Bali and the 1987 Brundtland Report. Therefore, the ICDP approach has received increasing attention from multilateral

50. See M. Gadgil, p.155.

51. Mohan Munasinghe, "Biodiversity Protection Policy: Environmental Valuation and distribution Issues", AMBIO, vol.21, no.3, May 1992, p.234.

and bilateral development institutions, as well as conservation organizations and government agencies.

Despite many caveats from ICDPs the early experiences of the case study by ICDPs offer the following insights: - often the main problem are not caused by local people, the targeted beneficiaries of ICDPs. Pressures on natural ecosystem can ultimately arise from poorly designed laws, policies, social changes and economic forces over which poor rural people have no influence and which can severely curtail their options. park management, therefore, cannot be regarded solely as a local issue.

- Public agencies responsible for protected area management tend to lack both financial and human resources, as well as political support.
- Serious design and implementation flaws have hampered several ICDPs.
- Genuine local participation in ICDPS is difficult to achieve.
- Conservation projects have had difficulty in designing approaches largely because of confused land and resource access rights. These approaches reflect different degrees of indigenusness in local populations.

"There appear to be five principal constraints to first increasing the effectiveness of initial ICDPs, and later replicating promising approaches on a scale which could have more extensive impacts:

1. The limited effectiveness of the agencies responsible for protected area management.
2. The lack of commitment from governments, in many cases tied to insufficient financial resources.
3. Inadequate long-term funding commitment from lenders and donors.
4. Legislative and policy environments which are not conducive to the implementation of ICDR development activities outside park boundaries, and
5. Limited capacities to identify, plan and implement projects, both among responsible government agencies and among implementing NGOs."⁵²

On the basis of above discussion we can say that conservation of biodiversity and natural habitats is important for sustainable development at all levels ranging from the global to the local. Improving the incomes and welfare of local communities and simultaneously preserving physical and biological systems in protected areas offers

52. Ibid., p.234.

opportunities for developing countries to pursue both environmental and developmental goals in a complementary manner.

Global Threatened Parks List: The conservation biology response has provided the rationale for conserving biodiversity through national parks and other types of protected areas. But the present conditions of some parks are not conducive. Today, there are 107 threatened parks from 64 different countries. Sixteen new areas have been added to global threatened parks list. These sites are suffering from a variety of stresses including proposed hydroelectric, military, skiing, road and railway development, Acid rain, cocaine production and mining. If corrective actions are not taken, the basic integrity of the natural heritage of each of the areas will be lost. Following is a digest of threats to 16 sites that were approved for addition to the Register by the IUCN commission on National Parks and Protected Areas meeting in December 1990.

Indomalaya:

1. Himchari National Park, Bangladesh
2. Kaziranga National Park. India
3. Gulf of Kutch Marine National Park, India
4. Royal Chitwan National Park, Nepal
5. Karthar National Park, Pakistan

6. Tubbataha National Marine Park, Philippines,
7. Doi Inthanon National Park, Thailand
8. Khao Sam Roi Yot National Park, Thailand

Afrotropical:

9. St. Lucia Game Reserve, S. Africa

Palaearctic:

10. Pirin National Park, Bulgaria
11. Low Tatra National Park, Czechoslovakia
12. Ras Mohamed Marine National Park, Egypt.
13. Ojcaw National Park, Poland
14. Pembrokeshire coast National, Park, U.K.

Neotropics:

15. Montes Azules Biosphere Reserve, Mexico
16. Tingo Maria National Park, Peru.

The increasing list of parks is only because Humans are changing the landscape and altering the ecological balance that prevailed prior to the onset of large scale, intensive human activity. Species extinction, habitat loss and degradation of landscapes and ecosystems have understandably been viewed with alarm and have raised public consciousness of the need to preserve critical habitats and conserve Earth's biological heritage. While we must curtail many of the senseless human activities that needlessly destroy the ecological balance of Earth, we must also turn our attention

to positive actions that reverse the negative impacts of humans. The use of plantations as one possible mechanism to restore diverse ecosystems in degraded lands is welcome. There are other measures also which can be used to restore or maintain biodiversity in managed landscapes. The point is that land management offer an opportunity for human beings to redirect the changes towards biodiversity and in some cases to reverse the negative trends.

CHAPTER - III

NEGOTIATIONS AND POLITICS OF A REGIME ON BIODIVERSITY

In recent times the degradations of the environment has emerged as a major world wide concern. Pollution in the industrialized countries has particularly become a serious threat to the quality of life. These wealthier countries have begun to place greater emphasis on improved environmental quality. Meanwhile, the developing nations are increasingly realizing that natural resource degradation is a serious impediment to economic development and the alleviation of poverty. Thus, these poorer countries are seeking sustainable development paths that will permit them to address both socioeconomic and environmental concern simultaneously.

"International efforts at conserving life forms are not new. There are over 150 bilateral, multilateral and global treaties on environment".¹

Many of these deal with various aspects and parts of biodiversity, starting with the conversion relating to the preservation of Fauna and Flora in their Natural State,

1. Register of International Treaties and other Agreements in the Field of the Environment. United Nations Environment Programme, Nairobi, May 1991, (Document No UNEP/GC 16/Inf.4).

1933. But most of these are specific and sectoral in nature, and there is perhaps a need for a unified and comprehensive treaty. "Discussion on such a global agreement began in various forums. Such as the United Nations Environment Programme (UNEP), in the mid 1980s. In 1988, an adhoc working Group of Experts on Biological diversity was set up by UNEP to look into the matter."²

On the basis of its report, UNEP entrusted an adhoc working group of legal and technical experts to work out a legal document. In 1991, this working group was renamed the Intergovernmental Negotiating Committee (INC). It was this committee comprising of senior governmental representatives, which had hammered out a convention in time for the UNCED at Brazil. Nearly 100 countries accepted a final draft which was put up for signing at Rio. However, some northern countries like US and Japan were showing signs of backing out, because they realized that the convention may be a thin wedge into their global dominance over natural resources and biotechnologies.

This situation is interesting for the final draft of the convention, though it hardly addresses the global roots of biodiversity destruction and only inadequately meets the needs of people in the southern countries, still provides

2. Environmental Law in UNEP, UNEP Environmental Law and Institution Unites, United Nations Environment Programme, Nairobi, 1991.

these countries with an outside chance of reversing many historical North-South inequalities.

The United Nations convention on Biodiversity which has not only generated international interests but has renewed impetus for conservation efforts. Among other things, the draft convention seeks to use a biological conception of biodiversity to develop an international capability for assessing biodiversity in relation to human actions. "Article 4 (2nd), for example, would commit signatory, governments to "... provide, establish and implement procedures for assessing the impact on biological diversity of proposed policies, programmes and projects where such an impact may be significant". Article 8(a) calls on nations to "..... establish procedures and other suitable measure for the integration of conservation of biological resources in the domestic decision making both governmental, including national plans and sectoral policies, and private". Article 11 calls for using environmental Impact Assessments to monitor and assess biodiversity and Article 12 (a) calls for signatories to survey, monitor and maintain inventories of biological diversity within their jurisdictions with particular attention to ecosystem, habitats and species that are under threat."³

3. J. Gordon Nelson and Rafal Serafin, "Assessing Biodiversity : A Human Ecological Approach", AMBIO, vol.21, no.3, May 1992, pp.212-218, p.212.

More recently, increasing attention is being paid to the links between biodiversity and the human but biodiversity remains primarily a biological concept defined in terms of genes, species and ecosystems that underpin human activities. Efforts to conserve biodiversity largely in terms of biological inventory, assessment and monitoring are likely to do little more than document the disappearance of species and the destruction of habitats in more details. "To maintain or restore certain types of biodiversity, efforts must be made to understand the history of human effects on the ecosystems. Moreover, if conservation efforts are to succeed in maintaining and restoring biological diversity and productivity in threatened areas, assessment and monitoring must address the different ways in which people value, use, manage and affect the biodiversity of an area. Conservation efforts must elicit the long term support and participation of people alongwith public agencies".⁴

CONTROVERSIES IN BIODIVERSITY CONSERVATIONS

It is tempting to look at the Biodiversity convention as a sincere effort on part of world's governments at saving what is global heritage. It would be naive to take it on

4. Ibid., pp.212-218, p.212..

face value. Biodiversity conservation, like many other issues is also political in nature and it is almost as fraught with political undertones as an election campaign. The primary contenders being the developed and the developing countries. And in the accompanying debate, a third party has been almost completely marginalised : the indigenous peoples and other local communities who breath biodiversity every moment of their lives, yet who are kept out of decisions which effect it.

