About Climate Change and Biological Diversity
(Source: CBD)

What is Climate Change?
In the atmosphere, gases such as water vapour, carbon dioxide, ozone, and methane act like the glass roof of a greenhouse by trapping heat and warming the planet. These gases are called greenhouse gases. The natural levels of these gases are being supplemented by emissions resulting from human activities, such as the burning of fossil fuels, farming activities and land-use changes. As a result, the Earth's surface and lower atmosphere are warming, and this rise in temperature is accompanied by many other changes.

Rising levels of greenhouse gases are already changing the climate. According to the Intergovernmental Panel on Climate Change (IPCC) Working Group I (WGI) Fourth Assessment Report, from 1850 to 2005, the average global temperature increased by about 0.76ºC and global mean sea level rose by 12 to 22 cm during the last century. These changes are affecting the entire world, from low-lying islands in the tropics to the vast polar regions.

Climate change predictions are not encouraging; according to the IPCC WGI Fourth Assessment Report, a further increase in temperatures of 1.4°C to 5.8°C by 2100 is projected. Predicted impacts associated with such temperature increase include: a further rise in global mean sea level, changes in precipitation patterns, and more people at risk from dangerous "vector-borne diseases" such as malaria.

What's the problem?
The present global biota has been affected by fluctuating Pleistocene (last 1.8 million years) concentrations of atmospheric carbon dioxide, temperature, and precipitation, and has coped through evolutionary changes, species plasticity, range movements, and/or the ability to survive in small patches of favourable habitat (refugia). These changes, however, occurred in a landscape that was not as fragmented as it is today and with little or no additional pressure from human activities. Habitat fragmentation has confined many species to relatively small areas within their previous ranges, resulting in reduced genetic variability. Warming beyond the ceiling of temperatures reached during the Pleistocene will stress ecosystems and their biodiversity far beyond the levels imposed by the global climatic change that occurred in the recent evolutionary past.

Current rates and magnitude of species extinction far exceed normal background rates. Human activities have already resulted in the loss of biodiversity and thus may have affected goods and services crucial for human well-being. The rate and magnitude of climate change induced by increased greenhouse gases emissions has and will continue to affect biodiversity either directly or in combination with other drivers of change.

Why does it matter?
There is ample evidence that climate change affects biodiversity. According to the Millennium Ecosystem Assessment, climate change is likely to become the dominant direct driver of biodiversity loss by the end of the century. Climate change is already forcing biodiversity to adapt either through shifting habitat, changing life cycles, or the development of new physical traits.

At the same time, biodiversity has a role to play in climate change adaptation and mitigation. For example, the conservation of habitats can reduce the amount of carbon dioxide released into the atmosphere. Currently, deforestation is estimated to be responsible for 20 percent of human-induced carbon dioxide emissions. Moreover, conserving mangroves and drought-resistant crops, for example, can reduce the disastrous impacts of climate change such as flooding and famine.

In addition, for a given ecosystem, functionally diverse communities are more likely to adapt to climate change and climate variability than impoverished ones. High genetic diversity within species appears to increase their long-term persistence. It must be stressed, however, that the effect of the nature and magnitude of genetic and species diversity on certain ecosystem processes is still poorly known. The ability of ecosystems to either resist or return to their former state following disturbance may also depend on given levels of functional diversity.

What needs to be done?
The resilience of ecosystems can be enhanced and the risk of damage to human and natural ecosystems reduced through the adoption of biodiversity-based adaptive and mitigative strategies. Mitigation is described as a human intervention to reduce greenhouse gas sources or enhance carbon sequestration, while adaptation to climate change refers to adjustments in natural or human systems in response to climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Given the interlinkages that exist between climate change and biodiversity, there is a need to:

- identify and conserve biodiversity components that are especially sensitive to climate change,
- preserve intact habitats so as to facilitate the long-term adaptation of biodiversity,
- improve our understanding of the climate change – biodiversity linkages, and
- fully integrate biodiversity considerations into climate change mitigation and adaptation plans.

Examples of activities that promote mitigation of or adaptation to climate change include:

- maintaining and restoring native ecosystems,
- protecting and enhancing ecosystem services,
- managing habitats for endangered species,
- creating refuges and buffer zones, and
- establishing networks of terrestrial, freshwater and marine protected areas that take into account projected changes in climate.