

Peatlands in Southeast Asia

a profile



Apfp

ASEAN Peatland Forests Project | www.aseanpeat.net

First published February 2011

Electronic book (2nd Edition) first published in April 2012.

ISBN 978 - 967 - 5554 - 02 - 5

Printed in Malaysia

This publication should be cited as:

Peatlands in Southeast Asia - A Profile. 2011. ASEAN Peatland Forests Project.
Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia.
ASEAN Secretariat and Global Environment Centre.

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Design and illustration by Shafinaz Shahabudin @ GEC

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Publication supported by ASEAN Peatland Forests Project with funding
from the Global Environment Facility (GEF) and the International Fund for
Agricultural Development (IFAD).

Electronic book of the publication supported by
Sustainable Management of Peatland Forests in Southeast Asia (SEApeat)
project with funding from the European Union (EU).

Peatlands in Southeast Asia – A Profile

A regional overview of peatlands in the Southeast Asian region

Projects funded by:



European Union



Projects implemented by:

www.aseanpeat.net



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Peatlands are one of the most important natural ecosystems in the world. **They play a key role in climate regulation, biodiversity conservation and are a source of livelihood for the local community.** Peatlands are wetland ecosystems that are characterised by the accumulation of organic matter called *peat*. Peat is derived from dead and decaying plant material under high water saturation conditions.

As one of the world's largest carbon stores, peatlands play a significant role in the regulation of global climate and greenhouse gas emissions. Although they only cover three percent of the land area they store between 20-35% of all carbon on land.

In Southeast Asia, peatlands are naturally forested and provide many benefits. Peat swamp forests have a unique biodiversity and a high economic value due to their abundance of resources - they are a source of high quality timber, fish and peatland plants (such as rattan and sedge for weaving mats and baskets). Peat swamp forests are also very important for water supply. They reduce flood peaks and maintain base flows in rivers during dry periods, thus preventing loss of life and damage to infrastructure by reducing flooding downstream.





Despite these benefits, peatlands have been heavily over-utilised and/or degraded. The large-scale clearance and drainage of peatlands for agriculture, forestry and infra-structure development has severely affected the natural values and functions of peatlands. The degradation of peatlands in Southeast Asia is very extensive, with an estimated 80% of the total peatland area being affected by land conversion or degradation.

**Why are peatlands
in
Southeast Asia
important?**

s in

About 60% of the world's tropical peatlands are located in Southeast Asia.

Peatlands have been found in all ten ASEAN Member States, but are more extensive in Indonesia, Malaysia, Brunei Darussalam and Thailand. Peatlands are the main wetland ecosystem type in Southeast Asia and help to regulate water supply and provide flood control.

Peatlands are one of the most critical ecosystems in Southeast Asia. They are important for biodiversity conservation, climate regulation and as a source of livelihood for the local community.

Peatland Degradation

The large-scale conversion and utilisation of peat swamp forests in Southeast Asia have severely affected the integrity of peatlands in the region; more than 30% of peat swamp forests have been converted to agricultural land and a further 30% logged or degraded over the last 20-30 years. Furthermore, in the past 15 years over three million hectares have burnt, leading to large-scale transboundary smoke haze, which has had serious environmental, economic and health impacts. This trend of peatland loss and degradation will continue if there are no interventions. With the current rate of loss, intact and functioning peatlands will disappear completely within a few decades.



Peatlands are a **single** **store of** **land**.

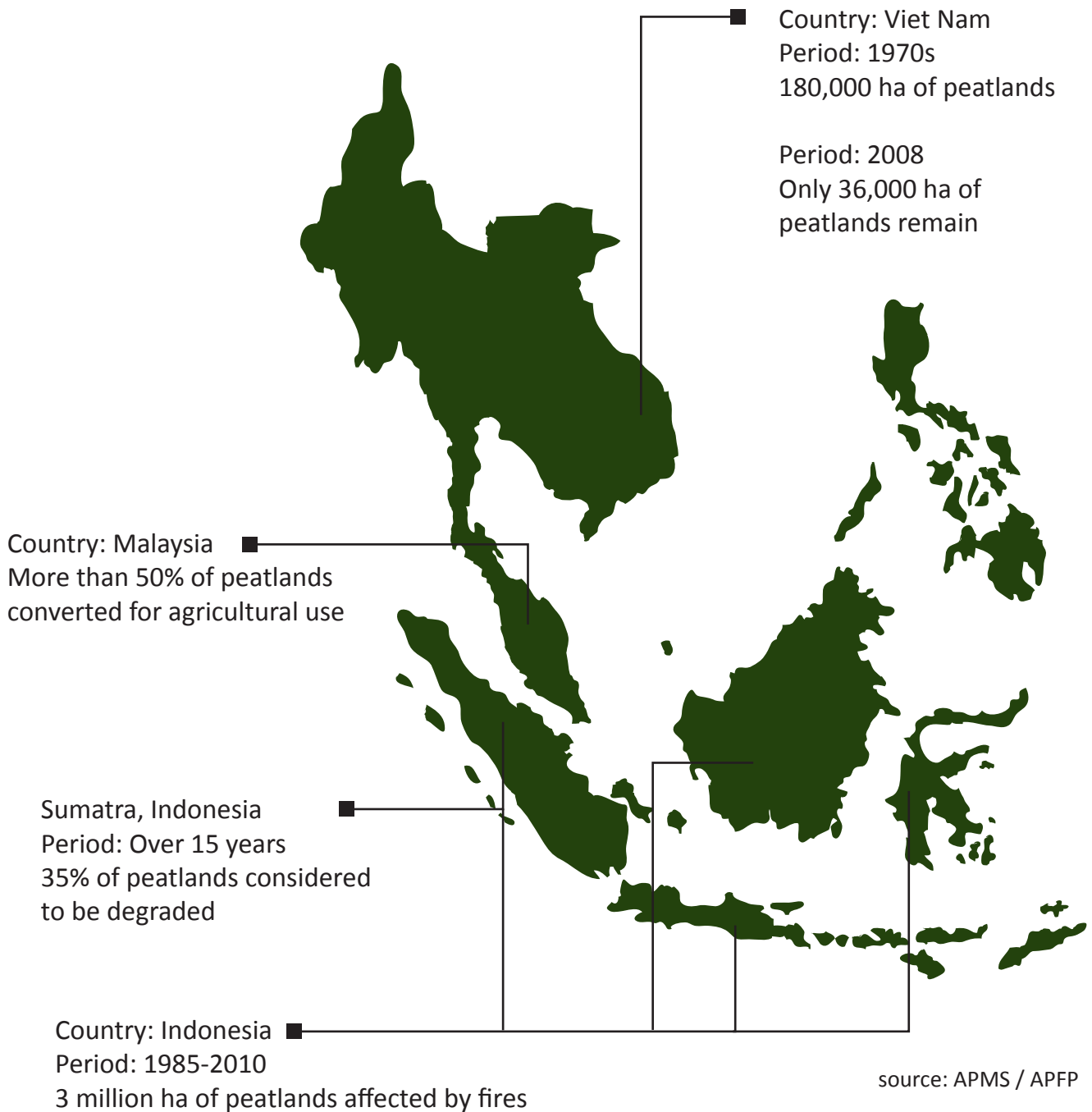
They **store** **carbon** **to** **vegetation** **whole** **w** **equivalent** **of all** **car** **atmosphere**

