The University of Nottingham

International Peat Society | IMTG MTO

Professor Jack Rieley

IPS Vice President and Chair Scientific Board, International Peat Society

RESPONSIBLE PEATLAND MANAGEMENT: CAN WE LEARN FROM THE PAST AND PRESENT TO MAKE A BETTER FUTURE?

International Workshop on Peatland Management, Hokkaido 10th October 2013

Presentation Structure

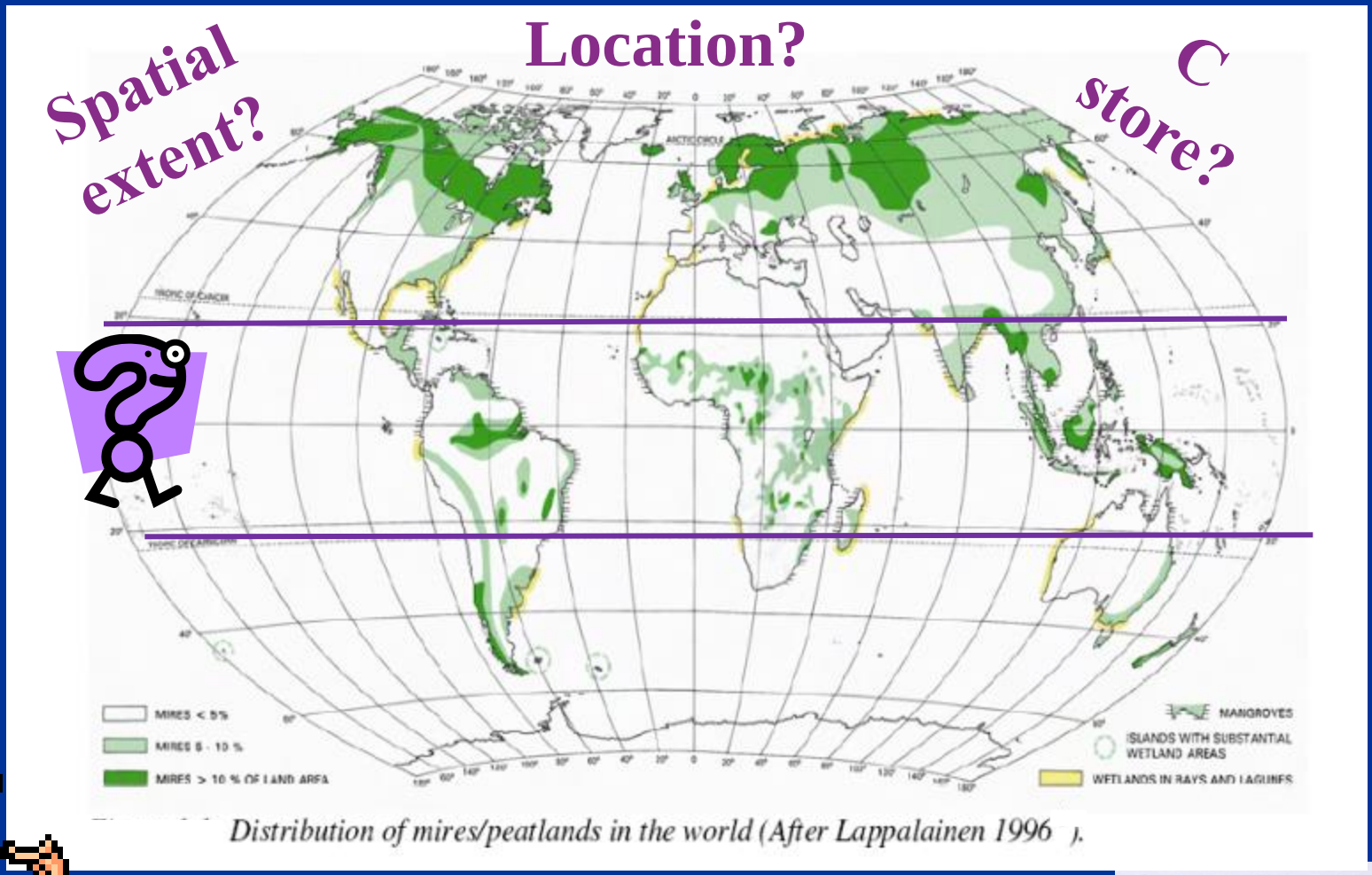
- Introduction and historical perspective
- History of peat use in British Isles and Europe
- Peatland management in the UK and EU
- Peatland management in Indonesia
- After the Mega Rice Project fiasco
- Where do we go from here?

International Peat Society | IMTG MTO

The University of Nottingham

SCHOOL OF GEOGRAPHY

Global Peatlands



Distribution of mires/peatlands in the world (After Lappalainen 1996).

The University of Nottingham
SCHOOL OF GEOGRAPHY

REVIEW OF PEATLAND GENESIS AND RATE OF PEAT ACCUMULATION

- Dates back to end of last ice age in boreal and temperate zones
- Raised bogs started to form 7-9000YBP
- Blanket bogs started to form 5-6000YBP
- Tropical peat has been dated to more than 25,000YBP but most is less than 6000YBP
- Exception is Kalteng where it is >20,000YBP
- During history rate of peat accumulation has changed, sometimes it stopped and even degraded

