Contents

- Background
- Tropical Wetland / Peat Swamp Forests (PSF)
- Ecosystem Goods & Services
- Landscape maps – ecosystem functions
- Scenarios for optimising land-use planning
- Conclusions & recommendations

ALTERRA
WAGENINGEN**UR**

Background

- International forest context:
  - Gobal Conventions on CBD, Kyoto, MDG, etc.
- Focus on sustainable use of biodiversity in developing world
  - Relief Poverty
  - Save biodiversity
- Some 1 billion people rely on forests for part of their livelihoods
- 60 % of forests is fragmented or degraded (IUCN 2007)
- Improved planning can optimise production of goods and services delivered by forests

ALTERRA
WAGENINGEN**UR**

Background

- Yogyakarta Statement ("Carbon-Climate-Human Interactions on Tropical Peatlands" Aug 2007)
- International concern:
  - Land-use change
  - Fire (trans-boundary haze)
  - Peat subsidence - Greenhouse gas emissions (GHG)
  - Loss of Biodiversity
  - Lively-hoods & health problems local people
- Responsible management through
  - Protection & rehabilitation
  - Improved land-use planning (involving stakeholders)

Tropical Wetland Forests / Peat Swamp Forests

- Occur on peat domes
- Coastal plains (5-10,000 yrs old)
- Good timber (e.g. Ramin)
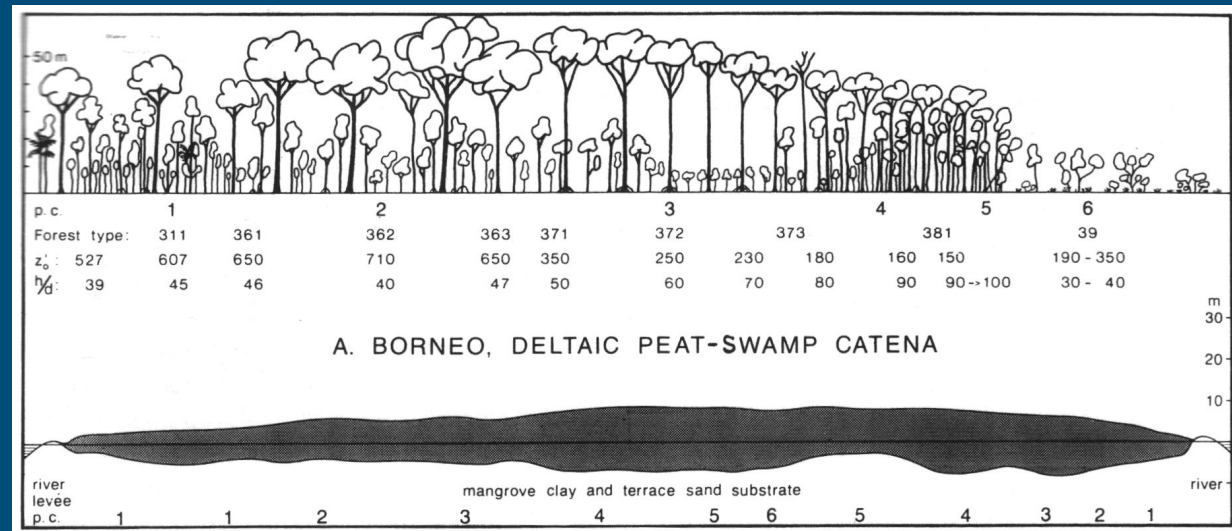- Several endemic species
- Easy access

p.c.		1		2			3			4	5	6
Forest type:	311	361	362	363	371	372	373		381		39
z_o' :	527	607	650	710	650	350	250	230	180	160	150	190 - 350
h/d :	39	45	46	40	47	50	60	70	80	90	90->100	30 - 40

A. BORNEO, DELTAIC PEAT-SWAMP CATENA

mangrove clay and terrace sand substrate

| river levee p.c. | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 5 | 4 | 3 | 2 | 1 river |

Figure 3 Section through a deltaic peat swamp with complete series of phasic communities p.c. 1 to 6. The corresponding peat (histosol) dome is shown cross-hatched. The numbers of the phasic communities p.c. 1 to 6 are given below the two profiles (Bruenig, 1990).