There is **that their** **degradation** **accelerates** **climate**

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Environmental Challenges

In Southeast Asia, about 12 million ha of peatlands have been cleared and drained for agriculture and forestry in recent years. The oxidation of the peat after clearing and draining results in the emission of carbon dioxide (CO₂). Fires in drained peat areas spread easily and can last for months. In 1997/98, flames engulfed about 2.2 million ha of peatlands in Indonesia, contributing about 6% (1.8 billion tonnes) of the world's CO₂ emissions. Smoke from the peat fires spread throughout Southeast Asia and is estimated to have caused an economic damage worth US\$10 billion, in addition to affecting the health of millions of people.



The image depicts a landscape affected by a forest fire. In the foreground, the ground is dark and covered with charred tree stumps and a dense layer of blackened, skeletal branches. Several tall, thin, dead trees stand as sentinels, their branches bare and reaching towards a pale, overcast sky. In the background, a dense forest of green trees is visible, providing a stark contrast to the charred foreground. The overall scene conveys a sense of environmental damage and the aftermath of a wildfire.

Protection and wise use of
peatlands must become a
regional priority . . .

**What are tropical
peatlands?**

*Peatlands form mostly on low-lying water-logged land where a lack of oxygen prevents dead plant tissue from decomposing completely. This dead plant matter then accumulates to form layers of **peat**.*

Tropical peatlands are areas in the tropics covered with peat soil. The natural plant community here are forests. A single peat swamp forest can hold a diverse range of forest types, all of which might differ from the range found in other peat swamp forests. The type of forest in a peat swamp varies according to peat depth, nutrient supply as well as the extent and period of flooding.

In peatlands, there is a close connection between water, peat and the vegetation growing on the land. If any one of these components is changed, the nature of the peat is fundamentally affected.

What is Peat?



Peat is defined as a soil type containing at least 65% organic matter. In the tropics, it is formed from decayed leaves, stems and roots of plants that have accumulated in a water-saturated environment in the absence of oxygen.

Peat accumulates in layers year after year to form a deposit which can amount up to 20m thick. These deposits develop over different geological times; recent deposits remain as peat while earlier deposits transform over millions of years into lignite and coal. The layers of peat can often show the succession of vegetation over thousands of years.

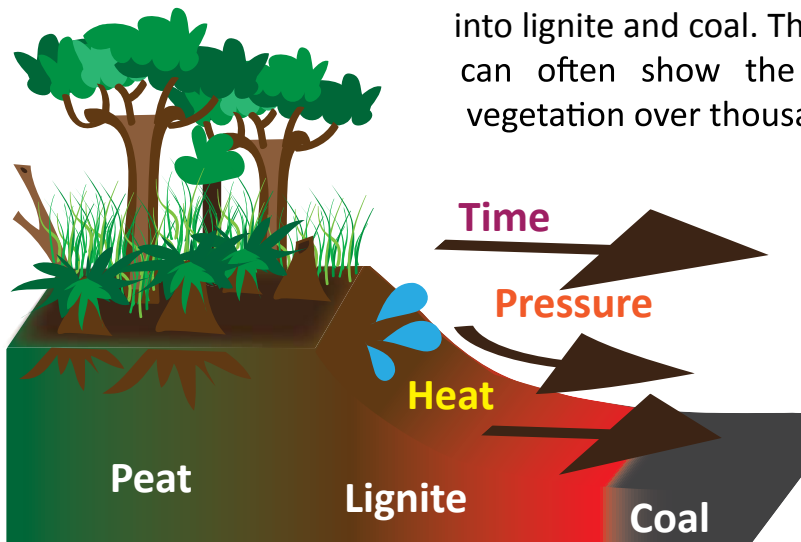
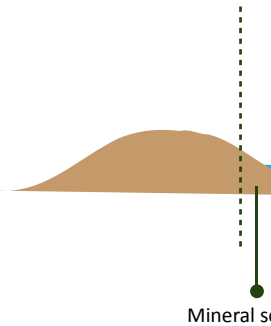


Illustration was redrawn from Assessment on Peatlands, Biodiversity and Climate Change - Executive Summary

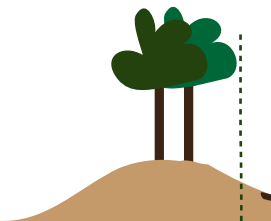
Peat comprises more than 90% water; this enables peatlands to have a unique ability to store large amounts of water. Peatlands are essentially water bodies, although trees can grow and people can walk on them. Forests formed on peat soils are called peat swamp forests. They possess unique vegetation assemblages adapted to the high degree of water logging, low pH and low nutrient conditions.

