Landscape Ecological Potential

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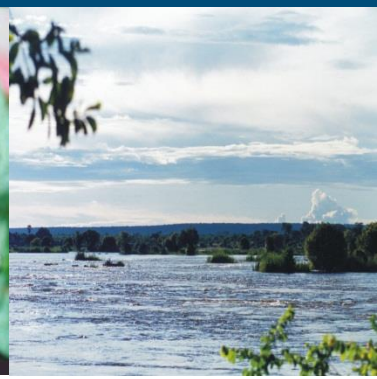

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Why ?

- Ecosystem accounting needs to be based on (among others) physical accounts of ecosystems and the benefits they provide
- Ecosystems, unfortunately, are very complex, diverse, and difficult to define and delineate.
- Simplified approach needed as a basis for physical (ecosystem) accounting
- Is this simplified approach the ‘Net Landscape Ecological Potential’ ?

What ?

- Net Landscape Ecological Potential (NLEP) developed by EEA ('Net Landscape Ecological Potential of Europe and change 1990-2000' – authors: JL Weber, R. Spyropoulou, T. Soukup, F. Paramo, April 2008)
- NLEP = Composite indicator for ecosystem integrity at the macro scale
- Developed by EEA for Europe for 1990 and 2000.
- Changes in NLEP reflect degradation or rehabilitation of ecosystems

How ?

- NLEP = f (vegetation cover, protected status, fragmentation)

Vegetation Cover: Green Background Index (0-100)