Peat Swamp Forests: "Competing claims"

- Timber
- Water
- Biodiversity
- Village area
- Fishing
- Agricultural plantations
- Others…
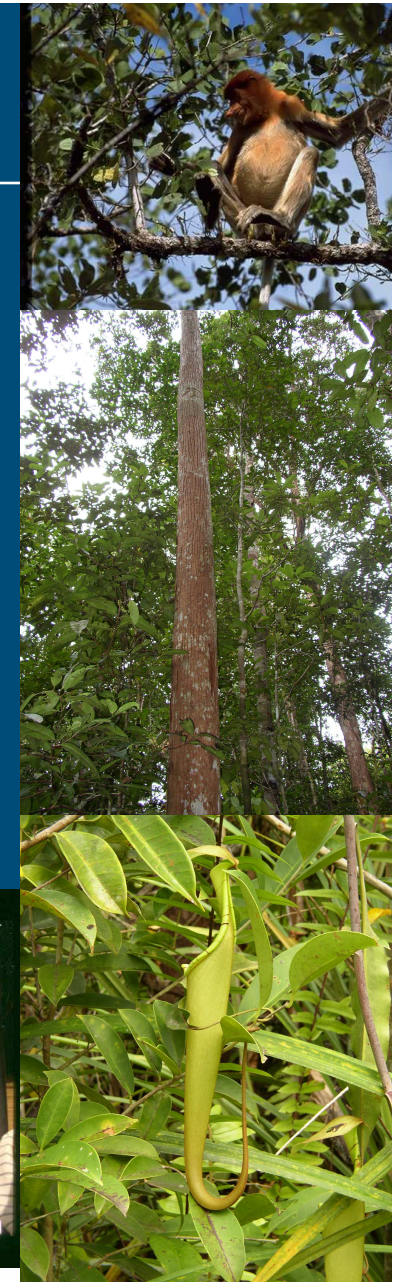
Peat Swamp Forests - Options

- Forests, agriculture and other land uses create 'landscape mosaics' that can provide most goods and services for rural poor

