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PRESERVATION OF FLORA AND FAUNA – A MORAL RESPONSIBILITY OF MANKIND

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1. Introduction

1:1. The great religions of the world have taught us that God's creation - man and nature - are integral parts of a whole, and therefore man cannot perform any activity which does not, in some way or another, affect his environment. Man is created as a steward of God's creatures but turned away from the natural laws through selfishness, ignorance, and pride and exploited and destroyed nature threatening the fragile ecology to his own peril.

1:2 Every organism requires energy from food which comes from its environment. All the material things man requires for his existence are referred as resources of his environment. Renewable resources are those that

can maintain themselves or continuously replaced if managed wisely, as for example crops, animals, forests, soil, and water. Plants are the ultimate source of organic food for all animals. The most important food plants are those which are green and capable of photosynthesis. They also largely determine and influence habitats and soil formation which are of fundamental importance for human life. The predicted rise of human population to 6,000 million in the year 2000 (Barker & Cook 1976) has led to a pressing need for the controlled exploitation of food resources in the world.

1:3. Ecosystems are systems of plants, animals, and soil microorganisms together with the non-living components of their environment, and support and control essential ecological processes that are essential for food production, health, other aspects of human survival and sustainable development. The main ecosystems termed as 'life support systems' are the most threatened today, and these include agricultural systems, coastal and fresh water systems, and forests. The environment nowadays is being polluted at an unprecedented rate with industrial wastes, oil spills, pesticides, and radioisotypes to which earth's biota has never before had to adapt. Consequently, vast areas are being removed from the cycle of photosynthetic productivity.

2. Dwindling resources of nature - a cause for our concern

2:1. Estuaries and mangroves are natural sanctuaries which provide food and shelter for fishes, crustaceans, molluscs and waterfowl. The gradual degeneration of these areas in the tropical countries is posing a threat to the resources which are fast dwindling. In Bangladesh, indescriminate cutting for leaves of Nypa palms used in thatching houses, overexploitation of Excoecaria wood for newsprint pulp, and other trees for firewood is depleting the forest of the habitats suitable for tigers, deer and other wild life, and discouraging the migratory water fowl that visit these areas. A significant threat to the living resources of sea, and fresh water is overfishing which has resulted in diminishing the fish supplies and extinguishing the major part of the species of whales, sea cows and sea turtles to cite only a few.

2:2. Coral ecosystems also provide habitats for fish on which many coastal communities depend, and are also important for coastal protection due to their activity resulting in calcium carbonate deposit. But the coral reefs are being destroyed the world over. There are reports that the coral reef along the south-west coast of Sri Lanka, which was once a natural barrier to keep off the lashing monsoon waves from eroding the sea shore, has been systematically destroyed to make lime material (Fernando 1986). Similar unwise attempts were in the

offing to exploit the corals surrounding the tiny St. Martin's island on the southern tip of Bangladesh in the Bay of Bengal. It was only the timely intervention by a few conscientious conservationists that has prevented the idea to materialize. But wanton destruction is being done to the reef by the unscrupulous traders who are doing a booming business openly in the tourist market.

2:3. Marine mammals have fascinated and inspired human beings for thousands of years on account of their gracefulness and intelligence. Their marvellous adaptations to aquatic life has made us respond so warmly to them. Their meat, fat, bone, and skins are in great demand in industry and to sustain Arctic life styles and traditions. In recent years, these animals have increasingly been captured alive for public exhibition in aquaria, training for specific tasks and scientific research. The captive individuals suffer intense physical, social, and psychological discomfort. A knowledge about these creatures is important to know how we can enjoy them without harming them. Different species of whales, which are being harpooned to almost extinction, have a number of similarities in their brains with those of the human beings, the most notable of which is the large proportion of 'grey matter' which is associated with

intelligence. The whales have remarkable methods of communication using sonar and echolocation, and exhibit complex behaviour. River dolphins in the S.E. Asian countries are also intelligent playful creatures, friendly towards humans, and there are instances of the drowing people being saved by these. They seem so full of personality and create such affection and sympathy in their observers that many people feel that we should not exploit them for their flesh and other products. If we hunt them to extinction, we not only lose a valuable and irreplaceable source but also some of our humanity.