At the very outset there have been difference even over guiding principles. The view is that "biological entities are a common heritage of humanity is ethically unexceptionable. One of the first victims of the North-South debate has been the ethcially superior position of biodiversity being a global heritage. Throughout history biological species and technologies and knowledge related to them, have been freely exchanged between societies and individuals, resulting in all-round enrichment."⁵

But in an unequal world, common heritage has every chance of misuse. Sine the last couple of centuries the countries of the developed world, themselves poor in

5. Ashish Kothari, "Politics of Biodiversity convention", Economic and Political Weekly, 11-18 April 1992, pp.749-755, p.749.

biological diversity, forcibly looting the resources of the biologically rich nations of the developing world. These developed nations are creating the most selfish protectionist systems to monopolise the technologies and benefits arising out of these resources. Because of this protectionist system a common heritage of mankind has been turned into a colony for the industrialized countries. Because of this intention of developed countries the developing countries fought for the deletion of the term 'common heritage', in the negotiations for the conventions. They instead pressed for, and got accepted, the principle of national sovereignty over biological resources. "Apart from the supreme arrogance of imposing political boundaries on nature, this is a sad dilution of the morally stronger position of common heritage which seems inescapable in a politically and economically unequal world."⁶

Here is a concrete example how developed countries exploit the natural resources of developing countries through modern biotechnology : In 1958 following clues from indigenous medicine men in Madagascar, researchers at Eli Lilly Pharmaceuticals investigated the low-growing tropical plant of Madagascar rosy periwinkle which delicate pink blossoms. They found that the plant contained two powerful

6. Ibid., p.750.

alkaloids, vinblastine and vincristine; the former is found to be effective against Hodgkins disease resulting in 80 percent remission in sufferers of this form of lymph cancer, the latter achieved a 90 percent remission rate against childhood leukaemia. Isolated produced commercially in large scale as special drugs, global sales of vincristine and vinblastine earn Eli Lilly about 100 million Us dollars each year, neither the medicine men nor the country of Madagascar saw a dime of these profites. This modern biotechnology is concentrated in the first world specially with the Trans National Corporations (TNCS).

The independent observations of the negotiations have been troubling by two questions. One, will the treaty legitimise the exploitative and one way access that northern countries have to biodiversity in the south? Secondly, will the convention further erode the rights and access to biological resources of indigenou and other local communities?

The following issues are relevant in answering these questions.

Benefits of Biotechnology within the Frame Work of "Intellectual Property Rights": The developing world particularly India has consistently stated that they would

oppose the signing of the Biodiversity convention if developed countries continued to deny access to biotechnology arising out of the resources and knowledge obtained from the south (developing nations). one of the most treacherous ways in which industrialized countries have been doing this is in the forms of patents or Intellectual property rights (IPR). Through these rights, virtual monopoly rights are granted to developers of new products or processes. This topic (IPR) has been thoroughly debated in the convention negotiations.

For centuries colonial and neocolonial powers have been freely taking resources and knowledge from the societies of the developing world, tinkering around with them in their laboratories and touting new biological materials for the world to admire. The argument of developed nations is that there materials are the outcome of millions of dollars worth of experiments, they want to establish patents, guarantee of suitable returns for the producers, but more obviously in maintain monopolies for maximum profit. "Not only pharmaceutical products, but also seeds, genetically modified organisms, germplasm, even entire species are coming under the widening net of patents. USAs patent law considers anything which has not been previously patented in a printed publications as novel, and therefore capable of

being patented."⁷ More than ever before, in this macabre game privatising the public property, developed nations seem to be pretending to be gods.

The biodiversity convention however gives some hope of reversing this trend. "Article 16 commits countries to "provide and/or facilitate access for and transfer to other contracting parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment".⁸

Moreover, such access/transfer is to be under fair and most favorable terms, including on concessional and preferential terms where mutually agreed. Para 2 of Article 26 attempts to dilute this by stating in the case of technology subject to patents and other intellectual property rights, such access and transfer shall be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights. This is, however, countered by para 5 of Article 16,

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7. Usha Menon (1991), "The Convention on Biodiversity, Intellectual Property Rights, and Policy Options", National Institute of Science, Technology and Development Studies (Prepared for the Ministry of Environment and Forest, Govt. of India).
 8. Document No UNEP/Bio Div/N6-INC, 4/WG-II/L1/Rev.1, dated 14 February 1992.

which states: "The contracting parties, recognizing that patents and other intellectual property rights may have an influence on the implementation of the present convention, shall co-operate in this regard subject to national legislation and international law in order to ensure that such rights are supportive of and do not run counter to the objectives of this convention".⁹

In an article on 'In-Site conservation, the present draft commits each signatory country to " respect, record, protect and promote the wider application of knowledge, innovations and practices of indigenous and local communities embodying traditional life styles relevant for the conservation and sustainable use of biodiversity with the involvement of the holders of such knowledge innovations, and practices and to share equitably the benefits arising from the utilization of such knowledge, innovations and practices."¹⁰

Both of these formulations are weakly and unclearly worded, but given pressure for strengthening them, they could work to the advantage of developing countries and

9. Document No UNEP/Bio Div/N6-INC, 4/WG-II/L1/Rev.1, dated 14 February 1992.

10. Document No UNEP/Bio Div/N6-INC, 4/WG-II/L1/Rev.1, dated 14 February 1992.

traditional communities. Nevertheless, if developing countries can maintain pressure for its suitable interpretation, and clearly show that IPRs work against the interest of biodiversity conservation, then this clause could well work to their advantage. The Biodiversity convention could become the developing nations effective weapon against the increasingly monopolistic and North-dominated international trade regime being currently propagated a regime which economically indebted nations like India are finding hard to resist. Because our biological resources are our greatest assets and can be used as a bargaining lever in a world which is otherwise so heavily stacked against us.

Moreover, just like developing nations are being asked to negotiate resources over which local communities have traditional rights, developed countries should be able to negotiate on behalf of their private corporate sector. Developed nations are, however, repeatedly stating that a number of formulations relating to patents technology transfer, etc. are not negotiable since these are in the hands of the private sector. This is nonsense, for there private sector. This is nonsense, for there is not much that private companies could have done in this field without governmental support especially in terms of opening out access to developing countries. The convention in Article

16, para 4, states that "Each contracting party shall take legislative, administrative or policy measures, as appropriate with the aim that the private sector facilitates access to, joint development and transfer of technology.....for the benefit of both governmental institutions and the private sector of developing countries"¹¹

There needs to be, in fact, an outright ban on the extension of IPRs, either by the private sectors or by the Governments on biological resources. The governments should make the relevant negotiations under GATT and other fora to the overall objectives of the 'Biodiversity convention'.

Recent pronouncements by USA, Japan and some other developed countries appears to suggest that these countries have realised the anti-north and anti-IPR Potential of the convention. If a minimum of 30 nations ratify it, the convention will come into force. It will then be up to the international conservation community to force USA and others to submit to its provisions.

11. Document No UNEP/Bio Div/N6-INC, 4/WG-I/L2/Add.3, dated 14 February 1992.

NATURAL RESOURCES : RIGHT OF EXPLOITATION

An obvious answer to the problems facing the world would be to allow Third World countries to keep a sole legal right on their natural resources. There have been several serious attempts to introduce international conventions to that effect. So far all attempts have failed and the explanations for failure are many and all very convincing. One can, however, reflect on why it is so difficult to solve the technical problems of such a copyright, in a world so used to paying licenses for patents or copyrights.

"If the priority for aid agencies is to support the poorest strata in the poorest countries, as DONIDA, it is difficult to justify resources spend on preserving genetic diversity. The poor people of the third world have many more immediate and preserving needs. Perhaps, their most pressing need is to be able to let their starving cattle browse in the forests."¹²

Rewards and Incentives for Extra Laboratory Innovations: The resources and information, which are for the benefits of humanity as a whole should not be allowed to be shackled by private monopolistic restriction like patents. There is no doubt that those who work towards gaining these resources

12. Document No UNEP/Bio Div/N6-INC, 4/WG-II/L1/Rev.1, dated 14 February 1994.

and information should be suitably rewarded. But there are three important questions arise while we talk about suitable reward. These are

- i) Why only scientists and corporations should be rewarded?
- ii) Why not also the countless indigenous and traditional communities which have for centuries been conserving biodiversity and finding new uses for them?
- iii) Why not also farmers who for generations have been discovering wild plants worthy of cultivation, and engaging in their own crossbreeding and selection methods to continuously refine agriculture?

Almost all of the 'miracle discoveries' of modern biotechnology are based on this traditional wealth of knowledge and resources. Looked at in this way the developed nations and the elite in the developing nations have an incalculable past debt to the traditional communities all over the world.

Article 8 of the final draft on biodiversity conventions states that each state must respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life

styles relevant for the conservation and sustainable use of biodiversity such a formulation was obtained after a great deal of debate in the negotiating sessions. Because the official delegates realized that indigenous and other traditional communities within their countries stand to gain by it. the weakened formulations notwithstanding, these parts of the convention must be used by indigenous and other traditional people, and by the groups that work with/for them. These formulations will make traditional communities which have been exploited by national elites, and whose knowledge base and resources are under constant threat of elimination by the forces of modernization, able to use the provisions guaranteeing them protection, much like the UN declaration of Human Rights has been used by communities whose basic rights are threatened.