- Improve understanding of multiple perspectives and competing demands at the local level

- More opportunity for balanced, negotiated agreements

Source: IUCN 2007

ALTERRA
WAGENINGEN UR
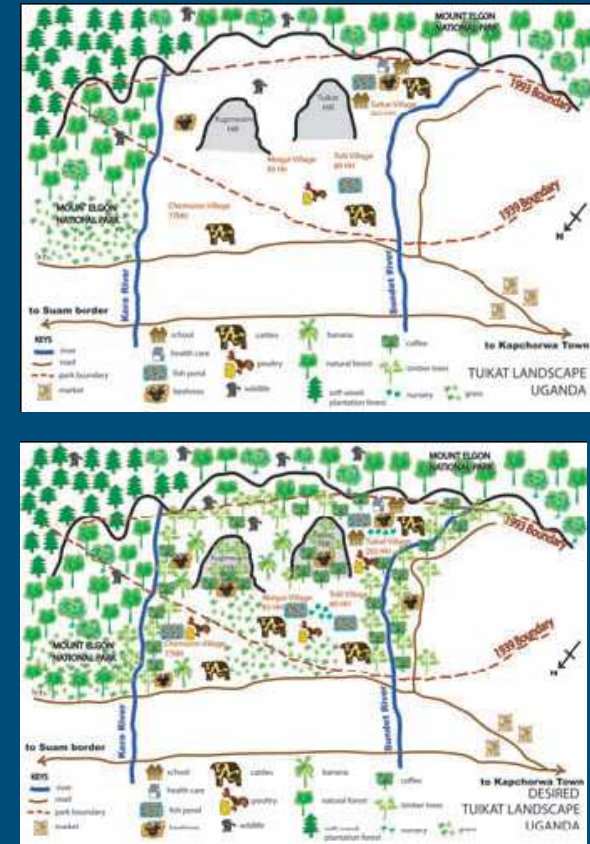
Assessment of Ecosystem Services
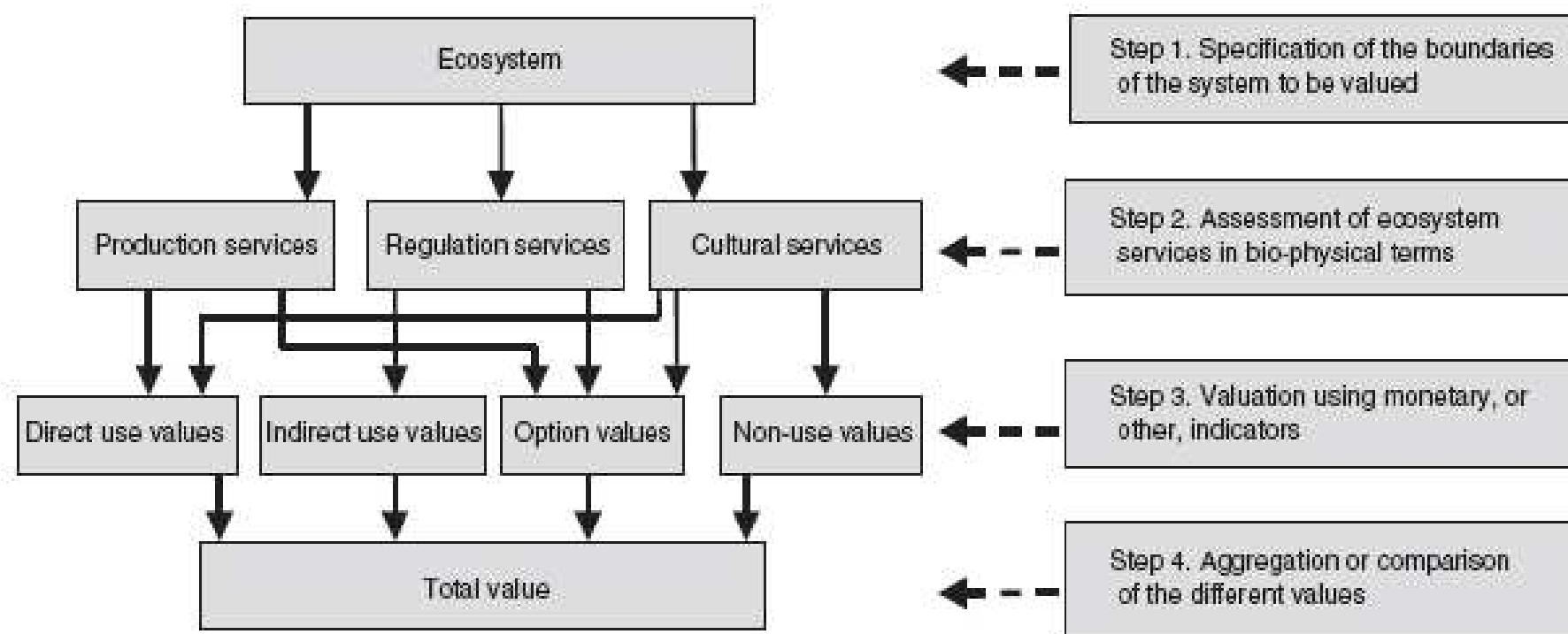
Source: Hein et al 2006

