

Learning about the functioning of grasslands in catchment systems: integrating water and agricultural management



Outline

- 1) Concepts and definitions
- 2) Grassland functioning
- 3) Multi-functioning grasslands:win-win/trade-offs
- 4) England and Wales science-policy bridging

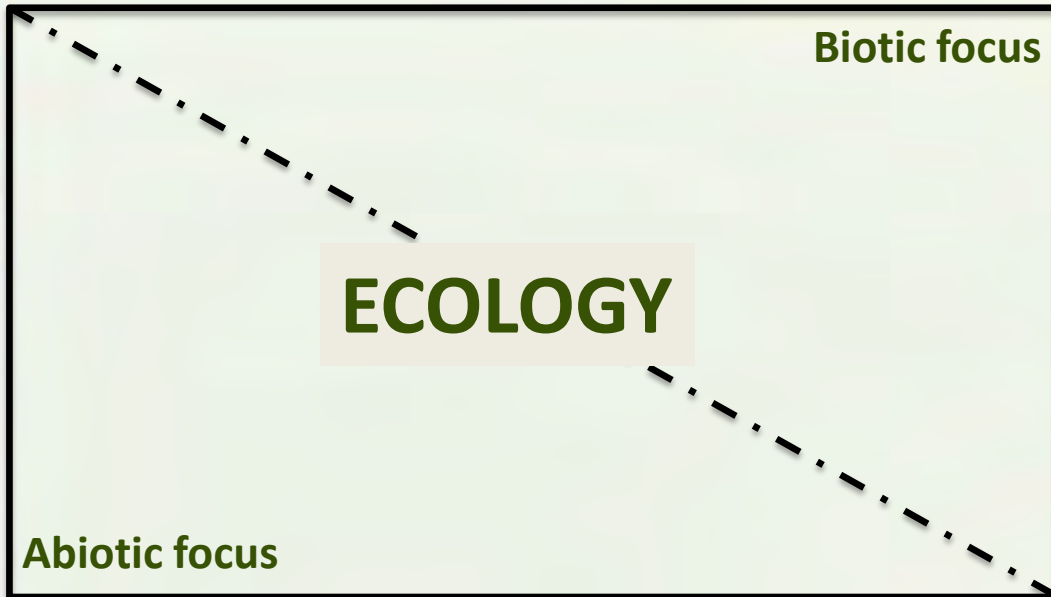


Roles and functions of agriculture, IAASTD 2008

Andrews *et al.* 2002
 USDA Soil Quality
