Loss of biodiversity and its effect

What is biodiversity?

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 to preserving biodiversity. Almost all cultures have their roots in our biological diversity in some way or form.

Declining biodiversity is therefore a concern for many reasons.

Why is Biodiversity Important?

**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](http://www.wwf.org.uk/core/wildlife/fs_0000000029.asp)
* Greater species diversity ensures natural sustainability for all life forms
* Healthy ecosystems can better withstand and recover from a variety of disasters.

A healthy biodiversity offers many natural services

A healthy biodiversity provides a number of natural services for everyone:

* Ecosystem services, such as
  + Protection of water resources
  + Soils formation and protection
  + Nutrient storage and recycling
  + Pollution breakdown and absorption
  + Contribution to climate stability
  + Maintenance of ecosystems
  + Recovery from unpredictable events
* Biological resources, such as
  + Food
  + Medicinal resources and pharmaceutical drugs
  + Wood products
  + Ornamental plants
  + Breeding stocks, population reservoirs
  + Future resources
  + Diversity in genes, species and ecosystems
* Social benefits, such as
  + Research, education and monitoring
  + Recreation and tourism
  + Cultural values

Loss of biodiversity

Despite knowing about [biodiversity’s importance](http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares) for a long time, [human activity has been causing massive extinctions](http://www.ens-newswire.com/ens/aug1999/1999-08-02-06.asp). As the Environment New Service, reported back in August 1999 (previous link): the current extinction rate is now approaching 1,000 times the background rate and may climb to 10,000 times the background rate during the next century, if present trends continue [resulting in] a loss that would easily equal those of past extinctions. (Emphasis added)

A major report, the [Millennium Ecosystem Assessment](http://www.globalissues.org/article/408/sustainable-development-introduction" \o "Global Issues: \“Sustainable Development Introduction\”, Last updated: Wednesday, November 18, 2009), released in March 2005 highlighted a substantial and largely [irreversible loss in the diversity of life on Earth](http://news.bbc.co.uk/1/hi/sci/tech/4391835.stm" \o "External Link: 'Study highlights global decline', BBC, March 30, 2005), with some 10-30% of the mammal, bird and amphibian species threatened with extinction, due to human actions

According to The International Union for Conservation of Nature (IUCN) the current threatning rate is as per follows:-

* At threat of extinction are
  + 1 out of 8 birds
  + 1 out of 4 mammals
  + 1 out of 4 conifers
  + 1 out of 3 amphibians
  + 6 out of 7 marine turtles
* 75% of genetic diversity of agricultural crops has been lost
* 75% of the world’s fisheries are fully or over exploited
* Up to 70% of the world’s known species risk extinction if the global temperatures rise by more than 3.5°C
* 1/3rd of reef-building corals around the world are threatened with extinction
* Over 350 million people suffer from severe water scarcity

Principal pressure on biodiversity

As explained in the UN’s 3rd [Global Biodiversity Outlook](http://gbo3.cbd.int/), the rate of biodiversity loss has not been reduced because the 5 principle pressures on biodiversity are persistent, even intensifying:

1. Habitat loss and degradation
2. Climate change
3. Excessive nutrient load and other forms of pollution
4. Over-exploitation and unsustainable use
5. Invasive alien species

Extinction risks out pace any conservation successes. Amphibians are the most at risk, while corals have had a dramatic increase in risk of extinction in recent years.

Declining amphibian population

[Amphibians are particularly sensitive to changes in the environment](http://ucsdnews.ucsd.edu/newsrel/science/10-08Turnover.asp). Amphibians have been described as a marker species or the equivalent of canaries of the coal mines meaning they provide an important signal to the health of biodiversity; when they are stressed and struggling, biodiversity may be under pressure. When they are doing well, biodiversity is probably healthy.

If current estimates of amphibian species in imminent danger of extinction are included in these calculations, then the current amphibian extinction rate may range from 25,039–45,474 times the background extinction rate for amphibians

Reptiles threatened

Approximately  [19% of the world’s reptiles are estimated to be threatened with extinction](http://www.iucn.org/news_homepage/news_by_date/2013/?12086/Almost-one-in-five-reptiles-struggling-to-survive), according to a study by the International Union for Conservation of Nature (IUCN) and the Zoological Society of London.

Reptiles include species such as snakes, lizards, crocodiles, turtles and tortoises.

The study noted that the extinction risk is not evenly spread. For example, the study estimated 30% of freshwater reptiles to be close to extinction. Freshwater turtles alone are at a 50% risk of extinction, as they are also affected by national and international trade.

Dwindling fish stocks

About 80 percent of the world marine fish stocks for which assessment information is available are fully exploited or overexploited.

Fish stocks assessed since 1977 have experienced an 11% decline in total biomass globally, with considerable regional variation. The average maximum size of fish caught declined by 22% since 1959 globally for all assessed communities. There is also an increasing trend of stock collapses over time, with 14% of assessed stocks collapsed in 2007.

the ocean ecosystems can

* Take sewage and recycle it into nutrients;
* Scrub toxins out of the water;
* Produce food for many species, including humans
* Turns carbon dioxide into food and oxygen

With massive species loss, the report warns, at *current* rates, in less than 50 years, the ecosystems could reach the point of no return, where they would not be able to regenerate themselves.

Declining Ocean Biodiversity

Ocean degradation has been feared to be faster than previously thought.