Legend

Green Background Landscape lindex 2000

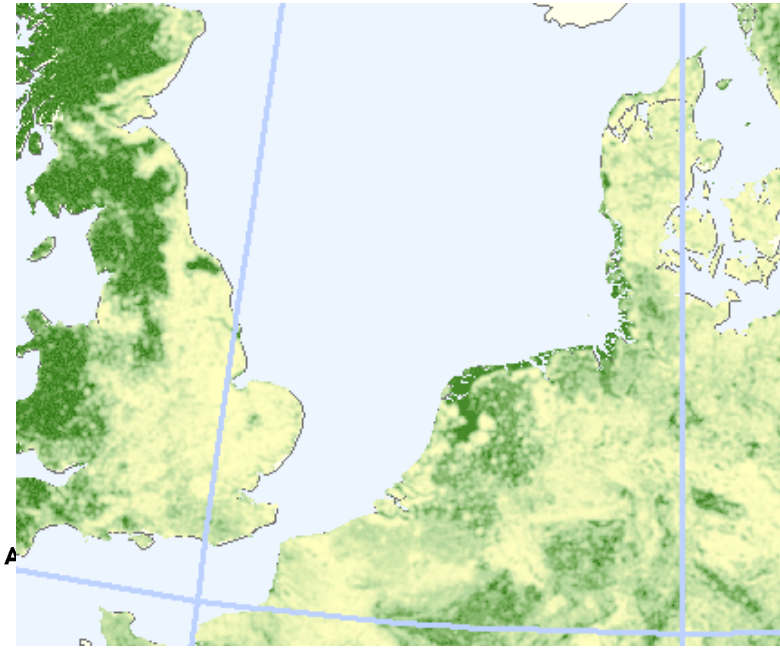
GBLI, scale : 0 to 100

High : 100

Low : 0

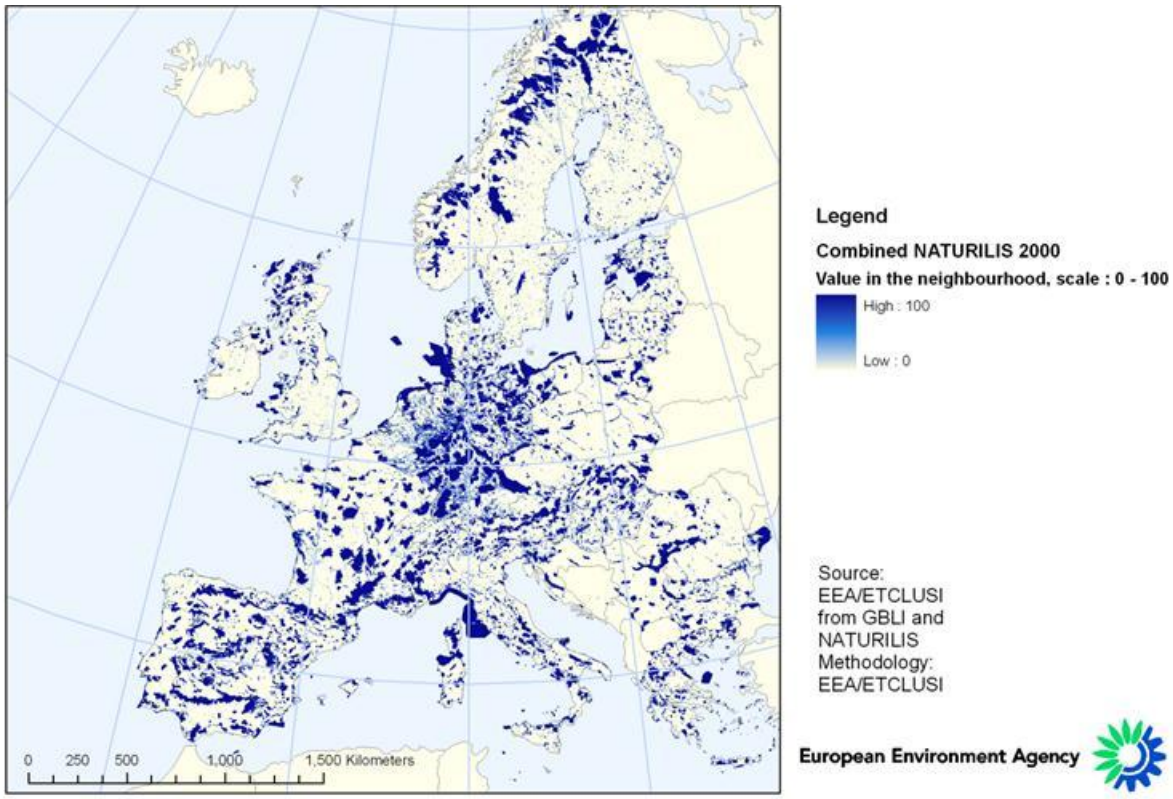
Source:
EEA/ETCLUSI
from GBLI,
NATURILIS
and MEFF
