GREENPEACE Briefing

Climate change impacts around the world

Mount Kilimanjaro – one example

The ice cap of Mount Kilimanjaro is disappearing rapidly due to melting snow and ice and is expected to disappear entirely within ten to 20 years. In February 2001 American geologist, professor Lonnie Thompson of Ohio State University's Byrd Polar Research Center, made public his findings based on more than 20 years research.

Thompson found that since 1912, when for the first time 12 square kilometres of snow, ice and glaciers were mapped out on the slopes of Mount Kilimanjaro, more than 80 per cent of the ice caps' volume has disappeared. Research shows that since 1989, 33 per cent of the ice mass has vanished. According to recent estimates the remaining ice cap of approximately 2 square kilometres will have melted in 10-20 years. A unique and vital African panorama will have disappeared forever.

Mount Kilimanjaro is located practically on the equator in Tanzania. With an altitude of 5,895 meters, it is the highest mountain in Africa. "Kilima" is Swahili for "mountain" and "Njaro" means "shining", a name that reflects the characteristic white ice cap that, when illuminated by the sun, is visible from great distances and neighboring countries like Kenya. Within some 20 years, Kilimanjaro's name is likely to be a reminder of the shining snowcap it once wore, rather than a description of the mountain itself.

Unfortunately Kilimanjaro's fate is not unique. Globally, the effects of climate change are being felt in a variety of ways and scientists predict more regular, and more intense impacts. Climate change presents a threat to most natural systems. Those natural systems threatened include glaciers, coral reefs, mangroves, arctic ecosystems, alpine ecosystems, prairie wetlands, native grasslands, and biodiversity "hotspots". Climate change will increase existing risks of species extinction and biodiversity loss in ecosystems at every latitude and in each region. This is not only impacting nature – it has devastating implications for human lives as well.

Developing countries are most at risk

The IPCC report finds that developing countries are most at risk from climate change. Global increases in temperature would produce net economic losses in many developing countries for all magnitudes of warming and these losses would be greater the higher the warming is most extreme among the poorest people in these countries.

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Those with the least resources have the least ability to adapt, and will be most damaged by climate change.

- The effects of climate change are expected to be greatest in developing countries in terms of loss of life and relative effects on investment and the economy. For example, the relative percentage damages to GDP from climate extremes have been substantially greater in developing countries than in developed countries.

In contrast an increase in global mean temperature of up to a few degrees Celsius would produce a mixture of economic gains and losses in developed countries, with economic losses for larger temperature increases.

What causes climate change

Climate change is directly linked to our fossil energy consumption. Global warming of the earth is the result of increasing greenhouse gas emissions. The principal cause is carbon dioxide (CO_2), which is released when fossil fuels such as coal, oil and gas are burned.

In 2001 a revised report was issued by the Intergovernmental Panel on Climate Change (IPCC), a body under the United Nations made up of more than 2500 scientists from around the globe. The IPCC found new and stronger evidence that most of the observed warming of the past 50 years is attributable to human activities, and that about three quarters of the anthropogenic (human created) emissions of CO2 during the past 20 years are due to fossil fuel burning.

The IPCC also reported that the average global temperature was projected to rise to between 1.4 and 5.8 degrees Celsius in the next 100 years. This is a massive increase on the projections in their previous report, made in 1977, which estimated the increase in temperature to be between 1 and 3.5 degrees.

The IPCC's projection of climate impacts around the world include:

Africa

- Grain yields are projected to decrease for many scenarios, diminishing food security, particularly in small food-importing countries.
- Extension of ranges of infectious disease vectors would adversely affect human health in Africa.
- Increases in droughts, floods, and other extreme events would add to stresses on water resources, food security, human health, and infrastructures, and would constrain development in Africa.
- Significant extinctions of plant and animal species are projected and would impact rural livelihoods, tourism, and genetic resources.

Asia:

- Climate change would exacerbate threats to biodiversity due to land-use and land-cover change and population pressure in Asia. Sea level rise would put ecological security at risk, including mangroves and coral reefs.

