Geographical Eye

Species Extinction

Human impact on the environment is rarely out of the news. The World Conservation Union have recently released a report asserting that the extinction of species is a prominent challenge facing world ecosystems. The report suggested that nearly one in six European mammal species are threatened by extinction. The report also highlighted the greater threat facing marine mammals, with 22 per cent facing possible extinction. The issue of species extinction is increasingly creeping into the realm of environmental concern.

The necessity of extinction

Species extinction is a rule rather than an exception. Extinction is a necessary part of change and progression, and it is widely understood that species come and species go. Charles Darwin showed that a steady rate of extinction is part of the evolutionary process, occurring by the inability of species to adapt to changing environments. Extinction is therefore not a new process, and there have been at least five major extinctions over geologic history, known as 'The Big Five'

The Big Five
It is wideley agreed there there have been at least five significant extinctions in the Earths history. The classical "Big Five" mass extinctions were identified by Jack Sepkoski and David Raup in 1982. The Big Five: End Ordovician, Late Devonian, End Permian, End Triassic and End Cretaceous.

Today's concern is with the accelerated rate of extinction, rather than the actual process. It is considered that 'human induced' species extinction is taking place at a rate between 1000 and 10 000 times greater than the natural. The World Conservation Union asserts that it is human activity that poses the severest threat to world species. This edition of Geographical Eye will consider the role of global warming in the extinction of species.

The Greenhouse effect

Global warming is widely understood as an agent of biotic impoverishment, and a key factor in the extinction of species. The anthropogenic warming of our planet is both high magnitude and rapid. The IPCC (Intergovernmental Panel on Climate Change) in their 2007 report, predict an average global increase of between 1.8 – 4 °C in the next century, depending on human activity and human population levels. The IPCC also assert that global warming is taking place now, as evident through increases in global average temperature, increase in sea level and widespread melting of snow and ice.

Paleoclimatic records shows that species faced with climate change have often responded by migration. For example, during the last 12,000 years forests have migrated across the continent in response to de-glaciation. There is concern that both plant and animal species will not be able to migrate fast enough to keep up with the pace of climate change. At worst, the result could be the rapid destruction of forest, without their replacement elsewhere.

Another 'greenhouse challenge' facing world species is the surge in carbon dioxide (CO_2) levels in the atmosphere. CO_2 levels are at their highest for at least 650,000 years, at levels never experienced by humans. Human activity is adding CO_2 to the atmosphere primarily through the burning of fossil fuels and deforestation. CO_2 concentrations stood at 278ppm in pre-industrial times, and reached 379ppm in 2005.

Investigations carried out in the 1990's suggested that increased concentrations of CO_2 in the atmosphere would present plants with better growing opportunities. Human additions of CO_2 were viewed as a fertilizer, with the potential to increase forest biomass. Recent investigations have shown that such predictions have not proved true in the real environment, and vegetation is struggling to cope with the surge in CO_2 levels. The unusually hot and dry conditions presented by the changing climate means that plants are less capable of absorbing CO_2. The changing climate is therefore causing a deterioration of forests and vegetation to act as 'carbon dioxide sinks'.

Carbon dioxide sink
A carbon dioxide sink is a carbon reservoir. The main natural sinks are the oceans and plants and organisms that use photosynthesis to remove carbon from the atmosphere. It is believed that there is need to preserve and increase the size of carbon dioxide sinks so as to manage the problem of global warming.

The IPCC report of 2007 addressed the issue of the acidification of the oceans and the challenge this presents to marine life. The world oceans which act as 'carbon dioxide sinks', absorb carbon dioxide from the atmosphere. The increasing levels of CO_2 mean that oceans are absorbing increasing amounts and are becoming 'overwhelmed'. CO_2 reacts with sea water to produce carbonic acid, leading to the acidification of the oceans. Ocean acidification is providing environmentally unsuitable conditions for marine organisms which depend on slightly alkaline conditions to build their calcium carbonate shells.

Climate change and increased CO_2 concentrations represent a great threat to world species. Climate change must take a greater priority in out modern society to avoid catastrophic extinctions. Experts assert that there may be a large time lag between the climate changing and the extinction of species. The rapid reduction of greenhouse gas emissions may allow some of these species to 'hang on' and escape extinction.

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