Methodology:
EEA/ETCLUSI

European Environment A



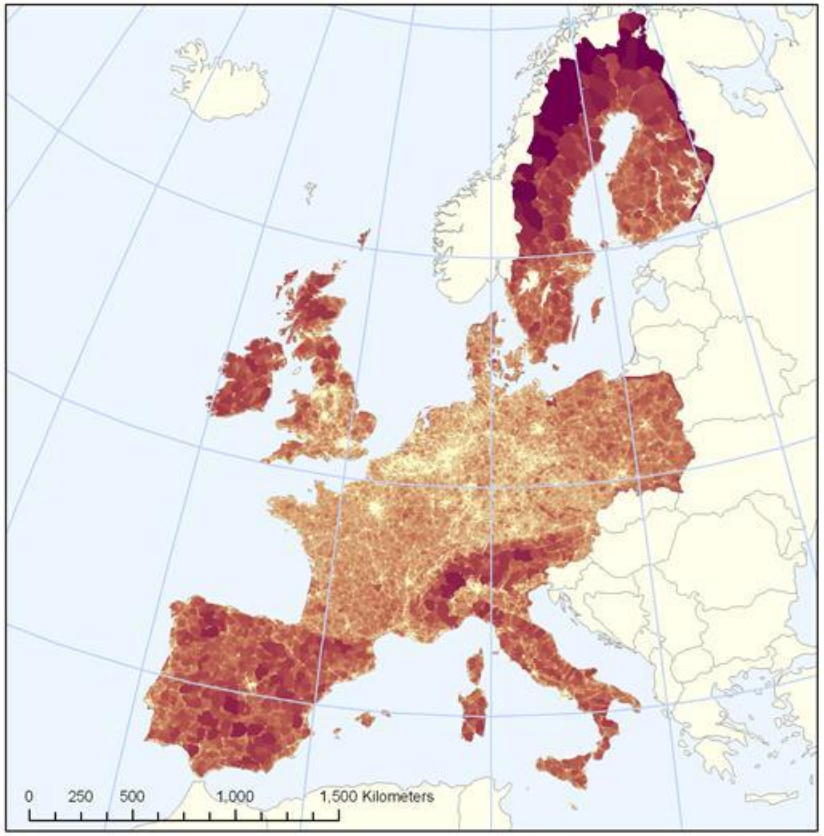
- Aggregation (and smoothing) of forests, pasture, inland waters, wetlands, semi-natural land and agricultural mosaics. Equal weighting ?