2:4. The wild cats are particularly sensitive to environmental disturbance, and the decline or disappearance of the vulnerable cat species serves as an indicator of changes in their ecosystem which, in most cases, is the result of the impact of human activities. There is a great concern by many people who feel an inner loss when such magnificent animals are gone from the wild.

2:5. Man has always had a double interest in birds - aesthetic and personal on the one hand, and the utilitarian on the other for food and plumage. Although man tried to probe the mysteries of flight, he never succeeded duplicating the effortless, flexible aerial mastery possessed by birds. Evidence is accumulating that they chart their courses during migration, by the sun

and stars. We seek again in birds solutions to the problems of navigation and space travel. Recent researches show that there is some reason to believe that birds may provide a kind of life saving service by warning us that the dose of chemicals and radioactive particles that we eat, drink, breathe, and absorb day after day may be reaching dangerous levels. A world without birds would be incomplete for any man; for many of us would be intolerable.

3. Forest ecosystems

3:1. Forest vegetation and its accompanying soil organisms probably make up as much as 90% of the total biomass on land representing a potentially immense foundation for ecological stability. They also store massive quantities of carbon in the form of fossil fuels. Forests influence local and regional climates, protect soil cover on site, and areas downstream from floods, thus reducing the silting of rivers and clogging of irrigation systems. In the distant past, foresters were some of world's first conservationists. The recent priorities are giving an emphasis on developing the forest as a material commodity converting it into wealth through construction related activities to the detriment of environmental concerns. These activities of man betray widespread ignorance of ecology.

3:2. An age old practice of shifting cultivation is in vogue by more than 200 million tribal people occupying about 30 million km^2 of tropical forests (IUCN 1980). The practice involves clearing an area, burning the logged trees to prepare the ground, and cropping for a few years before shifting for a new site leaving the first one to fallow for 10-30 years, enabling the soil to regenerate. But as the pressure on land is increasing,the fallow periods are shortening leaving no chance for soil regeneration. The case is especially acute in Bangladesh where large tracts of otherwise productive forest land are already impoverished. Consequently, the forest cover is diminishing so rapidly that, by the end of this century, the remaining unlogged forest will have been reduced to 50 per cent.

3:3. The soaring numbers have often driven people to a short sighted approach when exploiting natural resources the results being glaringly apparent in the disasters like soil erosion, loss of cropland, deforestation, desertification, pollution, ecosystem degradation and extinction of species. Although soil erosion is a continuous process, it can be usually regenerated provided there is a protective cover of plants. But the soil vegetation unbalance caused by human activities results in acceleration of erosion with disastrous consequences especially throughout the food hungry tropic

the floods and salinity often adding to the misery. The planet's capacity to suport people is being irreversibly reduced due to huge quantity of soil lost every year through deforestation and poor land management. Tropical forests are not only important locally for timber, food, and other economic and socio-cultural values but also globally for balancing atmospheric carbon-dioxide. The relationship between poverty and environmental degradation is leading to a vicious circle in the developing countries resulting in death and human suffering on a broad scale. The same conditions are destroying the environment which in turn leads to more poverty.

