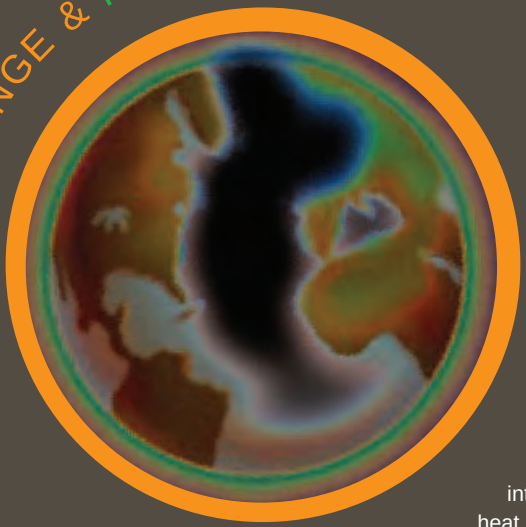
peat for life?

peatlands & climate change adaptation

CLIMATE CHANGE & PEATLANDS



The threat of climate change can no longer be dismissed as an exaggerated environmental concern. Planet Earth is feeling the heat of its effects, mostly through changes in climatic patterns throughout the world. Climate change is primarily caused by the increased emissions of Greenhouse Gases (GHGs) into the atmosphere which trap heat in the earth's atmosphere by reflecting infrared energy back to the earth's surface through the so-called "greenhouse effect"

Some GHGs are released naturally - however, it is GHGs that are generated as a result of human activities that are primarily attributed with disturbing the balance of GHGs in the atmosphere. Combustion of carbon-laden fossil fuels for domestic and industrial use as well as degradation of forests and peatlands have led to rising emissions of GHGs such as carbon dioxide, while industrial and agricultural activities add methane and nitrous oxide. Additionally land degradation and pollution have reduced the capability of the planet's ecosystems to absorb GHGs.

Peatland ecosystems are one of the most important ecosystems in relation to regulation of GHGs and global climate. They occur in more than 130 countries and play a key role on absorbing carbon dioxide and storing it in the form of dead plant material - creating layers of peat soil up to 20 metres thick. Over the past 10,000 years they have absorbed an estimated 1,200 billion tonnes of carbon dioxide from the atmosphere. Although peatlands cover about three percent of the land surface they are now one of the world's largest carbon stores. Unfortunately human activities such as drainage, peat extraction and fire are now turning peatlands from key carbon stores to carbon sources. This is exacerbated by changes in climate such as rising temperatures, longer dry seasons and reduced rainfall.

consequences

impacts of climate change

impact of climate change on peatland

Ecological

Disruption of reproduction, flowering and migration processes

Increased in coral bleaching

Reduction in river flow and drying out of wetlands

Increased incidence of forest fires

Extinction of animals and plants

Socio Economic

Increased floods and storm damage

Reduced water supply and quality of water

Disrupted agricultural output and food production

Increased frequency of pests and disease outbreaks

Creation of economic hardship and displaced populations

Climate Impacts & Peatlands Degradation

Peatlands store large amounts of carbon which is released when they are degraded directly by drainage, clearance or burning or by climate change

Climate models predict an increase in extreme events such as droughts as well as increased evaporation rates which will induce drying of peatlands and lead to more fires. In the 1997-1998 El Niño event, fires burnt over 2 million ha of peatlands in Southeast Asia releasing 1 - 2 billion tonnes of CO_2.

Observed and predicted increase in temperature in the Arctic Region of 5 - 8 ºC will lead to melting of permafrost peatlands and a lowered water table which will cause the northern peatlands to dry out and decompose and the fire frequency to increase. In Russia, Canada and Alaska southern permafrost peatlands are already melting and drying out and fire frequency appears to be increasing.