The Rights of Local Population:

The greatest anomaly in the position of developing nations has been that even while they stridently assert national sovereignty over biological resources, they try to underplay the rights of their own local communities. In its current form the convention may end up by strengthening western nations of biodiversity conservation, wherein local communities have been thrown out of protected areas or their rights and activities have severely curtailed. Such as an

approach adapted in India and in many other developing nations. This approach has succeeded in protecting species and habitats in the short run. But it has done incalculable harm in the long run by alienating local people. These people then turn hostile or become passive onlookers while official struggle to save the area. It is now recognized this "guns and guards" approach is neither in the interests of biodiversity conservation nor acceptable in a genuine democracy. Yet it remains the prevalent practice. Article 3 in the biodiversity convention reads, "States have in accordance with the charter of the United Nations and the principle of international law, the sovereign right to exploit their own resources pursuant to their environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdictions."¹³

What is missing in the principle is the sovereign right of local communities which have conserved and maintained biodiversity and whose cultural survival is linked intimately to the survival of biodiversity to conserve and use biological diversity.

13. Arne Schiotz, "Conserving Biodiversity : Who is responsible?" AMBIO, vol.18, no.8, 1989, pp.454-58, p.455.

But the final draft of the convention has only a qualified recognition of the interest of local communities in areas of significant biodiversity. Article 10(c) state to "protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements."¹⁴

These provisions are weak and inadequate, for instance, there is no explicit and unambiguous guarantee of the rights of local people in areas to be conserved for biodiversity. Domestic and international pressure for future amendments to the convention must include this point.

Destruction of Biodiversity : National and International Roots: It is becoming increasingly evident that the roots of biodiversity destruction lie in the relations between communities within each nation and between the nations of the world. It is these relations which corner and manage the vast majority of biological resources for the benefits of a small elite minority within poor nations, and for the wasteful consumption pattern of the north. In most of developing countries the roots of this destruction were laid during the colonial era; in India for instance, large

14. Document No UNEP/Bio Div/N6-INC, 4/WG-2/Add3, dated 14 February 1992.

scale commercial forestry started in British Colonial times. "Neo-colonial exploitation continues today, 18 million hectares of Amazonian forests have been cleared in Brazil to fulfill the European and American coffee demand. Germany cause degradation of 200,000 hectares of rainforest each year for its timber consumption."¹⁵

Japan has laid a huge chunk of Goa (India) bare for its demand of iron ore. Adverse terms of trade, protectionist policies of the industrialized nations, dumping of hazardous and environmentally destructive technologies and materials from developed countries into the developing countries and a host of other factors continue to cause severe and widespread biodiversity destruction. The same thing goes, of course, for the exploitative policies followed by elites within developing countries. Vast areas which were rich in biodiversity have been plundered to meet the ever growing consumption needs of this minority, aided by laws which legitimise urban industrial control over resources. The poor are forced to overstrain the meagre resources that are left in their control, and are then labeled as ecological culprits. In countries like India development policies and projects have rarely been sensitive to the need for

15. H. Schucking and Patrick Anderson, "Voices Unheard and Unheeded", in Shiva, V. et. al. Biodiversity : Social and Ecological Perspectives, world Rain forest Movement, 1991.

biodiversity conservation and to the interest of local communities.

The convention on biological diversity barely touches upon some of these issues and completely ignores others. Article 6 states that countries to "integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies", Article 10 commits them to "intergate consideration of the conservation and sustainable use of biological resources into national decision making. While Article 14 require that they "introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimising such effects. Countries are, however, required to do all this only 'as far as possible and as appropriate', which gives them the freedom to do nothing at all".¹⁶

There is no mention whatsoever of global consumption patterns, terms of trade and other roots of the biodiversity crisis in the convention. A clause in an earlier draft which committed countries to "take into account the effect of

16. Ashish Kothari, "The Biodiversity Convention : An Indian view point, Economic and Political Weekly, June, 1992, pp.9-15, p.13.

international trade policies" was dropped is the last meeting.

Developing countries and peoples organization all over the world must demand a commitment from the developed world toward a drastic restructuring of the world economy, and of far reaching structural adjustments within developed economies to make globally sustainable. But the reality is that they are not likely to get much support in this issue from the convention; on the contrary, in the absence of global restructuring, the convention is likely to remain mainly on paper.

Agricultural Biodiversity: The biodiversity convention provide some hope of bringing to centre stage a long neglected aspect of biodiversity; the destruction of cultivated and domesticated animals and plants. Due to the world wide spread of modern intensive agriculture and animal husbandry has displaced thousands of varieties of cultivated crops and domesticated animals, making way for a handful of laboratory generated varieties. The genetic depletion has proved to be disastrous for the food security of many nations and local communities and could prove so for humanity as a whole.

Under Agenda 21, the voluminous UNCED agenda on environment and development the chapter on sustainable

agriculture contains some of these points. However, Agenda 21 is nonbinding on countries and could remain only a statement of pious intent.

These points find only weakly worded mention in the convention. Whether the convention deals with domesticated living beings at all or not was unclear till the February 1992 negotiations. However, the convention remains heavily biased in favour of wildlife, with little elaboration of the steps needed to save domesticated life forms. For instance it defines convention as including "in the case of domesticated or cultivated species, the surrounding where they have developed their distinctive properties". This would presumably include farmers fields in areas where indigenous crops or livestock varieties have been used or developed. In actual article the text only mentions "natural surroundings".

In a developing country like our own (India) it is necessary to guarantee some kind of protection and encouragement to farmers growing traditional varieties, and to ensure that new laboratory generated varieties do not indiscriminately displace traditional ones. In this regard India would have to completely change its environmentally and socially, destructive Green Revolution strategies. The

biodiversity convention only vaguely commits it to doing so, and provides enough loopholes for it to wriggle out.

It is vital that the conservation of crops and livestock on farmers field, and acceptance of farmers Rights, and their participation in biodiversity conservation are guaranteed in the convention itself. It is now up to farmers and other group to ensure their wider interpretation or their expansion into appropriate protocols.

BIOTECHNOLOGY : ITS HAZARDS: The Green Revolution in India and elsewhere has clearly shown that the picture of bio-technology as humanity's savior is seriously flawed. There is plenty of evidence that modern bio-technological development has mainly resulted in biodiversity erosion, environmental and health damage and greater economic and social inequality within and among nations. This is perhaps where the convention fails the most miserably. Repeatedly, during the convention negotiations, there were attempts by people groups to propose a clause on people's groups to propose a clause on safety in the development and use of biotechnologies. But these moves were resisted by most delegations. The result is that the convention comes out rounding extremely positive about biotechnology with, little caution built in.

Earlier drafts committed countries to "regulate the

development, use and release of genetically modified organism (GMOs), which may have adverse effects on health and the conservation and sustainable use of biological diversity. There was some consensus on regulating GMO's which would include, for instance, HYV seeds. But in the final text the GMO's has been replaced (Article 8) by "living modified organisms". This phrase is not defined in the convention and could easily be interpreted to exclude seeds. If so this is a step backward which is most serious.

Article 18 of the convention suggests that "the parties shall consider the need for and modalities of a protocol setting out appropriate procedures including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity".¹⁷ It is imperative that farmer's and other people's groups use this clause to presurise for a protocol which cover's GMOs as a whole, and biotechnology in general, to ensure that its development and use does not result in the sort of ecological and social havoc that has so far been caused.

17. Document No UNEP/Bio Div/N6-INC4/WG2/L1/Rev.1, dated 14, February 1992.

FINANCIAL MECHANISMS AND TECHNOLOGY TRANSFER : The two most contentious parts of the convention relating to financial mechanisms and technology transfers were finally sorted out at the last negotiating round in May 1992. The pros and cons of these sections have been articulated adequately in the climate change debate and in the discussions leading up to UNCED in general. I will not deal with them in detail here. The claim of the developing countries to the finances and technologies of the developed nations is strategically important as also morally justified considering the overwhelming global damage that developed countries have caused. But the nature and quantum of this transfer is also important for the flow of finances and technologies to the developing world in the prevailing set up will not necessarily enhance biodiversity conservation. Such flow could infact reinforce domestic plans and programmes which only pay lip-service to biodiversity. This flow can become helpful only when it is democratically managed (unlike world Bank Controlled international fund the Global environmental facility), open and transparent to public scrutiny, flexible in its scale so as to allow for very small grants, and sensitive to the environmental and cultural context of the recipient country. Most earlier aid or loans to developing countries have been the opposite of this. There are serious differences on many fronts.

"Developing countries want the developed nations provide 'new and additional funds' independent of the developmental and environmental assistance already flowing to them. Many northern countries are reluctant to do this, and are agreeing only to provide 'incremental' costs over and above what it feels the south is capable of providing internally".¹⁸

Secondly, contribution to a global biodiversity fund, according to many developing countries, should be 'mandatory' for developed countries. Thirdly, there is no agreement on how a global fund will be handled and used. The US, many European countries, and Japan are of the firm opinion that money for biodiversity should be routed through the existing Global Environment Facility (GEF), the megafund that has been created under the control of the World Bank, UNDP and UNEP. Many southern nations on the other hand led by a vociferous Malaysia, are against this, and want a separate fund for biodiversity. They point out that GEF is north dominated and of undemocratic nature has hardly been responsive to the genuine needs of the south.