HISTORICAL PERSPECTIVE – PEATLAND AGRICULTURE IN EUROPE

- In Europe peatlands have been drained for millennia for pasture and winter fodder for domestic animals
- The Romans implemented drainage throughout their empire; for example during their 360 year occupation of Britain
- Subsequently drainage works were abandoned until 12th C and then peatland drainage throughout Europe speeded up
- Notable examples include Fens of Eastern England, Notec Valley Marshes in Poland and in the Netherlands
- By the end of the 19th C 2.5 Mha of mires had been drained in Russia for crops
- Initially drainage was practised to improve grazing
- Later, better technology enabled

deeper drainage for arable agriculture

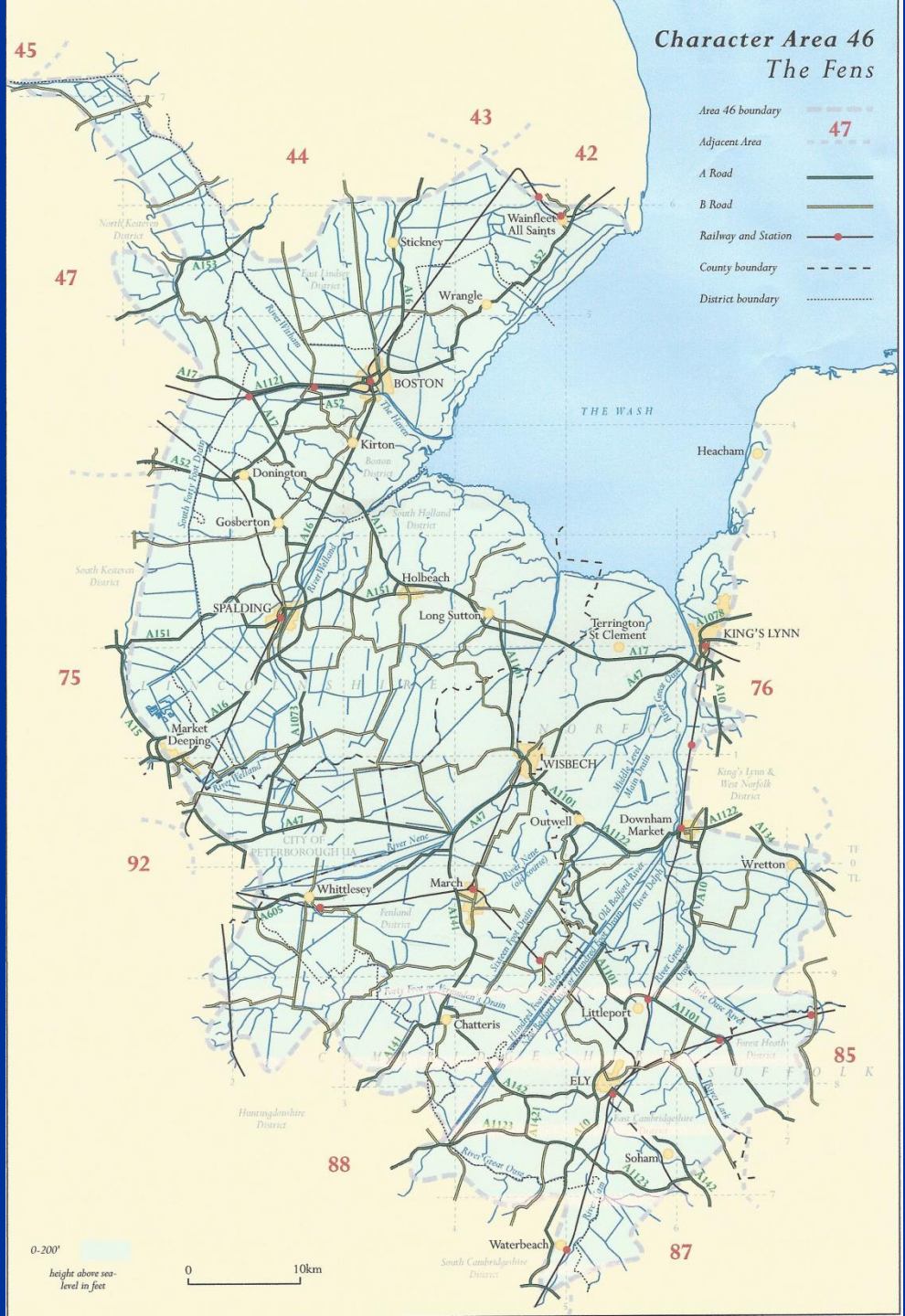
HOLME POST, CAMBRIDGESHIRE, UK

- Fen drainage in UK started by Romans but mostly took place between 1600 and 1900.
- Holme Fen is now below sea level. The Post was inserted in 1851 and top was 4m above surface in 2000.
- Average loss of peat: 3cm/yr
- CO_2 emission: 82.6 t $ha^{-1}yr^{-1}$
- Accumulated CO_2 emission: 11,000 t

International Peat Society | IMTG MTO

The University of Nottingham

SCHOOL OF GEOGRAPHY



The University of Nottingham
SCHOOL OF GEOGRAPHY

WICKEN FEN

HISTORICAL PERSPECTIVE – PEATLAND FORESTRY IN EUROPE

- Widespread drainage of peatland for forestry did not start until the 20th C
- More than half of the global area drained is in Finland where 700,000ha were drained between 1928-39, ceased until WW2 ended, and peaked at end of 1960s
- In 1992 the annual global rate of drainage was 453,500ha a^{-1}
- In Great Britain the area of peatland under forestry was more than 500,000ha much of it on pristine mire promoted by government tax incentives and grants, a policy that has since been reversed and trees are being removed to restore peat
- In many countries details of afforested areas are imprecise

