assessment

on peatlands, biodiversity and climate change

-key Interim findings related to climate change-

peatlands

Peatlands are the most efficient terrestrial ecosystem in storing carbon. While covering only 3% of the World's land area, their peat contains as much carbon as all terrestrial biomass, and twice as much as all forest biomass.

Peatlands are the top long-term carbon store in the terrestrial biosphere. They sequester and store atmospheric carbon for thousands of years.

Peatlands are some of the last wildernesses of the planet. Being critical for biodiversity conservation, they support specialised species and unique ecosystems, and increasingly provide refuge for threatened species that are expelled from intensively used and overexploited areas.

Degradation of peatlands is a major growing source of anthropogenic emissions. Carbon dioxide emissions from peatland drainage, fires and exploitation may be equivalent to at least 15% of the 1990 carbon dioxide emissions of the Annex 1 Parties to the UNFCCC.

Peatland degradation affects millions of people around the world. Drainage and fires in SE Asian peat swamp forests jeopardize the health and livelihood of regional populations, while destruction of mountain peatlands threatens water sources and food supply.

Climate change impacts are already visible through melting of permafrost peatlands, and desertification of steppe peatlands.

Conservation, restoration and wise use of peatlands are essential and very cost effective measures for long term climate change mitigation and adaptation.

introduction

Peatlands are one of the most important natural ecosystems in the world that have key values for climate regulation, biodiversity conservation and support of human welfare. Peatlands are wetland ecosystems that are characterized by the accumulation of organic matter called peat which derives from dead and decaying plant material under high water saturation conditions. Inappropriate management is leading to large scale degradation of peatlands worldwide - which has major implications for climate change, biodiversity and people.

The global **Assessment on Peatlands, Biodiversity and Climate Change** aims to collate the best available scientific information on the nature and value of peatlands in relation to biodiversity and climate change, the impact of human activities and the potential sustainable management options.

This document highlights some of the key interim findings specifically in relation to the Climate change issues.

Readers are encouraged to contribute to the finalization of the assessment as well as assist in dissemination of the findings.

Peatlands & People

- Peatlands and people are connected by a long history of cultural development. Peatland ecosystems provide a wealth of valuable goods and services such as livelihood support, carbon storage, water regulation and biodiversity conservation.
- Many indigenous cultures and local communities are dependent on the continued existence of peatlands, but peatlands also provide a wealth of valuable goods and services to industrial societies.
- The character and values of peatlands are generally poorly recognized. This is the root cause of degradation and avoidable conflicts.
- The main impacts on peatlands include drainage for agriculture and forestry and associated peat fires, peat extraction, infrastructure development and urban construction, inundation, contamination and pollution.
- Deterioration of peatlands has resulted in significant economic losses and social impacts, and has created tensions between key stakeholders at local, regional and international levels.

Key characteristics of Peatlands

- The major characteristics of natural peatlands are the formation and storage of peat (dead plant remains that are not fully decomposed), permanent water logging, and the continuous (upward) growth of the surface.
- Peatland distribution and peat formation and storage are primarily a function of climate which determines water conditions, vegetation productivity and the decomposition rate of dead organic material.
- Covering 4 million km^2, primarily in the boreal, subarctic and tropical zones, peatlands are found in almost every country. More detailed
- assessments of their extent nature and status are needed. Many peatlands are not recognised as such but are classified as marshes, meadows, or forests.
- As a result of different climatic and biogeographic conditions, a large diversity of peatland types exists. However, because of similar ecohydrological processes, they share many ecological features and functions.
- In northern regions and highlands, peatlands and permafrost are mutually dependent.
  The intense relationship between "plants", "water", and "peat" make peatlands vulnerable to a wide range of human interference.
- As a result of long development, peatlands may reach a high level of internal coherence and integrity. The coherence means that degradation of part of a peatland may affect the whole system while integrity makes undisturbed natural peatlands often less sensitive to climate changes than other ecosystems.