With regard to funding the final text of the

18. 'Fourth Revised Draft Convention on Biodiversity' Intergovernmental Negotiating Committee for a convention on Biological Diversity (UNEP Document No UNEP/BIO Div/N6-INC 4/2 dated 16, December 1991.

convention must be considered to have scored a victory of sorts for the developing world. Article 20 commits "developed country parties (to) provide new and additional financial resource to enable developing country parties to meet and agreed full incremental costs to them of implementing measures which fulfill the obligations of this convention...". Further, Article 21 states categorically that any mechanism to administer funds for the convention must be under the authority of the conference of parties, which is a one-country on-vote body. This mechanism must also "operate within a democratic and transparent system of governance". The GEF has been accepted as interim mechanism only, "provided it has been fully restructured in accordance with the requirements of Article 21." Since there is little chances of GEF becoming "democratic and transparent" and accepting the authority of the conference of parties, it is more likely that a new mechanism will have to be formulated at the first meeting of the conference of parties after ratification of the convention. This reformed text is the other main reason why countries like USA and Japan have backed out of the Biodiversity Convention.

The earlier formulation commits that "access to and transfer of technology to developing countries shall be provided and/or facilitated (fair and reasonable) (fair and

most reasonable) (preferential and concessional) conditions."¹⁹

But one final aspect about technology transfer is important and has been largely ignored in both the negotiations as also the debate surrounding the convention. It must be recognized that if what is needed is technology appropriate to biodiversity conservation and sustainable use, than the developing world may have a lot to teach the developed world. A considerable variety of traditional skills and techniques are ecologically sustainable and need to be encouraged and revived, rather than displaced by modern technologies just because they would now be available. The talk of "technology transfer" assumes a one way, developed to developing transfer. This is not only narrowminded but also self domeaning for countries with a rich tradition of relevant technologies, like in India. I am tempted to say more on those who are always harping on technology and financial transfers but I shall desist at this stage.

A Non-consultative Undemocratic Process: One of the worst aspects of the proposed Biodiversity Convention, from the point of view of citizens, is the thoroughly undemocratic way in which it has been pushed through. It should be

19. Document No UNEP/BIO Div/N6-INC4/WG2/L1/Rev 1, dated 14 February 1992.

incumbent upon any government which is going to negotiate an international treaty to conduct a process of wide ranging consultation with its citizens. Yet how many of developing nation's people, even among those who are involved in scientific, environmental and developmental work, know the contours of the biodiversity debate? Neither the government nor any other agency has made a systematic attempt to feed information to the media and to citizens groups, or to have hearings and consultations.

This is all the more tragic because the Convention negotiations are like most UN processes, almost purely an inter-governmental matter. Two or three government officials are supposed to represent the entire public of a nation, 850 million strong in the case of India. How can these officials claim to speak on behalf of the people of India, when they have never bothered to get the viewpoints of its citizens?

"Issues of biodiversity and biotechnology are complex, especially in their relations to social political and economic processes. The people of the world have a right to take part in any process of building up international agreements. Even now it is not too late."²⁰

20. Ashish Kothari, "The Biodiversity Convention : An Indian View Point, Economic and Political Weekly, June 1992, pp.9-15, p.15.

Each government should immediately start a dialogue with its citizens on the issues relating to the convention. The dialogue should include academics, environmentalist, scientists, social activists, and most importantly, representatives of traditional communities which are closest to the biodiversity that is sought to be conserved. Only when such a process is carried through, and a broad understanding and consensus reached will the convention be implemented to the benefit of people at large.

The global Biodiversity Convention has the potential of becoming a genuine instrument for the conservation of the earth's biological wealth and the equitable distribution of its benefits between and within nations. But only strong radical public opinion can ensure this. And halt its conversion into another weapon in the hands of the rich and the elite of the world.

On 23 December, 1993 this much awaited Biodiversity convention had come into force. The developed world was finally going to fork out millions in hard currency to conserve the rich biodiversity of developing world (including India). This is a big achievement of developing world.

CHAPTER - IV

INDIAN DILEMMA

Nature has endowed India with a rich biological diversity which includes over 40,000 species of plants and 75,000 species of animals. India is one of the top 12 mega diversity countries of the world which accounts for over 2% of the world landmass and spans a great diversity of environmental regimes. It has about 12% of the global plant wealth. Amongst these are nearly three thousand tree species. Nearly a third of the total plant species of India are endemic.

The approximate number of the species of insects are 60,000, species of fishes are 1693, species of birds are more than 3000 and species of mammals are 372. This is in addition to the country's rich marine life found along the shelf zone of over 45 million hectares. Both animals and plants are found in a wide variety of habitats which range from the wet tropical rain forests of the very heavy rainfall zone to the thorny forests of the very heavy rainfall zone to the thorny forests of the desert zone and the mixed temperate coniferous forests of the high hills. India has some of the largest mountains in the world and also tiny coral islands in the Indian ocean. Its river

systems include the mighty Ganga and Brahmaputra with their huge flood plains and the short and swift west-flowing rivers discharging from the Western-Ghats into the Arabian Sea. Because of this physiographic variations, India's natural vegetation ranges over tropical evergreen and mangrove to dry deciduous and desert scrub.

FLORA: India's flora is extremely varied in extent, composition and endemism. There are over thirty thousand species of higher plants in India under 174 natural orders. There are over 600 species of fern and pteridophyte. Of the higher plants there are 11,124 species of dicotyledons belonging to 1831 genera. The family orchidaceae is the largest family of flowering plants containing nearly 1,700 species.

Most plant species in India are found in the forest areas which occupy nearly 20 percent of the total geographical area of the country. These forests are found all over India, from Kashmir to Kerala and from Rajasthan to Tripura. However, the extent of forests varies from state to state.

Salient Feature of India's Flora:

Amongst the hundreds of families of flowering plants found in India, the following ten are dominant:

- | | |
|----------------|-----------------|
| 1. Orchidaceae | 2. Leguminosae |
| 3. Gramineae | 4. Compositae |
| 5. Labiatae | 6. Rubiaceae |
| 7. Urticacea | 8. Euphobiaceae |
| 9. Acanthaceae | 10. Cyperaceae |

Amongst the families, labiatae and compositae are more abundant in the temperate regions while the rest are largely tropical in distribution. One interesting feature of Indian flora is that-- "compositae which is the richest family of flowering plants in the world has a relatively low position in India."¹ There are hundreds of species of grasses, over 100 species of bamboos and more than 25 species of conifers in India.

Endemic Flora: India is connected by land with many other countries. However, the proportion of endemic flora is fairly large. The endemism of dicot flora is given in the following table:

Total No. of dicot species-11124

Total No. of dicot genera-1831

Percentage endemic to Peninsular India-18.2%

Percentage endemic to Himalayan region and N.E. India-28.8%

percentage endemic to other parts-4.9%

1. S.S. Negi, "Biodiversity and its conservation in India", Indus Publishing Company, New Delhi, 1993, p.45.

The major non-endemic elements which have influence on Indian Flora are Malayan element and Chinese element.

Rare and Threatened Plants: The population of many plant species of India has declined to alarming levels due to environmental change that are continuously taking place. These are being brought about both by causes induced by man and under nature's process of natural selection. It has been estimated by the Botanical Survey of India (1987) that 10% (about 1500 species) of our flowering plants are threatened.

The extinct, endangered, vulnerable and rare plants of India have been given briefly here.

Family: Acanthaceae, Aceraceae, Annonaceae, Apiaceae, Areceae, Arecaceae, Asteraceae, Berberidaceae, Capparaceae, Celastraceae, Cyperaceae, Dipterocarpaceae, Euphorbiaceae, Fabaceae, Malvaceae, Orchidaceae, Poaceae, Rosaceae, Rubiaceae, Sapotaceae, Sterculiaceae, Theaceae, Vitaceae, Zingiberaceae etc.

Bamboos are widely distributed in different parts of India. Out of the total 1000 known species of bamboos in the world about 100 are found in India. Out of these 100 genera 24 are rare and threatened.

