ESA side event at
UNFCCC COP 13 and CMP 3

SPACE SUPPORTING UNFCCC – GLOBAL PRODUCTS FOR A BETTER UNDERSTANDING OF OUR CLIMATE

CARBON ACCOUNTING AND STORAGE IN FORESTS AND PEATLANDS IN INDONESIA,

FROM LOCAL EXPERIENCE TO GLOBAL IMPACT

BY:
DR.BAMBANG SETIADI
President of the Indonesian Peat Association /
President of
The Indonesian Natural Resources Accounting and Environment Society

Thursday 6 December 13:00
at the Grand Hyatt Bali, Room WAVE

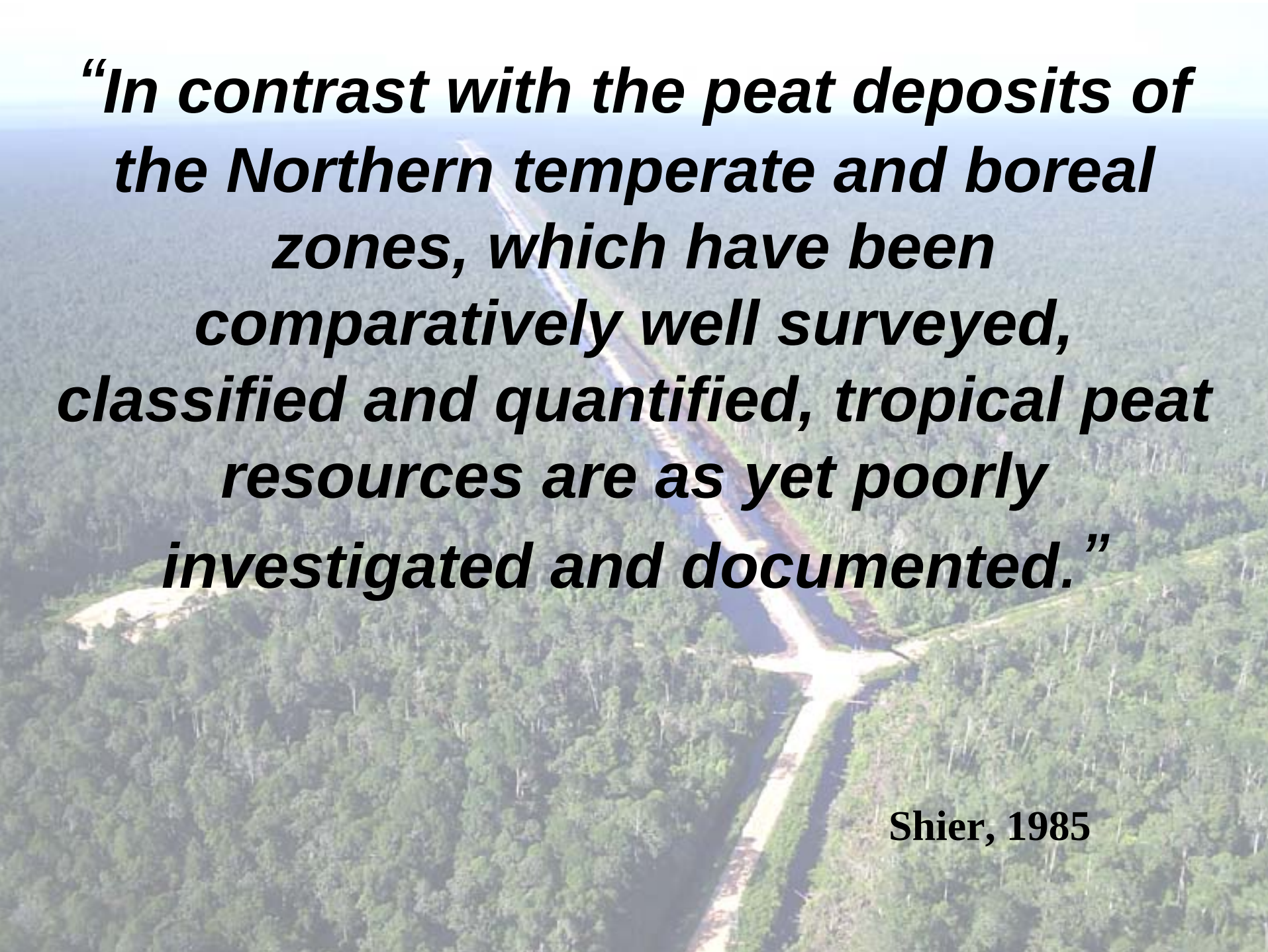
MAIN STRATEGY TO DECREASE GREENHOUSE EFFECT :

1. **Reducing emission of CO_2, clorofluorocarbon (CFC), ozone, methan and NO_2;**

2. **Recycling CO_2,**

3. **Developing energy without producing CO_2;**

4. **Best planning on peat and tropical peat forest management**



"In contrast with the peat deposits of the Northern temperate and boreal zones, which have been comparatively well surveyed, classified and quantified, tropical peat resources are as yet poorly investigated and documented."

Shier, 1985

To keep carbon in peatland, peat and PEAT DOME

(1) Deep peat thickness (PEAT DOME) must be protected to control CO2 emission rate

(2) Deep peatland (PEAT DOME) must be conserved or protected as reservoir that withholds water during rainy season, and release CO2 gradually during dry season

(3) To keep carbon in peat land and tropical peat forest and peat dome as an ”asset”

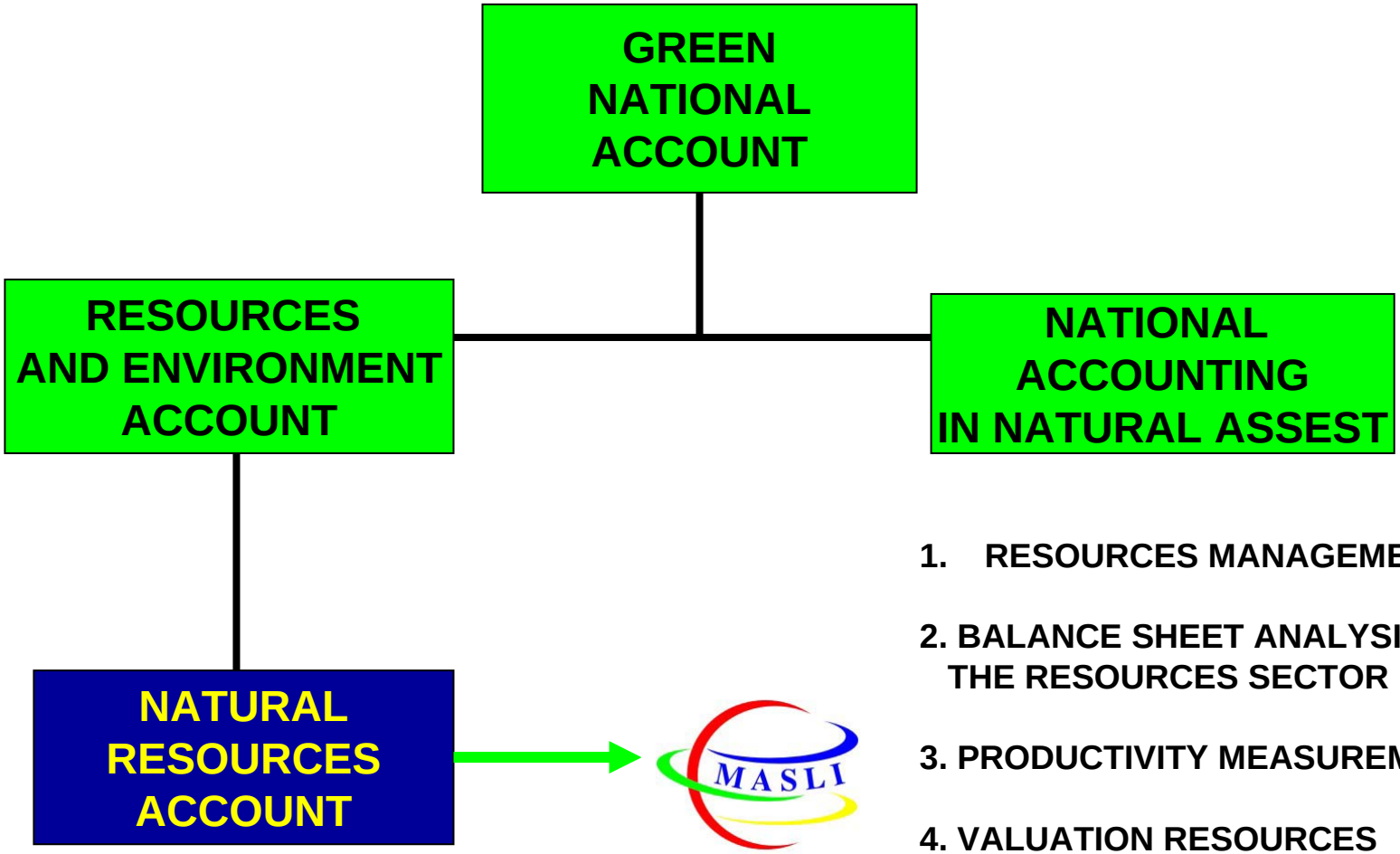
H. E. Ban Ki-moon

Secretary General of United Nation
THE KOREA HERALD
DEC. 5, 2007

- We have witnessed three economic transformation in the past century. First came Industrial Revolution, then the Technology Revolution, then our modern era globalization.
- We stand at the threshold of another great change :

THE AGE OF **GREEN ECONOMICS**

GREEN ECONOMICS
AND
NATURAL RESOURCES ACCOUNTING



1. RESOURCES MANAGEMENT
2. BALANCE SHEET ANALYSIS OF THE RESOURCES SECTOR
3. PRODUCTIVITY MEASUREMENT
4. VALUATION RESOURCES DEVELOPMENT

What is a Natural Resource Account?

- Natural resource accounts can be expressed in terms of physical quantities and/or the economic values associated with the stock and flow of natural resources and environmental services on the landscape.

THE INDONESIAN NATURAL RESOURCES ACCOUNTING AND ENVIRONMENT SOCIETY

TOWARD IMPLEMENTATION OF NRA

MASLI'S PUBLICATION LAUNCHING

WITH PROF. EMIL SALIM

Jakarta, Nop 23, 2005

Recent international developments Natural Resources Accounting

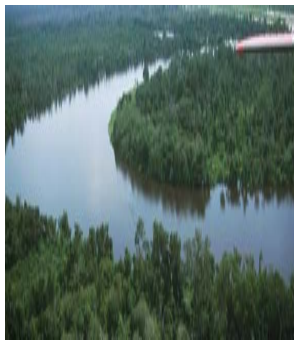
- United Nations Statistical Commission approves the creation of the UN Committee on Environmental-economic Accounting, whose main objective is to mainstream environmental accounting in official statistics
- Areas of responsibility of the UN Committee:
  - Coordination
  - Promotion of environmental accounting
  - Methodological development
  - Technical cooperation
  - Data harmonization


The Government
of Indonesia
should regard
its peatlands
as a ‘bank’

Without a provincial and national carbon account or inventory, both physical and monetary, it will be impossible to know how onerous or unfair that expectation might be.