Protected status (Naturalis Index) (0-100)



- Protected status, on the basis of designated sites (e.g. Natura2000, Ramsar) + high ecological value close to protected site (<5 km)

Fragmentation (0-255)



Legend

Effective Mesh Size 2000

log n value, 0 to 255 scale, 1 km² grid

High : 255

Low : 0

Source:
EEA/ETCLUSI
from TeleAtlas &
CLC/UMZ

Methodology:
Jochen Jaeger &
Tomas Soukup

European Environment Agency

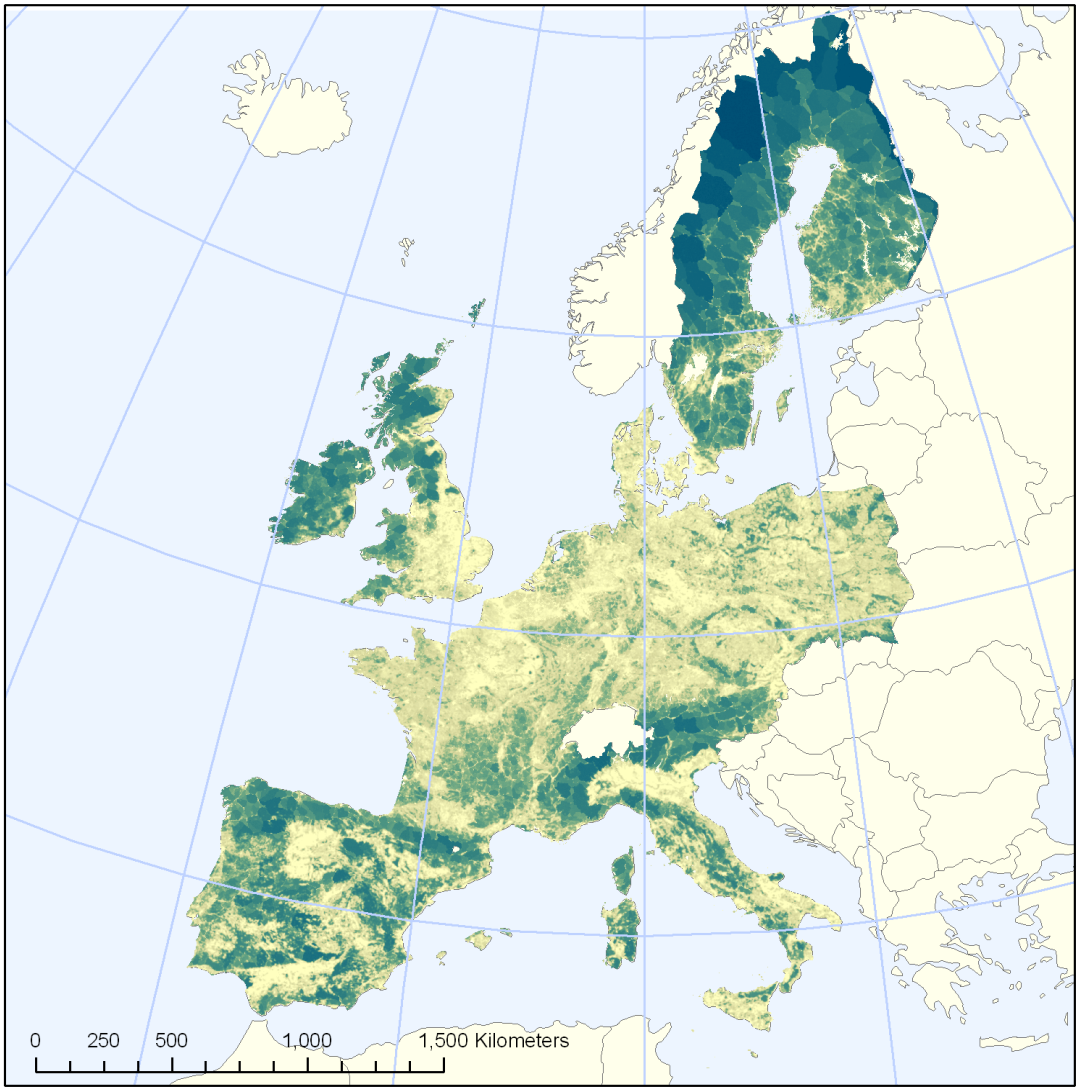
- Reflects barriers to wildlife from roads, railways and constructions. The more barriers the lower the index value. Log conversion.