3:4. The excess of carbon-dioxide in the atmosphere resulting from burning fossil fuels is mopped up by living trees which constitute an important biological system to maintain carbon-dioxide balance. By destroying the tropical forests, we are contributing to the warming of the climate or the green house effect caused by trapping of solar heat by carbon-dioxide. If the present trend continues, the climatologists predict, the earth could be up to 8.6 degrees warmer in less than another 100 years from now resulting in the change of weather systems. As a consequence, there will be melting of polar ice, expansion of water as it heats up, and rise in the present sea water level which would affect the great deltas of the world such as the Gangetic delta. A rise in the sea level would threaten urban drainage systems and

wreck the fish and shrimp culture besides rendering millions of people homeless on account of flood water.The warmer climates could also adversely affect the growth of important cereal crops and will encourage insect pests. Although the green house effect is inevitable under the present global changes in the atmosphere, the process may be delayed with sustained development efforts. The developing countries alone cannot cope up with the consequences of the green house effect to which the affluent nations are also contributing. The catastrophic consequences warrant a change in the life style of the people without changing the quality of life. Regional cooperation should be the first step to global cooperation

4. Reservoirs of genetic diversities

4:1. Genetic resources in the wild that are the heritable characteristics of wild plants and animals and of actual or potencial use to man, are being used increasingly to improve domesticated crops and livestock and as a new source of food and raw materials. Much of this genetic material comes from wild relatives of modern crop plants. But many of these gene pools are being destroyed before they have been identified, due to habitat destruction, overexploitation and competition from introduced species. Of a world total of some 80,000 edible plant species, only about 150 species have ever been cultivated on a large scale, and ninety percent of the world's food comes

from less than twenty species. Plants are also used for a wide variety of industrial purposes like production of paper, cosmetics, paints, varnishes, and detergents. Only ten percent of the plants have been subjected to a cursory screening to know whether they have a potential to yield any new material of benefit to mankind. Expanded efforts with the support of scientific community as well as political leaders is immediately required to safequard the biological diversity for human welfare. Although the science of genetic engineering may well provide the breakthrough in the human food supply, its advances will still continue to depend on the genetic raw material found in the wild relatives of the domestic species. Tomatoes could not have become a commercial crop without the help of their wild relatives. Wild silk worms are helping India to expand its silk industry. The potentia for discovering useful new plants is greater in the tropics than elsewhere but many tropical plants are being lost before they are properly understood.

4:2. An international Committee of botanists, met at the Missouri Botanical Garden in St. Louis in December 1984 at the request of the World Wildlife Fund (WWF) and International Union for Conservation of Nature and natural resources (IUCN), reached to the conclusion that at least two thirds of the world's flora that occu

in tropical and subtropical countries constitute a variety of ecosystems and harbour a rich diversity of species still mostly unknown. At the same time they comprise, along with the endemic island floras, the most highly endangered plants on earth. Unless we immediately take drastic and innovative measures to preserve them, it is likely that thousands of plant species will disappear for ever, causing a fundamental and permanent change in character of life on earth.

4:3. The desirable genetic material contained in the cultivars of crop plants and domesticated varieties of livestock as well as in their wild relatives is essential for breeding programs to achieve improvements in yields, nutritional quality, flavour, resistance to disease and pests, and other desired characters. Pests and pathogens are continuously evolving new strains to overcome resistance of hosts, and there is also a gradual alternation in climates and soils. Therefore, the continued existence of wild varieties of the world's crop plants, which form the reservoirs of genetic diversities, are the humanity's chief insurance against their own destruction. But the genetic base of the world's living resources is narrowing rapidly leading to a dangerous situation. A notable example is the newly discovered perennial maize existing in an area of only

1200 hectares in the state of Jalisco noth west of Mexico city. This maize can be crossed with cultivated maize and is resistant to at least four known diseases that attack the domestic varieties. However, the area is under great pressure from timber companies. This genetic resource is being protected under the Biosphere Reserves Program of IUCN.