CARBON ACCOUNTING

PEAT AS CARBON "BANK" = STOCK + NEW ACCUMULATION - DEPLETION - DAMAGE



Carbon store….Carbon balance…

(Jyrky, 2004)

TROPICAL PEAT IS A SIGNIFICANT LOCAL, REGIONAL AND GLOBAL CARBON STORE

CLIMATIC SCENARIOS IN SE ASIA SHOW INCREASE IN TEMPERATURE AND VARIABILITY OF RAINFALL THAT ARE LIKELY TO HAVE NEGATIVE IMPACTS ON PEAT NET CARBON BALANCE

LAND RECLAMATION DECREASES FOREST AREA AND THUS INCREASES LOSS OF CARBON STORES AND CAUSES BIOTIC IMPOVERISHMENT

SUSTAINABLE PEAT MANAGEMENT HAS POTENTIAL SIGNIFICANTLY REDUCE CARBON LOSSES AND EXTEND PEAT RESOURCE LIFE SPAN

CARBON ACCOUNTING ON TROPICAL PEAT

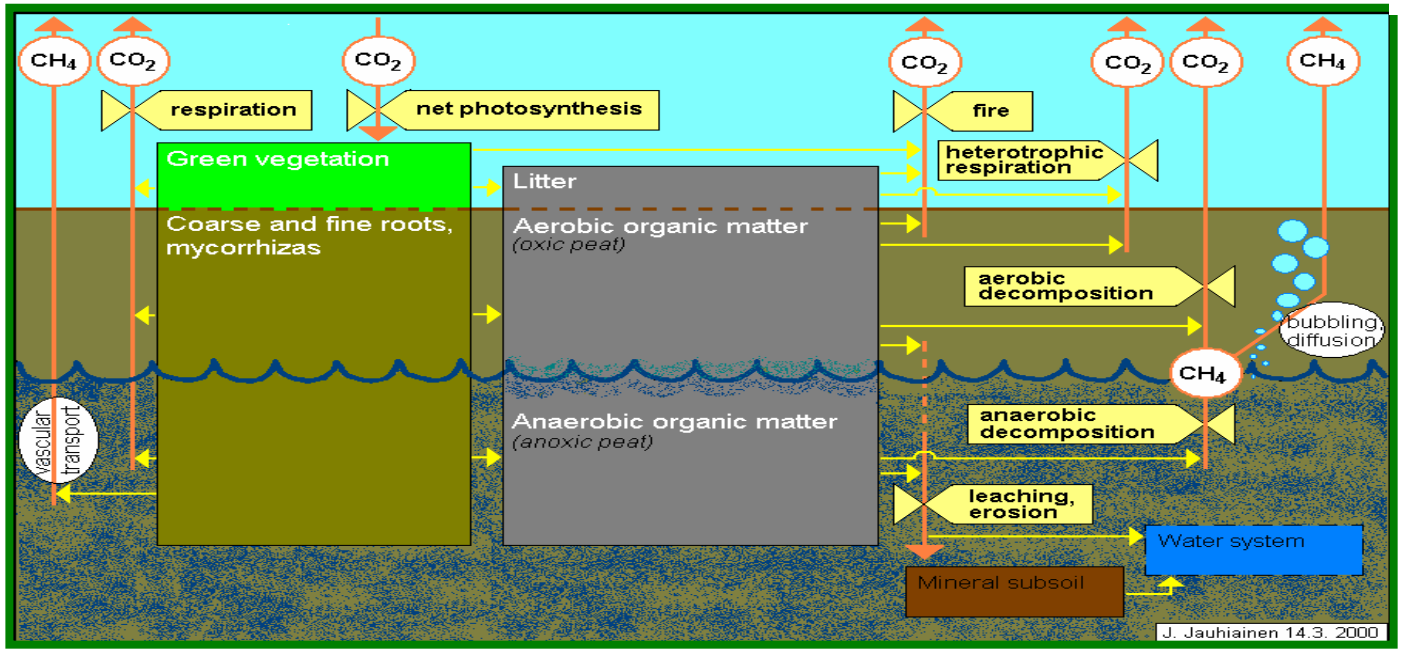
STOCK : In 1988, Indonesia's peatland carbon store would have been around 43 Gt (158 Gt CO2e)

DEGRADATION : between 0.87 and 2.57 Gt of carbon was released to the atmosphere as a result of forest and peat fires in Indonesia in the 1997 El Niño year, equivalent[1] to 3–10 Gt CO2.

In the subsequent 10 years, according to the PEAT-CO2 Report4, it is estimated that up to 20 Gt CO2e have been released from Indonesia's peatland as a result of peat subsidence (decomposition and oxidation) from land use change and fire (conversion to farming and plantations).

[1] CO2e = carbon dioxide equivalent

NET TRANSFER CARBON



THE LONG TERM APPARENT RATE OF C-ACCUMULATION (LORCA),

FINLANDIA	**:**	**18.5 G /M2/YEAR.**
RUSIA,	**:**	**20 G/M2/YEAR,**
KANADA,	**:**	**19,4 G/M2/YEAR DAN**
SIBERIA.	**:**	**17,2 G/M/YEAR**

C FLUX RATES IN TROPICAL PEAT

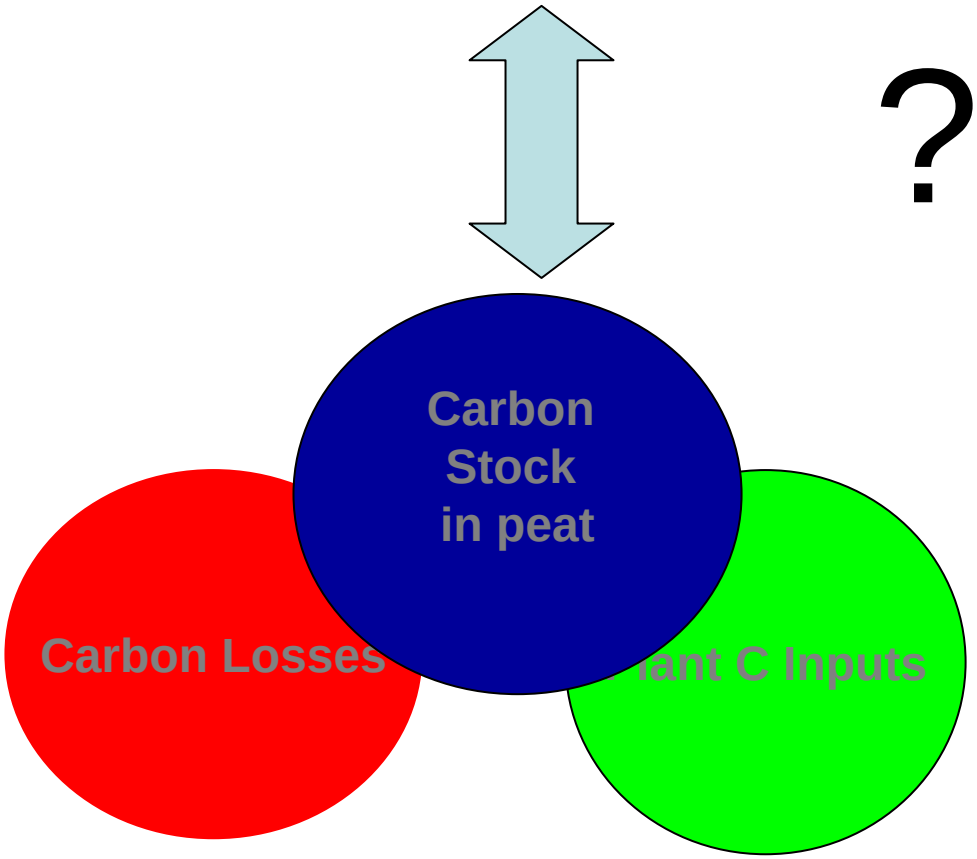
(Jyrky, 2004)

MEASURE	PSF	DEVELOPED
Temporary CO_2 (mg m^{-2} h^{-1})	236 – 620	220 – 430
Annual CO_2 (mg C m^{-2} y^{-1})	884 – 985	2000 (*
Temporary CH_4 (mg m^{-2} h^{-1})	max. 0.51	-0.11 – 10.8
Annual CH_4 (mg C m^{-2} y^{-1})	1	± neutral

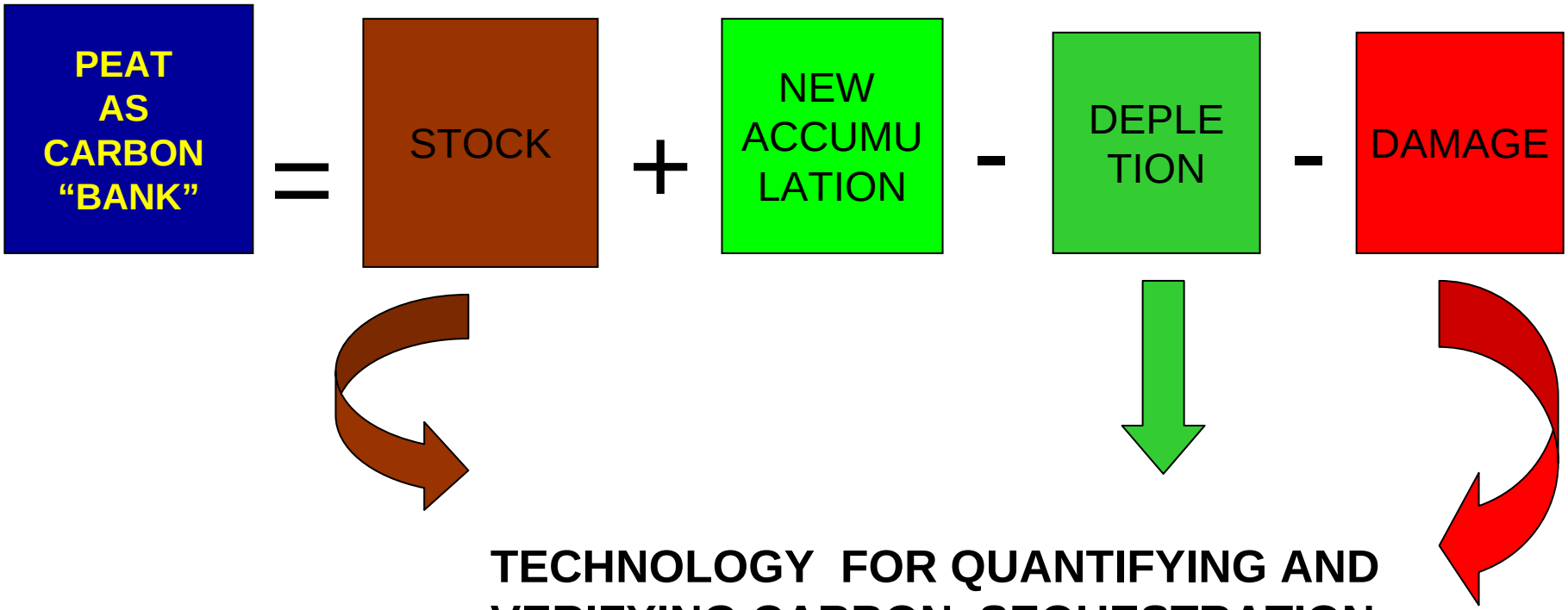
In dry seasons Peat Fires occure each yea

DAMAGE!