HISTORICAL PERSPECTIVE – PEAT FOR ENERGY IN EUROPE

- Peat has been used as a fuel by local communities in boreal and temperate zones for millennia in place of wood and coal
- Now largely replaced by coal, gas and electricity
- From the end of the 19th Century peat started to be used for energy generation, almost doubling between 1950 and 1980 from 28.2 to 54 Mt a^{-1} mostly in USSR, but has now declined
- Countries with power stations include Ireland (6), former USSR countries (>100), Finland, Sweden, Ukraine, Belarus
- in Finland and Sweden peat is used to provide supplementary heating energy in winter
- Peat is also co-fired with wood and waste material

HISTORICAL PERSPECTIVE – OTHER USES OF PEAT

- Since medieval times peat has been used as 'litter' bedding for domestic animals (cattle and horses), reaching a peak in the mid 19th C; it was widely used by armies; use declined with the advent and increase of motorised transport; wound dressings
- Peat use for growing m**e**dia and soil conditioners began in 1960s and expanded, from 30 Mt in 1970s to 78 Mt by the early 1980s; some NGOs and governments oppose this use of peat because it destroys habitats and increases CO_2 emissions
- Other minor uses of peat include production of gas, oil and tar; also used as water purifier and oil surfactant and in medicine
- Peat extraction is not a threat to all peatlands since not all are commercially exploitable and environmental regulation is making it increasingly difficult to obtain licences

CHAT MOSS, LANCASHIRE, ENGLAND

Abandoned agriculture on peat in Sweden

Oil palm on deep peat in Sarawak

Lettuce growing on fen peat in England

Forest on peatland in Finland

PEATLAND DEVELOPMENT IN INDONESIA

- 1794: John Andersen noted peatland in Riau; mentioned later by several explorers
- 1930-50: Detailed studies carried out by Polak on genesis, biodiversity and agricultural potential; little notice taken
- 1970: Joint studies by Dutch and Indonesian scientists of peat soils, ecology, agronomy, engineering and social economy in Riau and Central and West Kalimantan
- Reason: need to increase domestic food production
- Conclusion: "*No other soil type combines so many unused possibilities with so many unsolved difficulties*"
- Lack of nutrients, adverse physical properties; difficult access

The University of Nottingham
SCHOOL OF GEOGRAPHY


CIMTROP
Welcome To The Natural Laboratory Of Peat Forest
Palangkaraya, Central Kalimantan

PEATLAND DEVELOPMENT IN INDONESIA

- Dayak people used only shallow peat soil near rivers for rice, vegetables and rattan; later grew rubber and oil palm on small scale; rice productivity was low but decreased further when large drainage channels built
- 1985: Indonesia was self sufficient in rice and President Suharto received medal from FAO; by 1990 rice production fell because crop land in Java was converted
- 1995: Plan to open new rice production areas
- 1996: Mega Rice Project began in Central Kalimantan involving 1.7 Mha of wetland, mostly with peat
- 1999: MRP closed down by President Habibie
- Not one leaf of commercial rice was grown

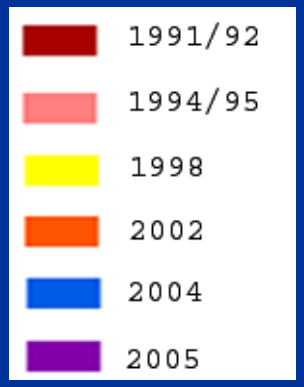
The University of Nottingham
SCHOOL OF GEOGRAPHY

The development situation

FIRE DISASTER IN 1997

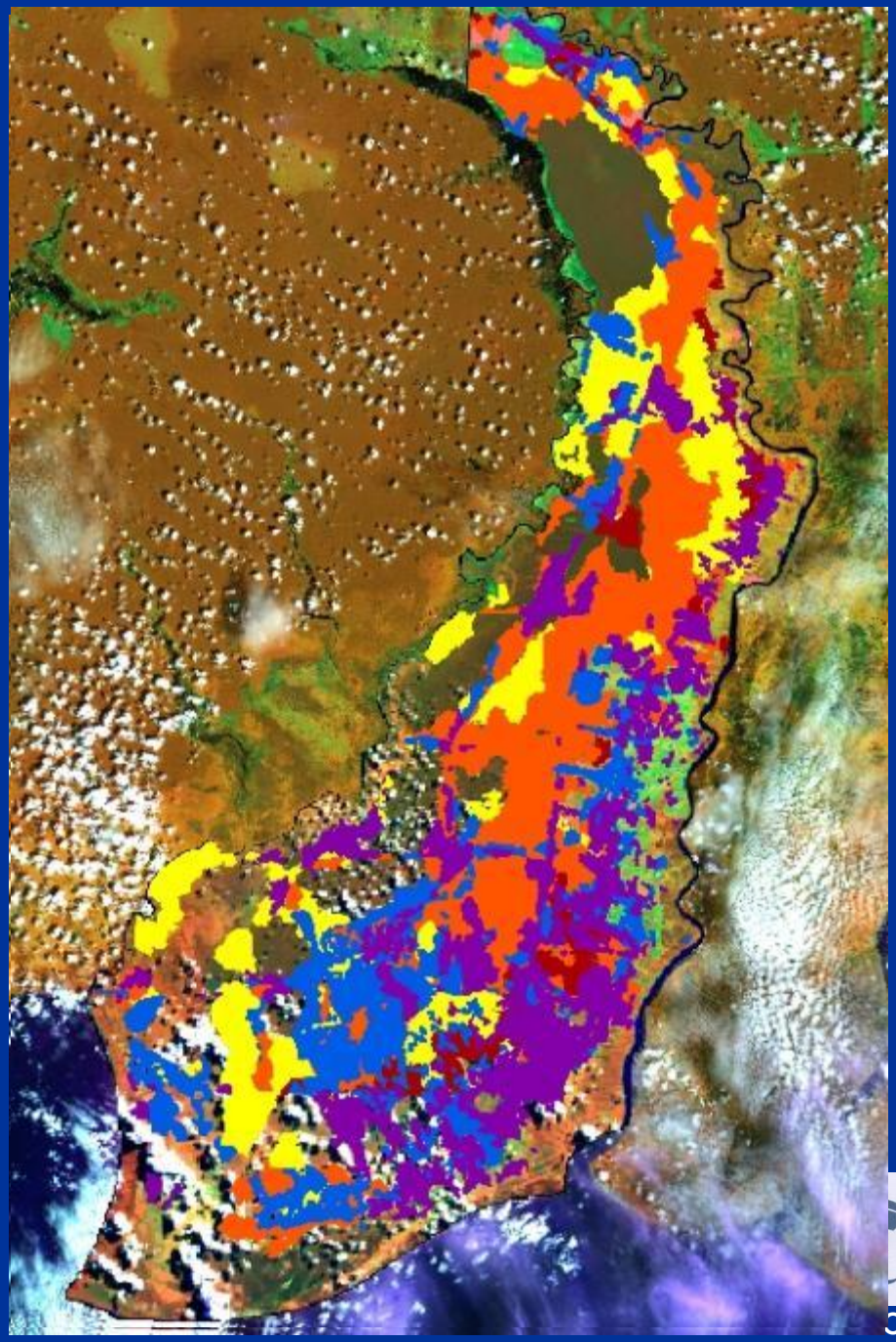
- In the El Niño year 1997 a major disaster occurred of global significance
- After 6-8 months without rain the peat water table fell to low level and the surface peat dried
- Land clearance fires (by farmers and in MRP) spread to remaining forest and also set fire to peat
- Fires burned for months and released an estimated 1-2 Gt carbon (3.5-7Gt CO_2) to the atmosphere
- When the MRP was closed down it left the largest ever problem for peatland restoration anywhere in the world