There are 135 genera, 734 species, 2 sub-species and 39 varieties of grasses in India (Hooker 1896). Since then 448

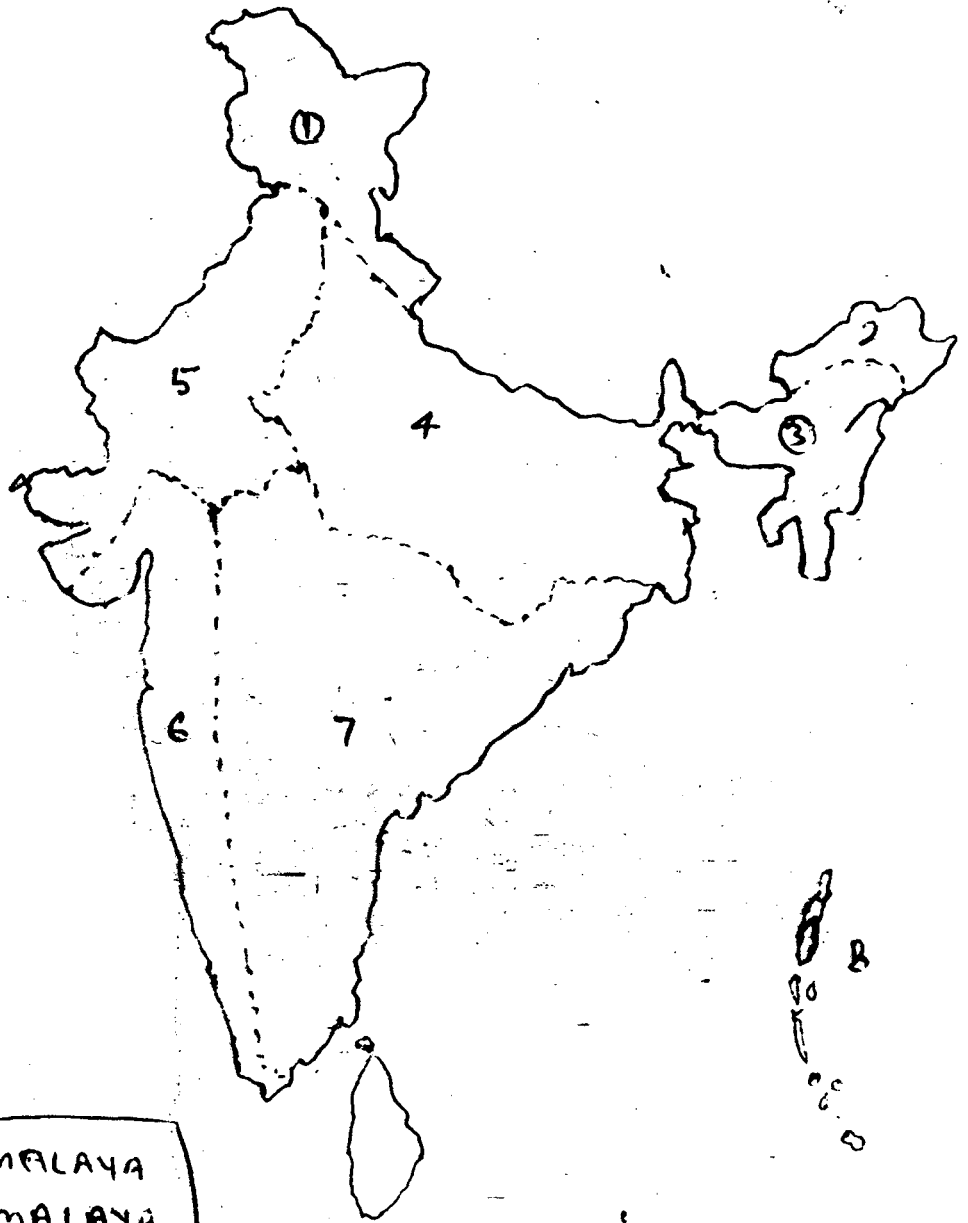
species, 1 sub-species and 109 varieties have been added. Of these 16 genera, 289 species, 2 sub-species and 43 varieties are endemic to India. Many species of grasses are rare and threatened with extinction. There are 58 rare species of grasses and 9 species are intermediate and threatened. One specie named 'Hubbardia heptaneuron' is extinct.

FAUNA: India is the home of thousands of species of wild animals, viz mammals, birds, reptiles, fishes and amphibians. They live in and around the country's dense vegetation that varies from the open thorny desert forests of Rajasthan in the west to the evergreen forests of Kerala in the South, the rain forest of north east India and the alpine pastures of Kashmir in the north.

The magnificent wild animals living in these forests were adversely affected by human settlement and British war effort. Reckless hunting too caused steady depletion of India's wildlife. This resulted in hundreds of tigers being shot dead during massive hunt, cheetah becoming extinct, and the distribution of animals like the rhinoceros and lion being confined to smaller and smaller pockets.

India's wildlife is under a severe strain which have brought many of them to the verge of extinction. "Despite such rich tradition and socio-religious back-ground the

BIO-
CENTRES OF DIVERSITY



- ① WESTERN HIMALAYA
- ② EASTERN HIMALAYA
- ③ NORTH EAST REGION
- ④ GANGETIC PLAINS
- ⑤ INDUS PLAINS
- ⑥ WESTERN GHATS
- ⑦ EASTERN GHATS
- ANDAMAN and NICOBAR

Source: Arora and Nayar, 1984.

country has witnessed serious depletion of this biological heritage, mainly because of the pressure exerted by the phenomenal increase in human and livestock populations in the country, particularly during the last few decades. From 297 million in 1931, the human population rose to 684 million in 1981, an increase of about 145 percent."² This figure has gone upto 850 million in 1991. Population explosion is responsible for the depletion of India's biological diversity. It has exerted an unprecedented pressure on the habitat of animals and plants.

Rare and Threatened Animal Species:

Due to a heavy pressure on the fast shrinking forests to meet the growing demands of the population, the habitats of many wild animals has been destroyed. This has rendered many animals extinct and many others are on the verge of extinction. The process of extinction of most animals is linked to the activities of human beings. The species that become too narrowly restricted to a particular area due to biotic pressure are the ones that will invariably become extinct sometime in the near future. An unbalanced sex ratio in a particular species is a danger signal of its decline and subsequent extinction. At present, a number of animal species are slowly moving towards extinction. There are a

2. S.S. Negi, "Handbook of Forestry", IBD, Dehradun, 1986, p.63.

large number of rare and threatened animal species, which if not adequately protected may become extinct in the near future. These include mammals, reptiles, fishes, birds and amphibians.

India has about 340 species of mammals. According to the Red Data Book of the International Union for the Conservation of Nature and Natural Resources, India has 27 mammals species which are threatened with extinction. This ranks India second in the world in the number of mammals faced with extinction. The USA is placed at the top of the list with 31 species of mammals threatened with extinction. The threatened mammals are i.e. Tiger, Indian lion, Leopard, snow Leopard, Desert Cat, Clouded Leopard, and Civet Cats. Other threatened animals are Primates, i.e. Loris, Macaque, Langur etc; Philidota; Rodents; marmots; Bears; Rhinoceros; Pigs and Canines (wild dogs, Jackal, red fox and Indian fox). Aquatic mammals are abundantly found in India. There are about 25 species of aquatic mammals in Indian waters. These include whales, porpoise and dolphins and nearly all of them are threatened with extinction. Other threatened mammals are dears and antelopes, Gaur, Wild Yak, Hispid hare, and Bharal etc.

A large variety of birds are found in India. These belong to over 2000 different species and sub-species. A

large number of these birds are threatened with extinction. Amongst these the great Indian bustard and the Bengal floricans are very rare and endangered species. This species endemic to India. The little bustard is also endangered species. Other endangered bird species are Nicobar Pigeon, Nicobar megapode, blood pheasant, mountain quail, whooper swan, white-winged wood duck, great teal, pink headed duck and many species of horn bills.

The rare and threatened species of reptiles are, all the three species of crocodiles, Snakes (stripped keel back, royal snake, king cobra, and India egg eating snake). Many species of lizards, Turtles, Tortoises and Amphibians are also rare and threatened.

Biodiversity conservation in India:

Conservation of biodiversity involve essentially long-range management. It is indeed a holistic concept and encompasses whole spectrum of activities from in situ conervation dealing with population, communities and ecosystems on the one hand, and on the other it deals with exsitu involving botanical gardens, arboreta. Zoos and zoological gardens, and biological banks for storing pollen, seed, sperm, egg, embryo, tissue, organ and genes.

Following Figure summerizes different options available for conservation.

FIGURE 1

Options for Conservation of biodiversity

	DEAD	Preservation	- Herbaria - Musea
		complete organisms	- Botanical Gardens - Arboreta - Zoos - Biological Parks
	Ex-Situ Preservation Organic evolution Discontinued	organic parts	- Bio-bank - Polen/seeds - Sperm/Egg - Embryo - Tissue/Organ - Gene
		Single use Wildlands	Genetic Rese - Crop/Non-Crop - Forest trees - Wild Relatives of livestock/ Fishes
ALIVE	in-Situ Conservation Continuation of organic evolution	Multi use Wildlands	- Biosphere Reserves - National Parks - Sanctuaries - Watersheds - Natural Monuments - Protected landscaps - Ehnobiological landscape - Ehnobiological Reserves - Sacred Groves
	Ex-Situ/ in-Situ	Non-wild Lands	Coverted land for genetic diversity - Man-made wilderness Areas

Source: Khoshoo, 1992

A distinction has to be made between in-sites and ex-situ conservation. Insitu conservation is indeed long term management and with it is implicit that both ecological processes and organic evolution go on unhindered. Under ex-situ conservation such processes are cut short. Obviously, ex-situ does not have the benefit of continued organic evolution.

A situation inter mediate between in situ and ex-situ occurs in wild land in man-made wilderness areas or when such lands are converted for purpose of preserving/conserving biodiversity or genetic diversity.