TECHNOLOGY FOR QUANTIFYING AND VERIFYING CARBON SEQUESTRATION RATES AND STOCK ON TROPICAL PEAT

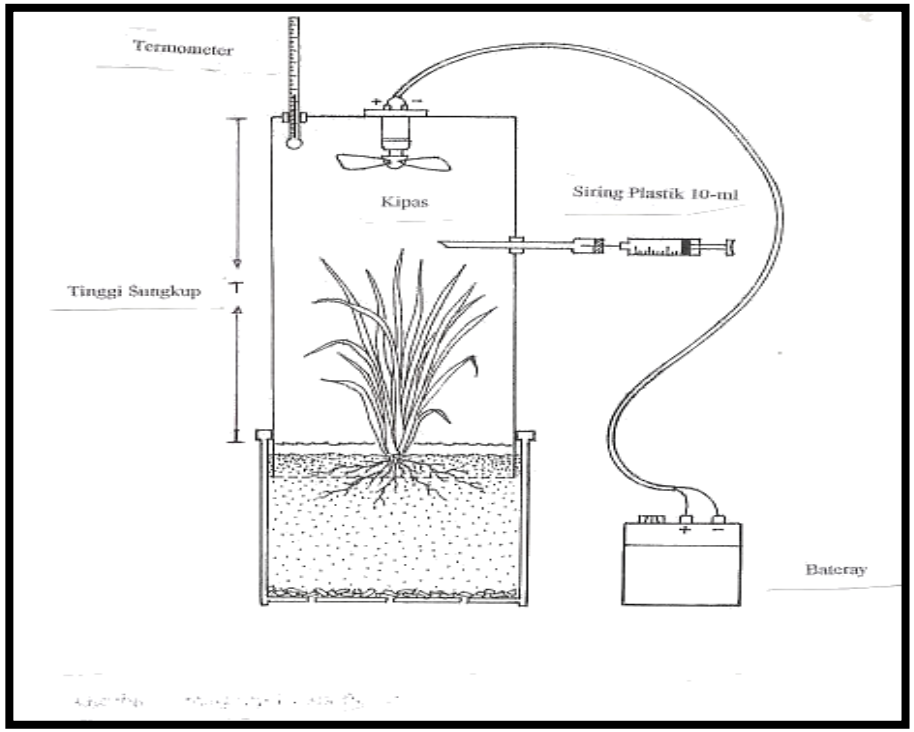


CARBON ACCOUNTING



TECHNOLOGY FOR QUANTIFYING AND VERIFYING CARBON SEQUESTRATION RATES AND STOCK ON TROPICAL PEAT

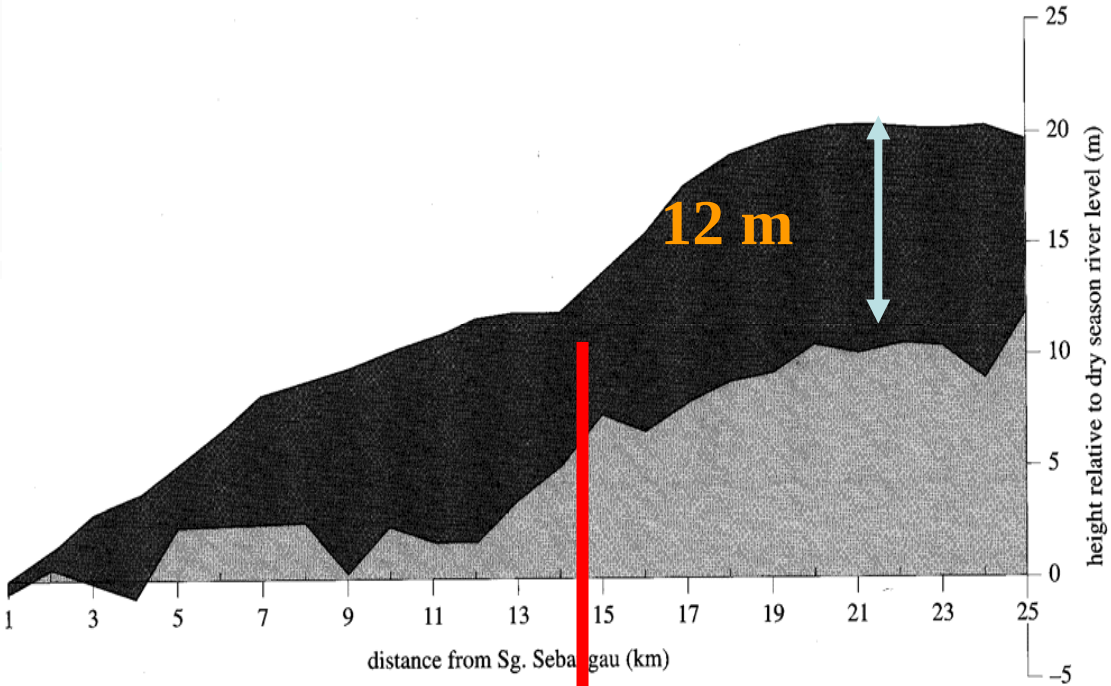
???



SMALL SCALE QUANTIFYING AND VERIFYING CARBON

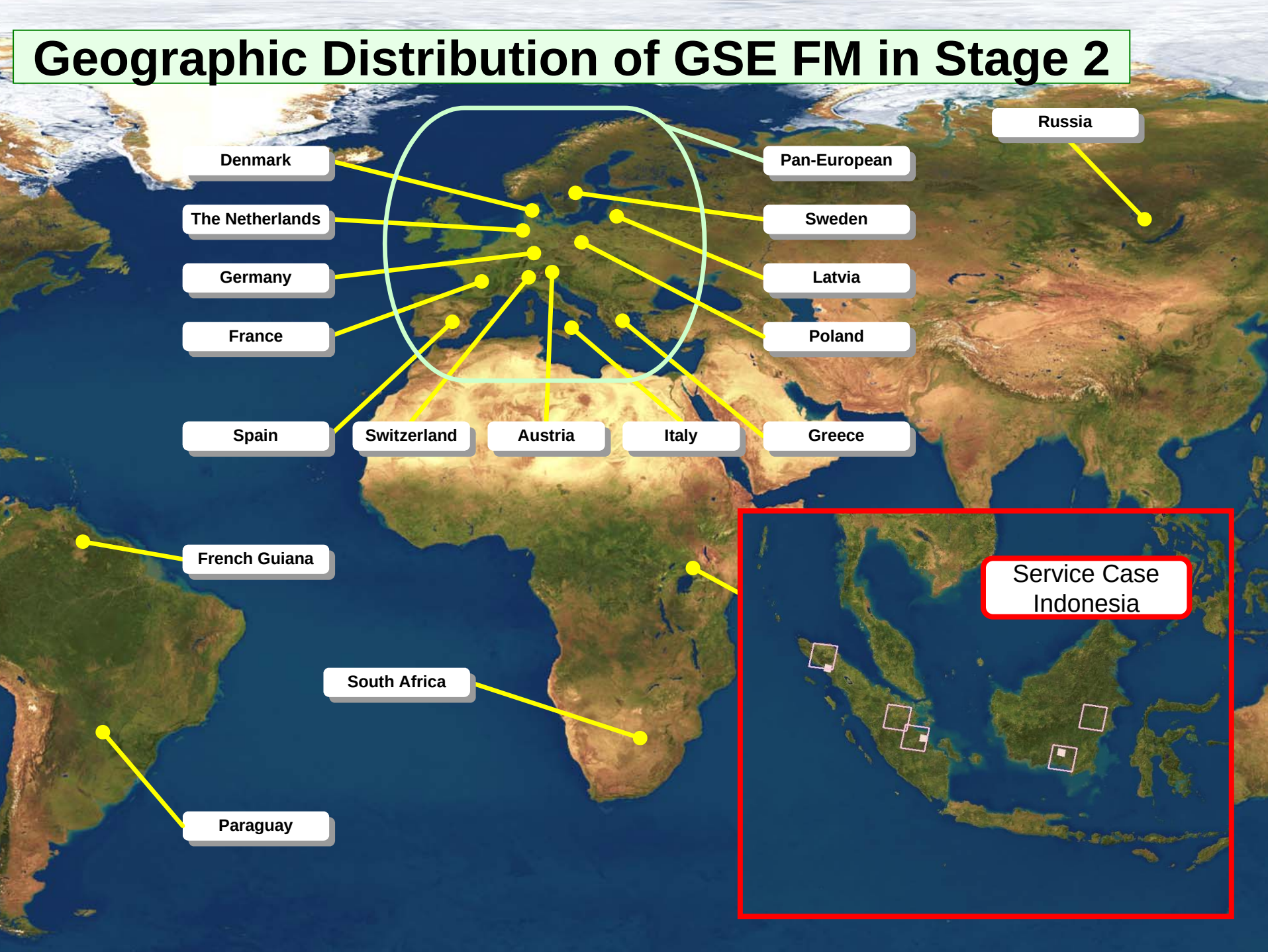

BIG SCALE
CARBON QUANTIFYING
???