The University of Nottingham
SCHOOL OF GEOGRAPHY



Fire history

(Hoscilo, Page & Tansey 2011. Int. J. Wildland Fire)

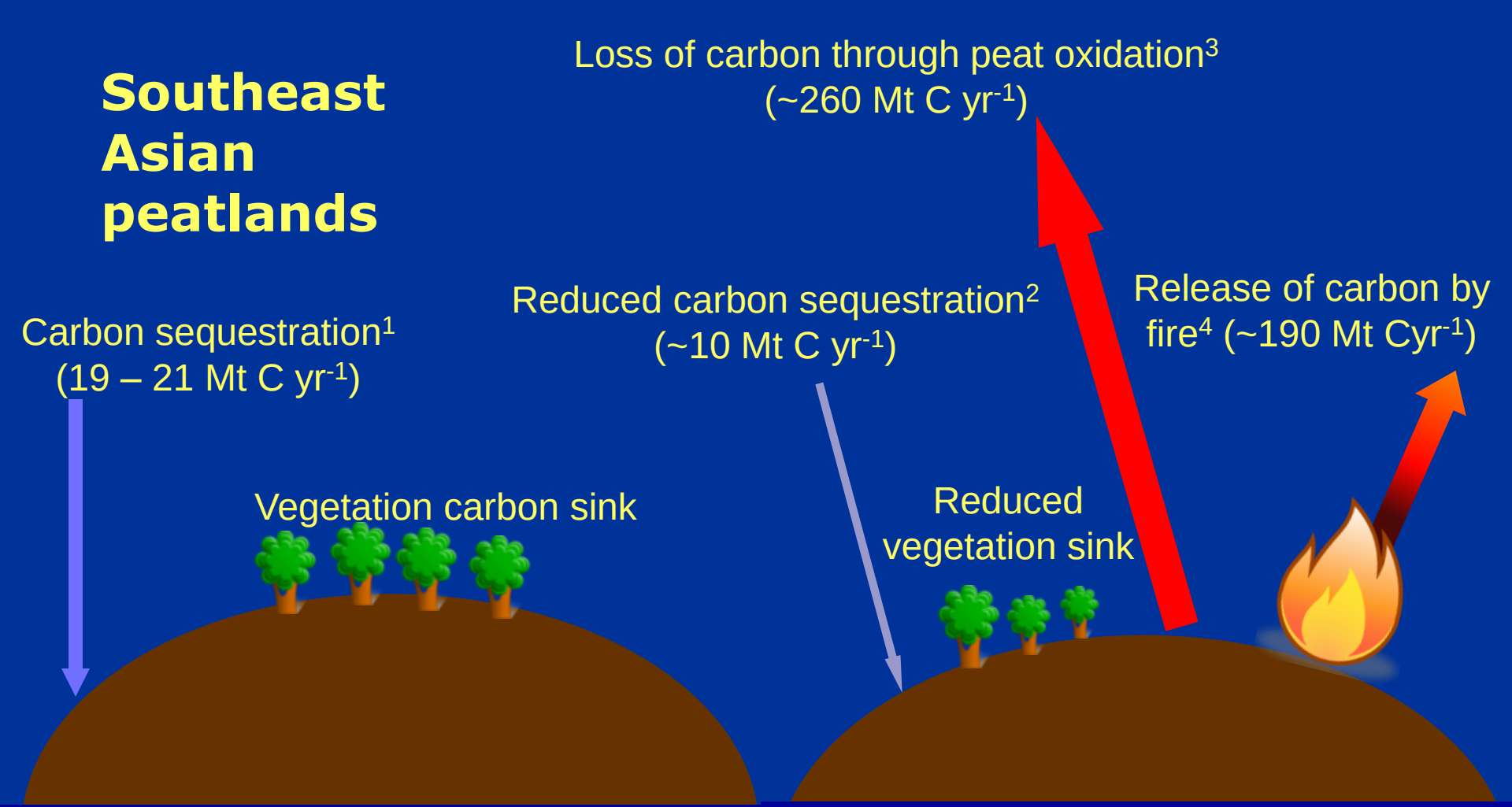


The University of Nottingham

OL OF GEOGRAPHY


Mangkok Canal, Sebangau National Park,
August 2006

Southeast Asian peatlands



Pool: 69 Gt (& increasing?)