Combined into: NLEP (0 to 255)

- GLEP = Green background Index + Naturalis Index (stretched from 0 to 255 ?)
- NLEP = sqrt (GLEP * Fragmentation index)

$$NLEP = \sqrt{(vegetation\ index + protected\ index) \times fragmentation\ index}$$

NLEP (1 km grid)



Legend

Net Landscape Ecological Potential 2000

NLEP, scale : 0 - 255

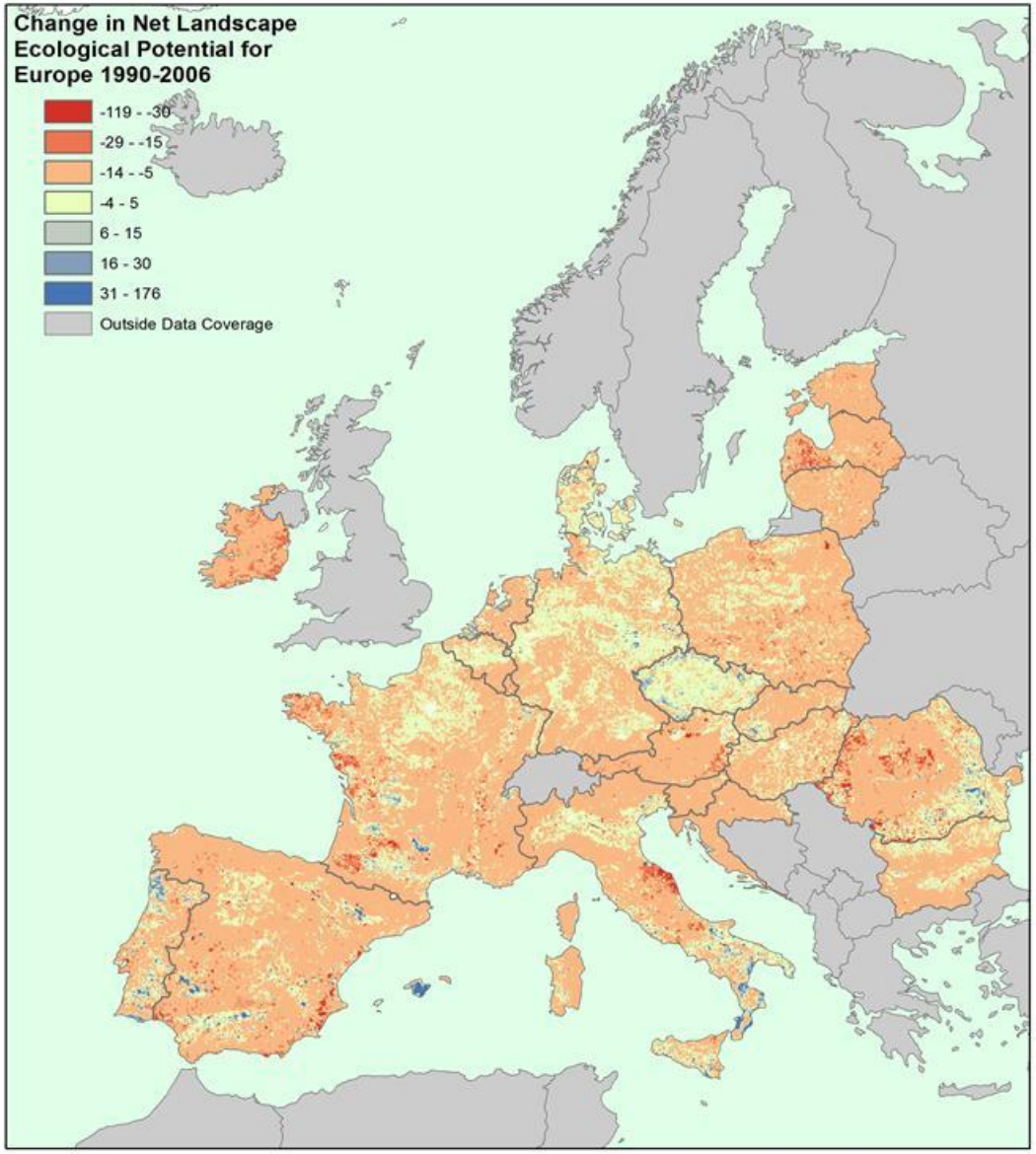
High : 159

Low : 0

Source:
EEA/ETCLUSI
from GBLI,
NATURILIS
and MEFF
Methodology:
EEA/ETCLUSI

European Environment Agency

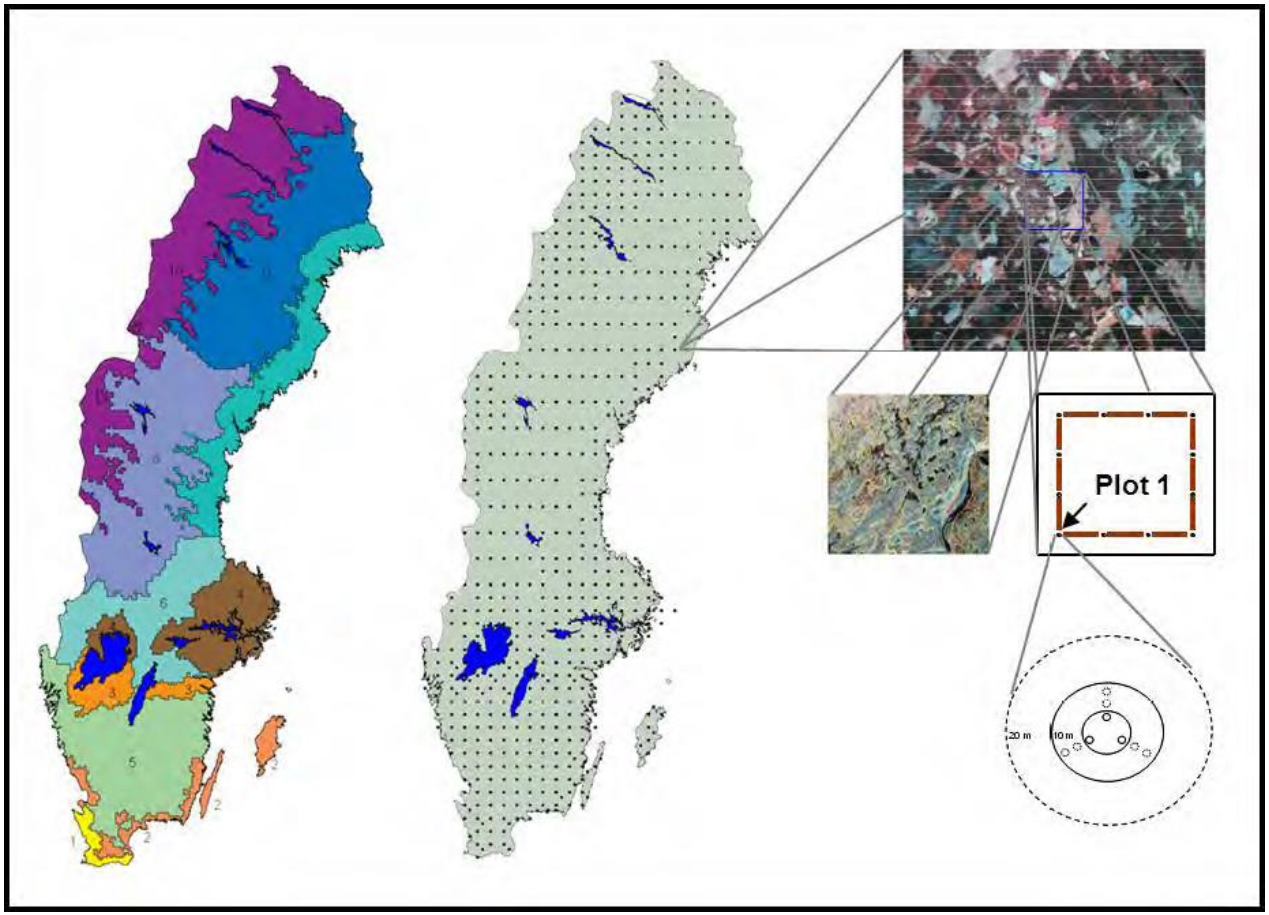
Change in the NLEP 1990-2006



Observations on the Methodology (1)

- Heavy weighting of Fragmentation, around twice as much impact as vegetation or protected status.
  - Not all species strongly affected by fragmentation (e.g. birds)
- Some choices appear subjective (log transformation of fragmentation, choice of 5 km form protected areas, equal aggregation of specific habitat types in the greenness maps)
- Why is fragmentation the difference between net and gross LEP ?

Observations on the Methodology (2)



- No embedding of bottom-up / national data (e.g. EBONE Project / GEO)

Observations on the Methodology (3)

- Index does not allow to analyse ecosystem or species diversity at a European scale (e.g. index may remain the same even if all wetlands are lost if this is compensated by forests)

Observations on the Methodology (4)

- NLEP proposed as proxy for ecosystem integrity (*defined as ability of ecosystems to support biological communities comparable to natural habitat*)
- Ecosystem use not reflected in the NLEP, but NLEP may reflect the potential to supply ES.
- Relation between ecosystem integrity and the supply of (all?) ecosystem services unclear.

Discussion questions

- Is the NLEP a correct indicator for ecosystem integrity ?
  - how can it be improved ?
- Will a reduction in NLEP lead to a loss of ES supply ?
  - Can NLEP be used to reflect the supply of some ecosystem services ?
- CAN NLEP serve the creation of physical accounts ?
  - Should we have a top-down approach (such as NLEP) or have a bottom-up approach (starting with ES supply and linking those to ecosystem properties) , or is there scope to test both approaches ?
- Where to go from here in defining ecosystem units/properties in support of establishing physical accounts ?
- What other questions do you have ?

Question 1

- Is the NLEP a correct indicator for ecosystem integrity ?
  - how can it be improved ?

Question 2

- Will a reduction in NLEP lead to a loss of ES supply ?
  - Can NLEP be used to reflect the supply of some ecosystem services ?