Formation of

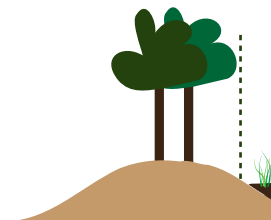
STAGE 1



STAGE 2

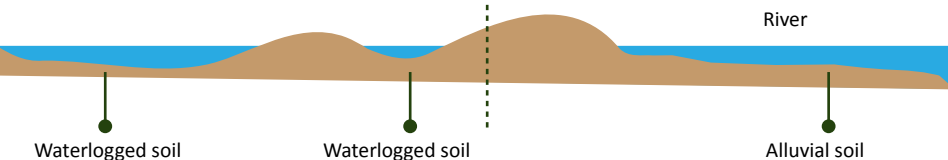


STAGE 3



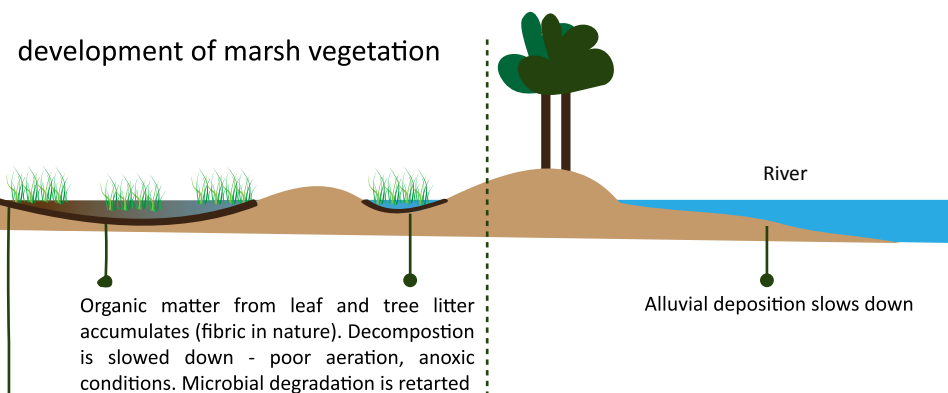
Tropical Peatlands

water is retained in the depression from nearby river flows and rainfall



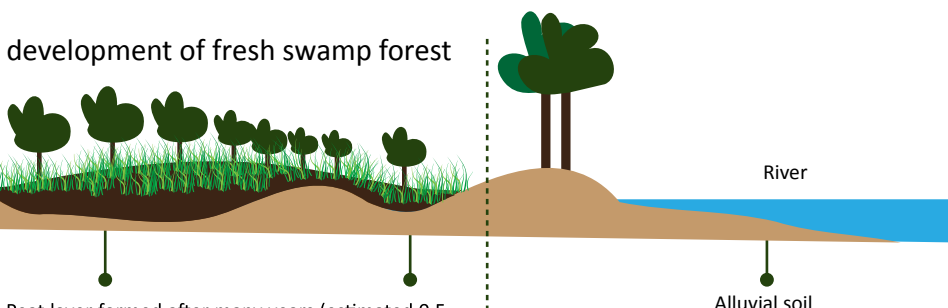
oil

development of marsh vegetation



Water colour changes
to brownish black
(pH 2.5 - 4.5)

development of fresh swamp forest



Peat layer formed after many years (estimated 0.5 - 2 mm per year of peat deposit)

Illustrations redrawn from UNDP, 2006

Peat is formed when dead vegetation is incorporated into the soil. These materials only partly decompose because the rate of chemical breakdown (decay) is slowed down by the presence of water. Peat forms when the rate at which the vegetation (or organic matter) accumulates in the ground is higher than its chemical breakdown.

Water is an important factor in the formation of peat because it slows down the rate of plant decay. The water table is held permanently high through high precipitation (rainfall) or by ground or surface water flow.

In the tropics, peat accumulates at a rate of about 0.5-2 mm per year (or 5-20m over 10,000 years). Most peatlands which exist today were formed over the last 10,000 years since the last ice age.





Balu Perumal/GEC



Anne Majanil



Jon Davies/GEC



Balu Perumal/GEC



Balu Perumal/GEC



Jon Davies/GEC

Where are tropical peatlands?

Tropical peatlands are
found in the Capricorn in South
Asia. In Southeast A

found?

are found in the region between the tropics of Cancer and America, Africa, India, Papua New Guinea and Southeast Asia, there are about 25 million ha of peatlands.

The largest area of peatlands in Southeast Asia is found in Indonesia which has an estimated 21 million ha, followed by Malaysia with c. 2.5 million ha and Brunei Darussalam with 100,000 ha of peatlands. Thailand has c. 60,000 ha mostly in the southern provinces, while Viet Nam has an area of peat about 36,000 ha mainly in the Lower Mekong Delta. Two peatland areas were identified in the Philippines recently at Agusan Marsh and Leyte Sab-a, c. 11,000 ha in total. Myanmar has at least 3,500 ha, and Lao PDR 20,000 ha.

Work has been undertaken under various initiatives in recent years to assess the extent of peatlands in Southeast Asian countries. New peat areas have recently been documented in Cambodia, Lao PDR and Myanmar. There is a need for further surveys and assessments of peatlands to get a better estimate of the extent of peatlands in the region. This is being arranged under the APFP and other projects.

MYANMAR: 3,5

MALAYS

**Approximate Peat D
Southeast Asia**



Distribution in

Main Peatlands

Note: Map is not drawn to scale

Some peatlands in Southeast Asia

Kalimantan, Indonesia



Batu Perumal/GEC



*Raja Musa,
Selangor, Malaysia*





Balu Perumal/GEC

*Champasak
Province,
Lao PDR*



Balu Perumal/GEC



Balu Perumal/GEC

*U Minh Thuong
National Park, Viet Nam*



Koompassia malaccensis

Gonystylus bancanus



**How are peatlands
important to us?**

ds

Peatlands are beautiful landscapes with a unique biodiversity. They provide people with services that are worth billions of dollars, which may be easily lost by inappropriate action.

Approximately 10% of the world's peatland areas is tropical, about 60% of which is found in Southeast Asia, predominantly in Indonesia.

Functions of



Biodiversity



Carbon St

Peatlands are habitats for unique flora and fauna which contribute significantly to the gene pool. The tropical peat swamp forests of Southeast Asia feature some of the highest freshwater biodiversity of any habitat in the world. They are home to the largest remaining populations of Orang Utans and are inhabited by other rare and endangered animals such as the Tiger, Sun Bear, Asian Elephant and the Proboscis Monkey. Peat swamp forests in the region also have a relatively high diversity of tree species, many of which are restricted and becoming rare to this habitat. The endangered freshwater crocodile, the False Gharial, is also endemic to peatlands in Malaysia, Sumatra and Borneo. Rivers in peatland areas often have a higher degree of endemism for fish species and are an important source of aquarium fish, including the endangered Arowana.

Peatlands are some of the m stores in the world and in m still actively sequestering c forests in the ASEAN regi estimated 5% of all carbon p land surface. Additionally, a swamp forest actively a offsetting to some extent ca fossil fuels. Peatland exploita lead to the release of carbon The annual carbon emissio Southeast Asia by drainage million tonnes while a similia on average by fires each year

Peatlands

Storage



Water Regulator

Most important carbon
In many regions they are
carbon. Peat swamp
ion store up to an
present on the world's
a healthy intact peat
accumulates carbon,
carbon emissions from
ation and degradation
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on from peatlands in
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r.

Peatlands are comprised of about 90% water and act as vast water reservoirs to maintain water levels and help in flood control for communities and ecosystems downstream. They also play an important role in the provision of drinking water for local communities.