Functions of Peat Swamp Forests....

- **Regulating functions:**
  - Water
  - Climate
- **Habitat functions:**
  - Biodiversity (including CITES "/ threatened species)
  - Landscapes
- **Production function:**
  - Timber / poles
  - Fuel-wood
  - Food and medicines (Non-timber forest products)
- **Information function**
  - Cultural / heritage
  - Eco-tourism
  - Aesthetic experience

..and their goods and services....

Function	Good and/or Service	Quantification
Water regulation	Water supply to local communities	m^3 fresh water / household / year
Climate regulation	CO_2 sequestration	Tonnes captured / ha /yr
Biodiversity conservation	Habitat for endangered species	Nr species protected
Timber production	High value timber (e.g. Ramin, Meranti etc.)	m^3 timber/ha/yr
Food & Medicines	Ferns, Fruits, palms	Kg material/ha/yr
Cultural/heritage	Use of traditional religious sites	Frequency and number of people using site
Ecotourism	Boat ride / bird watching	Nr tourists / yr

ALTERRA
WAGENINGEN UR

…. and valuation EGS

- **Economic**
  - Money (e.g. Constanza et al 1998)
  - But…. not providing sufficient cash flows (see presentation H. Diemont)
- **Ecological**
  - E.g. uniqueness/rarity and renew-ability value
- **Social**
  - E.g. in giving health (therapeutic) and heritage value
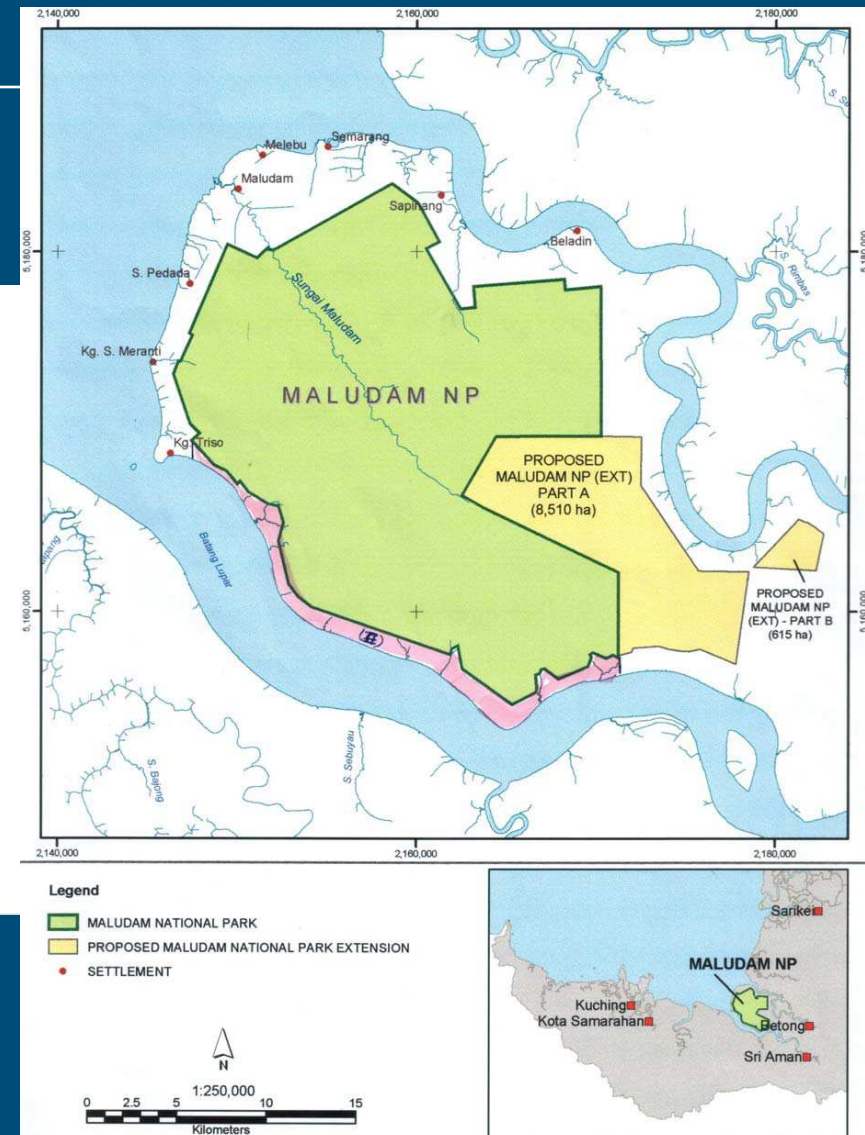
Example (from India): Economic valuation

Production functions	Quantities from forest (kg/hh/yr)	Price (€/kg)	Direct market value (€/hh/yr)
Food products	26	0.12 - 1.52	14
Raw materials (timber, fibre, baskets)	53	138-517 / 0.15	15
Energy (Fuelwood)	1,229	0.05	61
Cattle-related products (fodder, cattle-bed)	3,815	0.02 / 0.006	57
Agriculture-related products (manure & others)	4,997	0.006	31
Genetic resources	-	-	-
Medicinal resources	-	-	-
Ornamental resources	-	-	-
Cultivation (grazing)	10,939	0.02	219
Waste (Sanitary facilities)	34% respondents	187 € sanitary Facility	1
TOTAL			399

= 75 % of annual income (€ 532)

ALTERRA
WAGENINGEN UR

Land-use units in PSF area – Maludam area
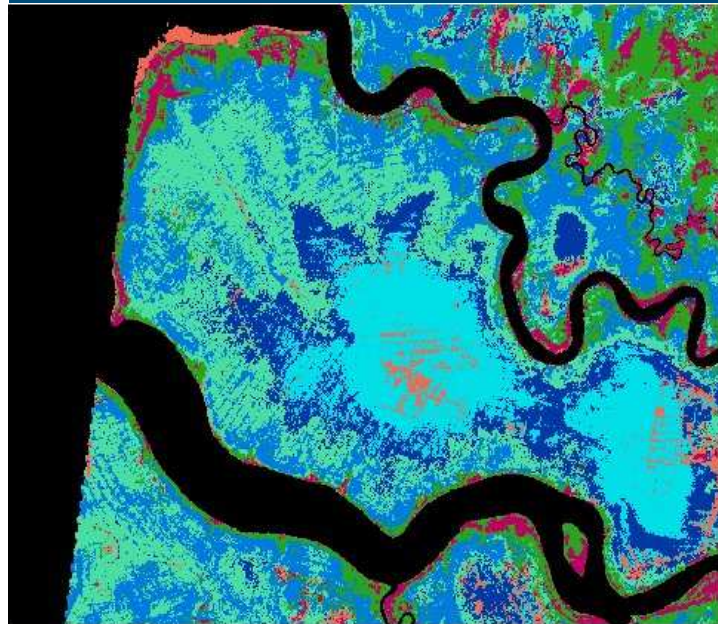
forest (rather closed canopy)
logged over forest
heavily logged over forest
brusland, plantation
mangrove, swamp
humid logged over forest
rice fields

MALUDAM NP

PROPOSED MALUDAM NP (EXT) PART A (8,510 ha)

