

Bio diversity: a major concern of our eco system

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Bio Diversity: A Major Concern of Our Eco System The variety of life on Earth, its biological diversity is commonly referred to as biodiversity. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth. Appropriate conservation and sustainable development strategies attempt to recognize this as being integral to any approach. Almost all cultures have in some way or form recognized the importance that nature, and its biological diversity has had upon them and the need to maintain it. Yet, power, greed and politics have affected the precarious balance. Biodiversity is the degree of variation of life forms within a given species, ecosystem, biome, or an entire planet. Biodiversity is a measure of the health of ecosystems.

Biodiversity is in part a function of climate. In terrestrial habitats, tropical regions are typically rich whereas, Polar Regions support fewer species.

Rapid environmental changes typically cause mass extinctions. One estimate is that less than 1% of the species that have existed on Earth are extant.

Biodiversity The term biodiversity is a shortening of biological diversity and according to the Convention on Biological Diversity (CBD) means "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." The CBD was created by the United Nations Environment Program and opened for signatures at the Rio Earth Summit in June 1992, by the time signatures were closed in December 1993 168 countries had signed up to its three main aims: the conservation of

biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. There are now 193 signatories. Although around 1.75 million species have been categorized by science the true number of species on the planet is recognized to be much higher than this, many of them tiny organisms which may never be discovered by science. Estimates as to how many species there range from 3 million to 100 million with the CBD placing the best estimate at around 13 million species. New species are being discovered all the time: the 1992 Global Biodiversity Strategy said: "Surprisingly, scientists have a better understanding of how many stars there are in the galaxy than how many species there are on Earth." One of the problems in properly estimating the number of species with which we co-exist is the historically ad-hoc nature of much scientific research, there is no central collecting or regulating body and no single database of just what has been discovered and documented. Biodiversity extends down to the genetic level, with varieties of plants and breeds of animals qualifying as unique blocks in the intricate structures that make up the planet's biological diversity. It is also taken to refer to the variety of ecosystems or habitats on Earth: from ocean to desert, lake to farmland. " We all have an important part to play in creating this new [world] order. It is essential to acknowledge responsibility for the actions which produce environmental degradation ... since they all have consequences which we must and can avoid, to the best of our ability. ...we must keep in mind the new general global framework in which the negotiations are taking place, be clear that the conservation and rational use of biodiversity is the responsibility of all and that solidarity among peoples

inevitably benefits everyone." — Ambassador Vincent Sanchez, Chairman of the Intergovernmental Negotiating Committee for a Convention Biological Diversity. Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play. For example, a larger number of plant species means a greater variety of crops; greater species diversity ensures natural sustainability for all life forms; and healthy ecosystems can better withstand and recover from a variety of disasters. " Biodiversity" is most commonly used to replace the more clearly defined and long established terms, species diversity and species richness. Biologists most often define biodiversity as the " totality of genes, species, and ecosystems of a region". An advantage of this definition is that it seems to describe most circumstances and presents a unified view of the traditional three levels at which biological variety has been identified: - Genetic Diversity - Taxonomic Diversity - Ecological Diversity —Tor-Bjorn Larsson (2001). Biodiversity evaluation tools for European forests. Page no -178.

Genetic Diversity The first level of biodiversity, genetic diversity, is the level at which we can most clearly observe the evolution of diversity. Genetic diversity includes the many kinds of genes that are available for given members of a species, such as a family, a population, or the entire species. This variety of genes allows the species to have many kinds of heritable traits that allow it to survive through changing environments. For example, in a particularly cold winter, many individuals of a species may die from lack of insulation, but if the population as a whole has genetic diversity for a trait such as fat storage, then at least some members of the population will survive and the species will not become extinct. The next year, more

offspring will have the valuable trait and the species will evolve to tolerate the cooler environment. Species with little genetic diversity, such as farm hybrids (special breeds of crops or livestock that are all closely related), have limited ability to adapt to changing weather conditions or insect pests.

Species lacking genetic diversity cannot adapt to a changing environment and may become extinct without help like the careful maintenance that goes into farm crops and animals. At the opposite extreme, characteristics of genetically healthy populations are a high population size that includes many individuals that are unrelated to each other. Often, the existence of disjunction populations, those separated by some geographic barrier that only occasionally lets migrants through, ensures that there are always unrelated individuals. Taxonomic Diversity The next level of biodiversity,