Peatlands & Biodiversity

- Peatlands are unique and complex ecosystems of global importance for biodiversity conservation at the genetic, species and ecosystem levels.
- Peatlands play a special role in maintaining biodiversity at the genetic level due to habitat isolation and heterogenity and at the ecosystem level due their ability to self-regulate and adapt to different physical conditions.
- Although species diversity may be lower, the proportion of characteristic species is higher in peatlands than in dryland ecosystems of the same biogeographic zone.
- Peatlands have a significant impact on biodiversity far beyond their borders by maintaining hydrological and microclimate features of adjacent areas and by providing temporary habitats for "dryland" species.
- Peatlands are often the last remaining natural areas in degraded landscapes and thus mitigate landscape fragmentation. They also support adaptation by providing habitats for endangered species and those displaced by climate changes.
- Peatlands can be impacted by human activities both in the peatland and its catchment, leading to losses in habitats, species and mire types as well as associated ecosystem services.

Peatlands & Carbon

- While covering only 3% of the World's land area, peatlands contain at least 550 Gt of carbon in their peat. This is equivalent to 30% of all global soil carbon, 75% of all atmospheric C, equal to all terrestrial biomass, and twice the carbon stock in the forest biomass of the world. This makes peatlands the top long-term carbon store in the terrestrial biosphere.
- Peatlands are the most efficient carbon (C) stores of all terrestrial ecosystems. In the (sub)polar zone, peatlands contain 3.5 times, in the boreal zone 7 times, in the tropical zone 10 times more carbon per ha than ecosystems on mineral soil.
- Peatlands store carbon in different parts of their ecosystem (biomass, litter, peat layer, mineral subsoil layer), each with their own dynamics and turn-over.
- The peat layer is a long-term store of carbon. Peatlands have accumulated and stored this carbon over thousands of years. Permanent waterlogging and consequent restricted aerobic decay is the prerequisite for long-term storage of carbon in peatlands.
- Most coal and lignite and part of the "mineral" oil and natural gas originated from peat deposits of previous geological periods.
- Peat growth depends on the delicate balance between production and decay. Natural peatlands may shift between carbon sink and source on a seasonal and inter-annual time scale, but the accumulation of peat demonstrates that their long-term natural balance is positive.
- Human interventions can easily upset the natural balance of production and decay turning peatlands into carbon emission sources. Drainage for agriculture, forestry and other purposes increases aerobic decay and change peatlands from sinks and stores of carbon to (often vigorous) sources. Peat extraction (for fuel, fertilizers, etc.) transfers carbon to the atmosphere even more quickly.
- Peatland drainage also facilitates peat fires which currently are thought to be one of the largest carbon emission sources associated with land management.

Peatlands & Greenhouse Gases (GHG)

- Natural peatlands affect atmospheric burdens of CO_2 , CH_4 and N_2O in different ways and so play a complex role with respect to climate.
- Since the last ice age peatlands have played an important role in global GHG balances by sequestering enormous amount of atmospheric CO_2 .
- GHG fluxes in peatlands have a spatial (zonal, ecosystem, site and intersite) and temporal (interannual, seasonal, diurnal) variability which needs to be considered in assessment and management.
- Small changes in ecohydrology can lead to big changes in GHG fluxes through influence on peatland biogeochemistry.
- In assessing the role of peatlands in global warming the different time frame and radiative forcing of continuous CH_4 emission and CO_2 sequestration should be carefully evaluated rather than using simple global warming potential calculations.
- Anthropogenic disturbances (especially drainage and fires) have led to massive increases in net emissions of GHG from peatlands, which are now comparable to global industrial emissions.
- Peatland drainage leads to increased CO_2 emissions, a rise of N_2O release in nutrient rich peatlands but may not significantly reduce CH_4 efflux.
- Because of these huge emissions, restoration of degraded peatlands is the most cost-effective way of avoiding anthropogenic greenhouse gas emissions.








Peatlands & Climate

- Climate is the most important determinant of the distribution and character of peatlands.
- Peatlands preserve, in the constantly accumulating peat, a unique record of their own development as well as past changes in climate and regional vegetation.
- Records show that the vegetation, growth rate (carbon accumulation) and hydrology of peatlands was altered by past climate change and this knowledge can help in making predictions for the future.
- Natural peatlands showed resilience to the changes in climate that have occurred in the past. However, the rate and magnitude of predicted future climate changes and extreme events (e.g. fire, drought and flood) may push many peatlands over their threshold for adaptation.
- The effects of recent climate change are already apparent in melting of permafrost peatlands, inundation of coastal peatlands due to sea level rise, desertification of steppe peatlands, and increased peatland erosion by high intensity rainfall.
- Human activities such as vegetation clearance, drainage, overgrazing increase the vulnerability of peatland to climate change.