PROPOSED MALUDAM NP (EXT) - PART B (615 ha)

Legend

MALUDAM NATIONAL PARK
PROPOSED MALUDAM NATIONAL PARK EXTENSION
SETTLEMENT

N

1:250,000

0   2.5   5   10   15
Kilometers

ALTERRA
WAGENINGEN UR

Land-use values – fictive ranking: 5 (high) – 1 (low)

Ecosystems/ landuse types	Regulating	Habitat	Production	Information
Conservation Forest	5	5	1	4
Production Forest	3	3	3	3
Plantation	2	3	5	1
Agriculture	2	2	5	3
Settlements	1	3	3	3

ALTERRA
WAGENINGEN UR

Decision tree / knowledge rules (need checking)

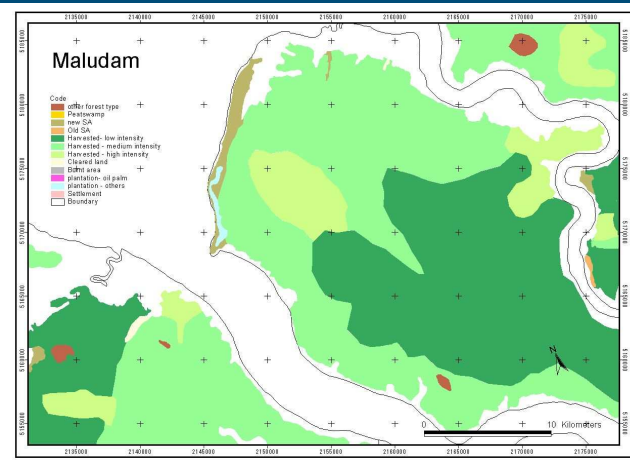| Ecosystem Function	Physical factor	Effect on value
Decision tree for the effect of peat depth, cover, and distance to village on values for three ecosystem functions		
Regulating	Peat depth	> 10 m = **+1** / > 3 m = **no effect** / < 3 m = **-1**
	Cover	> 80 = **+1** / 50-80 = **no effect** / < 50 = **-1**
	Distance village	> 5 km = **+1** / 5-1 km = **no effect** / < 1 km = **-1**
Habitat	Peat depth	> 10 m = +1 > 3 m = **no effect** / < 3 m = **-1**
	Cover	> 80= **+1** / 50-80 = **no effect** / < 50 = **-1**
	Distance village	> 5 km +1 / 5-1 km = **no effect** / < 1 km = **-1**
Production	Peat depth	> 10 m = +1 > 3 m = **no effect** / < 3 m = **-1**
	Cover	> 80= **+1** / 50-80 = **no effect** / < 50 = **-1**
	Distance village	> 5 km +1 / 5-1 km = **no effect** / < 1 km = **-1**

ALTERRA
WAGENINGEN UR

Map overlay

Peat Depth

Vegetation cover

Maludam

Code
otter forest type
Peatswamp
new SA
Old SA
Harvested- low intensity
Harvested - medium intensity
Harvested - high intensity
Cleared land
Bilhti area
plantation- oil palm
plantation - others
Settlement
Boundary

Village distribution

Kg. Maludam Approx{4000}
Kg. Samarang {1106 pop}
Kg. Sapinang {595 pop}
Kg. Beladin Approx{8,000}
Kg. Daun {215 pop}
Kg. Mulon {396 pop}
Kg. Triso {150 pop}
MALUDAM NATIONAL PARK
Lingga, Seduku. {4000}
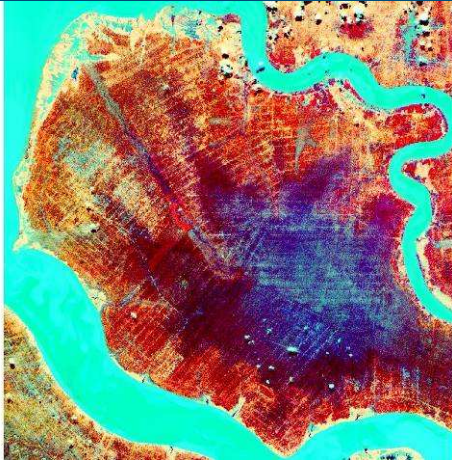
Modelling within the Osiris modelling framework