Agriculture and Infrastructure

Large areas of tropical peatlands have been converted for other land uses, particularly for agriculture, plantations and infrastructure development. With good water management and careful practices it is possible to cultivate a range of crops on peatlands. However, without proper assessment or management, agriculture in peatlands may face problems with subsidence, flooding and fire.



Forestry

Peat swamp forests are a main source of high quality timber, especially in Indonesia and Malaysia. Ramin is a valuable timber species found in tropical peat swamp forests but over-exploitation and illegal trade has led to trade restrictions of this species under CITES. Jelutong is another timber species confined to peat swamp forests and has been utilized for its latex. Other valuable timber species are Kempas, Meranti, Kapur Paya and Jongkong. More than a hundred tree species from peatlands are of commercial value.

of Peatlands



Livelihood

Local communities living within or around peatland areas often derive considerable benefits from the goods and services they provide. Fishing is a good source of protein and peatland plants are harvested to make mats and baskets. Many local people sustain their livelihoods and derive their cultures from peatlands, with little adverse impacts on the ecosystem.



Research and education

Peatland ecosystems are able to record their own history from peat accumulation. By studying the layers of peat in an area, one is able to learn its human and environmental history. There is great interest in research and education at peatland areas.







Channa micropeltes
(Giant Snakehead)

**What impact do
human have on
peatlands?**

Human activities have had significant and damaging impacts on peatland ecosystems.

In Southeast Asia, land clearing, timber extraction and the rapid development of large-scale agriculture and forest plantations have caused significant peatland destruction. Plantation crops such as oil palm or Acacia (for paper making) generally require heavy drainage, which have huge impact even on adjacent peat swamp forest.



Oil palm planted on peat in Kuala Langat, Selangor, Malaysia

Cultivation of crops such as oil palm in peatland areas is possible with good practices, especially with effective water management. However many activities in peatlands take place with insufficient knowledge of their characteristics and ecology. As a result, several large-scale peatland development schemes in the region have been abandoned due to unsuitable soils, rapid subsidence, flooding, fire and other reasons.

More than 3 million ha of peatlands have been cleared or drained for agriculture and/or forestry in Southeast Asia and eventually abandoned. These areas are rapidly degrading and burn regularly.

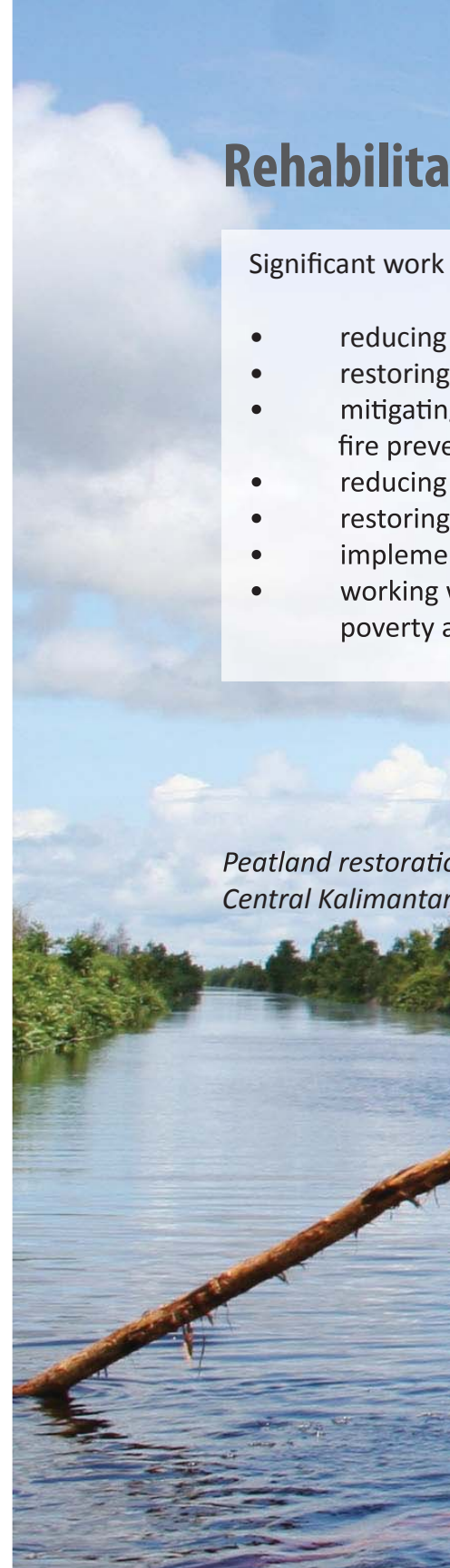
Drainage is a major cause of peatland degradation in the region. It not only causes the further decomposition of peat and release of carbon into the atmosphere (i.e. global warming), but the excessive drying also increases the risk of peat fires.

Rehabilita

Significant work

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*Peatland restoration
Central Kalimantan*