PEAT DEPTH > 12 M



Water > 90%
Carbon organic
Mineral (very small)

Geographic Distribution of GSE FM in Stage 2



BENEFIT

- New information on the forest resources and dynamics
- Transparent methods for assessing the forest resources, biomass, volume and forest degradation
- Fills a major gap, since no forest inventory data for Indonesia
- Additional benefits will be derived from data about the dynamics of the fragile peat forests in coastal areas

PRODUCT LIST

- Land Use/Land Cover and **Forest Type Map** (1990 / 2002)
- Land Use/Land Cover and Forest Type **Change Map** (1990 / 2002)
- **National and Regional Volume, Biomass and Carbon Statistics (Stock volume, Biomass, Carbon)**
- **National and Regional Volume, Biomass and Carbon Change Statistics (Stock volume, Biomass, Carbon)**

Statistical Results

Calculation of National and Regional Volume, Biomass and Carbon Statistics

Method FAO 1997:

AGB (t/ha) = VOB * WD * BEF

where:

VOB = volume over bark (stock volume)

WD = volume-weighted average wood density (an average wood density of 0.57 t/m^3 for Asia (FAO 1997) was used for the calculations)

BEF = biomass expansion factor (calculated from AGB ,equation taken from FAO 1997, FAO 2003)

Biomass specifications per class were taken from scientific literature

Service Operations

Processing Methods:

Pre-processing:

- Geometric Accuracy Assessment

Thematic:

- Classification
- Change Detection

Post Classification:

- Post Classification Processing (Interactive/Interpretative Enhancement)

Thematic Accuracy Assessment

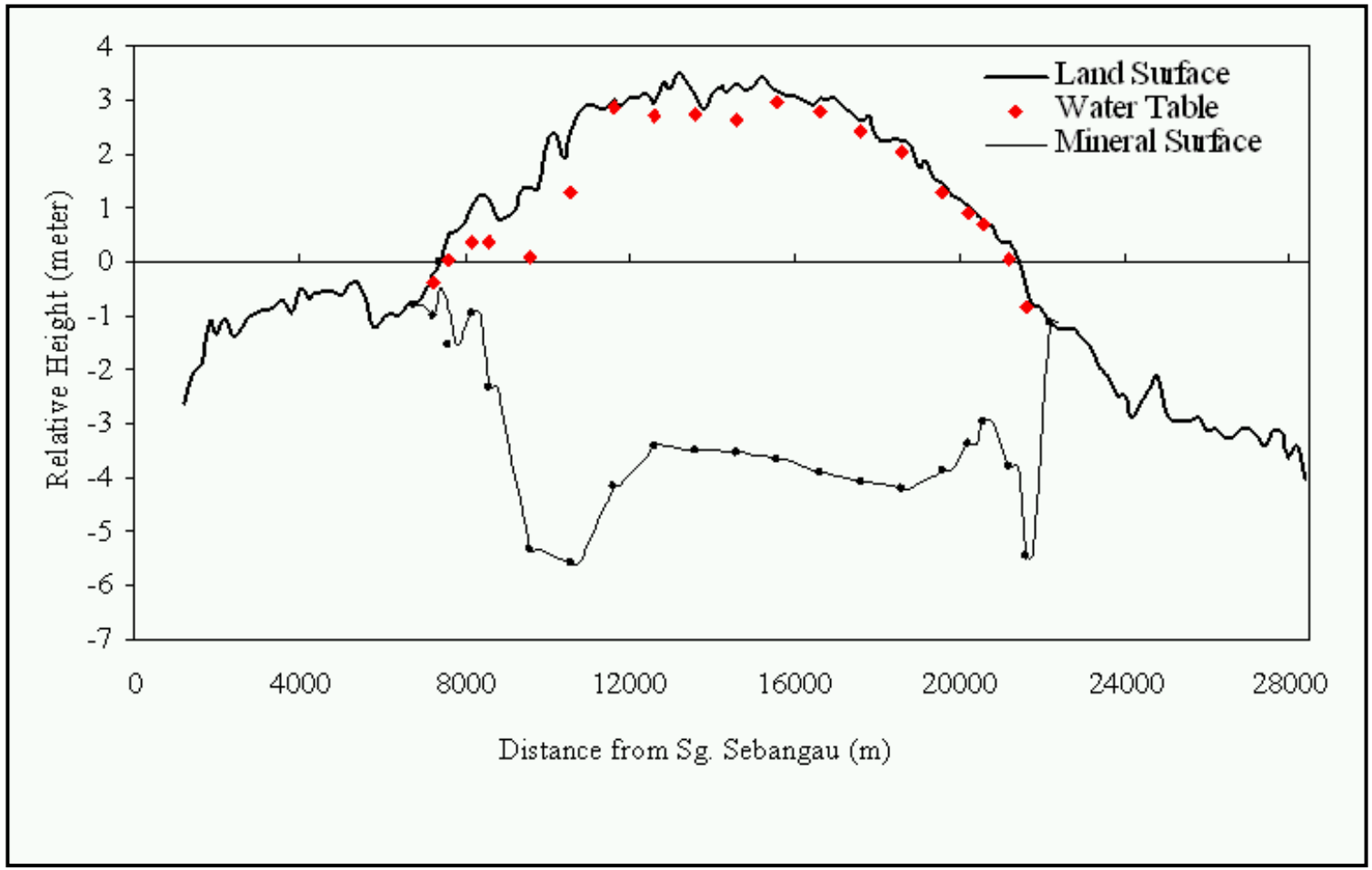
Analysis and Modelling

- **Carbon Stock estimation & modelling**
- **Carbon Stock Change**

Peat dome in Central Kalimantan

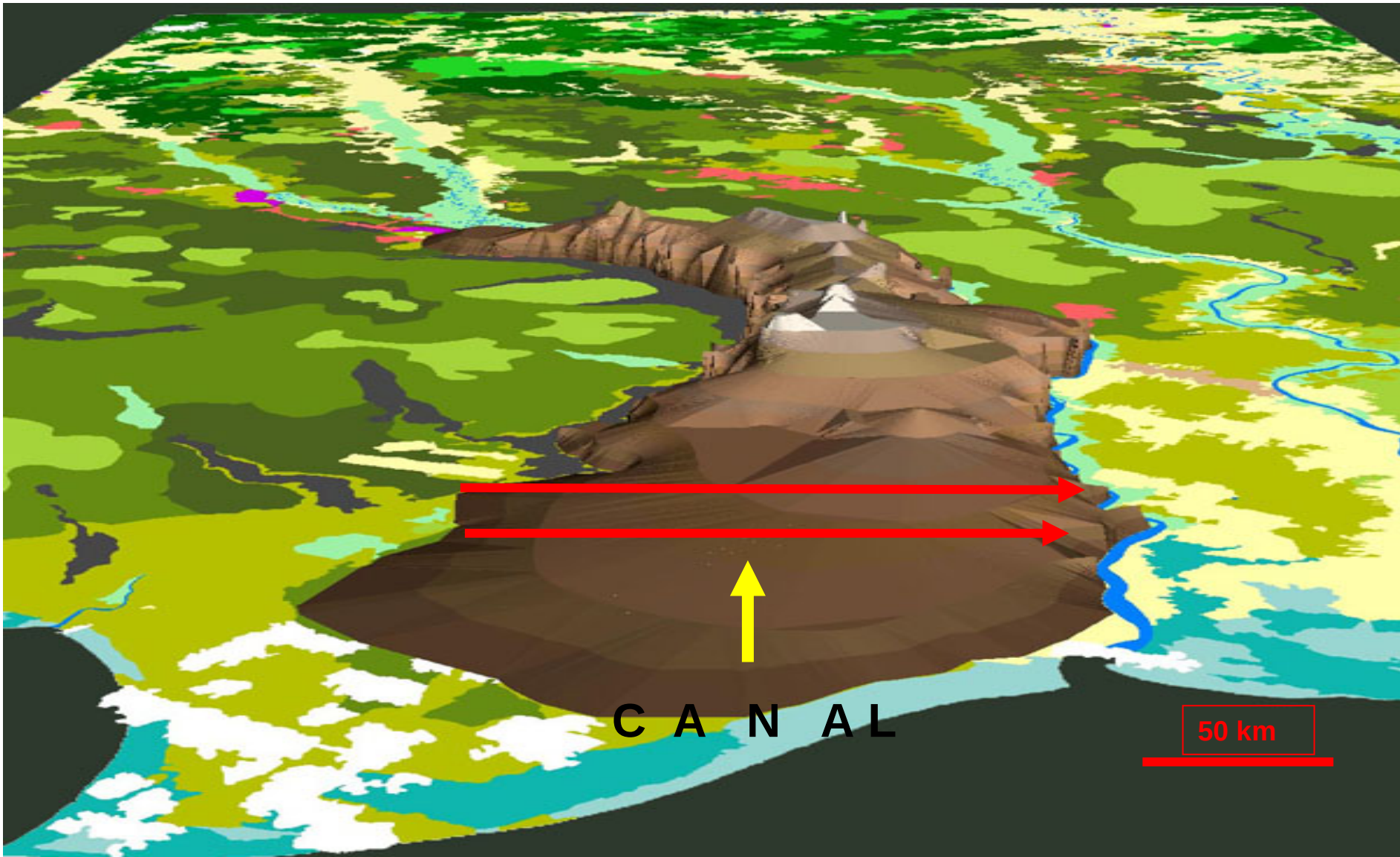
- Peat swamps are bordered by the sea and by rivers, and have a dome-shaped surface .
- The surface of the swamps rises gently from the edges to form a convex shape (dome) with slopes of 1–2 m/km.
- The highest point may be 10 to 20 m above mean sea level. In the older, more developed swamps, the convexity at the edges is more pronounced.
- A rise of 6 m over the first 250 m has been recorded.
- The central bog planes are almost flat, with a riseof less than 0.5 m/km (Tie, 1991).
- It should be realised that because of the dome-shape topography, peat domes **cannot be irrigated by gravity from the surrounding rivers.**
- The only source of water for (gravity) irrigation is runoff from the top of the dome, which can be diverted to irrigate lower parts of the dome.

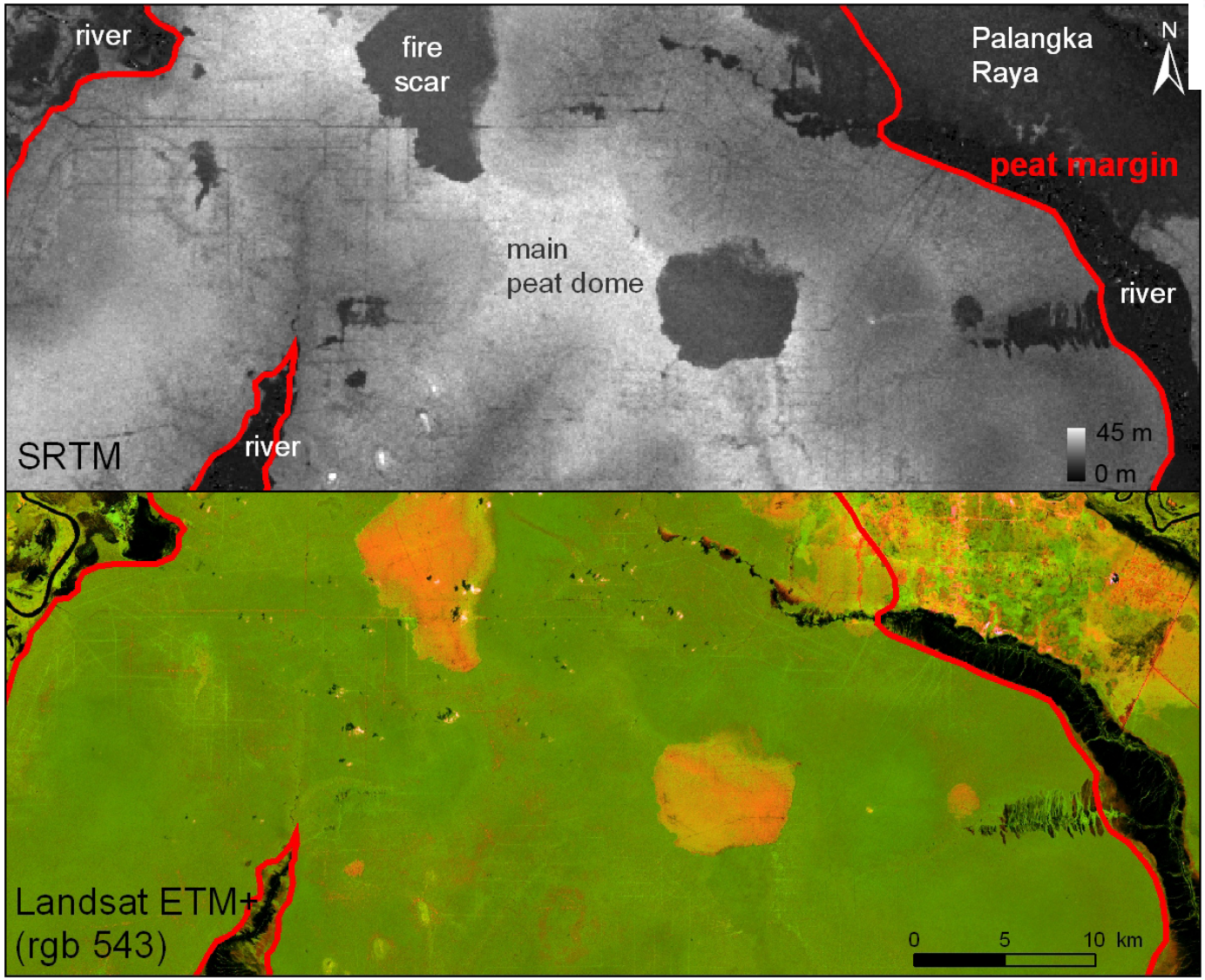
PEAT DOME


Land Surface
Water Table
Mineral Surface
Relative Height (meter)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
4000
8000
12000
16000
20000
24000
28000
Distance from Sg. Sebangau (m)