Esri grid (Thematic map) → Thematic map
Knowledge rules — Translation → Spatial indicator
Esri grid (Thematic map) → Thematic map
Knowledge rules — Translation → Spatial indicator
Knowledge rules — Combination → Intermediated steps
Knowledge rules — Combination → Ecosystem function maps
Knowledge matrix — Combination → Intermediated steps
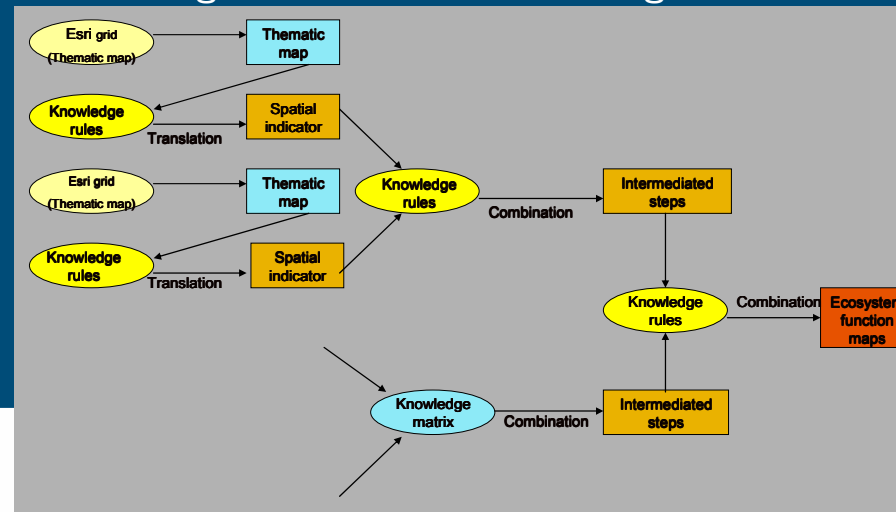
Ecosystem function map

Example of Ecosystem Function Map (China)
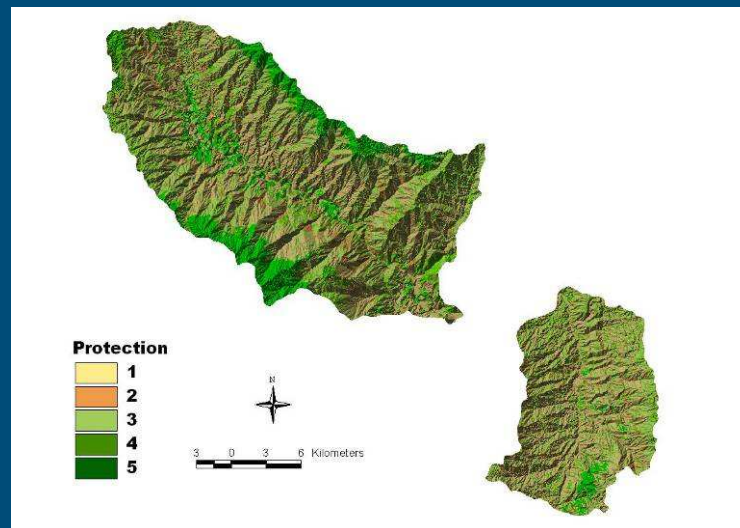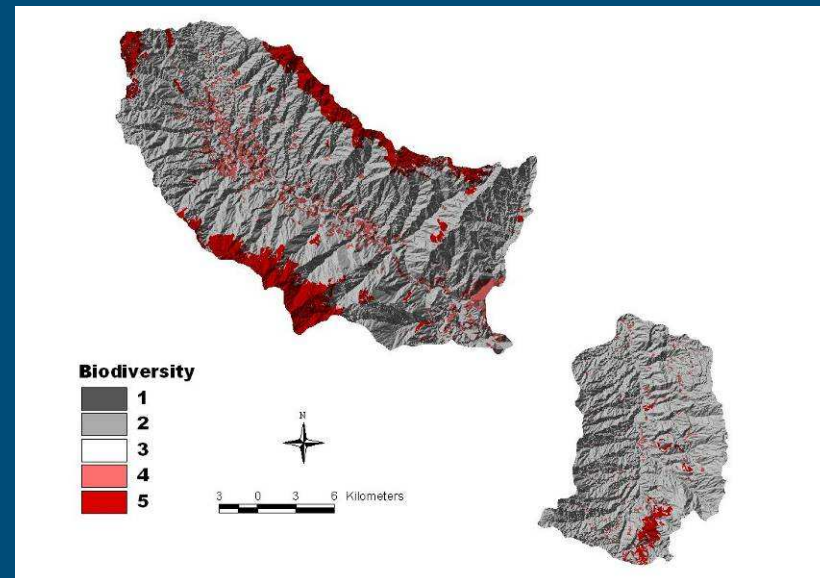