 Technical Note No.10,
 2008



Socio-ecological systems



Biotic focus

ECOLOGY

Abiotic focus

Geology
Hydrology

Biogeochemistry

Landscape ecology

Community ecology

Population ecology

Likens 1992

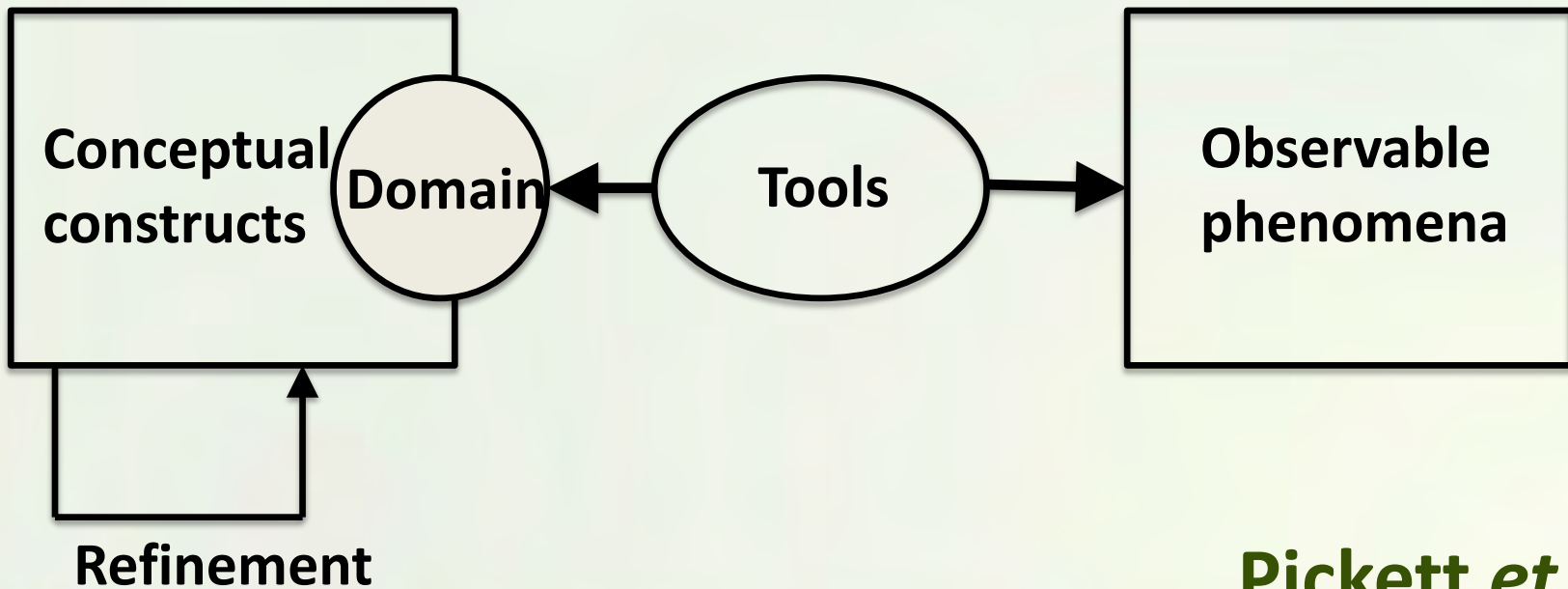
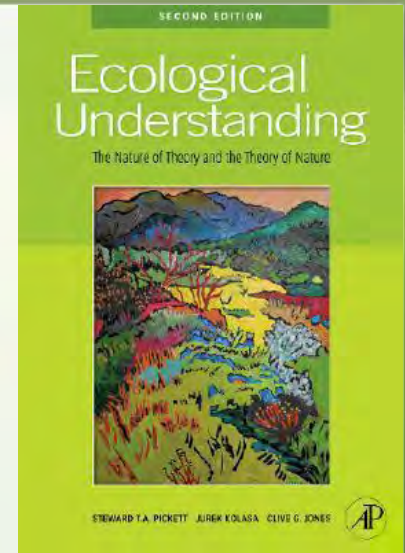
Genetics
Physiology

Behavioural ecology



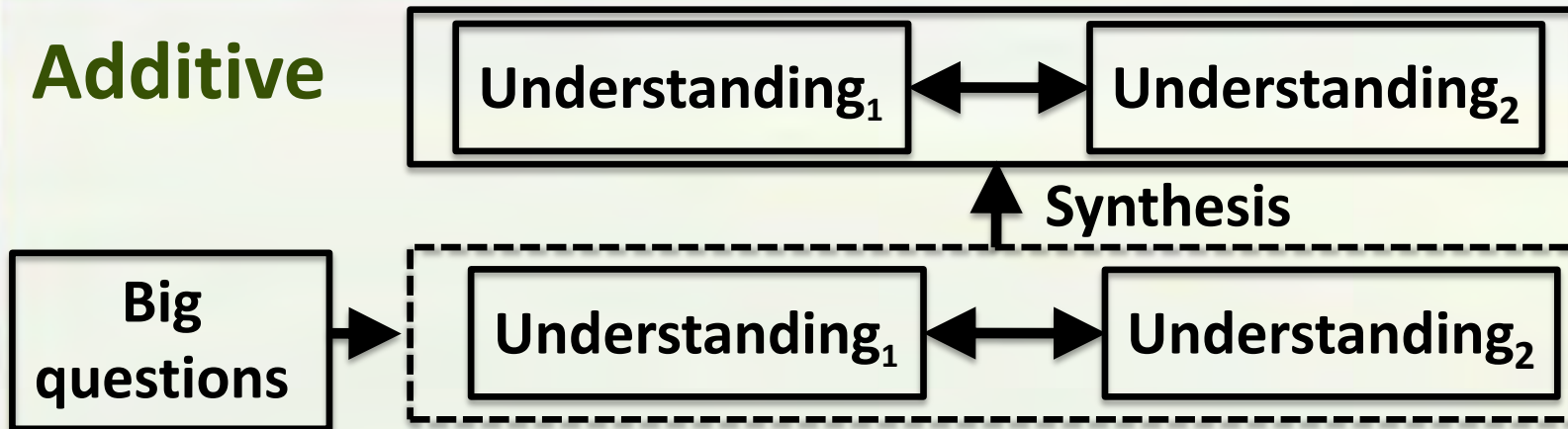
**IBSS - International Bibliography
of the Social Sciences**