India is a biomass based civilization, therefore, biodiversity is a matter of considerable significance, Over two third of its 850 million people depend on agriculture for their subsistence. "They gather some 150 million tons of fuelwood annually for domestic use and free-rang grazing by their livestock amounts to a fooder demand of over 500 million tons."³.

The anthropological survey of India has recently completed an investigation of the 2600 ethnic communities making up the entire Indian population, revealed that the very substantial dependence of the Indian population on

3. M. Gadgil, M. Sinha and J. Pillai, "India : A Biomass Budget", Final Report of the Study Group on Fuelwood and Fooder, Planning Commission, Govt. of India, 1989.

biomass, with atleast some member in 5% of the communities being engaged in hunting gathering; 7% in fishing; 2% in trapping birds; 2% in woodwork, 7% in basket and mat weaving, 3.5% in shifting cultivation; 20% in animal husbandary and 50% in settled cultivation.

Jodha's investigations in 82 villages in semi arid districts of 7 Indian state suggest that " biomass harvests from common land furnish 14% to 23% of household income from all sources. Two-third of community report continued use of indigenouse herbal medicines."⁴

In this biomass based civilization a wide diversity of living organisers are put to range of uses. A significant proportion of India's large population depends on a diversity of products from living organisms. Some 35-40% of the Indian population earns just enough to itself and has no purchasing power to meet other needs from the market place. Thus, "a third or more Indian people behave as "ecosystem people," people whose quality of life is intimately linked to the productivity and diversity of living organisms in their own restricted resource catchments."⁵

4. N.S. Jodha, "Rural Common Property Resources : Contribution and Crisis", Foundation day lecture, Society for promotion of wastelands Development, New Delhi, 1990, p.24.

5. Madhav Gadgil, "Biodiversity and India's Degraded Lands", Ambio, vol.22, no.2-3, May 1993, p.168.

But under pressures of non-sustainable exploitation of biological resource the Indian environment is rapidly losing both the productivity and diversity so critical to the ecosystem people. Official attempts to protect biodiversity are largely confined to about 3% of India's land surface that makes up the protected areas system. These few species rich areas are being increasingly surrounded by a matrix of biologically poor land and water scape. Ecological theory tells us that such fragments are bound to lose a large proportion of their species in the long run. Such a loss would be more drastic in the event of the global warming that may occur over the next few decades. It is vital that protected areas are entrenched in a biologically diverse, ecologically friendly matrix. The critical issue then is : how can 40% of Indian's landmass currently under excessive pressure of extraction of biological resource and depleted biodiversity be restored to supporting productive and diverse biological communities in way that would contribute to the quality of life of India's ecosystem people.

In a country as complex and heterogenous as India, there are obviously, no simple solutions. But here I will try to highlight some conservation efforts done by various organisations including the governments.

Government Policies and Programmes:

India has declared in the Directive Principles of state policy that the "state shall endeavour to protect and improve the environment and to safeguard the forest and wildlife of the country (Article 48A)."⁶ This article was added in the Indian constitution in 1976. Although this principle is not binding on the courts, such a formulation is important for conservation measures, because in interpreting laws and policies, the court of India have viewed conservation objectives in a favourable light with reference to Article 48A.

The most significant steps toward biodiversity (wild life) conservation in India was the framing of the National Wildlife Action Plan. In 1982 Prime Minister Indira Gandhi outlined a broad framework for wild life conservation, which consisted of the following :

- (1) The establishment of a network of protected areas such as national parks, sanctuaries and biosphere reserves to representative sample of all major wildlife ecosystem.
- (2) The restoration of degraded habitats to their natural state within these protected areas.

6. Durga Das Basu, "Introduction to the Constitution of India", Prentice-Hall of India Private Ltd., New Delhi, 1990, p.140.

- (3) The rehabilitation of endangered and threatened species and their restoration to protected portion of their former habitats.
- (4) Support for the management of botanical gardens and zoological parks and undertaking captive breeding programmes for threatened species of plants and animals.
- (5) The development of research and monitoring facilities which will provide a scientific understanding of wildlife population.
- (6) The review and updating of statutory provisions providing protection to wildlife.
- (7) Participation in international conventions designed to prevent the depletion of wildlife resources and to provide protection to migratory species.
- (8) Long-term conservation of wildlife on the scientific principles of evolution and genetics.

Based on the above the National Action Plan was formulated, consisting mainly of the following objectives :

- (a) Establishment of a Representative Network of Protected Areas.

- (b) Management of Protected Areas and Habitat Restoration.
- (c) Wildlife Protection in Multiple Use Areas.
- (d) Rehabilitation of Endangered and Threatened species.
- (e) Captive breeding programmes.
- (f) Wildlife education and Interpretation.
- (g) Research and Monitoring.
- (h) Domestic legislation and International Conventions.
- (i) National Conservation Strategy.
- (j) Collaboration with voluntary Bodies and Non-Government Organisation.

The central and state governments have initiated some special programmes aimed at preserving certain endangered species. The best known of these is Project-Tiger, but there are also like Project Hangul; Crocodile Breeding Project; Gir Lion Sanctuary-Project; Himalayan Musk Deer Projects; and Manipur Brow-Antlered Deer conservation Project.

National Parks, Sancturies and Biosphere Reserves:

India did not have a national park till the thirties of this century when the corbett national park came up. Since then hundreds of sancturies, national parks and biosphere reserves have come up in different parts of the country.

The continuining ecological and environment degradation has assumed alarming proportion, compelling the authorities and environmentalists to think seriously about the conservation of flora and fauna. Sancturoes and national parks have been created exclusively for protecting the wild flora and fanna in India, as a part of broad wild life management perspective so that natural biodiversity grow under natural and protected conditions. These are the last resort of wild life and prevent it from disappearance.

Sancturies, national parks, game-reserves and closed areas are dealt with in chapter IV of the wild life (Protection) Act, 1972 from section 18 to 38. Under section 35 "whenever it appears to the state government that an area, whether within a sanctuary or not is by reason of its ecological, faunal, floral, geomorphological or 300 logical association or importance, needed to be constitute as a national park for the purpose of propagating or developing wildlife therein or its environment, it may by notification,

declare its intention to constitute such areas as a national park."⁷

Sanction 36 dealt with the game reserves sanction 27 dealt with the closed area.

Under section 18 "the state government may by notification, declare any area to be a sanctuary, if it considers that such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance for the purpose of protecting propagation or developing wild life or its environment."⁸

There are more than 59 national parks and 275 wild life sanctuaries in India.

Yet another concept of management of biodiversity has emerged in the form of biosphere reserves. The man and Biosphere Programme of UNESCO envisages the following objectives :

- (1) To conserve for present and future human use the diversity and integrity of biotic communities of plants and animals within natural ecosystems and to safeguard the genetic diversity of species on which their continuing evolution depends.

7. Wildlife (Protection) Act, 1972, Sanction 35.

8. Ibid., Sanction 38.

- (2) To provide these areas for ecological and environmental research including baseline studies, both within and adjacent to these reserves.

The Government of India and the state governments are taking keen interest in the preservation and management of wildlife in India by creating more national parks, Sancturaries and biosphere reserves.

The world wide man and Biosphere (MAB) Programme was launched in the year 1971. One of the most important aspects of the MAB programme is the 'conservation of natural areas and the genetic material they contain.' The idea of biosphere reserves was introduced under this.

Characteristics Features of Biosphere Reserve

- (1) They are protected areas of representative terrestrial and coastal environments recognized world wide for their value in conservation.
- (2) They are representative examples of natural or minimally disturbed ecoystems.
- (3) Each such reserve is large enough to function as a unit of conservation.
- (4) People are a part of biosphere reserves.

(5) Biosphere reserve function as an open system.

Biosphere Reserves in India: A number of biosphere reserves have been constituted in India. These are :

- 1) Great Nicobar Biosphere Reserves.
- 2) North Andaman Biophere Reserves.
- 3) Namdhapa Biosphere Reserves.
(Arunachal Pradesh, 7000 sq.km.)
- 4) Manas Biosphere Reserve (Assam, 2837 sq. km.)
- 5) Kaziranga Biosphere Reserve (Assam, 37823 sq. km.)
- 6) Rann of Kutch Biosphere Reserve (Gujrat)
- 7) Kanha Biosphere Reserve (M.P.)
- 8) Nokrek Biosphere Reserve (Meghalaya, 60 sq. km.)
- 9) Thar Desert " " (Rajasthan)
- 10) Gulf of Mannar " " (T.N.)
- 11) Nilgiri " " (T.N.)
- 12) Nanda Devi " " (U.P.) (2600 sq. km.)
- 13) Uttara Khand " " (U.P.) (3941 sq. km.)
- 14) Sundar bans " " (W.B.).

The details of the above biosphere reserve is not possible here.

In addition to above reserves there are 46 Botanical gardens and 109 zoological parks in India. Beside these parks and gardens 28 other gardens (mainly of horticultural

interests) which are contributing to the conservation of the biological diversity of India.