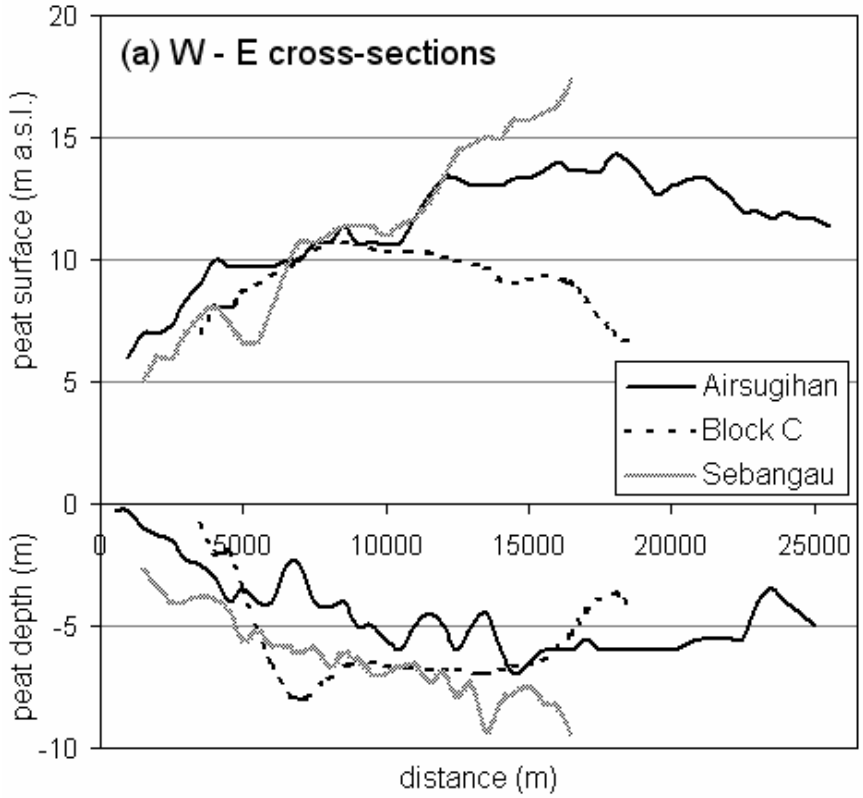
PEAT DOME IN CENTRAL KALIMANTA

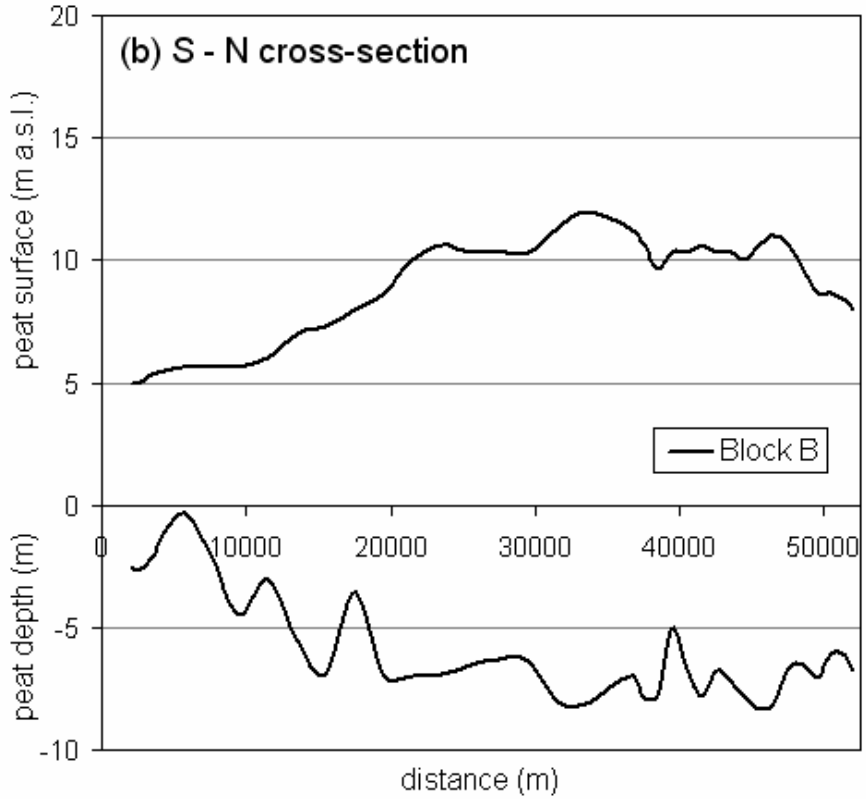
3D REPRESENTATION OF PEAT VOLUME, BLOCK C



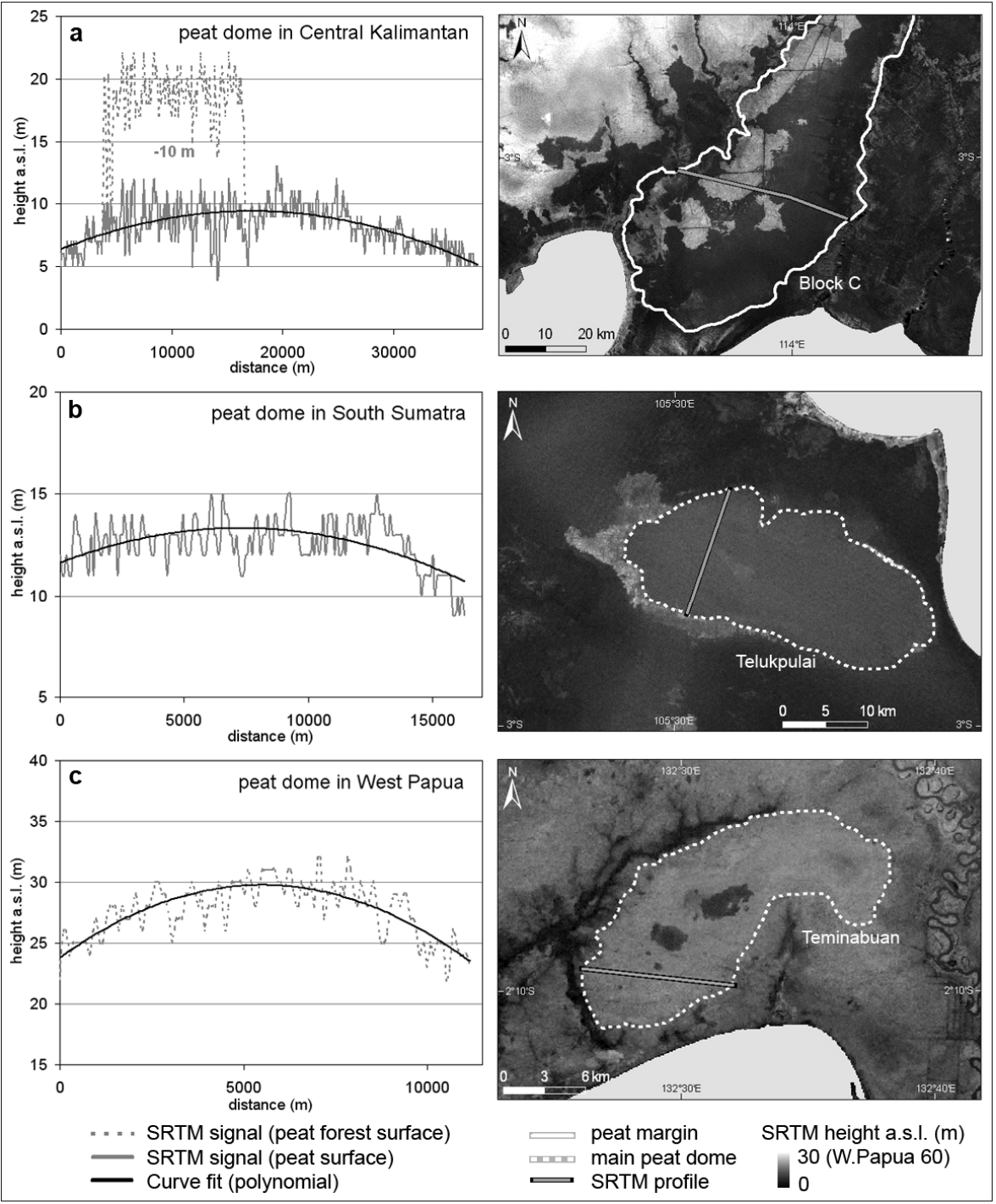


Delineation of the *Sebangau* peat dome in Central Kalimantan by means of a DEM (SRTM) and a Landsat ETM+ image from 7 Feb. 2000. The Landsat image is required in addition to SRTM data for detection of the peat margin (SRTM © USGS; Landsat © NASA)