4:4. Modern medicine depends heavily on the pharmaceutical products derived from world's plants and animals as constituents used directly as therapeutic agents, as starting material or as models for drug synthesis. In a list compiled by a U.N. workshop recently (UNIDO 1978 more than 40 of the 90 medicinal plants listed from Africa, Asia, and Latin America, are available only from the wild, and another 20 are taken both from the cultivated and wild plants. So tittle is known of the tropical plants that many have not yet been properly named. The specimens of these that are preserved may well be all that are passed on to our descendents in the next century. The useful properties and their potential as medicinal sources can certainly be determined today when they are still in existence rather than at any point in the future. The existence of the indigenous pharmaceutical industries are thus dependent on the preservation of these species.

5. Traffic in wild life

5:1. According to a recent estimate by TRAFFIC (USA), the minimum annual world trade in wild animals and plants included some 2.5 million live reptiles, 10 million cacti, 50 million furs, and one million kg of raw corals (Brautigam 1987). Although some of these are largely captive bred or artificially propagated, others come from the wild. In many developing countries environmental affairs are still not a political priorit and there is absolute lack of control of wild life trad

5:2. News from specialist groups include decline in fin whales off Newfoundland, the common dolphin in the Mediterranean, dwindling of African and Asian elephant populations, severe depletion of crocodiles in Brazilia rivers to speak only a few threats due to gross pollution of waters, habitat destruction, and overexploitation for trade. In Bangladesh, observations indicate gradual decline of sea turtle near offshore islands, gangetic dolphins in the rivers, and the Indian bullfrog in the marshes. The last one is the main species collected in India, Indonesia, and Bangladesh by the villagers who earn a significant part of their income in the monsoon. It is estimated that those three countries exported about 10 million kg in 1983 (Species 1986). The trade is undoubtedly an important foreign exchange earner but the policy makers failed

to take an account of the vast amount of money spent on imported pesticides to combat the insect pests which the frogs would have controlled. Snakes,deprived of their normal diet of frogs, have been known to invade the village homesteads to prey on chicks and ducklings. Thus, the recent decision of the Bangladesh government to ban the export of frogs during their breeding season from April to July will be widely welcomed. Every industry that benefits from wild plants and animals should determine the living resource it uses, and in cooperation with respective governments, ensure that the particular resource is exploited sustainably and the ecological processes of which they are part are maintained.

5:3. A well organized international trade that is vastly expanding, deals with commodities taken from wild mainly from the developing countries where a significant part of it takes place illegally. There is a substantial trade in raw turtle shells, elephant ivory, and wild collected cacti from countries many of which are parties to the convention on the International Trade in Endangered Species, which is a gross contravention of the Convention.

6. Endangered Species

6:1. Habitat destruction, overgrazing by domestic animals, use of fertilizers in the expanding agriculture

introduction of exotic plants without their natural controls, annihilation of pollinators by the use of insecticides can endanger plant species. According to a study completed in 1978 by the Smithsonian Institution out of an estimated 20,000 taxa of the higher plants native to the continental United States, about 90 specie are already extinct or presumed extinct, about 850 are currently in danger of extinction, and more than 1200 are likely to become endangered within the near future (Raven et al. 1981). The data base prepared by Threatened Plants Unit (TPU) of IUCN covers 40,000 plants out of which an estimated 15,000 are threatened worldwide. Along with their extinctions, our opportunities to learn about them not only scientificall but also in terms of our possible benefits from them would disappear.

6:2. World Conservation Strategy defines conservation as the management of the human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. The activities of every organism in our planet modify its environment, a process which is both natural and necessary for development. But unless the development is guided by ecological, social, cultural, economic,and ethical considerations it is bound to have undesired effects.

6:3. Eversince the unique flora and fauna of the Galapagos were brought to limelight by Darwin, considerable attention has been paid to the studies of biota of the islands. Many of the recent extinctions have happened on islands, and the proportion of rare and endangered species especially on the smaller islands can be many times higher than in most continental areas. An extreme example is a monotypic Rubiaceous cafe marron (Ramosmania heterophylla)whose only solitary surviving plant is endemic on the Mauritian island of Rodrigues (Fitter 1987). As more and more islands are reaching their limits of carrying capacity for human populations, the inhabitants face the only choice of halting the destructive exploitation of their island while it is still possible to conserve essential ecosystems and genetic resources for the future. Species extinctions are a normal feature of biological evolution as a result of competition among species over resources as food, space, predation, and natural catastrophes. We, by our misuse of the earth are destroying the web of life that sustains us and thus accelerating the extinction of species. In order to harness the natural wealth, human beings must come to terms with reality of resource limitation and the capacities of ecosystems, and also take account of the needs of future generations.