Preservation plots, Sample plots and protected Trees are important for conservation of biological diversity. This process was started in India in 1905. At present there are 309 preservation plots all over the country, 187 in natural forests and 122 in plantations. These cover an area of 8500 hectares. There are 1905 sample plots in different forest types and 537 protected trees of different species in various forests.

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The following table gives the present status of preservation plots and sample plots in different states of India.

TABLE V
Present Status of Preservation Plots and Sample Plots

State	Number of Preservation Plots			Number of Sample Plots
	Natural Forest	Plantation	Total	
Andhra Pradesh	11	-	11	17
Arunachal Pradesh	1	-	1	2
Assam	9	1	10	13
Bihar	9	-	9	125
Goa	-	-	-	13
Gujrat	18	-	18	-

Haryana	-	-	-	-
H.P.	6	6	12	111
J & K	3	-	3	92
Karnataka	11	-	11	101
Kerala	8	43	51	156
Madhya Pradesh	28	-	28	191
Maharashtra	11	-	11	69
Manipur	-	-	-	-
Meghalays	2	-	2	-
Nagaland	-	-	-	-
Orissa	6	-	6	88
Punjab	-	-	-	-
Rajasthan	3	-	3	45
Rajasthan	3	-	3	45
T.N.	2	67	69	70
U.Ts	-	-	-	10
U.P.	32	-	32	184
W. Bengal	27	5	32	184
Total	187	122	209	1905

Source : ICFRE Annual Report 1981-82.

As a matter of fact, after the African continent, India is considered to be the home to the richest assemblage of wild animals. The country will never above the rest if biological diversity of both animals and plants is taken as a yardstick.

Because of this richness of Biodiversity government of India has taken several steps to protect, preserve, and promote biodiversity in India. The above mentioned methods have been taken by Govt. of India and various state governments to protect the rare and threatened species of plants and animals. India's biodiversity should not and be conserved in the protected areas system that currently covers about 8.1 million hectare, but conservation should be in the much large matrix of forest areas, pastures and on farm and canal bunds, in house yards, and over 143 million hectares of cultivated tracts. Because as many as 250-300 million ecosystem people of India depend on gathering a name of biological produce from these 211 million hectare and would greatly benefit from these lands continuing to support biologically diverse communities. An ecologically friendly matrix would greatly help in the long-term conservation of biodiversity in the protected area system. Devotion of powers to the ecosystem people and greater attention to their interests in organizing of the economy must therefore accompany attempts at conservation and restoration of biodiversity on a larger scale.

A number of positive steps in this direction have been taken in recent years in India. The new forest policy accepted in 1988 gives primacy to the needs of ecosystem

people. A resolution of the Government of India, promulgated in June 1990, encourages involvement of local communities in co-management of forest resources. Since 1989, the National Wasteland Development Board has initiated a program of local level Micro-planning for rehabilitation of degraded lands in which local communities are expected to play an active role. This program emphasizes the need to use a wide variety of species of local utility in the ecorestoration programs.

Roles of Non-Governmental organization:

The non-governmental initiatives have vigorously preceded and catalyzed these developments over the past 15 years. These include grassroot level programs where small tribal and Rural communities have spontaneously organized themselves to manage biodiversity. The best known of these being the chipko activism in Himalays, as well as activities of urban based NGOs like world wide fund for Nature-India.

A Delhi-based NGO Kalpavriksh urges the government to integrate biodiversity concerns into environmental assessment (EIA) procedures and to start a national register of plant, animal and micro-organism diversity following the legislation of the convention on biological diversity signed at the Earth Summit 1992. India is considering ratification of the convention which came into legal force on December 23, 1993. The NGO also urges the government to take some

positive steps to make the convention more rational and favorable to the south before ratifying it. This includes the need to review internal policies and programmes which destroy the diversity of crops and livestock. Thee Kalpavriksh says together with checking over - exploitation of natural habitats outside our national parks and sanctuaries, there is also an urgent need to focus on conservation of mangroves, coral reefs. and other such "gaps" in conservation coverage.

Welcoming a proposed legislation to monitor export and import of biodiversity, Kalpavriksh hopes it would check the current whole sale transfer of biodiversity across India's borders. The action group also proposes a regional agreement between countries of South and South-east Asia who share a considerable amount of biodiversity. This agreement can be initiated at the coming SAARC meeting.

Emphasising the need to respect and preserve rights and traditional knowledge and practice systems of local communities in conserving biodiversity, Kalpavriksh says it is important that the government consults all parties concerned in conservation, especially the grassroot movements and local communities in the decision-making process.

At the global level the euphoria of biodiversity convention may fizzle out once the implications become clear. Aid-for-nature deals, contrary to their stated intent, have usually ended up stripping the genetic heritage of nations in the developing world. If India need to learn its lessons early, it better understand what is happening in Costa Rica, a Latin American country that has plumped for trade in genetic resources.

Deciding costa Rica's genetic fortunes is In Bio, a state sponsored non-profit organization that has signed a trade-cum-conservation agreement with the world's leading drug gaint Merck. "Under the deal the pharmaceutical company will pay INBIO \$1 million. This represent 0.7 per cent of Merck's annual research budget and less than one per cent of its standard cost in developing a new drug. In return, the multinational will gain unrestricted access into Costa-Rica's natural reserves for two years. Merck has got away by paying a mere \$1 million to a country believed to posses five per cent (5%) of the world's biodiversity"⁹ At this exchange rate, the rest of the third world's biodiversity can be bought for \$ 20 million, a pinprick amount for global corporations.

9. Devinder Sharma, "Shortselling the Country's Biodiversity", Times of India, 26 April 1994, New Delhi, (ed.), p.22.

India's stakes are too high to barter away its biodiversity for a song. According to Ministry of environment and forest estimates, the country shelters about 75,000 species of animals and 45,000 species of plants. It is also considered home to 7,000 endemic species (not found elsewhere in the world), and has one of the richest collections of medicinal herbs in the world.

Therefore, it is not enough for the Ministry to introduce legislation to protect gene pools by prohibiting destruction of habitats and banning the export of genetic material. More crucial is to know the value of what it aims to protect.

Further, India should take a lead in pressing for the setting up of an independent international fund should be operated by a democratic, transparent show of hand by all the countries. Because the Global Environment Facility, currently granting fund for conservation, is dominated by developed countries and is undemocratic.

The establishment of a National Biodiversity Conservation Board (NBCB) rather than Indian Board of Wildlife was suggested by the Task Force on Environment of the Planning commission in 1988. While conserving biodiversity, we have to keep some important facts in mind, because India is a diversified country.

In India, where parallel to biological diversity, we have a tremendous amount of cultural diversity. The biological and cultural diversity have been mutually supportive. Infact, biological diversity has given rise to cultural diversity. Thus, in every sense, cultural diversity is a part of biological diversity. The NBCB, Beside overlooking management based on scientific and technological consideration, would also take tangible steps to establish a stake of the people who should be the guardians and protectors of the Protected Areas Network (PAN). It may be pointed out that community involvement in such national task poses problems, because due to short-sighted policies people are alienated. Even the tribal and rural development and the proposed Panchayati Raj can be oriented to conservation of biodiversity one way to build the stake of the people is to ensure, on a sustainable basis, the supply of good on which the people of particular protected area depend.

NBCB will need to prepare a holistic plan and oversee its implementation. The Board's success will no doubt, depend on the cooperation it would receive from various agencies.

As we know that there are many positive indications in India that a broader based people oriented approach to

conservation of biodiversity is beginning to take root. Restoration and maintenance of biodiversity over degraded and waste lands in the Third World tropics would contains bee an important element in this effort.

CONCLUSION

The problem of biodiversity loss and conservation to the extent discussed herein, is only a part of the larger problem of the environmental degradation. The drama involved in biodiversity loss and conservation and the high publicity it receives, in no way lessens the tragedy involved. Biodiversity loss involves an analysis, that accommodates two fundamental needs of our society. On the one hand, is the need to make sustainable use of nature's bounty for the benefit of man without threatening the rights of generation's to come, where as on the other, lies the need to ensure that man does not so pollute the environment as to make impossible the continuance of the very activities, which depend on the biodiversity.

To balance these needs we have examined the provisions mentioned in biodiversity convention (1992). Though there are many flaws in this convention, yet it has been finally accepted and signed by member nations in December 1993 to bring it into legal force.

The introductory part (Chapter - I) of our study is concerned about all global commons in brief. We have dealt with every aspects related to global commons. There are many legal provisions to protect these common heritages of man

kind from national jurisdiction of any particular nation-state. Because of these legal provisions exploration and exploitation of any thing exist there come under the supervision of various UN and other international bodies. Despite of all these legal provisions some nation-state always try to interfere with these provisions.

As was seen in Chapter II of our study, the biodiversity has an overall impact on human beings. This impact of biodiversity has been discussed in detail as the value of biodiversity as a resource. The process of global biodiversity loss is a combined result of many factors, viz, substitution of native plants and animals by laboratory produced varieties of plants and animals; specialization in production of a few varieties of plants and animals which ultimately leads to monotonous regime of plants and animals, that is disastrous to human beings. These specialised methods of production are extensively being used throughout the globe. The forces behind the loss of biodiversity are many but the major among them is deforestation. The conservation of biodiversity by modern as well as traditional or indigenous methods have been discussed. It is shown that the loss of biodiversity all over the world is more human made rather than by nature itself. We have added 16 new parks in global threatened parks list, which shows the growing loss of biological diversity all over the world.