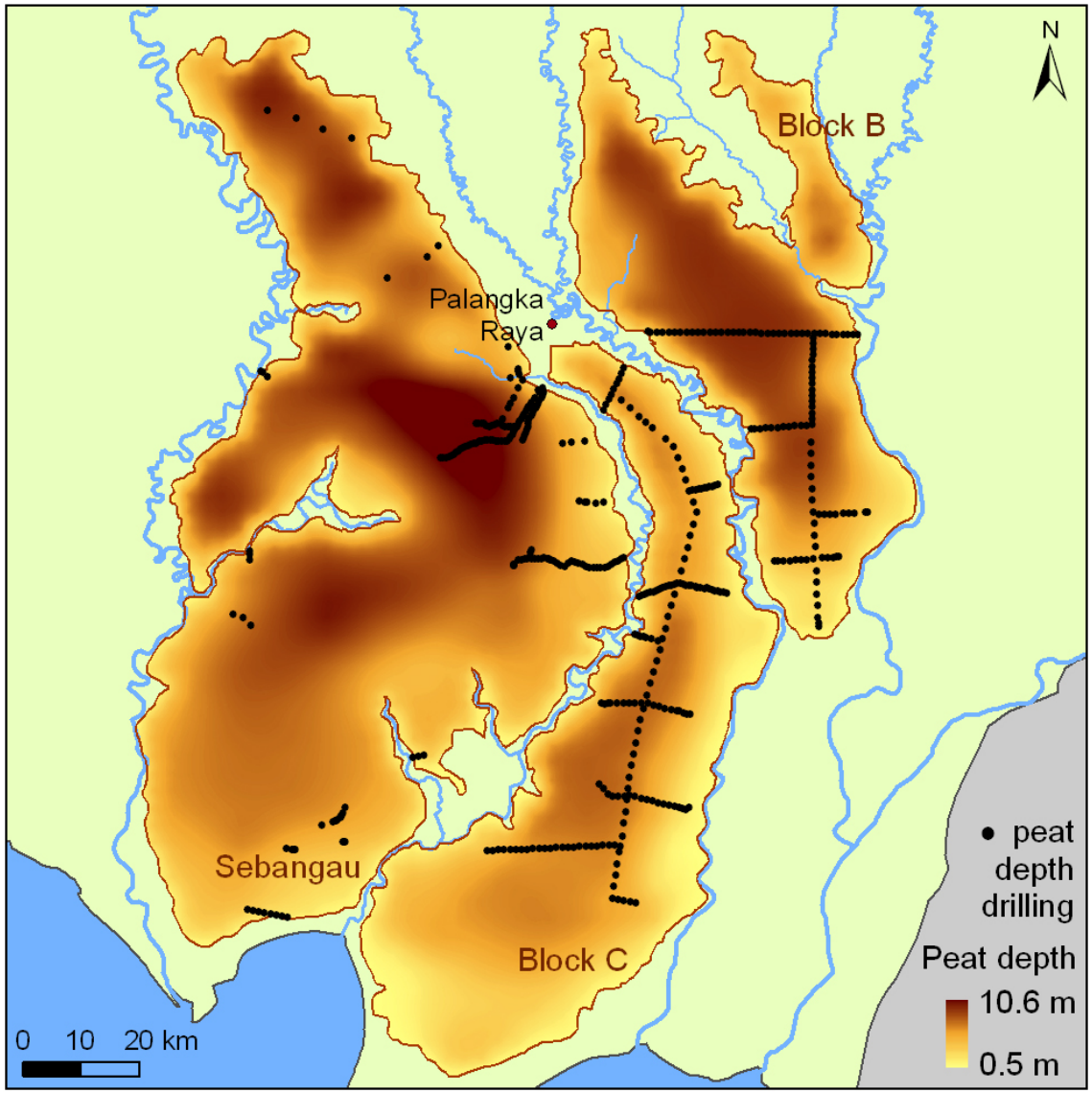


The investigated ombrogenous peatlands in Indonesia show a biconvex cross-section,(a) from West to East (b) from South to North. The peat depth is derived from manual drillings, the peat surface from SRTM data. On the horizontal scale bar zero marks the peat margin, while the other end of the cross-section is located somewhere on the peat dome.



SRTM elevation profiles of peat domes typical for the Indonesian provinces Central Kalimantan (a), South Sumatra (b) and West Papua (c).

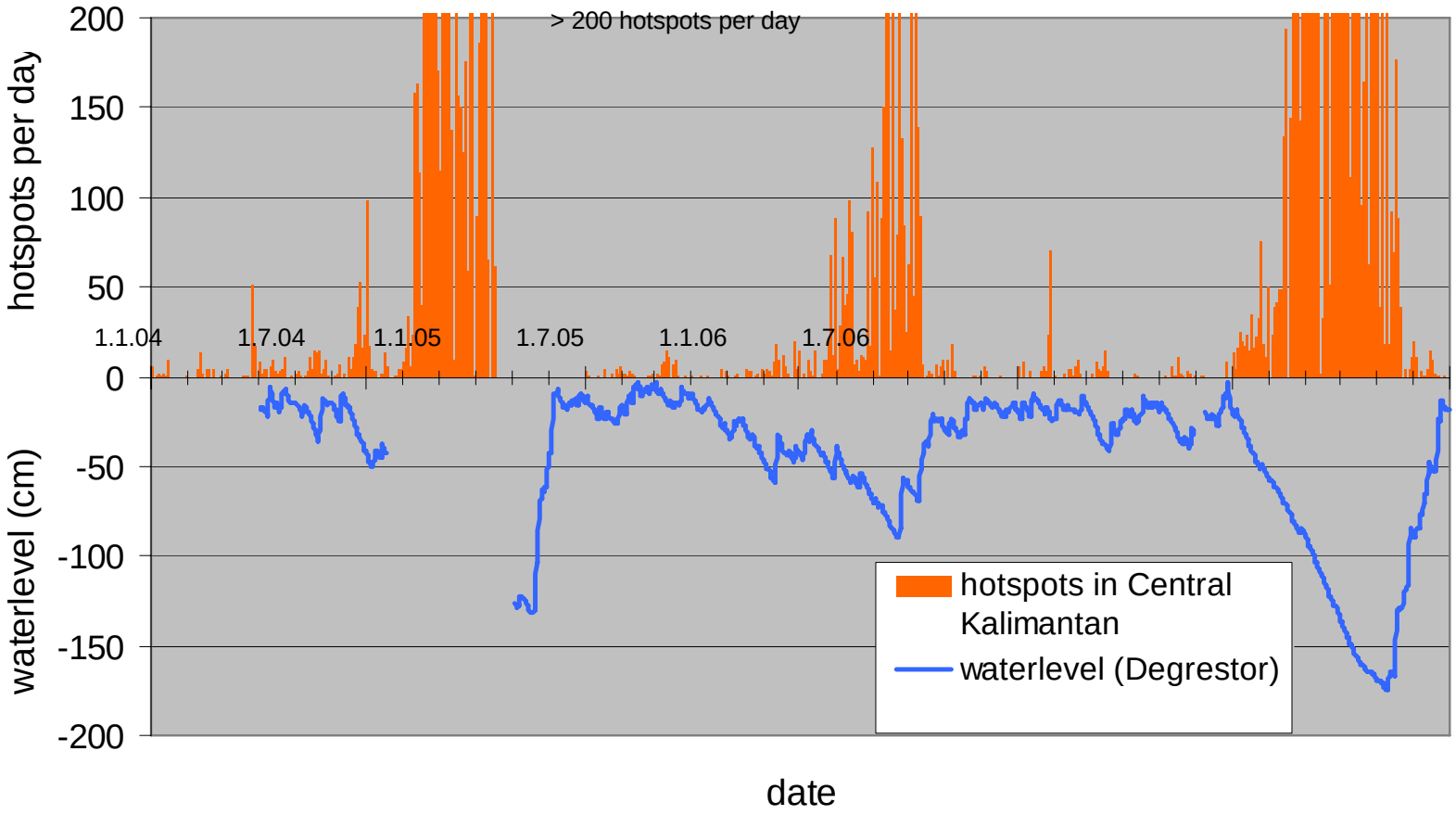
The SRTM data clearly shows the characteristic dome-shaped surface of ombrogenous peat (SRTM © USGS).



Peat depth model of selected peat domes in Central Kalimantan. Kriging interpolation was applied using 542 peat depth drilling values and a correlation function between the peat dome surface and bedrock curvature.

COMPARATION OF WATER LEVEL DATA AND HOTSPOT IN CENTRAL KALIMANTAN

comparison of waterlevel data and hotspots in Central Kalimantan



Service Description

User Organisation: **MASLI**

Indonesian Society for Natural Resources and Environmental Accounting

Service Functionality:

- Preparation for Indonesia to National GHG reporting
- Support the Indonesian government for future policy and programmatic steps

Service Provider(s): **Remote Sensing Solutions GmbH**

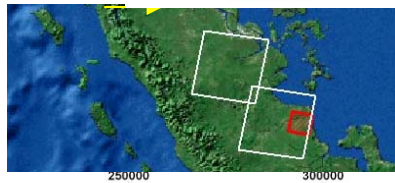
Temporal Range:

Period Begin: 1.1.1990 - Period End: 3.10.2006

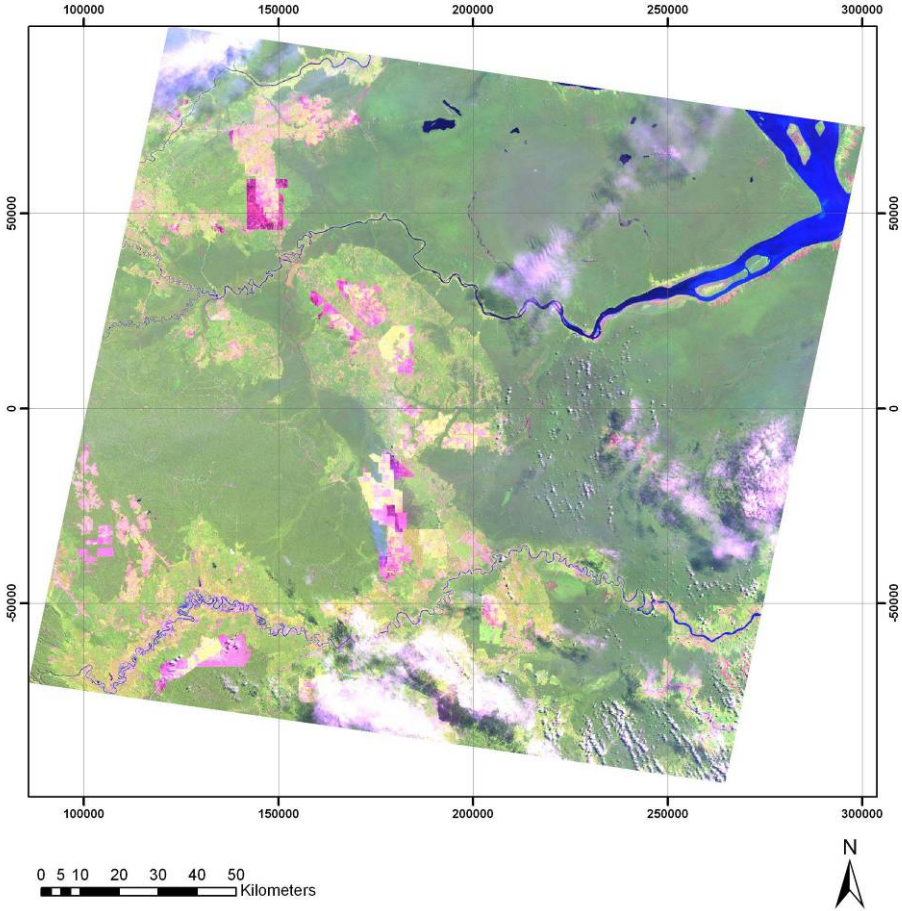
Service Area: **Sumatra and Kalimantan, Indonesia**