7. International sharing of natural resources

Impacts on the atmosphere in one country can affect the living resources of other countries. Acid rain caused by excessive emissions of sulphur dioxide, mainly in Europe and North America has reduced the productivity of rivers, lakes, and forests in countries other than the sources of pollution (Likens et al. 1979). International river basins acting as catchment areas shared by two or more states, and the open seas under the jurisdiction of more than one country also demand an international cooperation. Hydroelectric installation irrigation, and water supply works in one country can deplete, degrade or destroy valuable ecosystem and species of another. The living resources of the open seas of one country are likely to be affected by events in another such as overfishing or pollution. Economics can be achieved with improved efficiency through joint action. The concerned states should cooperate to prevent, reduce or eliminate adverse environmental effects that may arise from the utilization of shared natural resources.

8. Conservation-constraints and strategies

8:1. The world conservation strategy prepared by the IUCN helps to achieve sustainable development through conservation of living sources, the aims of which are,

(i) to maintain essential ecological processes and life support systems, (ii) to preserve genetic resources, and (iii) to ensure the sustainable utilization of species and ecosystems. Development can be defined as the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of human life. Living resources, unlike the non-living resources, are renewable if conserved, but are destructible if not. Flood plains and vast tracts of wetland characteristic to some tropical countries like Bangladesh are converted to productive agricultural land by draining them and protecting them from inundation. But this is depriving people from fisheries of essential support and also leading to the loss of other valued living resources which may not be compensated by the agriculture that replaces them. So before embarking on such major changes in land use, the social, economic, and ecological costs and benefits have to be thoroughly assessed.

8:2. The main constraints to achieving conservation are, (i) a mistaken notion that living resource conservation is a limited sector rather than a process that must be considered by all sectors, (ii) failure to integrate conservation with development, (iii) an undue emphasis on narrow short term interests on environmental planning rather than broad long term ones, (iv) inadequate legislation incompletely enforced, (v) poor organization

due to lack of trained personnel and consequently lack of basic information on priorities, and capacities of living resources, and (vi) lack of public and government support for conservation which reflects an incomplete awareness of the benefits of conservation.

8:3. Conservation and development often appear to be incompatible especially if we take an apprisal of the prevailing conditions in the rural areas of developing countries. There the people, out of their poverty, are compelled to destroy the few resources available to them by stripping the trees and shrubs for fire wood until the area becomes bare. As a consequence the villagers are forced to burn dried dung and stubble which is so badly needed to regenerate soils. Under such precarious conditions for survival, it can hardly be expected that they can respond sympathetically to calls of conservation and to subordinate their acute short term needs to the possibility of long term returns. This vicious circle can be broken by long time planning, education, training, better organization and research so that the biosphere may respond to reforestation and restoration of degraded environment. Where vegetation is being destroyed for firewoods, immediate steps should be taken to establish large scale plantations for suitable fuelwood consisting of fast growing trees, and to provide alternative sources of energy such as biogas, or more efficient stoves. The integrated actions in the rural areas

might include the efficiency of food productions, growing additional food plants, and the employment of local people in programs such as plantation of fast growing trees. They should also be encouraged to grow better plant cover to stabilize and prevent the loss of soil, and 'live fences' to protect the growing crops. Sustainable utilization of species and ecosystems is regarded as some what analogous to spending interest while keeping the capital intact. A society that insists on this ensures that it will benefit from their resources virtually indefinitely. The behaviour of the people should be modified towards long term attitude by increasing the awareness of their environment, and drive home the fact that human societies are required to live in harmony with the nature on which their very survival and well being depends.

