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Problems: EXTINCTIONS of PLANT and ANIMAL SPECIES

The "Sixth Mass Extinction"

Massive extinctions have occurred *five times* during the earth's history, the last one was the extinction of the dinosaurs, 65 million years ago. Scientists are calling what is occurring now, the *sixth mass extinction*. The loss of species is about losing *the very web of life* on Earth. People trying to save critical habitat have been dismissed or ridiculed as sentimental "tree-huggers" who want to save the "spotted owls," even if it costs jobs. Most Americans have little idea of the magnitude of the problem.

Although they are uncertain of the numbers, most scientists believe the *rate of loss* is greater now than at any time in the history of the Earth. Within the next 30 years as many as *half of the species on the earth* could die in one of the fastest mass extinctions in the planet's 4.5 billion years history. Dr Leakey, author of "The Sixth Extinction," believes that 50% of the earth's species will vanish within 100 years and that such a dramatic and overwhelming mass extinction threatens the entire, complex fabric of life, including *Homo sapiens*, (the species responsible for the crisis.)

The problem is not just the loss of species. There is also the loss of the genetic diversity *within* species, as well as the loss of diversity of different types of *ecosystems*, which can contribute to or hasten whole species extinction. Preserving the wider gene pool diversity in subdivisions of species, such as subspecies and populations, offers the raw material for the evolution of new species in the future.

"Every **day**, an estimated 100 plant and animal species are lost to deforestation" . . . "A conservative estimate of the current extinction rate indicates that about 27,000 species a year are being lost." National Wildlife Federation

Causes of the Extinction of Species

Scientists have identified the key causes of the crisis. In particular, the loss of species is caused by as the growing size of human populations, and the rate at which humans consume resources and cause changing climate.

Global Warming and the Loss of Species At the end of the Permian period, 251 million years ago, global warming caused the worst mass extinction in the history of the planet. That time a six-degree C. increase in the global temperature was enough to kill up to 95 per cent of the species that were alive on Earth. This extinction is called the "Great Dying." Gigantic volcanic eruptions caused this warming by triggering a "runaway greenhouse effect" that nearly put an end to life on Earth. Conditions in what geologists have termed a "post-apocalyptic greenhouse" were so severe that only one large land animal was left alive, and fewer than one in 10 species survived.

Michael Benton, Professor of vertebrate paleontology and Head of the Department of Earth Sciences at the University of Bristol, in *When Life Nearly Died: the Greatest Mass Extinction of All Time* .

It took *100 million years* for species diversity to return to former levels. In this case, the carbon dioxide buildup which created this greenhouse effect came from massive volcanic eruptions. Today the build up of carbon dioxide is coming from our life style and industrial activity.

An increase of 6°C is the upper end of what the IPCC is forecasting for this century, the range that will occur if we do not make severe changes soon. If 95% of the species on Earth die out—one of them will be *Homo sapiens*.

Global warming is already affecting species: migration is accelerating, the timing of the seasons is changing, and animals are migrating, hatching eggs, and bearing young on average five days earlier than they did at the start of the 20 th century. In addition, some butterflies have shifted northward in Europe by thirty to sixty miles or more, species' ranges are shifting toward the poles at some four miles a decade, amphibians were spawning earlier, and plants are flowering earlier. In a major report in *Nature*, the lead author, Terry Root said: "There is a consistent signal. Animals and plants are being strongly affected by the warming of the globe." She later said that, "It was really quite a shock, given such a small temperature change. . . If we're already seeing such dramatic changes among species, it's really pretty frightening to think what we might see in the next 100 years."

"For if one link in nature's chain might be lost, another might be lost, until the whole of things will vanish by piecemeal."

Thomas Jefferson

Habitat Loss as a Cause of the Loss of Species Other than global warming, the greatest threat to biodiversity is habitat loss and fragmentation by deforestation and urbanization.

Urbanization has dramatically increased the rate of habitat loss and change. Sprawling development is consuming land at a rate of five or more times the rate of population growth, destroying wildlife habitat and degrading water quality. Dredging, draining, bulldozing, and paving the land for housing developments, malls, business parks, and new roads, all destroy habitat. For example, in Maryland, 10 years ago every new person added to the state accounted for the loss of 1/3 acre of land; now, every new person causes the loss of 2/3 acre.

Biological resources are degraded and lost through "development" activities like large-scale clearing and burning of forests, over-harvesting of plants and animals, use of pesticides, draining and filling of wetlands, destructive fishing practices, air pollution, and the conversion of wildlands to agricultural and urban uses.

Humans create all of these causes. Humans have altered nearly *half* of Earth's land mass over the past 150 years and the amount could rise to *70 percent* within 30 years, according to the United Nation. These alterations include farming, logging and urban development.

Deforestation is also one of the leading causes of habitat loss. For centuries, humans have altered landscapes, through deforestation, fire and over-use. Already, around half of the world's original forests have disappeared, and they are still being removed at a rate 10 times higher than any possible level of re-growth. As tropical forests contain at least half the Earth's species, the clearance of some 17 million hectares each year is causing a dramatic loss of biodiversity. Habitat loss is identified as a main threat to 85 per cent of all species described in the IUCN's *Red Lists* (those species officially classified as "threatened" and "endangered." ICUN is the World Conservation Union").