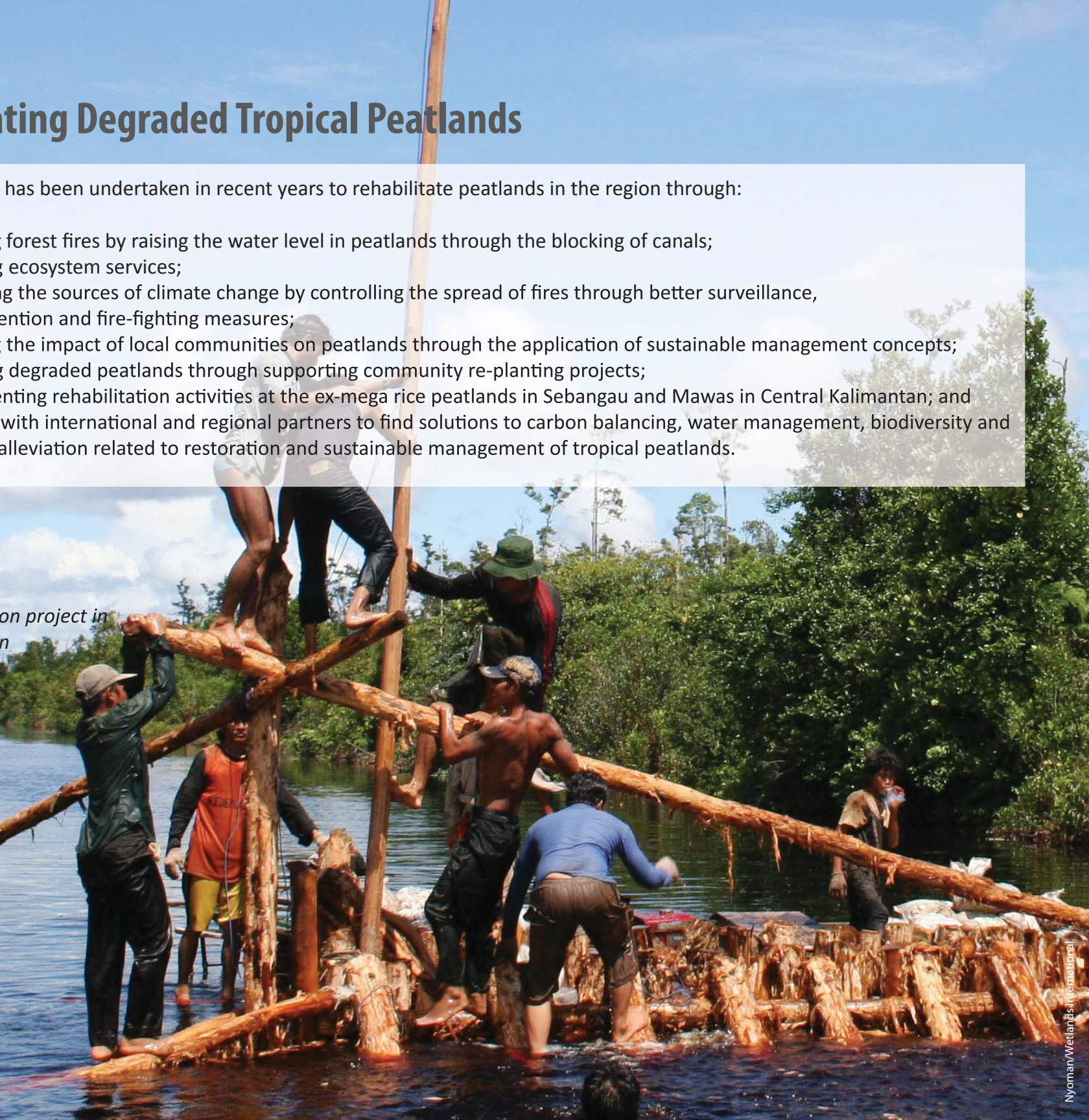


Restoring Degraded Tropical Peatlands

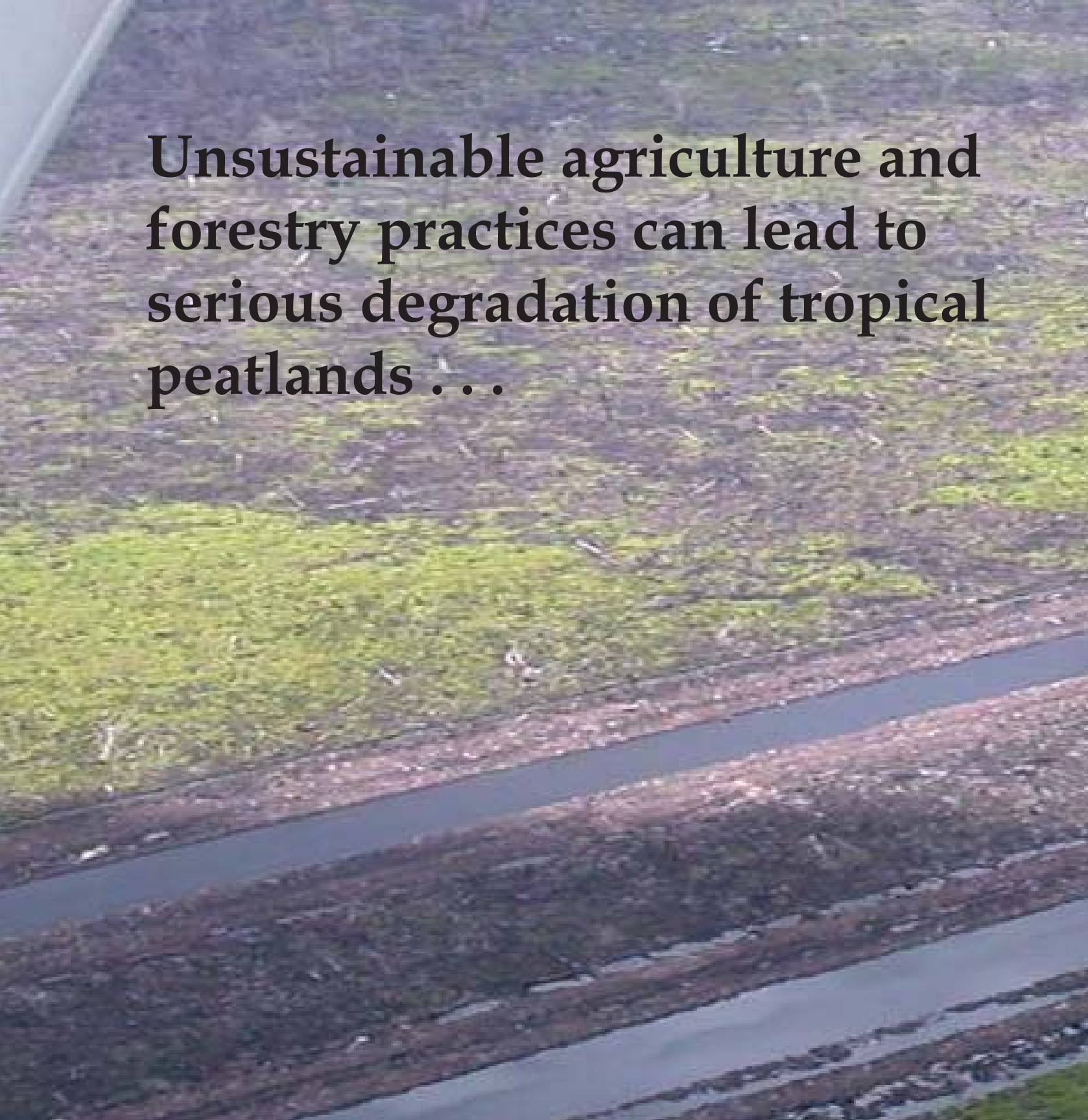
has been undertaken in recent years to rehabilitate peatlands in the region through:

- forest fires by raising the water level in peatlands through the blocking of canals;
- ecosystem services;
- the sources of climate change by controlling the spread of fires through better surveillance, prevention and fire-fighting measures;
- the impact of local communities on peatlands through the application of sustainable management concepts;
- degraded peatlands through supporting community re-planting projects;
- rehabilitating rehabilitation activities at the ex-mega rice peatlands in Sebangau and Mawas in Central Kalimantan; and
- with international and regional partners to find solutions to carbon balancing, water management, biodiversity and alleviation related to restoration and sustainable management of tropical peatlands.

on project in
n



Unsustainable agriculture and forestry practices can lead to serious degradation of tropical peatlands . . .