Natural overall carbon sequestration

Pool: < 69 Gt

(& decreasing by 460 Mt C yr^{-1})

Current situation overall carbon source

Notes:

[1] based on area of 252,229 km^2 and carbon accumulation rate of 80 g C m^2 yr^{-1} (Neuzil, 1997; Page et al., 2004)
[2] based on deforestation of 121,000 km ^{2} of peat swamp forest (Hooijer et al., 2006; 2009)
[3] based on likely mean annual drainage depth of 60 cm and a resulting annual soil CO_2 emission of 81 t ha^{-1} (Jauhiainen et al., in prep.)
[4] based on average fire-related C emissions over period 1997-2006 (Page et al., 2002; van der Werf et al., 2008)

AFTER THE MEGA RICE PROJECT

- When the MRP ended 15,600 transmigrant households had been moved there, of which only 8,500 remained in 2005
- In 2005 GORI established an "AD HOC TEAM" chaired by Bambang Setiadi to produce guidelines for government officials and stakeholders on rehabilitation of the Ex-MRP area
- The AHT published its report in October 2007

The University of Nottingham
SCHOOL OF GEOGRAPHY

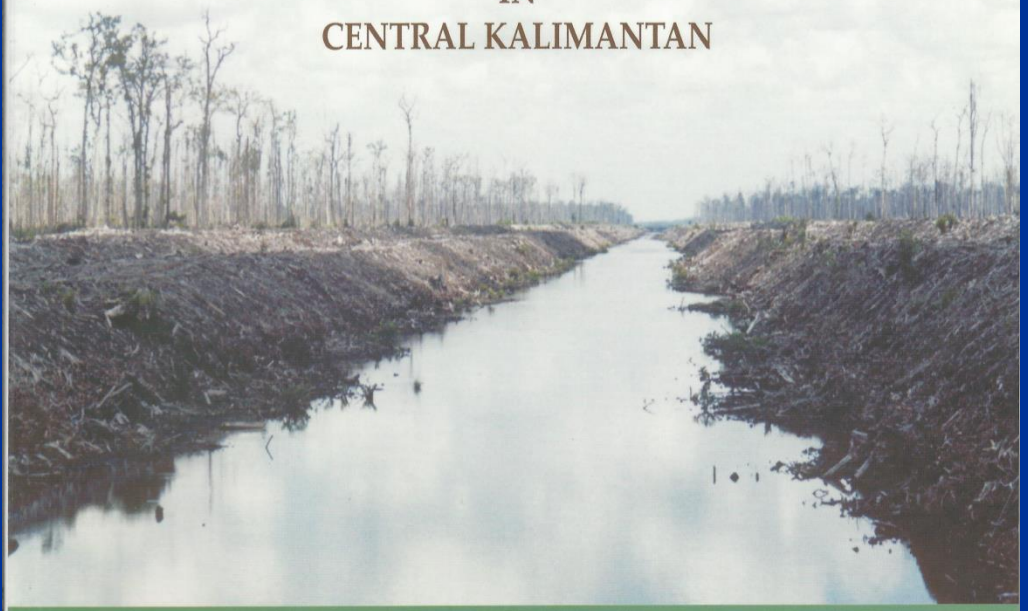
THE AD HOC TEAM REPORT

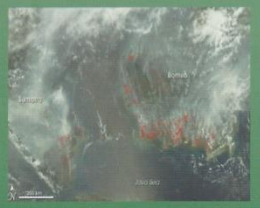
- Environmental Problems
  - Fire in dry season and flood in wet season
  - Illegal logging
  - Abandonment of land cultivated by transmigrants
  - Reduction of natural resources and impact on livelihoods
- Infrastructure Problems
  - MRP infrastructure not maintained and cannot be used
  - Poor transport and communications for local people
  - Education and social services lacking; communities remote
- Social, Economic and Cultural Problems
  - Socio-cultural and economic needs of local people largely ignored
  - Lack of infrastructure at field level
  - Potential for social conflict
  - Cost of compensation claims

The University of Nottingham
SCHOOL OF GEOGRAPHY

AD HOC TEAM
THE EX-PLG PROJECT CENTRAL KALIMANTAN

ACCELERATION OF REHABILITATION & RESTORATION ON EX-PEAT AREA DEVELOPMENT IN CENTRAL KALIMANTAN





Editor : DR. Bambang Setiadi

PUBLISHED WITH THE SUPPORT OF
RESTORPEAT - EU PROJECT 2007

The University of Nottingham
SCHOOL OF GEOGRAPHY

AD HOC TEAM APPROACH AND STRATEGY

- The MRP was not based on integrated planning
- EIA was not carried out before MRP was implemented
- Rehabilitation of MRP must be based on good science and integrated planning and implementation
- It must take account of nature and carrying capacity of the land and focus on empowerment and prosperity of society based on legal, production, conservation, water management, institutional and social aspects.
- All peatland of 3m thickness or more should be conserved, especially as reservoir of carbon and water
- Peat <3m should be assessed for its optimal use