In Chapter III it has been discussed in detail on biodiversity convention held in 1992. The major content of this chapter is to expose the controversy, over the biological diversity, between developed north and developing south. Another major content is the absence of third party (local people) in the convention. We have focused on the major tug-off-war between north and South on technology transfer and funding to developing countries for conserving their biodiversity. But the developed countries in the name of intellectual property right or 'patent right' obstruct the easy and smooth flow of Technology and funding to developing countries. This weakens the process of biodiversity conservation in the developing world, because without proper technology and aid it is not possible for them to maintain biodiversity to the environmentally friendly situation. Developed nations give reason behind, not transferring technology and aid to developing world that, these technologies are controlled by cooperations and MNCs whom they can not pressurise for this. Because of this unequal position between developed and developing world, the common heritage has every chance of getting misused.

Since last couple of centuries the developed world, which is poor in biological diversity, forcibly exploiting the natural resources of the biologically rich nations of

the developing world. This is done through creating the most selfish protectionist systems to monopolies the technologies and benefits coming out of these biological resources. Because of this tendency the common heritages have been transformed into a colony for the developed world. Because of this colonisation of common heritages the developing countries fought for the deletion of the term 'common heritage'. Instead they pressed for, and got accepted, the principle of national sovereignty over biological resources. But the greatest anomaly in the position of developing nations has been that even while they stridently assent national sovereignty over biological resources at the same time they try to underplay the rights of their own local communities. In the name of biodiversity conservation the local communities have been thrown out of protected areas or their rights and activities been severely curtailed. The same approach has been adopted in India and many other developing countries. As we have discussed earlier in this chapter that without the cooperation of local or indigenous people any effort of biodiversity conservation can not succeed.

We have also discussed in Chapter III about the rewards and incentives to indigenous people and farmers. Why only scientists and cooperations should get rewards and incentives for conserving biodiversity? The countless indigenous people have for centuries been conserving

biodiversity and finding new uses of them. For generations farmers have been discovering wild plants worthy of cultivations. Almost all of the "miracle discoveries" of modern biotechnology are based on this traditional wealth of knowledge and resources.

It has also focused on agricultural biodiversity which is a long neglected aspect of biodiversity. The displacement of thousand of varieties of cultivated crops and domesticated animals by modern intensive agriculture and animal husbandry. And it makes way for a handful of laboratory produced varieties. This genetic erosion has proved to be disastrous for the food security of many countries and local people, and could prove so for humanity, as a whole. Hence we will try to discuss critically the Biodiversity-Biotechnologs Documents of Earth summit 1992.

The following Six flaws in the Biodiversity convention are important -

- 1) The sovereign right of local community which have conserved and maintained biodiversity and whoes cultural servival in linked intimately to the servival of biodiversity to conserve and use ^{of} biological diversity is missing.

- 2) The flaw in the convention is the assumption that biotechnology is essential for the conservation and sustainable use of biodiversity as stated in Article 16.¹ Diverse species exist independent of technology, though biotechnology depends on biodiversity to provide raw material for commercial objectives. Unlike other commodities, replace and substitute the original biodiversity which they consume as raw material. It is this double transformation induced by biotechnology that has significant adverse impact on the Third world. Not only is biodiversity devalued, from being a means of production into being mere raw materials but also displaced by the genetically uniform biotechnology products.
- 3) The third flaw is that it has accepted patents in the area of living resources. Article 17 para 2 and 3 of the 20 February 1992 draft addressed the issue of transfer of technology on fair and concessional terms with no commitment to patents and intellectual property protection. The final draft of convention had introduced a clause that stated that in the case of technology - subject to patents and other intellectual property rights, such access and transfer shall be provided on terms which recognise and are consistent with the adequate and effective protection of

intellectual properties.

- 4) The fourth flaw, due to last minute changes that the U.S.A. manipulated in Nairobi is the exclusion of the world's present crop gene banks. By not including in the convention the issue of ownership and related rights over genetic resources presently in gene banks could result in serious economic loss to developing countries, as industrial countries, where most of the gene banks are located, can be expected to rush to patent these genetic materials. The reason is that the convention deals only with access to genetic resource to be collected in future, whilst excluding the hundreds of thousands of sample now housed in gene banks or botanical gardens. There is thus to be no internationally binding obligation on these gene banks or botanical gardens to pay the countries of origin of the genetic resources or to share equitably with them the benefits of the use of the materials and the technology.
- 5) The fifth flaw in the convention is in last minute change in the definitions. Terms such as 'country of origin', 'in situ condition' and 'ecosystem' have been so defined as to lend themselves to convenient

interpretation in order to suit the interests of the developed countries and their TNCs.

- 6) The Sixth flow of the Biodiversity convention is that it has accepted the world Banks Global Environmental Facility Strongly under the influence of TNCs as the interim financial mechanism. An independent funding mechanism, called Biological Diversity Fund in earlier draft on which the Third world was insisting has been sacrificed.

In the light of the 6 flaws indicated above, the Biodiversity convention has the risk of favouring the First world developed countries and their TNCs more than it favours the Third world. Much will depend on future interpretations and amendments.

Chapter IV is devoted to Indian Dilemma on biodiversity. We have discussed the biological resources in detail with emphasis on rare and endangered species of flora and fauna and their conservation. Various methods of conservation have been discussed, viz, national parks, wild-life sanctuaries, game sanctuaries, biosphere reserves, zoological parks, botanical gardens, Protected and preserved plots etc. But the participation of local people in biodiversity conservation is highly ignored in government plans and programmes. Role of NGOs and other organization

have also been discussed. Some NGOs give emphasis on integration of bio-diversity. concerns into environmental impact assessment procedures and other urges the government to start a national register of plant, animals and micro-organism diversity following the legislation of the convention on biological diversity signed at the Earth Summit 1992. India is considering ratification of the convention which comes into legal force on 23 December 1993.

At international level, so far we think, to avoid unnecessary request for funding from developed world, India should take a lead in pressing for the setting up of an independent international fund for biodiversity conservation. This fund should be operated by democratic, transparent show of hand by all the countries party to the bio-diversity convention. Because as we have already mentioned that the global Environment Facility, currently granting funds for conservation is dominated by developed countries and is undemocratic.

At national level it is the duty of our government to respect and preserve rights and traditional knowledge and practice systems of local communities in conserving bio-diversity. For this government must consults all parties concerned in conservation, especially the grass root movements (chipko etc.) and local communities in the

decision making process. Biodiversity is subject to anthropogenic pressures, even within the protected areas. Global Climate Change further threatens to alter the structure and distribution of Natural Communities. An effective strategy to conserve biodiversity must include a plan to restore degraded lands and ecosystem. Restoration of biodiversity is important for two reasons. First, it is evident that the biomass needs, primarily fuelwood, and fodder, of rural and urban communities in the developing countries cannot be met from the existing natural communities with further degradation of such areas. Second, restoration utilizing native species can enhance the biodiversity of the area and thereby indirectly help in the maintenance of biodiversity of protected areas.

The human pressure on natural communities is the major cause of current losses in biodiversity. In order to stem losses in biodiversity and restore degraded ecosystems, we need to fully understand the impact of humans on the existing biodiversity. Specifically, precise information is required about the magnitude of losses resulting from the utilization of biodiversity and the factors that promote the unsustainable use of biotic resources.

An informed public is the most effective custodian of biodiversity. A campaign to improve public education in the

conservation of biodiversity would include several specific actions. First, working paper on the conservation status of various taxonomic groups, e.g. birds, mammals, trees etc. should be developed by experts in the respective fields. Papers on public policy relating to conservation and management of biodiversity are also needed, with special attention to identification of policies that encourage misuse and depletion of biotic resources. Papers outlining the social, economic, and cultural factors responsible for erosion of biodiversity are especially important.

A Second project that would assist in raising public awareness of biodiversity issues would be an assessment of the publication of teaching materials used in primary and secondary schools for appropriate coverage of biodiversity. Education in Biodiversity issue should not belong solely to scholars and policymakers, however, a strong effort should be made to reach local communities. Coordinated efforts should be made to develop local awareness of biodiversity, emphasizing regional patterns, use of different local species, curiosities, and losses.

Every element of biodiversity that exist in nature shall ensure that our already fragile environment, will be less prone to the damage. The legal as well as indigenous system must respond to this problem of biodiversity loss by

evolving norms, principles and rules aimed at bringing to book every act of "ecocide". The Government of India hastened to introduce the National Environmental Tribunal (NET) Bill in the Lok Sabha in August 1982. Despite many merits this bill can not be accepted in toto. Because it bears some major demerits, viz, excluding of harmful living organisms/genetically engineered organisms or cells as hazardous substance; violations of Fundamental Rights to life of equality before law, and ineffective environment law. There fore, government should try to remove these demerits from this bill.

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