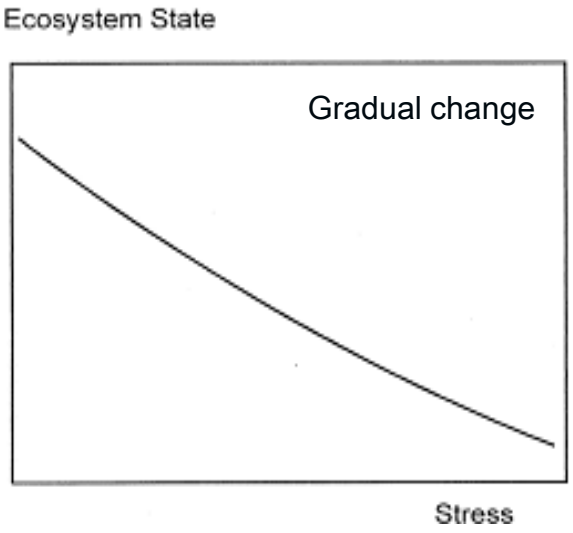
Question 3

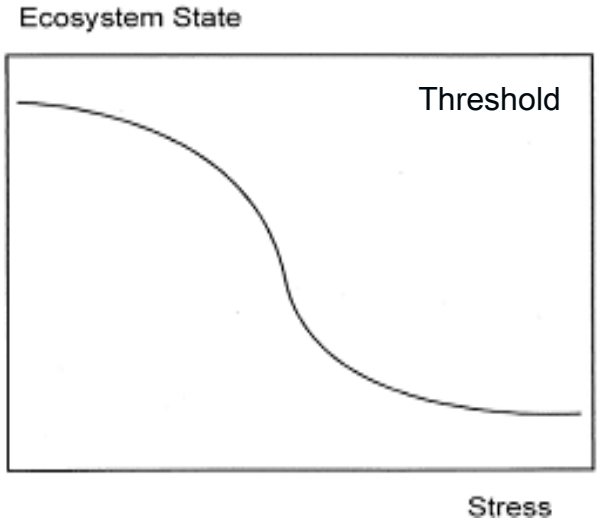
- CAN NLEP serve the creation of physical accounts ?
  - Should we have a top-down approach (such as NLEP) or have a bottom-up approach (starting with ES supply and linking those to ecosystem properties) , or is there scope to test both approaches ?

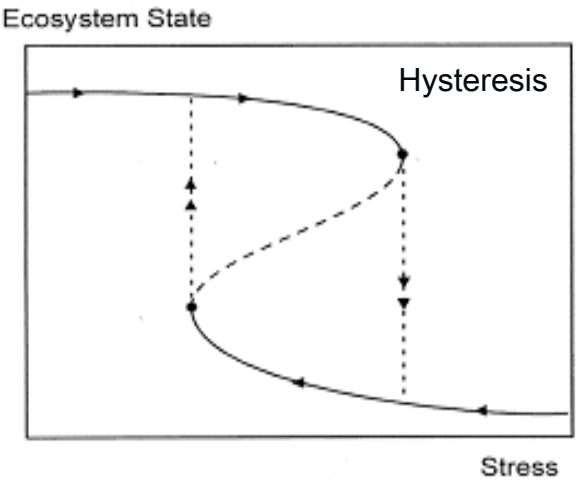
Question 4

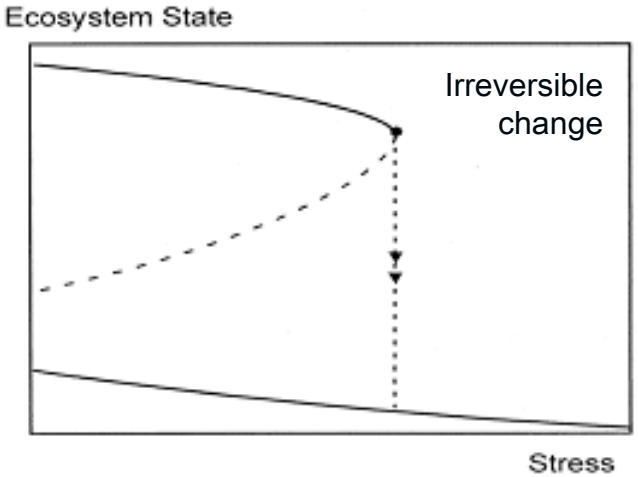
- Where to go from here in defining ecosystem units/properties in support of establishing physical accounts ?

Ecosystem change is complex









Source of figures: Scheffer et al., 2001. Ecosystem models developed in Weikard and Hein, in press (Threshold); Hein, 2006 (Hysteresis) & Hein and Van Ierland, 2006 (Irreversible change).