8:4. The legislation concerning living resources is marred in many developing countries by failure to implement laws, often inadequate budgets for enforcement, weak penalties, and lack of coordination among agencies responsible for living resources. The problem is further accentuated by inadequate training facilities and low salarries of the field staff. It is important to ensure, before legislation, that the law is ecologically, economically, and socially feasible. Public education programmes should precede and also follow the enforement of laws to help the public to understand and support it.

8:5. Effective action in conservation demands welltrained scientists and technicians but there is a severe shortage of such people in the tropics where they are needed most. There is a need for simple and effective means of communication on the importance of environmental conservation at all levels from rural populations and school children to government officials and policy makers. The environmental issues should also be included in teacher training programs. Although training in conservation is an activity of fundamental importance, this often falls far short of the standards set up by IUCN. A great effort to incorporate training activities is clearly needed to transform the attitudes of the entire societies towards the biosphere and to ensure conservation objectives. The scientific programs in tropical forests should also include (i) identify and taxonomy of plant and animal species, (ii) dynamics of forest ecosystems to know how they function without human interference, (iii) the potential of forest plant species for economic use, (iv) studies on biological diversities, and endemism to determine areas best suited for conservation, and (v) anthropological studies of forest tribals for developing better farming systems for their well being. Research and training should also be promoted in biological oceanography because of their relevance to fisheries.

The system of protected areas of a country should develop within the framework of national ideas concerning natural processes, genetic diversity, and durable exploitation of land. The protected areas often cause great conflicts with the traditional practices such as restrictions on hunting, collection from the wild, freedom of movement, and restriction of forestry and fishery uses. The situation is likely to become more acute where protected areas are also used for education, tourism, and research. In such cases the local population feels severely menaced in their rights on traditional exploitations, as an inhabitant, and claim for a self identity. So it is imperative, before setting out protected areas, to analyse not only the ecological compatibility but also the social and cultural one. Failure to take these points into consideration would result in a regional rejection of protected areas which severely impairs the natural as well as global strategy for conservation of nature.

8:6. Many economically important plants that occur in man-made landscapes can be preserved as the latter are routinely maintained. For areas that have already been cleared, reforestation with native species has become essential to meet growing demands for fuel and industrial wood products and to stabilize soil and water resources. Monocultural practices are detrimental as they hinder the restoration of biological diversity, and ecological

equilibrium. The actual area involved in afforestation programs have to be large enough to meet the villagers' needs by dispersing trees widely on farms, near homesteads and in small wood lands rather than in concentrated plantations. The combined production of crops and trees, known as agroforestry, is a practice especially promising. This involves planting nitrogen-fixing trees as wind breaks or interspersed with crops thus enhancing soil fertility, retaining soil moisture and reducing erosion. This results in the increase of crop yields while the trees provide firewood and timber, and that too in the short term while the resource base is stabilized for the long term. Tree plantations in the developing countries will benefit all nations by reducing the carbon dioxide build up in the atmosphere by absorbing this noxious gas from the air through photosynthesis.

8:7. The botanic gardens have a vital role to play in conservation, and can provide important information for the public on plant conservation issues. The living collections in the garden play a valuable part as a back up when conservation in the habitat (in situ) fails, as well as provide material for education, horticulture, and research.

Whether we can meet the challenge of living in equilibrium with the environment depends entirely upon

ourselves. Those living in the developed countries have a great responsibility in finding lasting solutions as they have greater wealth, more technology and better educated populations than many of those in the developing countries. It is the responsibility of all of us to educate the millions, mostly in the developing countries, into a greater awareness of the vital connection between man and nature and to proclaim that sustainable utilization of natural resources is the only hope for the survival of mankind.

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