Results - Sumatra Riau

Image Products: Service area Sumatra Riau

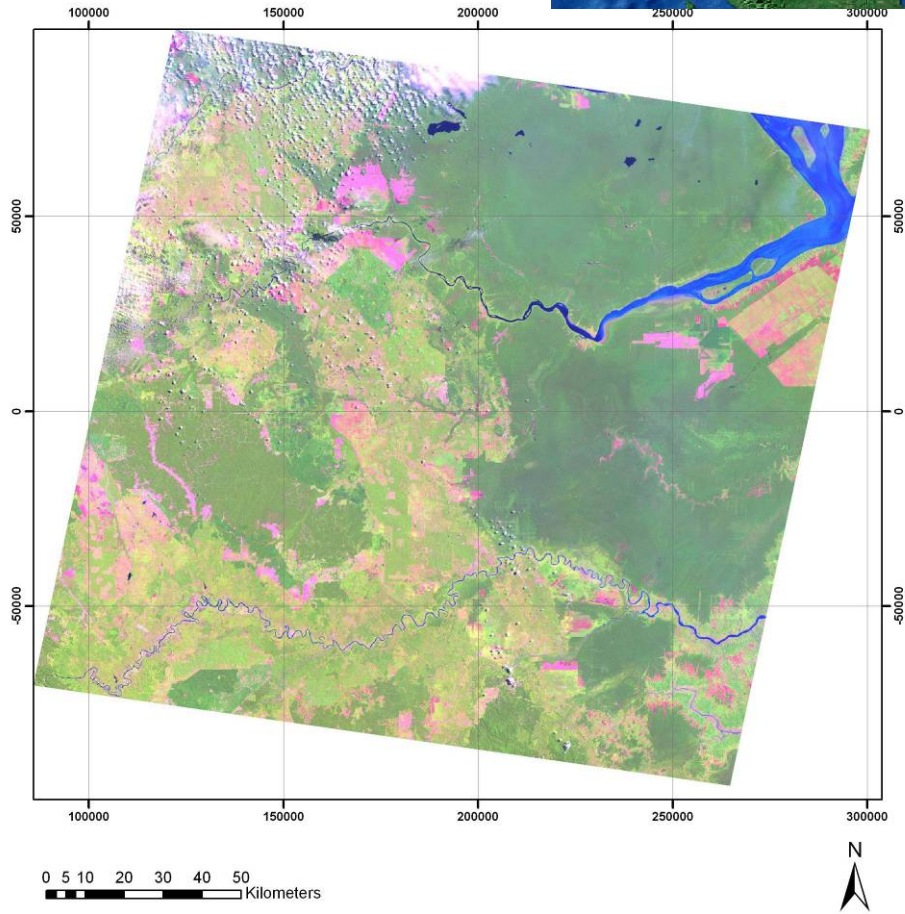


TM 1990 (5-4-3)



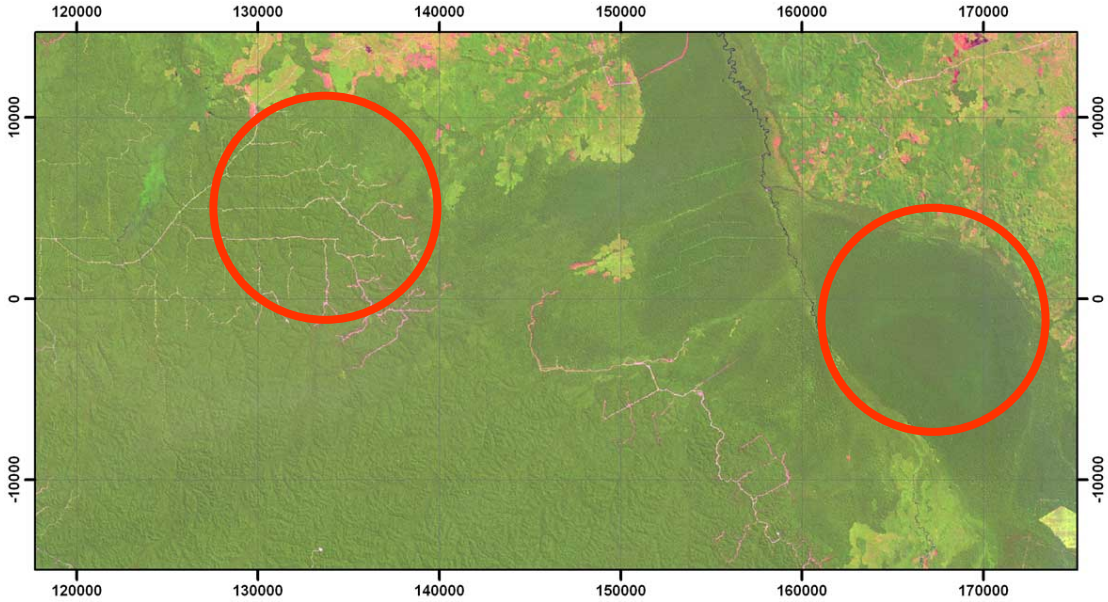
Landsat TM, Sumatra Riau, 1990

ETM 2002 (5-4-3)

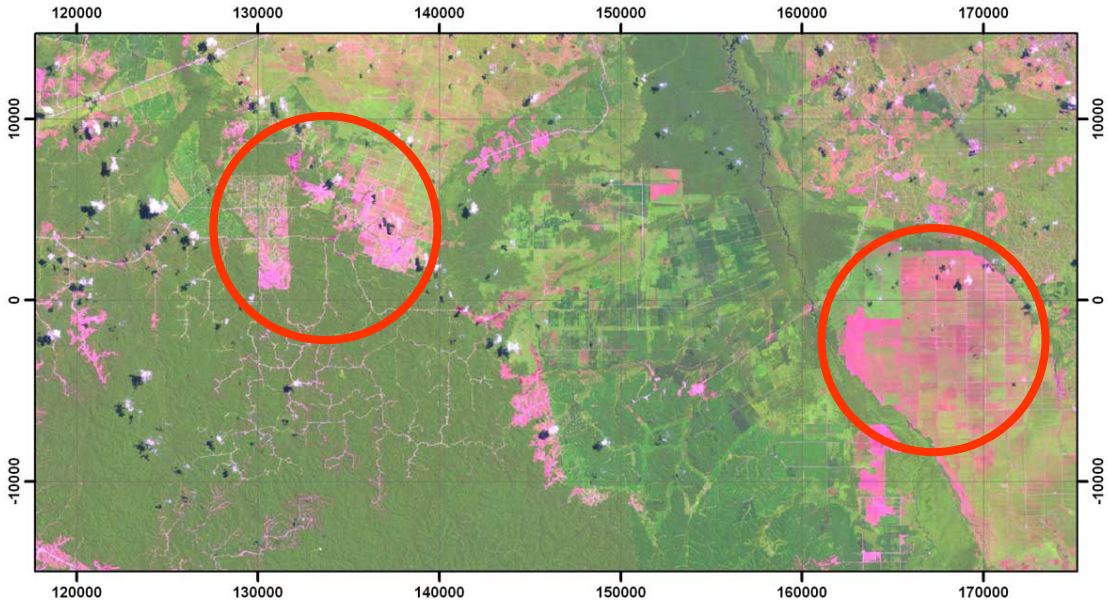


Landsat ETM, Sumatra Riau, 2002

Results - Sumatra Riau



Landsat TM 1990

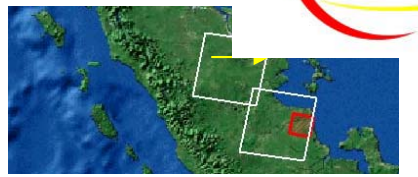


Dramatic decrease of peat swamp forest and Dipterocarp forest from 1990 to 2002!

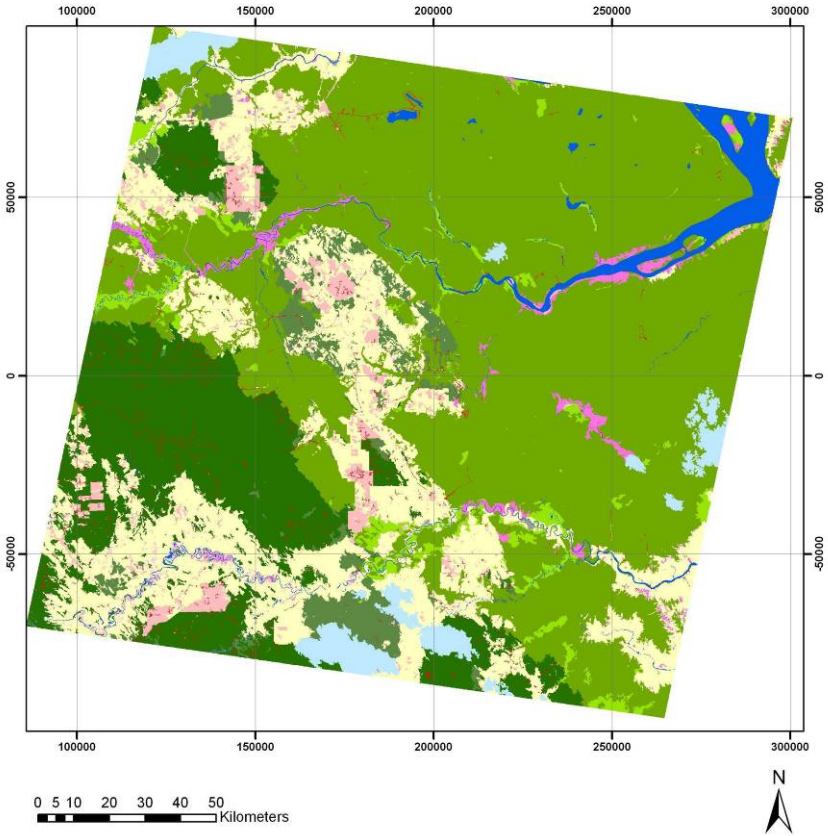
Landsat ETM 2002

Results – Sumatra Riau

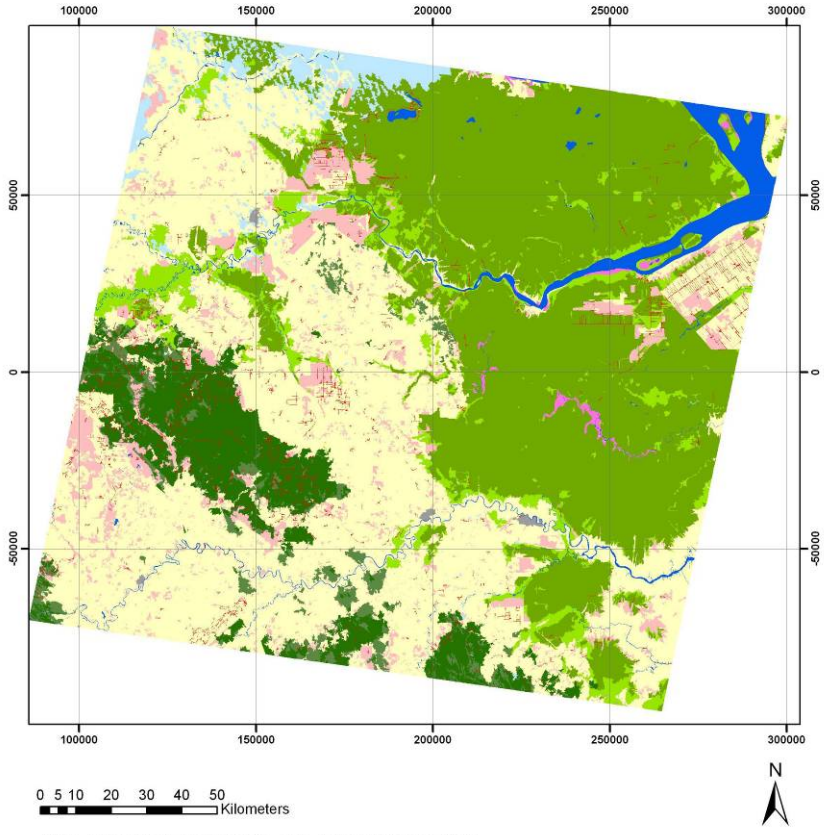
Map Products: Example service area Sumatra Riau