taxonomic diversity, refers to the variety of individuals at a given hierarchical level in the scientific naming system. This could be the number of different species, genera, families, or kingdoms. For example, a cornfield may have hundreds of birds living in it, but they may represent only three species that are all in one family, meaning that there is low taxonomic diversity. A similar-sized area in a nearby forest may also have hundreds of birds living in it, but these birds may be from twenty different species that belong to eight families and three orders, representing a higher level of diversity. Around the world, crops and livestock typically consist of only one species. These monocultures support a low level of biodiversity. Ecological Diversity Ecological diversity is the variety of habitat types that are available in a given area. These habitats can have different physical characteristics such as temperature and soil type, as well as different organisms inhabiting

them. When the habitat with all its organisms and their complex interactions are considered together, it is termed an ecosystem. Ecosystem diversity is typically the level that is discussed in relation to biodiversity. Beyond ecosystems is a division termed "landscape" that consists of all of the ecosystems in a defined region, such as a drainage basin. Biomes are groups of similar landscapes, such as all the mountain ranges in the world. Finally, the largest division is the biosphere, which refers to all life on Earth. A mountain range is as an example of ecological diversity that illustrates the evolution and patterns of biodiversity. Because of the latitude of the range selected as an example here, the temperatures are warm and plants grow throughout the year. The topography and weather patterns typically make one side of the mountain moist while the other is dry, meaning that each side grows its own kinds of plants. There will also be variation in soil type, as the soils are made from dead plants and variation in insects because many insects can eat only certain species of plants. Soil type will determine what kind of ground-dwelling invertebrates and other decomposers can live there, as well as providing habitat for reptiles, amphibians, and small mammals that build their burrows in the soil and feed on the invertebrates. This kind of variation at the base of the food chain determines that there will be variation at all the higher levels as well, including predators. As humans we often see ourselves as sitting at the top of an evolutionary pyramid and somehow removed from the rest of 'nature'. However, while we have, to a degree, insulated ourselves from natural processes, humans are still massively dependent on the almost unimaginably complex natural systems around us. Forests for example are vital in protecting us from flooding and in helping we

get clean drinking water. And, because the natural world is the product of millions of years of evolution and development, it is an incredibly complex system and we have little idea of what the effect of humans on biodiversity - through a massively increased rate of extinction thought to be at the very least 100 times greater than the natural rate - will have. For example, a December 2010 study found that declining biodiversity was increasing rates of infectious disease in humans as so-called 'buffer species' vanish and pathogens look for new victims and find us. So much of what we live on - food, industrial materials and medicines for example - comes from the natural world that the United Nations Environment Program has put a price on failing to preserve biodiversity: and it's between -1. 2 and 2. 8 trillion a year. For example, the recent declines in honey bee populations related to colony collapse disorder have caused great concern. While we've mechanized much of our agriculture, we still rely on these little workers to pollinate many of the crops on which we rely: a 2000 study put the value of honey bee pollination to United States agriculture at \$14 billion-a-year. Selective breeding in agriculture has led us to rely on fewer and fewer breeds of plants and animals for our food. Such a narrow range of productive breeds means a greater vulnerability to diseases and pests. Such was the concern at the rate at which crops were vanishing that seed vault was established under a frozen Norwegian Arctic mountain to keep 'back up copies' of thousands of threatened agricultural plant species. While the fact that a smaller gene pool is of itself a bad thing for the future of life on the planet might be taken for granted, it is not an idea that has been unchallenged. In March 2011, scientists led by Professor Emmett Duffy of the

Virginia Institute of Marine Science tried to prove the case conclusively. Their research, Duffy said: "should be the final nail in the coffin of that controversy. It's the most rigorous and comprehensive analysis yet, and it clearly shows that extinction of plant species compromises the productivity that supports Earth's ecosystems." " No longer do we have to justify the existence of humid tropical forests on the feeble grounds that they might carry plants with drugs that cure human disease. Gaia theory forces us to see that they offer much more than this. Through their capacity to evapotranspiration vast volumes of water vapor, they serve to keep the planet cool by wearing a sunshade of white reflecting cloud. Their replacement by cropland could precipitate a disaster that is global in scale. "

–James Lovelock, in Biodiversity (E. O. Wilson (Ed)) The Importance of Biodiversity The value of biodiversity has been argued by many different people for a variety of reasons, but they all point to a unified ideal of conservation. Aldo Leopold is known as the father of environmental ethics in the United States. In books such as Sand County Almanac and Sketches Here and There (1949), he stressed that humans must change their role from consumer of the natural world to cohabitate of it. This change is needed to preserve biodiversity, which would ensure that natural resources are available for future generations. The value of biodiversity is also recognized by various groups and organizations in modern society. They include waste managers who use wetlands to clean runoff; pharmacists who search for new drugs in rare species; a food industry that interbreeds wild species to improve domestic ones; a pet industry that imports and breeds rare animals; hobbyists who bird-watch, camp, and photograph in search of new species;