The University of Nottingham
SCHOOL OF GEOGRAPHY

THE DUTCH FUNDED 'MASTER PLAN'

- The GORI had no money to implement the recommendations of the Ad Hoc Team
- The Dutch Government provided financial support to make a detailed plan for the rehabilitation of the MRP area based on the AHT Report. This commenced in 2007
- This joint initiative between GORI and Dutch Government was published in October 2008 and is very detailed.
- Once again nothing was done because GORI had no money to fund this very expensive programme

The University of Nottingham
SCHOOL OF GEOGRAPHY

A Joint Initiative of the
Governments of Indonesia and the Netherlands

Master Plan for the Rehabilitation and Revitalisation of the Ex-Mega Rice Project Area in Central Kalimantan

THE SCIENCE OF TROPICAL PEATLANDS AND THE CENTRAL KALIMANTAN PEATLAND DEVELOPMENT AREA

Technical Review No. 1

OCTOBER 2008

Euroconsult Mott MacDonald and Deltares | Delft Hydraulics
in association with
DHV, Wageningen UR, Witteveen+Bos, PT MLD and PT INDEC

The University of Nottingham
SCHOOL OF GEOGRAPHY

KALIMANTAN FORESTS AND CLIMATE PARTNERSHIP (KFCP)

- KFCP was a partnership between the Governments of Australia and Indonesia funded through a budget from AusAid of 30M$Aus, focussed in Block A of the EX-MRP
- It was to be the first large scale REDD demonstration project in Indonesia and first on tropical peatland
- It commenced in 2008 and ended in failure in 2012
- Of an original area of 200,000 ha to be rewetted less than 10% has been achieved
- Blocking of major canals was not started
- Only 50,000 tree saplings wereplanted out of one million that were planned
- Funding received was less than expected owing to bureaucracy

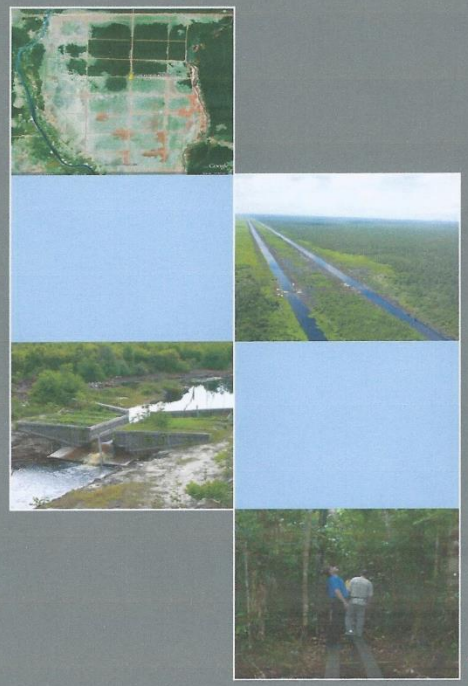
The University of Nottingham
SCHOOL OF GEOGRAPHY

2009

Australia Indonesia Partnership
Kemitraan Australia Indonesia

KALIMANTAN FORESTS AND CLIMATE PARTNERSHIP (KFCP)

DESIGN DOCUMENT



The University of Nottingham
SCHOOL OF GEOGRAPHY

FAILURE OF THE KFCP

- Deforestation in the project area continued rapidly
- Oil palm plantations spread across the EX-MRP area
- The objective of demonstrating effective and equitable approached to REDD+ was only partially achieved
- Land tenure issues were more complex than first thought
- The project was largely 'top down' in its planning and implementation and local aspirations and knowledge were not taken into account even at local government level
- Following severe criticism in the Australian Parliament and press the Australian Government terminated the project in 2013 placing a similar project in Riau on hold
- This is a major setback for REDD+

The University of Nottingham
SCHOOL OF GEOGRAPHY

WHAT LESSONS HAVE BEEN LEARNED AND WHERE DO WE GO FROM HERE

- Cool temperate and boreal zones
  - No more large-scale peatland drainage for agriculture or forestry
  - Large areas of former agriculture land on peat are being rewetted
  - Afforested peatlands in the UK and Ireland are having the trees removed and rewetted; the same is happening on upland bogs drained for grazing, shooting and water supply
  - Companies extracting peat for energy and growing media are adopting 'Responsible Peatland Management Strategies'
  - GHG emissions are being mitigated, reduced and compensated
  - There is major focus and expenditure on peatland restoration and habitat rehabilitation