Impacts of future Climate Change on Peatlands

- Climate change scenarios suggest major changes in temperature, precipitation and other phenomena that will have significant impacts on peatland carbon store, GHG flux and biodiversity.
- Increasing temperatures may affect production in both directions by lengthened growing seasons and increased decay in peatlands.
- Precipitation changes are expected to be highly variable depending on regional factors. This will affect hydrology and have far-reaching effects on peatland ecosystem processes.
- More frequent and extreme droughts, floods and rainstorms will likely enhance peatland erosion and desiccation and boost the incidence of peat fires.
- Impacts on peatlands will be regionally differentiated - such as melting of permafrost; inundation and salinisation in coastal zones or desiccation in mountain and steppe regions.
- The combined effects of climate change will have consequences for the distribution and ecology of peatland biota which in turn will feedback to the climate system.
- Human activities in many cases increase peatlands' vulnerability to climate change.
- The most vulnerable peatland types (tropical peat swamp forests, permafrost, mountain and coastal peatlands) require urgent adaptation measures.
- Climate mitigation measures such as hydropower or biofuel production can, if implemented on peatlands, have serious negative impacts on peatland carbon storage, GHG flux and biodiversity

Management of Peatlands for Biodiversity & Climate Change

The current management of peatlands is generally not sustainable and has major negative impacts on biodiversity and climate change.

A wise use approach is needed to integrate protection and sustainable use to safeguard the peatland benefits from increasing pressure from people and changing climate.

Simple changes in peatland management can both improve the sustainability of land use and reduce its impacts on biodiversity and climate change.

Restoration of peatlands can be a cost-effective way to generate immediate benefits for biodiversity, and climate change by reducing peatland subsidence, oxidation and fires.

New production techniques such as wet agriculture should be developed and promoted to generate production benefits from peatlands without negatively impacting their environmental functions.

Strict protection of intact peatlands is critical for the conservation of biodiversity and will maintain ecosystem function and carbon stores/sequestration.

Peatland management should be integrated into land use and socio-economic development planning by taking a multi-stakeholder, ecosystem, river basin and landscape approach.

Peatland issues should be better incorporated into global (CBD, UNFCCC, Ramsar Convention, CCD etc.) and regional policy-making processes.

Lack of awareness and capacity, poverty, inequity, and perverse incentives are important root causes of peatland degradation and should be addressed in a comprehensive manner.

The preparation of the Assessment is being coordinated by a multidisciplinary international team of peatland, biodiversity and climate change specialists in the period 2005-2007 as a contribution to the global policy deliberations on biodiversity, climate change and sustainable development. It builds on the resolution on wetlands and climate change adopted by the Ramsar convention on Wetlands in 2002. It was recognised by the 2004 CBD Decision on Climate and Biodiversity and will be formally be considered by the CBD SBSTTA in 2007. It will be made available to Parties to the UNFCCC, the UNCCD and other stakeholders.

The Assessment on Peatlands, Biodiversity and Climate Change study was initiated by the project on Integrated Management of Peatlands for Biodiversity and Climate Change implemented by Wetlands International and the Global Environment Centre with the support of UNEP-GEF, the governments of the participating pilot countries (China, Indonesia and Russian Federation) and regions (ASEAN); as well as the Dutch and Canadian governments and a range of other organisations.

Your input is needed. Please contribute to the finalization of the assessment such as by proposing changes, contributing case studies or by reviewing draft chapters. Further details and the current version of the Assessment are available on:

www.peat-portal.net

Kindly contact the following for any feedback or comments:

Andrey Sirin, Scientific Editor of the Assessment
Laboratory of peatland forestry and hydrology, Institute of Forest Science
Russian Academy of Science
Upenskoye, Moscow Region 143030
Russia
Tel/Fax +7 495 930 6777
E-mail (office): sirin@proc.ru

Faizal Parish
Director, Global Environment Centre
2nd Floor, Wisma Hing
78, Jalan SS2/72
47300 Petaling Jaya
Selangor, Malaysia
Tel + 60 3 7957 2007
Fax + 60 3 7957 7003
E-mail: fparish@genet.po.my
Website: www.peat-portal.net

October 2006