*Abandoned agriculture development in
Central Kalimantan, Indonesia*

Community-based Management and Protection of Tropical Peatlands

The sustainable management of peatlands requires an integrated approach – developing common strategies for management of different uses within each peatland area.

Local communities have a very important role as stewards of peatland resources and should be effectively involved in activities to restore and sustain the use of peatland resources. Plans for integrated peatland management should be developed at regional, national and local levels, as appropriate.

Enhancing the awareness and capacity of the local community, addressing poverty and inequity, and providing positive incentives are important to tackle the root causes of peatland degradation.

Regina Cheah/GEC



Regina Cheah/GEC



Lew Siew Yan/GEC



Suzana/GEC



Integrated
management
of peatlands is
required...



Tree planting at Raja Musa Peat Swamp Forest, Selangor, Malaysia

Fire Prevention in Peatlands

A major problem facing Southeast Asian countries is the issue of peatland fires. Peatlands in their natural condition do not burn, unless a very severe drought occurs. Burning occurs when peatlands are indiscriminately and excessively drained for agriculture or forestry activities. Excessive drainage in peat results in the loss of water and irreversible drying up of peat. Dry peat materials are extremely susceptible to fire especially in the dry season.

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Faizal Parish/GEC

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ent fires in peatlands it is necessary to reverse the drying of
ds through rehabilitation of degraded peatlands and blocking
s that drain the peat areas. Regular monitoring of hotspots to
n preventive measures in these areas and to put out fires as
they start is also important. The most appropriate means of
ing peatland fires is still to conserve peatlands and refrain
ivities that compromise their natural state.

measures for fire prevention in tropical peatlands have been
ended at the local community level. These measures include:

- Enhancing prediction and warning of fire risk in
peatland areas;
- Setting up of local fire prevention
volunteers group by local communities;
- The adoption of alternative land preparation
methods instead of slash and burn by
imposing or brikiating using waste from the
briqmass;
- The implementation of socialization
programmes to raise awareness among local
communities, private sector and farming using
no burning practices;
- Written undertakings by plantations and
farmers not to commit open burning; and
- Where needed, the supply of portable water
pump, fire resistance jacket, air quality
monitoring stations and training in fire fighting.



What is the ASEAN Management Initiative

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ASEAN Peatland Management Initiative?

The ASEAN Peatland Management Initiative (APMI) was developed to provide a framework for addressing issues of peatland degradation, fires and its associated transboundary smoke haze pollution that has negatively impacted human health, food production and biodiversity as well as contributed to global climate change.

The goal of the APMI is to promote the sustainable management of peatlands through collective effort and enhanced cooperation among ASEAN Member States.

The objectives of the APMI are:

- To enhance understanding and cooperation among ASEAN Member States
- To reduce the impact of peatland fires on the environment and human health
- To support national efforts to manage peatlands sustainably
- To develop a regional framework for peatland management

The APMI is the result of the collaboration between the ASEAN Senior Officers of the Environment-Haze Technical Task Force (ASOEN-HTTF), the Sub-Regional Fire-fighting Arrangements and the Global Environment Centre.

The APMI is also a contribution to the implementation of the ASEAN Agreement on Transboundary Haze Pollution and the ASEAN Regional Haze Action Plan. The Initiative was endorsed at the 20th Meeting of ASOEN-HTTF in Manila, Philippines, and adopted by the ASEAN Ministerial Meeting on Haze in Siem Reap, Cambodia in February 2003.



Lew Siew Yan/GEC



Lew Siew Yan/GEC



PMI are:

Understanding and build capacity on peatland management issues in the region through enhanced
among ASEAN Member States;

Reduction of peatland fires and associated haze;

Regional and local level implementation activities on peatland management and fire prevention; and

Regional strategy and cooperation mechanisms to promote sustainable peatland management.



Haze pollution from peatland fires severely affects the aviation industry

Fighting peat fire



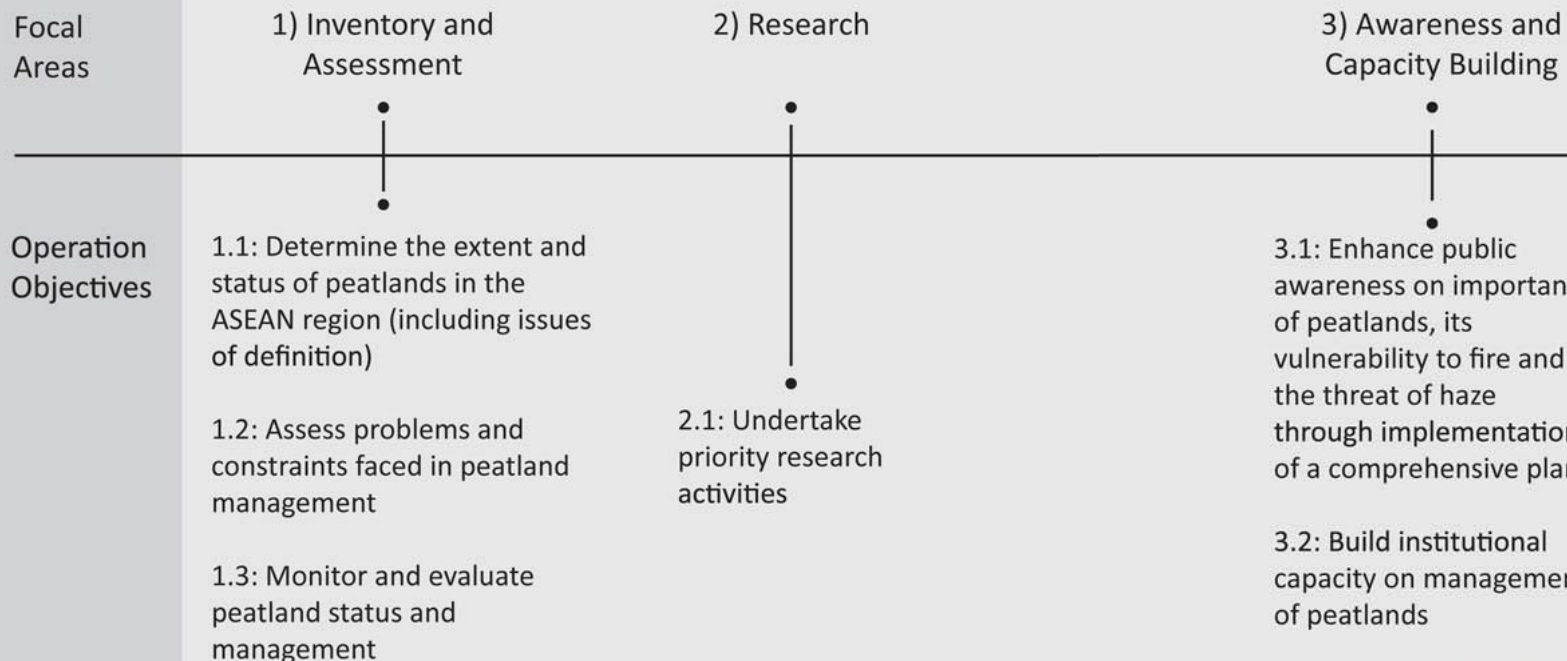


What is the ASEAN Management Strategy?