The University of Nottingham
SCHOOL OF GEOGRAPHY

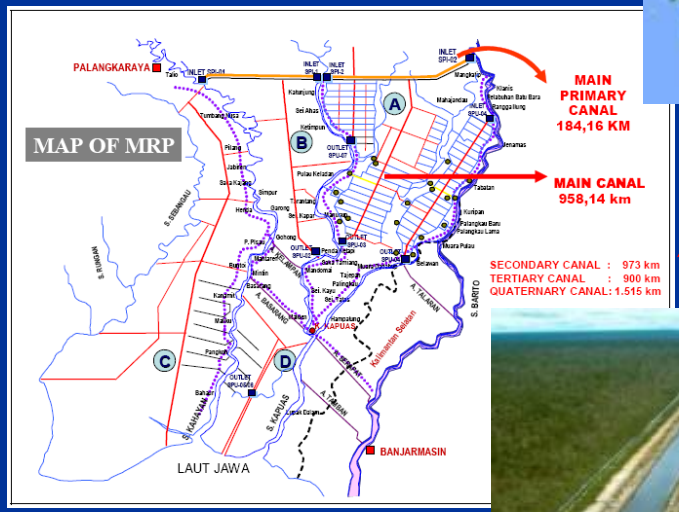
WHAT LESSONS HAVE BEEN LEARNED AND WHERE DO WE GO FROM HERE

- Tropical SE Asia
  - Still major government and private sector pressure to convert natural peat swamp forest to agriculture and plantations
  - Smallholder agriculture on peat has been a failure and should be discontinued; peat soil fertility declines after a few years and farmers then leave the degraded land
  - Oil palm and paper pulp tree plantations on peat are only profitable because of windfall income from deforestation, government subsidies and tax breaks, and large inputs of soil ameliorants
  - Indigenous local people do not wish to become plantation workers and prefer to obtain livelihood fromin their traditional ways
  - Intensive use of tropical peatland leads to large emissions of greenhouse gases, especially CO_2 but also N_2O
  - Restoration rewetting of degraded tropical peatland has not yet been shown to be feasible

The University of Nottingham
SCHOOL OF GEOGRAPHY

Large-scale peatland agricultural and plantation projects In Indonesia

Kalimantan (ex) Mega Rice Project



Riau pulp wood & oil palm plantations

The University of Nottingham
SCHOOL OF GEOGRAPHY

Carbon sink to carbon source

- Forest clearance and drainage
- Plantation and agricultural enterprises
- Poor forest/land management

Peat oxidation !

<ENSO-related extended dry season>

Fire !

PEAT AND PEATLAND FACTS!

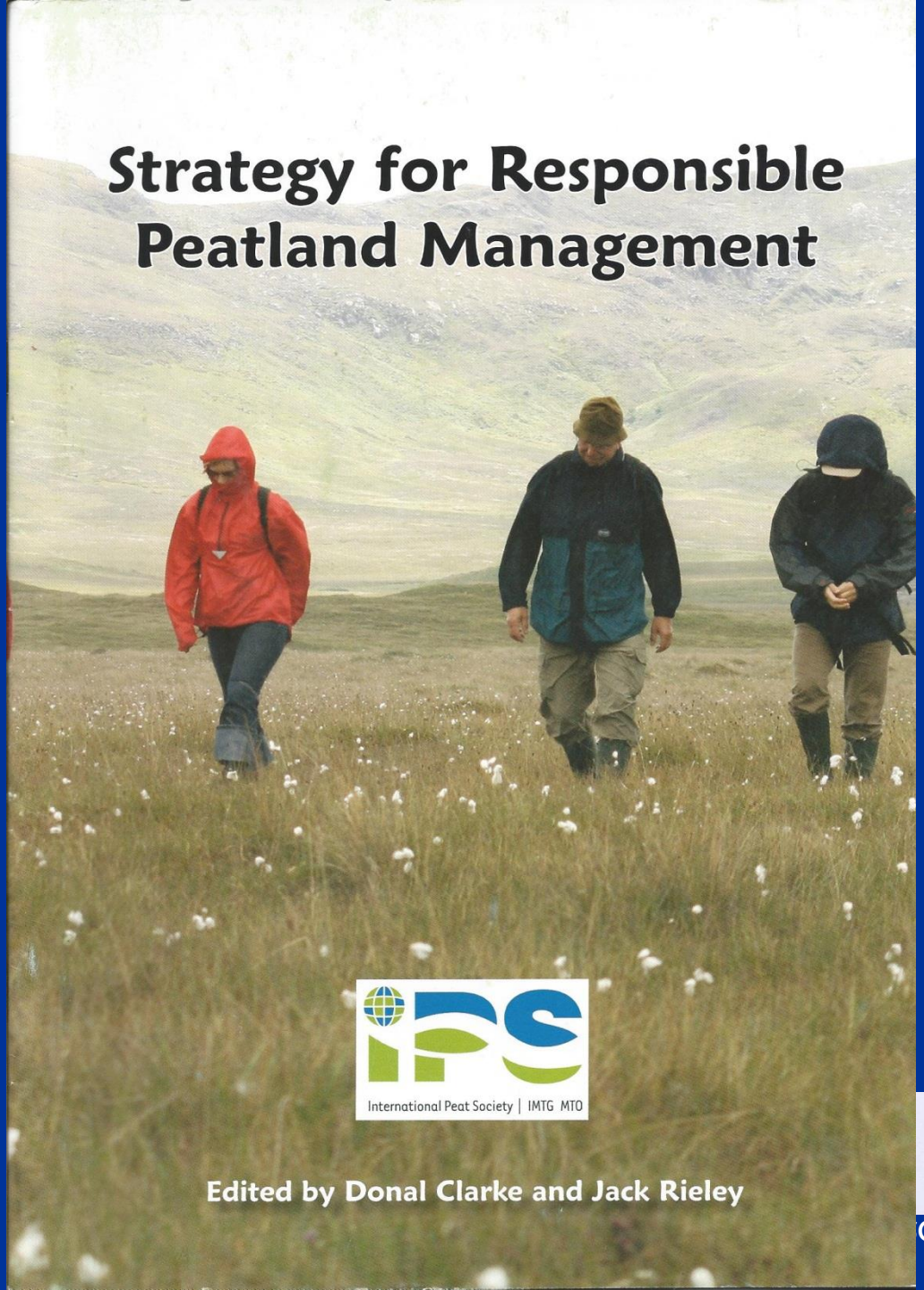
- Peat consists mostly of partly decomposed plant material
- Only the natural vegetation growing on a peatland can form peat
- Peat contains more than 90% water
- Peat is approximately 50% carbon by dry weight
- There is a relationship between the natural vegetation growing on a peatland and the peat that develops over thousands of years
- In tropical peatland most of the nutrient capital is in the trees and relatively little is in the peat where it is locked up and unavailable
- Ombrotrophic (domed) bogs receive their only nutrient inputs from precipitation (rain and dust); some is recycled from dead plant material and surface peat when the water table falls
- Peatland development removes the forest nutrients so they cannot be recycled to provide nutrient for plants and large amounts of lime and fertilizer have to be added

IPS International Peat Society | IMTG MTO
The University of Nottingham
SCHOOL OF GEOGRAPHY

PEAT AND PEATLAND FACTS!