Increased evaporation and reduced rainfall and run-off in arid or semi arid regions will put further stress on peatlands. As one of the remaining ecosystems in arid landscapes with good vegetation and water supply, they are likely to be under intensified pressure from grazing and other human activities. The area of intact peatlands in Mongolia has reduced by over 50% in recent years due to twin pressures of changes in climate and increased grazing pressure.

burning

melting

desertification

causes climate change

destruction cycle repeats

damaging

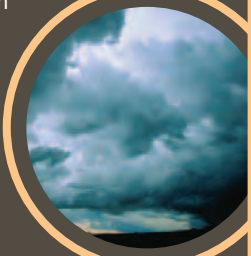
effects of climate change

Increase in global temperature

In the last century, the earth's surface temperature has been reported to have risen by approximately 0.6ºC and is predicted to rise a further 1.4 to 5.8 ºC in the next 100 years. In parts of the planet, this could lead to severe and prolonged droughts and intensive heat waves which can threaten lives and cause hardship. In the colder regions or at high altitude rising temperatures will cause glaciers and ice caps to melt resulting in rising sea levels.

Changes in precipitation patterns

Although overall average precipitation will increase, in some regions there will be less rainfall. In addition, the frequency of extreme events will increase with more floods and droughts. Increased variations in year-to-year rainfall will also occur. Evaporation will also increase resulting in less run-off to supply rivers and other wetland systems.



Rise in sea level

In the last century, there has been an average rise in sea level of 10 - 20 cm as a result of melting ice and expansion of warmer sea water. In the next 100 years an increase by 10 - 90 cm is expected. This will lead to increased coastal erosion and saline water intrusion, which will impact coastal and island regions and displace the populations of low lying countries and cities.

Reduced agriculture production

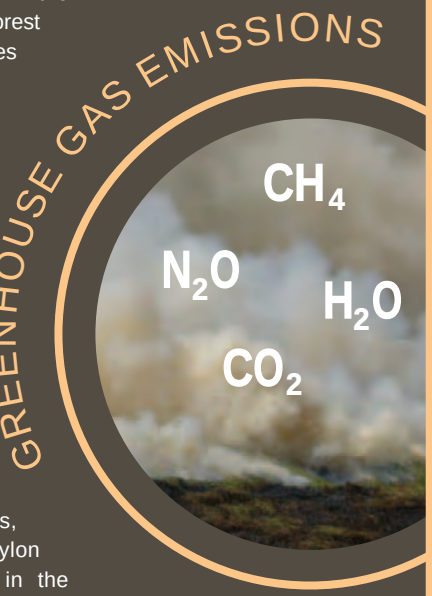
Agricultural yields are expected to drop in most tropical and sub-tropical regions - and in temperate regions, too, if the temperature increase is more than a few ºC. The continental interiors, such as central Asia, the African Sahel, and the Great Plains of the United States are forecast to dry up. The range of crop pests as well as human diseases such as malaria will also expand. These changes will disrupt food supply or at worst lead to large scale displacement of populations.

peatland degradation

There are a broad range of gasses that contribute to the greenhouse effect of which the most important are described below:

Carbon Dioxide

Carbon dioxide (CO_2) produced by human activities is probably the main cause of climate change. There are many sources of carbon dioxide but the CO_2 from natural sources is balanced by 'sinks' like oceans and vegetation that take the carbon out of the atmosphere. However, since the industrial revolution, there has been a 30% increase of CO_2 in the atmosphere caused by use of fossil fuels as well as forest and peatland degradation. In the next 100 years increases of 50 - 150% are predicted.



Methane

Methane (CH_4)is naturally produced by bacteria during the decomposition of animal and plant remains especially in wetland soils. The concentration of methane in the atmosphere has increased by 150% since the mid 1700s, particularly through human induced activities such as livestock and rice production, and industrial activities.

Nitrous Oxide

Nitrous oxide (N_2O) is naturally released by soils especially in the tropics. Human activities have enhanced emissions through agricultural activities, biomass burning and industrial sources (e.g. nylon production). There are lesser concentrations of it in the atmosphere compared to CO_2, however it is over 300 times stronger as a GHG than CO_2.