- Many species of mammals and birds could be exterminated as a result of the synergistic effects of climate change and habitat fragmentation.
- Extreme events have increased in temperate and tropical Asia, including floods, droughts, forest fires, and tropical cyclones.
- Decreases in agricultural productivity and aquaculture due to thermal and water stress, sea level-rise, floods and droughts, and tropical cyclones would diminish food security in many countries of arid, tropical, and temperate Asia; agriculture would expand and increase in productivity in northern areas
- Human health would be threatened by possible increased exposure to vector- borne infectious diseases and heat stress in parts of Asia.
- Sea level rise and an increase in intensity of tropical cyclones would displace tens of millions of people in low-lying coastal areas of temperate and tropical Asia; increased intensity of rainfall would increase flood risks in temperate and tropical Asia
- Climate change would exacerbate threats to biodiversity due to land-use and land-cover change and population pressure in Asia. Sea level rise would put ecological security at risk, including mangroves and coral reefs.
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Australia and New Zealand:

- The net impact on some temperate crops of climate and CO_2 changes may initially be beneficial, but this balance is expected to become negative for some areas and crops with further climate change.
- Water is likely to be a key issue due to projected drying trends over much of the region and change to a more El Nino-like average state
- Increases in the intensity of heavy rains and tropical cyclones, and region-specific changes in the frequency of tropical cyclones, would alter the risks to life, property, and ecosystems from flooding, storm surges, and wind damage.
- Some species with restricted climatic niches and which are unable to migrate due to fragmentation of the landscape, soil differences, or topography could become endangered or extinct.
- Australian ecosystems that are particularly vulnerable to climate change include coral reefs, arid and semi-arid habitats in southwest and inland Australia and Australian alpine systems.
- Freshwater wetlands in coastal zones in both Australia and New Zealand are vulnerable, and some New Zealand ecosystems are vulnerable to accelerated invasion by weeds.

Europe:

- Half of alpine glaciers and large permafrost areas could disappear by the end of the 21st century.
- River flood hazard will increase across much of Europe; in coastal areas, the risk of flooding, erosion, and wetland loss will increase substantially with implications for human settlement, industry, tourism, agriculture, and coastal natural habitats.
- Upward and northward shift of biotic zones will take place. Loss of important habitats (wetlands, tundra, isolated habitats) would threaten some species.

Latin America:

- Loss and retreat of glaciers would adversely impact runoff and water supply in areas where glacier melt is an important water source.
- Floods and droughts would become more frequent with floods increasing sediment loads and degrade water supply in some areas.
- Increases in intensity of tropical cyclones would alter the risks to life, property, and ecosystems from heavy rain, flooding, storm surges, and wind damages.
- Food security could become a serious problem for many countries in Latin America.
- Yields of important crops are projected to decrease in many locations in Latin America even when the effects of CO_2 are taken into account; subsistence farming in some regions of Latin America could be threatened.
- The geographical distribution of vector-borne infectious diseases would expand poleward and to higher elevations, and exposures to diseases such as malaria, dengue fever, and cholera will increase.
- In Latin America, valuable ecosystem resources will disappear, as already threatened biodiversity hotspots get hotter.
- The rate of biodiversity loss would increase.

North America

- Unique natural ecosystems such as prairie wetlands, alpine tundra, and cold water ecosystems will be at risk and effective adaptation is unlikely.
- Sea-level rise would result in enhanced coastal erosion, coastal flooding, loss of coastal wetlands, and increased risk from storm surges, particularly in Florida and much of the US Atlantic coast.
- Weather-related insured losses and public sector disaster relief payments in North America have been increasing; insurance sector planning has not yet systematically included climate change information, so there is potential for surprise.
- Vector-borne diseases—including malaria, dengue fever, and Lyme disease—may expand their ranges in North America; exacerbated air quality and heat stress morbidity and mortality would occur socioeconomic factors and public health measures would play a large role in determining the incidence and extent of health effects.

Polar Regions

- Natural systems in polar regions are highly vulnerable to climate change and current ecosystems have low adaptive capacity; technologically developed communities are likely to adapt readily to climate change but some indigenous communities, in which traditional lifestyles are followed, have little capacity and few options for adaptation.
- Climate change in polar regions is expected to be among the largest and most rapid of any region on the Earth, and will cause major physical, ecological, sociological, and economic impacts especially in the Arctic, Antarctic Peninsula, and Southern Ocean.
- Changes in climate that have already taken place are manifested in the decrease in extent and thickness of Arctic sea ice, permafrost thawing, coastal erosion, changes in ice sheets and ice shelves, and altered distribution and abundance of species in the Polar regions.