TM 1990



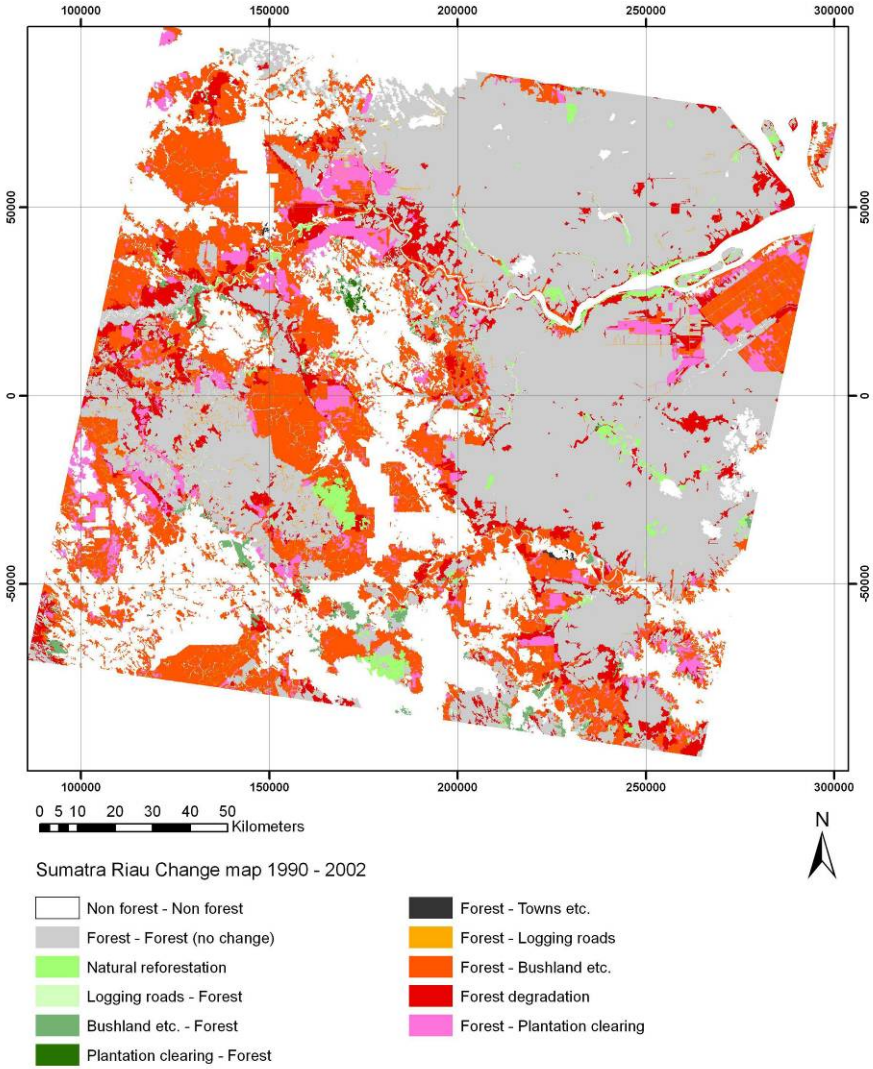
ETM 2002



Results – Sumatra Riau

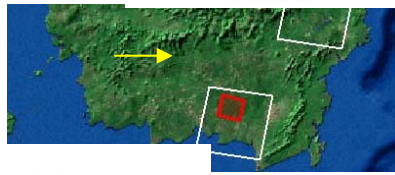
Change Products: Example service area Sumatra Riau

Land use/ Land cover & Forest change maps - Sumatra Riau 1990 - 2002

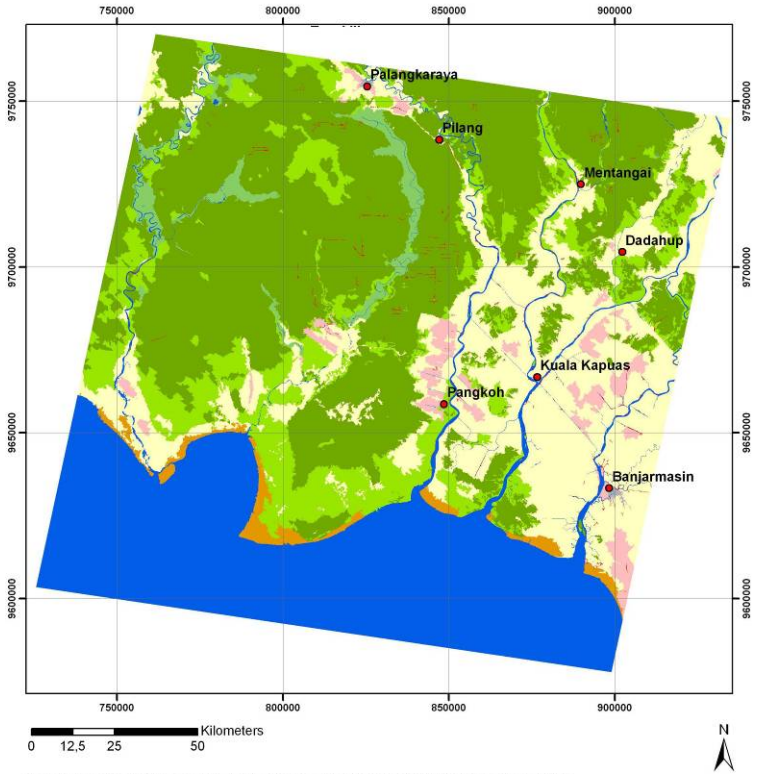


Results – Central Kalimantan

Map Products: Example service area Central Kalimantan



TM 1991

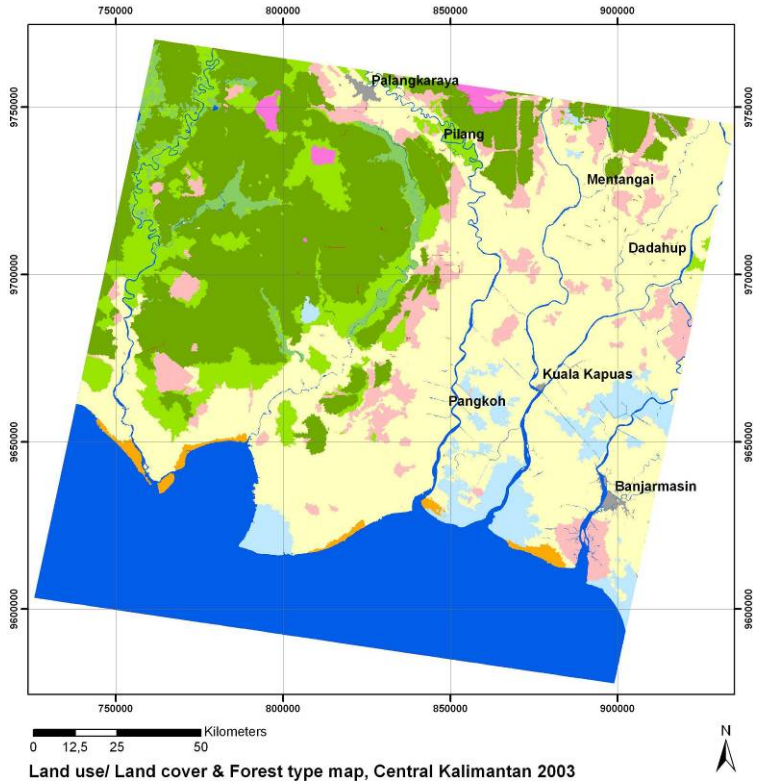


Land use/ Land cover & Forest type map, Central Kalimantan 1991

GSE_FM_LFM_LULC_GSE_FM_LFM_FTM_CK_1991

- Peat swamp forest - pristine
- Peat swamp forest - open, canopy closure <75%
- Mangrove
- Swamp including sedges, pandanus
- Bushland, forest mosaics, shifting cultivation, secondary forest, shrubs, regrowth following cultivation
- Plantation, clearing
- Logging roads
- Water
- Towns, villages, industrial areas, other settlements
- Clouds

ETM 2003



Land use/ Land cover & Forest type map, Central Kalimantan 2003

GSE_FM_LFM_LULC_GSE_FM_LFM_FTM_CK_2003

- Peat swamp forest - pristine
- Peat swamp forest - open, canopy closure <75%
- Peat swamp forest-fragmented, burnt
- Mangrove
- Swamp including sedges, pandanus
- Bushland, forest mosaics, shifting cultivation, secondary forest, shrubs, regrowth following cultivation
- Plantation / Clearing
- Logging roads
- Water
- Towns, villages, industrial areas, other settlements
- Clouds

REDD INDONESIA FOR TECHNOLOGY TRANSFER

NATIONAL COORDINATIOR

MINISTRY OF R & T

ENERGY

ADAPTATION

TECHNOLOGY TRANSFER

FORESTRY

DONOR :
- World Bank
- German
- Findland

INDONESIA TECHNOLOGY TRANSFER CLIMATE CHANGE ALLIANCE (ITCCA):
MST, LocalGovern, MASLI,GAF BPPT, LAPAN, GSE, RSS, Univ. of Munich, Univ, Helsinki, GTZ

HEAD OF SUB TEAM COP 13 SUBTANCE

Head of Subteam Side Events COP 13

3 ACTIVITIES

3 TARGETS

METHODOLOGY

STRATEGY

STAKEHOLDERS

CARBON ACCOUNTING

DAM TECHNOLOGY

MONITORING STOCK CARBON OF PEAT DOME

1.FOREST CARBON STOCK-DEPLETION AND DEGRADATION

2. CANAL BLOCKING

3. PEAT DOME PROTECTION

1. TRAINING
2. FIELD WORK
3. JOINT ACTIVITIES