- All forms of peatland development require vegetation removal, drainage, fire and replacement with a non-peat-forming vegetation
- After drainage, rainwater is chaneled into drains to remove it quickly to adjacent rivers and prevent flooding
- Lowered water table leads to drying of surface peat, prevents peat accumulation, leads to increased GHG emissions and increases risk of fire
- Consequent peat subsidence takes place continuously leading eventually to abandonment as flooding increases
- Restoration (drain filling, rewetting and revegetating) is expensive, uncertain and takes a long time to achieve
- On degraded tropical peatland this may be impossible!!

The University of Nottingham
SCHOOL OF GEOGRAPHY



The University of Nottingham

SCHOOL OF GEOGRAPHY

Aims of the Strategy

- To promote responsible management of peat and peatlands according to strategic objectives
- To improve peatland management within the framework of 'Wise Use of Mires and Peatlands'
- To ensure that high biodiversity value peatlands and their carbon store are conserved, 'utilised' peatlands are managed responsibly and degraded peatlands are rehabilitated to restore ecological and landscape functions and minimise greenhouse gas emissions

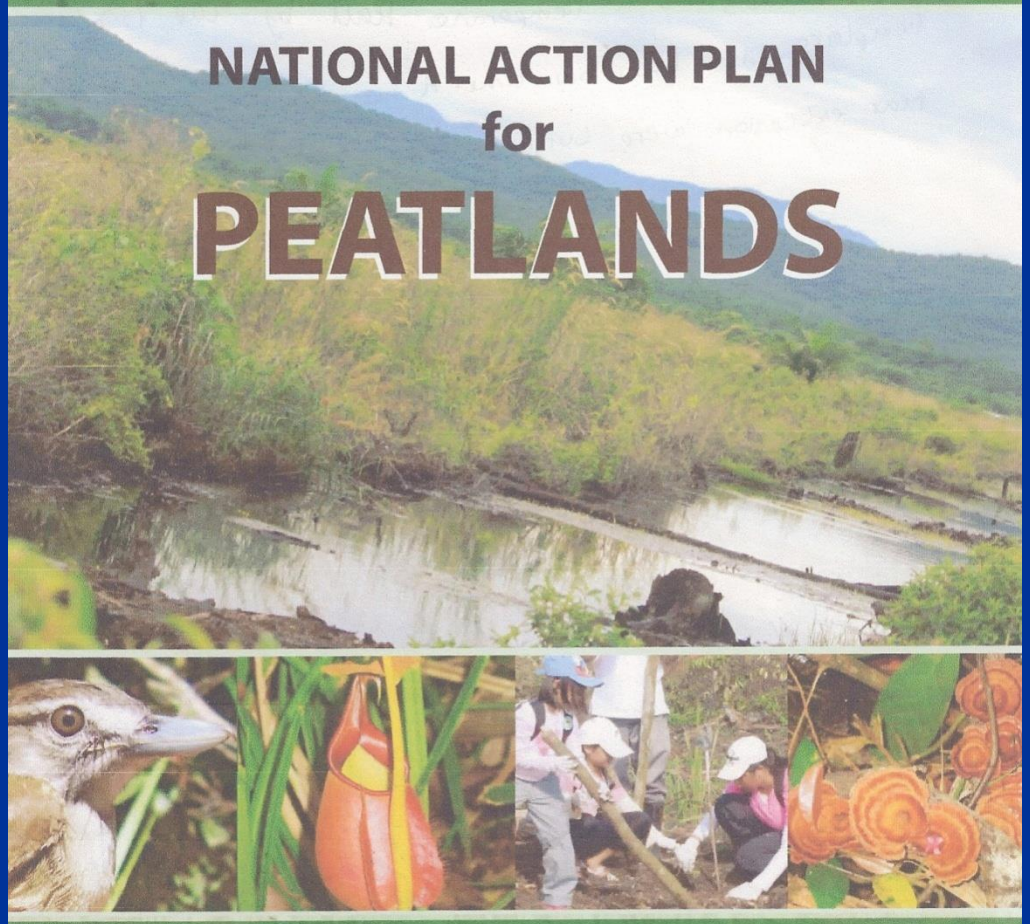
The University of Nottingham
SCHOOL OF GEOGRAPHY

SRPM 8 PRIORITY THEMES

- Biodiversity
- Hydrology and water regulation
- Climate and climate change processes
- Economic activities
- After-use, rehabilitation and restoration
- Human and institutional capacity and information dissemination
- Engagement of local people
- Good governance

MALAYSIA

NATIONAL ACTION PLAN for PEATLANDS



MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

The University of Nottingham

SCHOOL OF GEOGRAPHY

Gaston Sieffermann

The University of Nottingham
SCHOOL OF GEOGRAPHY


Thank you very much for listening
International Peat Society | IMTG MTG