The factors affecting the ocean’s health includes:

* De-oxygenation
* Acidification
* Warming

These impacts will have cascading consequences for marine biology, including altered food web dynamics and the expansion of pathogens

Increasing rapid ocean acidification, caused by the oceans absorbing more carbon dioxide than usual (because it is emitted by humans more than it should) also affects marine ecosystems

Inland water ecosystems Destruction

We use water for a variety of purposes from agricultural, domestic and industrial uses. This has involved activities that alter surrounding ecosystems

According to report

* Between 56% and 65% of inland water systems suitable for use in intensive agriculture in Europe and North America had been drained by 1985. The respective figures for Asia and South America were 27% and 6%.
* 73% of marshes in northern Greece have been drained since 1930.
* 60% of the original wetland area of Spain has been lost.
* The Mesopotamian marshes of Iraq lost more than 90% of their original extent
* More than 40% of the global river discharge is now intercepted by large dams and one-third of sediment destined for the coastal zones no longer arrives. These large-scale disruptions have had a major impact on fish migration, freshwater biodiversity more generally and the services it provides. They also have a significant influence on biodiversity in terrestrial, coastal and marine ecosystems.

Loss of forests equates to a loss of many species

A 20-year study has shown that deforestation and introduction of non-native species has led to [about 12.5% of the world’s plant species to become critically rare](http://www.unep-wcmc.org/species/plants/overview.htm)

The report notes (p.32) that forests

* Are approximately 31% of the Earth’s land surface,
* Contain more than half of all terrestrial animal and plant species (mostly in the tropics), and
* Account for more than two-thirds of net primary production on land – the conversion of solar energy into plant matter.

A report from the World Commission on Forests and Sustainable Development suggests that [the forests of the world have been exploited to the point of crisis](http://www.ens-newswire.com/ens/apr1999/1999-04-20-03.asp) and that major changes in global forest management strategies would be needed to avoid the devastation.

Long Term Costs

If biodiversity deteriorates to an unsustainable level, then the problems resulting can be very expensive, economically, to reverse.

logging of trees and forests means that the [floods during the monsoon seasons can be very deadly](http://www.ens-newswire.com/ens/aug2000/2000-08-03-01.asp). Similarly, many avalanches, and mud slides in many regions around the world that have claimed many lives, may have been made worse by the clearing of so many forests, which provide a natural barrier, that can take the brunt of such forces.

The cost of the effects together with the related problems that can arise (like disease, and other illness, or rebuilding and so on) is much more costly than the maintenance and sustainable development practices that could be used instead.

The Military and the Environment

There is a complete set of examples, the following illustrate some of the issues:

* In the Gulf War and Kosovo crisis, the US and UK used depleted Uranium which have [environmental consequences](http://www.globalissues.org/article/131/effects-of-bombing-on-the-environment) as well.
* In the Vietnam war, the US used Agent Orange to defoliate the entire Vietnamese rainforest ecosystem. The effects are still being felt.
* In the [Democratic Republic of Congo](http://www.globalissues.org/article/87/the-democratic-republic-of-congo), various forces often kill gorillas and other animals as they encroach upon their land.
* In Okinawa, the large US military bases also affect the environment for the [local population](http://www.foreignpolicy-infocus.org/briefs/vol4/v4n09wom.html).
* Vieques, Puerto Rico, the US use live rounds in bombing ranges, and low altitude flying for training. This also has had an effect on the environment.

Attempts to promote biodiversity outweighed by activities against it

At the 1992 UN Conference on Environment and Development (the Earth Summit), the [Convention on Biological Diversity](http://www.cbd.int/) (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.

[The Economics of Ecosystems and Biodiversity for National and International Policy Makers 2009](http://www.teebweb.org/LinkClick.aspx?fileticket=I4Y2nqqIiCg%3d&tabid=1052&language=en-US) suugests

Implementing REDD (Reducing Emissions from Deforestation and Forest Degradation) could help

* Halve deforestation by 2030, and
* Cut emissions by 1.5 Gt of CO2 per year.

From a cost perspective (p.18), it is estimated that

* It would *cost* from US$ 17.2 – 33 billion per year
* **The estimated *benefit* in reduced climate change is US$ 3.2 *trillion***

**Steps taken to reserve biodiversity**

We can be optimistic and believe human ingenuity will solve these kind of problems. For example,

* The report does add that combating nutrient pollution can work and overtime reverse the pressure on ecosystems. A number of European nations have been doing this recently.
* Additionally, an estimated 12% of the area of the world’s inland waters are included within protected areas.
* Governments of 159 countries have ratified the Ramsar Convention on Wetlands, currently committed to conserving 1,880 wetlands of international importance, covering over 1.8 million square km, and to the sustainable use of wetland resources generally.
* In many countries, steps are being taken to restore wetlands, often reversing previous, sometimes recent land-use policies as there is increased recognition of the multiple benefits such as purification of water, protection from natural disasters, food and materials for local livelihoods and income from tourism.

Indigenous and local communities play a significant role in conserving very substantial areas of high biodiversity and cultural value.

In addition to officially-designated protected areas, there are many thousand Community Conserved Areas (CCAs) across the world, including sacred forests, wetlands, and landscapes, village lakes, catchment forests, river and coastal stretches and marine areas. These are natural and/or modified ecosystems of significant value in terms of their biodiversity, cultural significance and ecological services. They are voluntarily conserved by indigenous and local communities, through customary laws or other effective means, and are not usually included in official protected area statistics.

Globally, 4 to 8 million square km (the larger estimate is an area bigger than Australia) are owned or administered by communities. In 18 developing countries with the largest forest cover, over 22% of forests are owned by or reserved for communities. In some of these countries (for example Mexico and Papua New Guinea) the community forests cover 80% of the total. By no means all areas under community control effectively conserved, but a substantial portion are. In fact, some studies show that levels of protection are actually higher under community or indigenous management than under government management alone.