Protection value

- FQ : 2.46
- XJ : 2.01

Biodiversity value

- FQ : 2.38
- XJ : 1.89

Spatial planning - scenarios

- **Scenarios can be used:**
  - a) to evaluate how development will affect functions of ecosystems
  - b) to optimise land-use (e.g. by connecting land-use types)
- **Examples of scenario's:**
  - "No measures taken": baseline scenario
  - "Degrading forest, expanding villages": population increases with increased pressure on forest
  - "Regenerate forest densities": pressure on forest decrease by planting more forest
- **Scenario development needs involvement local stakeholders (e.g. local communities, planning agencies etc.)**

ALTERRA
WAGENINGEN**UR**

Scenario results India – habitat Sambar deer
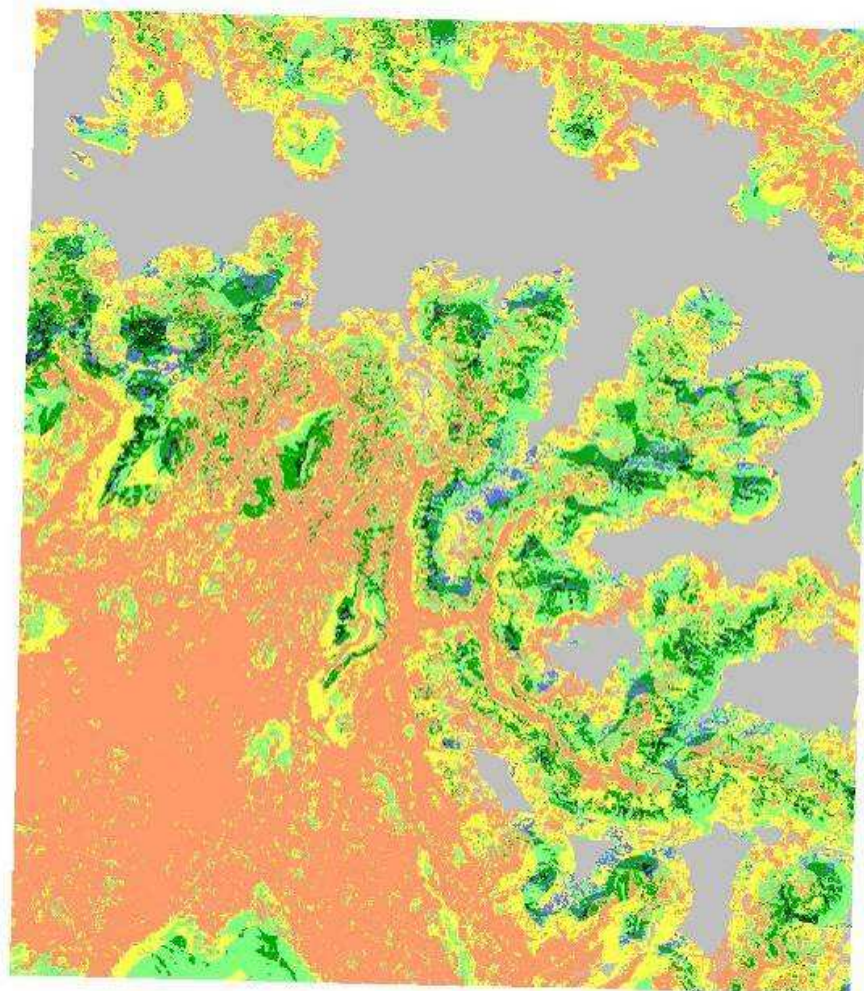
## Scenario No Measures