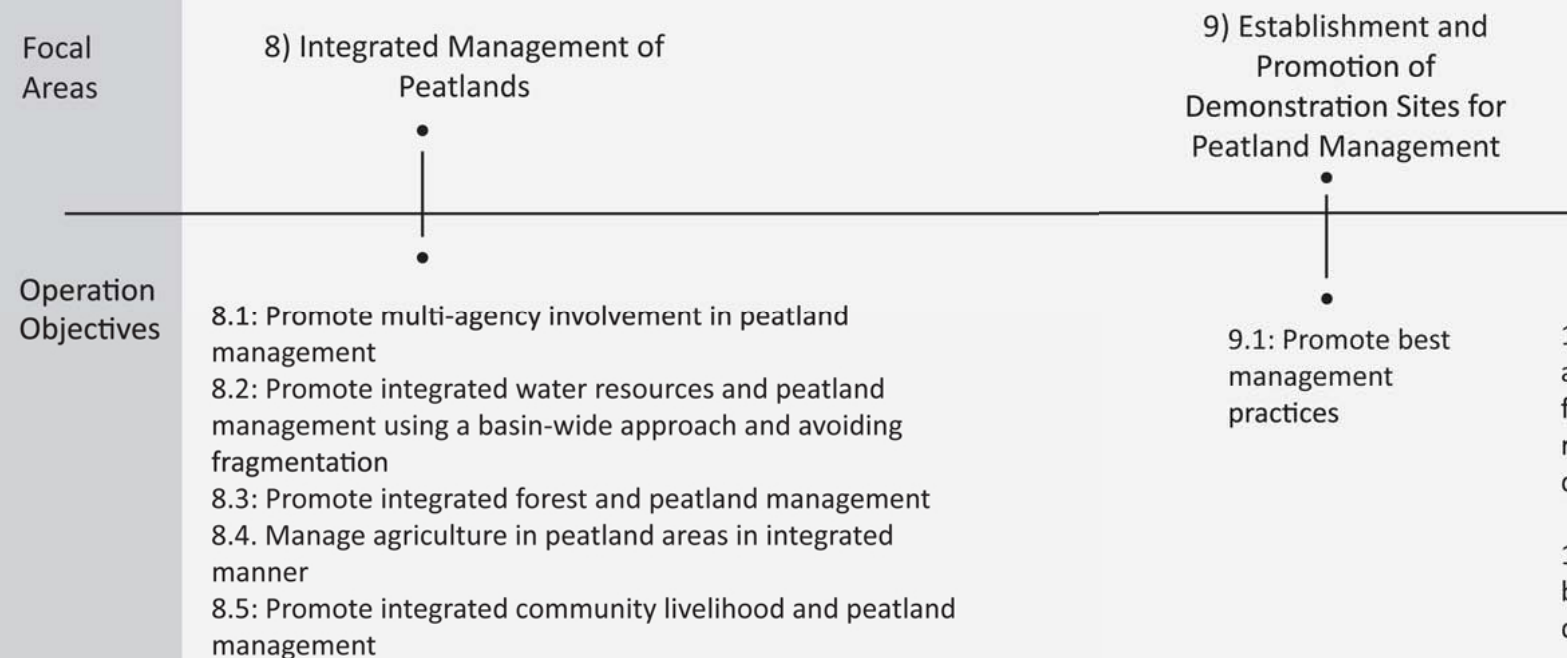
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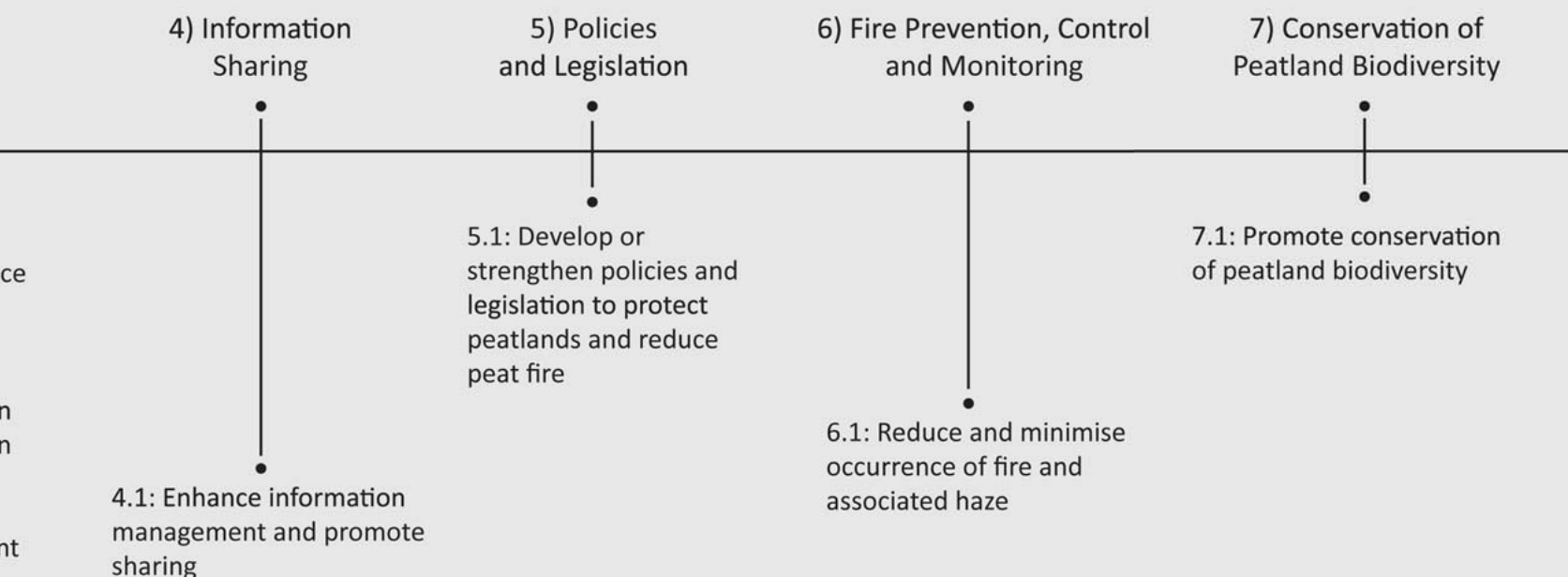
N Peatland

ASEAN Peatland Management Strategy (APMS) developed within the framework of the APMI and ASEAN Agreement on Transboundary Haze Pollution. It aims to guide actions to support the period 2006-2020. The development of the Strategy was one of the requirements of the initial workplan (2003 - 2005) of the APMI. All ASEAN Member States were requested to develop a National Action Plan (NAP) for Peatlands under the framework of the APMI. The APMS was endorsed in Cebu, Philippines on 10 November 2006 by the ASEAN Ministers Meeting on the Environment.