Water Vapour

Water vapour acts as an important GHG. The concentration of water vapour in the atmosphere increases rapidly with rising temperature (about six percent per °C): As the earth's temperature rises, more water vapour passes into the atmosphere and so water can help accelerate the greenhouse gas effect.

Mitigation

Although there is little direct action which can be taken to reduce the level of water in the atmosphere, the level of other GHG's can be reduced by protecting forests and peatlands, and modifying agricultural and industrial practices.

adaptation options

Climate change is now inevitable and its effects will continue even if GHG emissions reduce. Therefore, adjustments need to be made in order to moderate its impact. Climate change adaptation is adjustment in natural or human systems in response to current or future climatic conditions or their impacts. There are a number of adaptation strategies which can be applied to peatlands but need to be adjusted according to the region and the exact nature and function of the site.

ACT NOW!

Adaptation Strategies include:

- ☐ Maintain or restore peatlands
  - As a buffer against saline intrusion (coastal peatlands).
  - To absorb increased flood peaks (floodplain peatlands)
  - For their role in water supply (upland or floodplain peatlands)
- ☐ Increase the resilience of peatlands to climate change through:
  - Stopping or controlling drainage
  - Enhancing water management systems
  - Modify logging, mining and other extractive activities
  - Reducing grazing pressure
- ☐ Reduce risk and impacts of peatland fires by:
  - Implementing fire warning systems
  - Preventing fires through improved management, awareness and incentive measures
  - Establishing better fire response and control systems
- ☐ Develop alternative sustainable economic activities for local communities:
  - To reduce pressure for further drainage and extraction from peatlands.
  - To provide incentives for better peatland management
  - To take advantage of the functions of peatlands as carbon store and water reservoirs
  - To modify peatland forestry and agriculture practices in line with future climate regimes
- ☐ Reduce the level of non-climate stresses such as pollution, fragmentation of habitats, over-extraction or diversion of water and disruption of hydrology
- ☐ Ensure management of peatlands is on the basis of hydrological units such as peat domes or catchments

peatlands

climate change causes peatland degradation causes greenhouse gas emission causes climate change

cycle of destruction

danger cycle

adaptation options

Peatlands are one of the main terrestrial stores of atmospheric carbon. While they cover a mere three percent of the land surface, they store 30 percent of the carbon. However, this function is now being reversed due to human intervention. Drainage, land clearance and fires combined with climate change are changing peatlands from a store to a source of carbon - further accelerating climate change. Mitigation measures include protection and restoration of peatland systems.

ACT TODAY.
PEAT FOR LIFE.

IMPACTS
ECOLOGICAL & SOCIO-ECONOMIC

- Disruption of reproduction, flowering and migration processes
- Reduction in river flow and drying out of wetlands
- Increased incidence of forest fires
- Extinction of animals and plants
- Increased floods and storm damage
- Reduced water supply and quality of water
- Disrupted agricultural output and food production
- Increased frequency of pests and disease outbreaks
- Creation of economic hardship and displaced populations

ADAPTATION OPTIONS

- Maintain or restore peatlands
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- Reduce risk and impacts of peatland fires
- Develop alternative sustainable economic activities for local communities
- Reduce the level of non-climate stresses such as pollution, fragmentation of habitats, over-extraction or diversion of water, disruption of hydrology
- Ensure management of peatlands is on the basis of hydrological units such as peat domes or catchments

Global Environment Centre

WETLANDS INTERNATIONAL

for more information visit www.peat-portal.net

- working together. peat for life. -

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Main Information Sources:
Interlinkages Between Biological Diversity and Climate Change (CBD Technical Publication 10, 2003); Impacts of a Warming Arctic : Arctic Climate Impact Assessment (ACIA, 2004); Assessment on Peatlands, Biodiversity & Climate Change (GEC/WI, in preparation); Climate Change 2001 : Impact, Adaptation and Vulnerability (IPCC, 2001)

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