hunters and fishermen who selectively harvest to eat and teach their families about the wilderness; scientists who use species to study evolution; and, finally, conservationists interested in preserving biodiversity not only for what it can do for them, but for its inherent value in that it lives and breathes as we do. –Rosen Zweig, Michael L. Species Diversity in Space and Time. New York: Cambridge University Press, 1995. The Decline of Biodiversity The decline of biodiversity is documented for prehistoric times and can be the result of natural events that may or may not be related to the fitness of the species that become extinct. A constant level of background extinction has always existed, but it is mass extinction events that cause concern about the future of biodiversity. Extinction The largest extinction event recorded occurred 250 million years ago, when 95 percent of marine species died in response to an uplift of the species-rich continental shelf that was caused by plate tectonics. Another famous example of mass extinction is the impact of the Chicxulub meteorite, which is thought to have left a dense cloud over the sky worldwide for a decade, causing a decrease in primary production (plant activity) and a subsequent extinction of many taxa. This impact coincides with the end of the dinosaur age and probably contributed to the extinction of many of those lines. Extinction rates at the beginning of the twenty-first century are undeniably higher than background rates, but the exact rate calculated depends on what method of calculation is employed. Using estimates from recent past extinction rates based on fossils, mammal extinctions were once one per two hundred years, and most recently were twenty species in the twentieth century. At the turn of the twenty-first century, the rate of bird extinction is 1, 000 times the average over the past

2, 000 years. Combining the two calculations provides an estimate of a 1 percent loss of species diversity over the twentieth century, a number much greater than any prehuman impact. Using habitat loss as a predictor of species loss, it is estimated that between 2 and 25 percent of biodiversity will be lost over the twenty-first century. Conserving Bio-diversity At the 1992 UN Conference on Environment and Development (the Earth Summit), the Convention on Biological Diversity (CBD) was born. 192 countries, plus the EU, are now Parties to that convention. In April 2002, the Parties to the Convention committed to significantly reduce the loss of biodiversity loss by 2010. Perhaps predictably, that did not happen. Despite numerous successful conservations measures supporting biodiversity, the 2010 biodiversity target has not been met at the global level. This page provides an overview on how the attempts to prevent biodiversity loss are progressing. –Begon, Michael, John L. Harper, and Colin R. Townsend. Ecology, 2nd ed. Cambridge, MA: Blackwell Scientific Publications, 1990 The February 1999 Biodiversity Protocol meeting in Colombia broke down because USA, not even a signatory to the Convention on Biological Diversity, to which the protocol is meant to be part of, and five other countries of the "Miami Group" felt that their business interests were threatened. The safety concerns were unfortunately overridden by trade concerns. Some technological advances, especially in genetically engineered food, have been very fast paced and products are being pushed into the market place without having been proven safe. All over the world, concerned citizens and governments have been trying to take precautionary measures. However, 1999 was not a successful year in that respect. –Elredge, Niles. Life in the

Balance: Humanity and the Biodiversity Crisis. Princeton, NJ: Princeton University Press, 1998. A Biosafety Protocol meeting was hosted in Montreal, Canada January 24 to January 28. Compared to the fiasco of the previous year, this time, there had been a somewhat successful treaty to regulate the international transport and release of genetically modified organisms to protect natural biological diversity. However, there were a number of important and serious weaknesses too. So we have to do our own parts to conserve biodiversity by following these important concerns: - Species and ecosystems need space to develop and recover. At least 10% of all ecosystem types should be under protection to maintain nature and natural landscapes. - Without biodiversity there will be no agriculture. Farming practices should not jeopardize species survival: improving farmland diversity and reducing the usage of pesticides and fertilizer are key efforts to saving biodiversity. Organic agriculture practices can serve as an example in many areas. - 75% of all fisheries are fully exploited or over-fished. Species like cod, haddock and halibut are already threatened. If we do not move towards sustainable use, there will be no fish left for our grandchildren. - Roads, factories and housing destroy habitats for animals and plants. If urban and rural development continues to ignore nature, our surroundings will be dominated by concrete and pollution. - Climate change is considered to be the greatest challenge for humanity. With changing conditions, ecosystems and habitats will change as well. It is an obligation to fight climate change and make sure that species can migrate or adapt to new surroundings. - If you release a species outside its usual habitat, it might simply die. In other cases, the so-called alien invasive species have thrived

and destroyed local flora and fauna. As you never know how things turn out, reducing these invasions is crucial. - Biodiversity is the foundation for sustainable development. Its ecosystem services provide the basis for all economic activity. Biodiversity concerns need thus be integrated into all areas of policy-making. Measures include market incentives, development assistance, biodiversity-friendly trade and international governance processes.