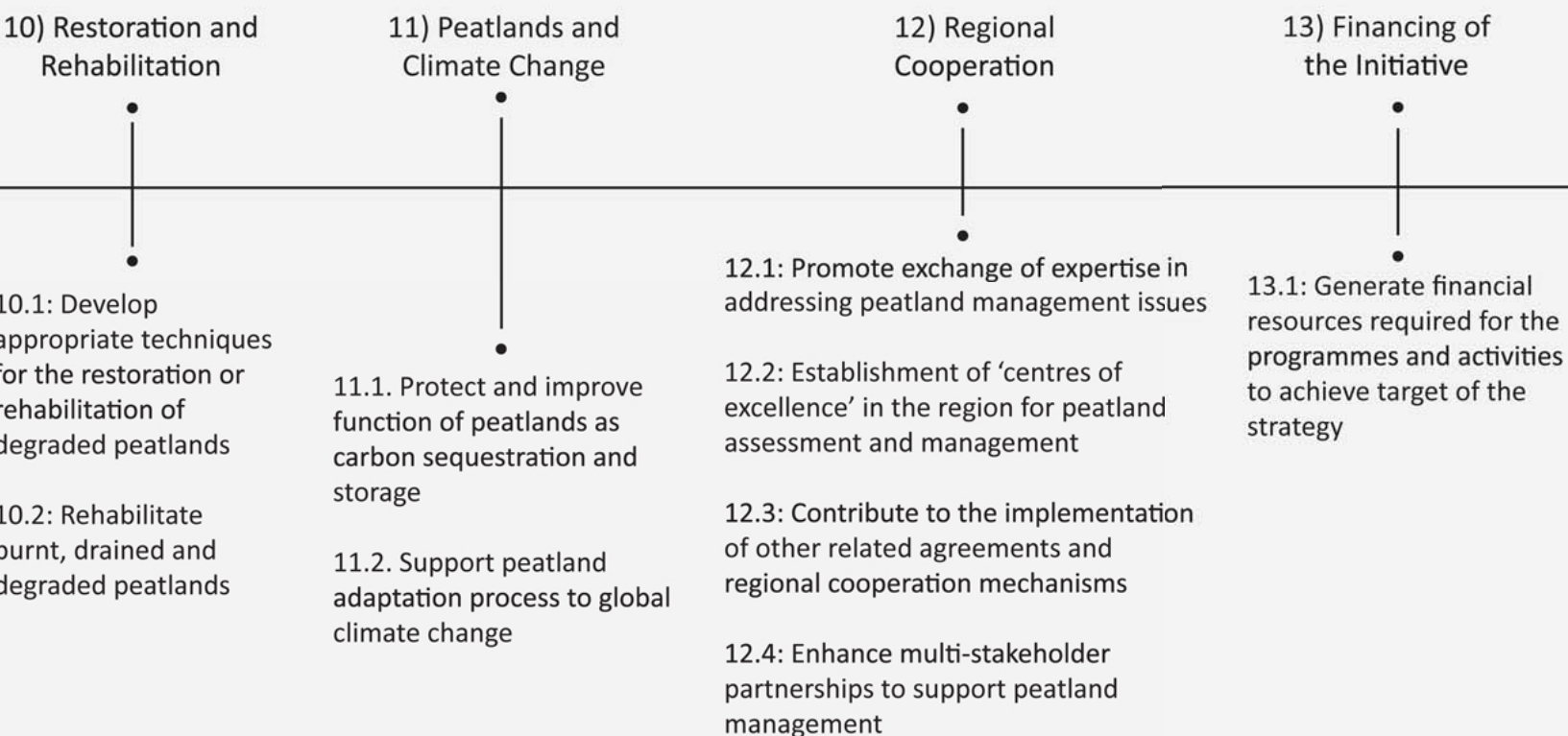


Ther





There are 13 focal areas and 25 operational objectives in the APMS.



Danau Pulau Besar, Kampar Peninsula, Riau, Indonesia





List of References

ASEAN Peatland Management Initiative. 2005. Jakarta: ASEAN Secretariat.

ASEAN Peatland Management Strategy. 2007. Jakarta: ASEAN Secretariat.

Hooijer, A., Page, S., Canadell, J.G., Silvius, M., Kwadijk, J., Wosten, H. and Jauhiainen, J. 2010. Current and future CO₂ emissions from drained peatlands in Southeast Asia. *Biogeosciences*, 7, 1505-1514.

Lesley Safford and Edward Maltby (editors). 1998. Guidelines for Integrated Planning and Management of Tropical Lowland Peatlands with special reference to Southeast Asia. The IUCN Commission on Ecosystem Management (CEM), Tropical Peatland Expert Group (TROPEG).

Parish, F., Sirin, A., Charman, D., Joosten, H., Minayeva, T., Silvius, M. and Stringer, L. (Eds.). 2008. Assessment on Peatlands, Biodiversity and Climate Change: Main Report. Global Environment Centre, Kuala Lumpur and Wetlands International, Wageningen.

Peatlands. Do you care? 2005. A booklet published by Ramsar Coordinating Committee for Global Action on Peatlands (CC-GAP).

The **ASEAN Peatland Forests Project** (APFP) aims to demonstrate, implement and scale up the sustainable management and rehabilitation of peatland forests in Southeast Asia. It fits within the framework of the APMI, and directly supports the APMS, and associated National Action Plans on Peatlands. The Project focuses on strengthening institutional capacity and frameworks; reducing the rate of degradation of peatlands in Southeast Asia; demonstrating integrated management and rehabilitation of peatlands at target sites; and engaging the private sector and local communities in sustainable peatland management.

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