Small Island States

- The projected sea level rise of 5mm per year for the next 100 years will cause enhanced coastal erosion, loss of land and property, dislocation of people, increased risk from storm surges, reduced resilience of coastal ecosystems, saltwater intrusions into freshwater resources, and high resource costs to respond to and adapt to these changes
- Islands with very limited water supplies are highly vulnerable to the impacts of climate change on the water balance.
- Coral reefs will be negatively affected by bleaching and by reduced calcification rates due to higher carbon dioxide levels, mangrove, sea grass beds, other coastal ecosystems and the associated biodiversity would be adversely affected by rising temperatures and accelerated sea level rise.
- The reef fisheries that support populations on small island states are severely threatened by expected weakening and damage to coastal ecosystems.
- Declines in coastal ecosystems would negatively impact reef fish and threaten reef fisheries, those who earn their livelihoods from reef fisheries, and those who rely on the fisheries as a significant food source
- Agricultural limitations on small islands will be worsened by the precipitation variability and sea level rise resulting from climate change.
- Limited arable land and soil salinization makes agriculture of Small Island States, both for domestic food production and cash crop exports, highly vulnerable to climate change.
- Tourism, an important source of income and foreign exchange for many islands, will face severe disruption from climate change and sea level rise.

Global impacts

Greenhouse gas increases over the next century could trigger large scale and irreversible impacts. These events may not be likely to occur in the next century but there is a significant likelihood that they could be triggered by human activities in the next 100 years. Among these risks are:

- The slowing down or stopping of the North Atlantic's thermohaline circulation (The Gulf Stream) which could plunge Europe into the climate regime experienced by Labrador.
- Melting of the Greenland and West Antarctic Ice Sheets, which could lead to up to 3 metres of sea level rise *each* over the next 1000 years and "submerge many small islands and inundate extensive coastal areas.
- Acceleration of global warming caused by releases of carbon to the atmosphere from forest disturbance which is itself caused by climate change.
- Releases of terrestrial carbon caused by the melting permafrost and releases of methane, a powerful greenhouse gas, from the decomposition of hydrates under coastal sediments on the seabed "would further increase greenhouse gas concentrations and amplify climate change".

Threats to humans

Threats to human systems, beyond the loss of natural ecosystems, derive from threats to water resources, agriculture, forestry, health, settlements, energy, industry, and financial services. Vulnerability of particular human populations is determined by degree of the nature of the threat, sensitivity and ability to adapt--characteristics that depend on geographic location and development level of social, economic and environmental conditions. Tens of millions of people living in low lying coastal areas face the risk of having to move due to flooding.

The IPCC report also finds

- There is emerging evidence that some social and economic systems have been effected by the recent increasing frequency of floods and droughts in some areas.
- Increased frequency of heat waves will increase crop and livestock losses, frequency of wildfires, wildlife mortality, energy demand for cooling, and human deaths and illness from heat stress and air pollution.
- Decreased frequency of cold waves and fewer frost days will extend the range of some pests and disease vectors while reducing losses due to cold.
- Increased frequency of high intensity rainfall will increase flood (and flash flood) risk, with consequent property damage, soil erosion, flushed pollutants, health threats, and deaths.
- Any increase in intensity and frequency of extreme climate events will increase demands on already overburdened public and private financial mechanisms to cover weather related losses.

Greenpeace's conclusions – what must be done

- The costs of fulfilling the Kyoto commitments and further reducing emissions are relatively low.
- Stabilizing CO_2 at relatively low levels based on known technology is possible.
- Unless energy investment patterns are changed we may not be able to stabilize CO_2.
- Availability of fossil fuels will not limit future greenhouse emissions. As the energy mix needs to be changed as sources of oil and gas are running out, the choice is between coal and unconventional oil or new renewable energy sources.
- The more quickly we initiate short-term action to reduce emissions the more we minimize the risk of damaging human and natural systems.