Habitat: SAMBAR final capacity
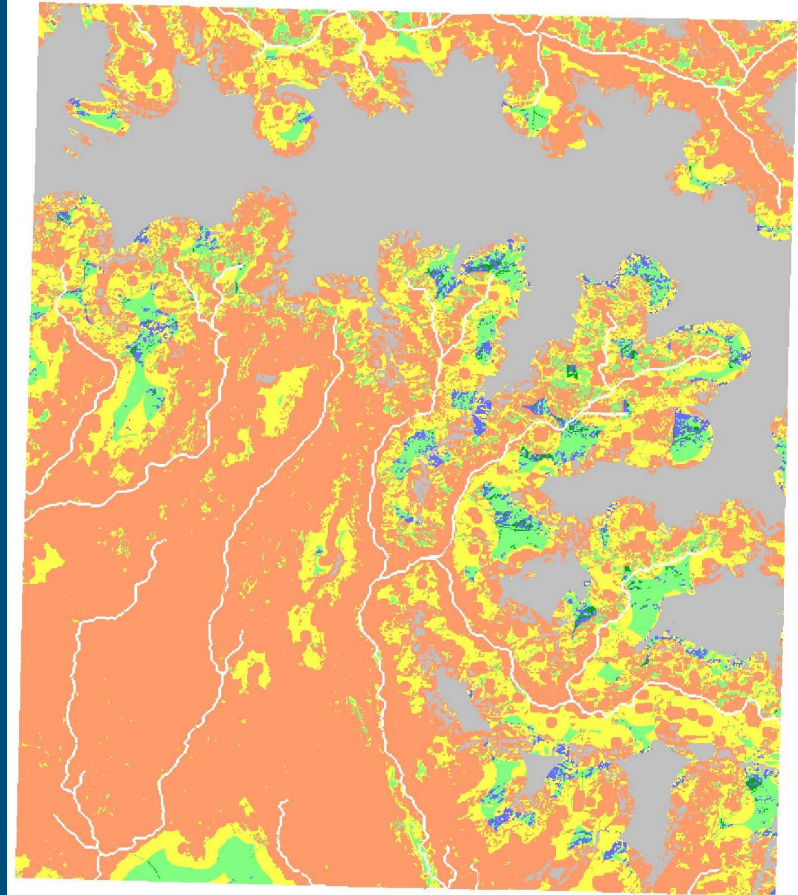
not suitable
1 potential suitable habitat, no suitable ecotopes
2 potential suitable habitat, but fragmented
10 - marginal habitat (carrying capacity = 0.1)
50 - medium quality habitat (carrying capacity = 0.5)
75 - good habitat (carrying capacity = 0.75)
100 - optimal habitat (carrying capacity = 1)

Scenario results – habitat Sambar deer
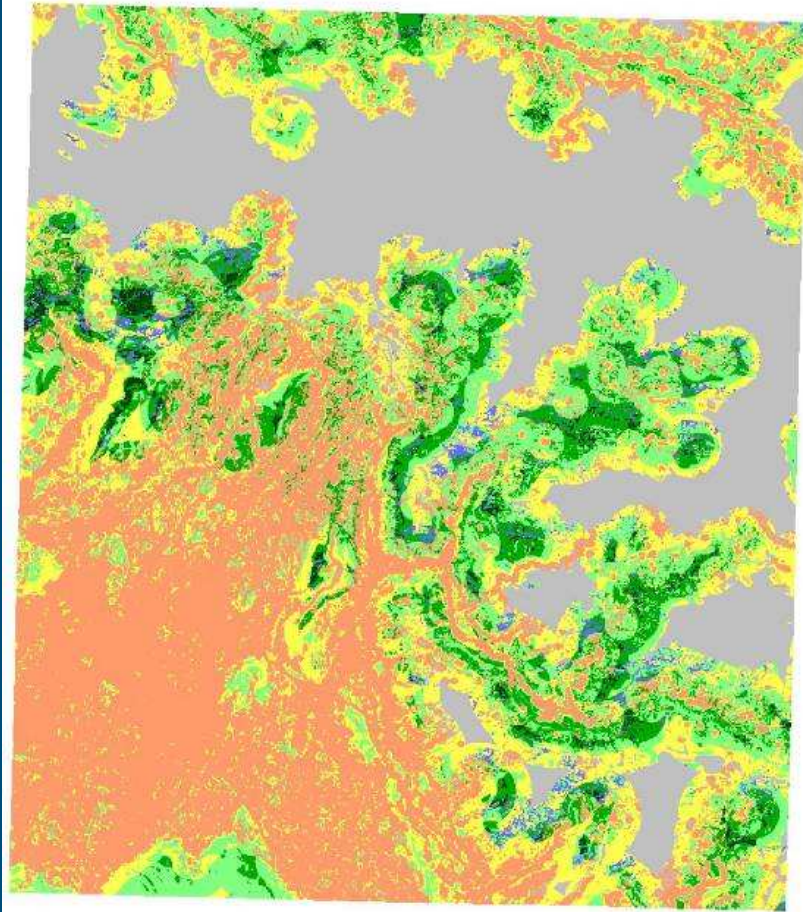
Regenerate forest

Degrading forest; expanding villages

Conclusions / Recommendations

- With current high pressure on PSF areas the combined EGS & landscape approach is useful tool to arrive at beneficial partnership;
- Further field testing and development in PSF areas is needed, including:
  - quantification & valuation of EGS (participatory approach)
  - Scenario development with local planning agencies
  - Attention for implementation of results
  - Stakeholder consultation needed to get right priorities
- The accuracy of the outputs depends on quality of the input maps and expert knowledge;
- Application also possible outside PSF areas (e.g. Heart of Borneo; finding balance between conservation & development)

ALTERRA
WAGENINGEN UR

Thank you

Acknowledgements: Ramin & Maludam Projects

© Wageningen UR

ALTERRA
WAGENINGEN**UR**