Invasive Alien Species Cause the Loss of Species An "alien" or "exotic" species is one that occurs in an area outside its historically known natural range, as a result of either intentional or accidental dispersal by human activities. For millennia, oceans, mountains, rivers and deserts served as natural barriers to the movement of certain plants and animals, providing the isolation essential for unique species and ecosystems to evolve. In just a few hundred years, however, international trade and the expansion of global travel, accompanied by intentional introductions, have ended millions of years of biological isolation. When alien animal and plant species spread to non-native habitats, they alter habitats, and crowd out native species through predation, competition, disease and hybridisation. Hundreds, possibly thousands of extinctions have been caused by alien invasive species.

Pollution Leads to a Loss of Species Pollution is found everywhere in the world--chemicals have been found in animals even in the Arctic and Antarctic. Chemicals can cause mutations and fertility problems, already seen in the reproductive organs of fish, alligators, and polar bears. The city and industry sewage treatment plants that lack advanced technology, dump nutrients and pathogens in the water. When the treatment plants discharging into Tampa Bay were upgraded, the sea grasses, 85 percent of which had been destroyed, began to grow back, and along with them the fish and other creatures that depend on them.

A recent EPA report noted that nearly 40 percent of the nation's rivers, lakes, and estuaries are too polluted for safe fishing and swimming. Fifty percent of freshwater species populations, from fish and frogs to river dolphins, are declining from pollution by pesticides, fertilizers and other agricultural chemicals. Everything that happens on land affects the waterways; storm water picks up contaminants from roads, vehicles, lawns, and construction sites and then dumps it in the nearest stream.

"In pushing other species to extinction, humanity is busy sawing off the limb on which it is perched." Paul Ehrlich

Bycatch Causes the Loss of Species Bycatch is unwanted species, juveniles, and other marine wildlife, that fishers catch unintentionally. Commercial fishing is grossly wasteful: in the process of harvesting 85 million tons of fish each year, fishers routinely discard at least 20 million tons of "bycatch," unwanted fish and marine specs that are usually killed.

According to a new study submitted to the International Whaling Commission (IWC), nearly 1,000 whales, dolphins, and porpoises drown *every day* when they become entangled in fishing gear,. Scientists believe that death in fishing gear is the leading threat to the survival of the world's 80-plus species of whales, dolphins and porpoises. Bycatch is also the greatest threat to seabirds and sea turtles.

Illegal Wildlife Trade causes the loss of species Trade in some animal and plant species is high, and is capable of heavily depleting their populations and even bringing some species close to extinction. Live animals are taken for the pet trade, or their parts exported for medicines or food. Thousands of species including African and Asian elephants, Tibetan antelopes, rhinos, birds of paradise, parrots, and orchids are part of the illegal international wildlife trade. This trade is worth billions of dollars annually and has caused massive declines in the numbers of many species of animals and plants.

The scale of over-exploitation for trade is a major threat to the survival of species. In 1973, to try to stop this trade, an international treaty (CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora) was created that subjected international trade in specimens of selected species to certain controls.

Links to other sites on Biodiversity

ActionBioscience.org <http://www.actionbioscience.org/>
Adopt a Watershed www.adopt-a-watershed.org
Biodiversity Education Network www.bioednet.org
Biodiversity Partnership of Defenders of Wildlife <http://www.biodiversitypartners.com/>
Center for Biodiversity and Conservation <http://research.amnh.org/biodiversity/>
Convention on Biological Diversity <http://www.biodiv.org/>
Conservation International (CI) <http://www.conservation.org>
Conservation International: Biodiversity Hotspots
<http://www.biodiversityhotspots.org/xp/Hotspots>
Convention on International Trade in Endangered Species of Wild Fauna and Flora
<http://www.cites.org>
Defenders of Wildlife <http://www.defenders.org/>.
Endangered Species Coalition <http://www.stopextinction.org/>
Endangered Species.com. <http://www.endangeredspecie.com/>
Environmental Defense Fund Preserving Species and Habitat
<http://www.edf.org/system/templates/page/focus.cfm?focus=1>
Evangelical Environmental Network Booklet on Endangered Creatures
http://www.creationcare.org/resources/endangered_book.php
Fauna & Flora International <http://www.fauna-flora.org/>
IUCN The World Conservation Union <http://www.iucn.org/>
IUCN Red List of Threatened Species <http://www.iucn.org/redlist/2000/index.html>
IUCN - US www.iucn.org/places/usa/index.html
Mass Extinction Underway <http://www.well.com/user/davidu/extinction.html>.
Monarch Watch www.monarchwatch.org
National Audubon Society www.audubon.org
National Biological Information Infrastructure <http://www.nbi.gov/>
National Invasive Species Council <http://www.invasivespecies.gov/council/main.shtml>
National Wildlife Federation www.nwf.org
National Wildlife Federation, Backyard Habitat Program <http://www.nwf.org/habitats>
Nature Conservancy www.nature.org
Save Our Environment <http://www.saveourenvironment.org/>
State biodiversity Clearinghouse of Defenders of Wildlife
<http://www.defenders.org/states/about.html>
The Nature Conservancy <http://www.nature.org/>
Tree of Life Web Project <http://tolweb.org/tree/phylogeny.html>
UNEP World Conservation Monitoring Centre <http://www.unep-wcmc.org/>
US Fish and Wildlife Service, Endangered Species <http://endangered.fws.gov/>
Wildlands Project www.twp.org
World Resources Institute <http://biodiv.wri.org/index.cfm>
World Wildlife Fund (WWF) <http://www.worldwildlife.org/>