Socio-ecological understanding

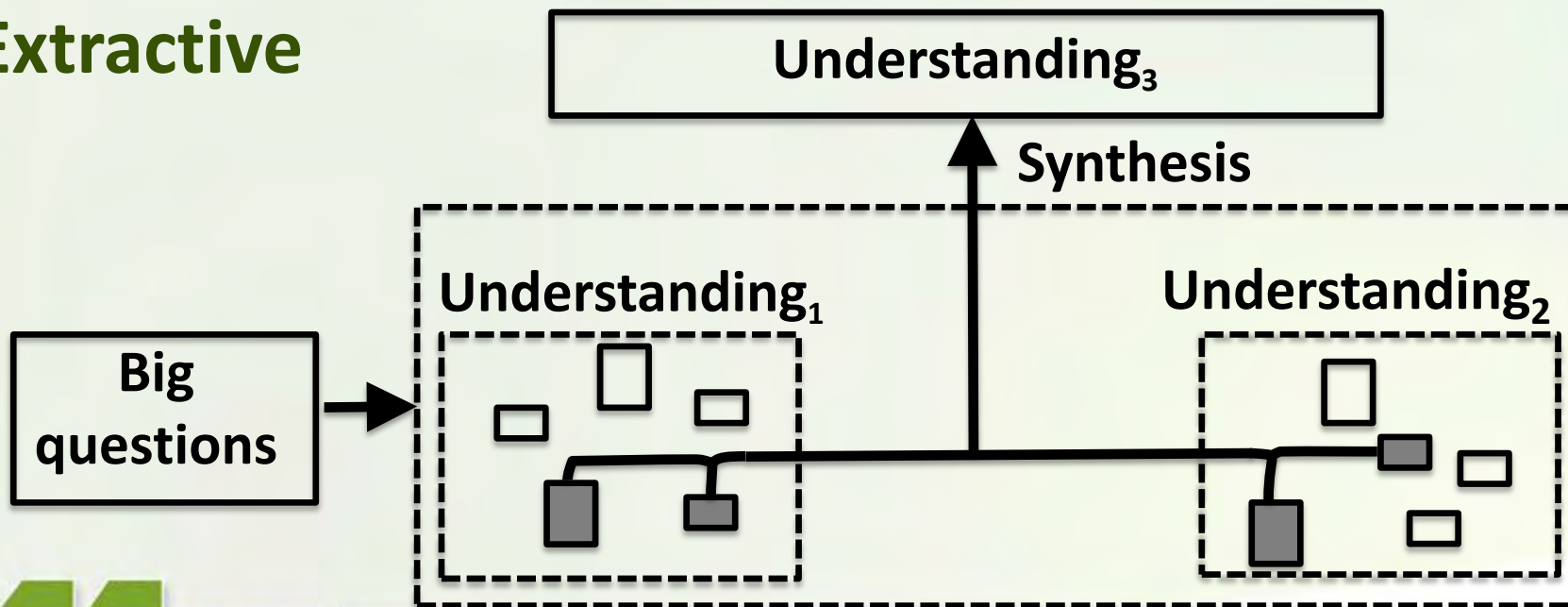


Pickett *et al.*

Additive

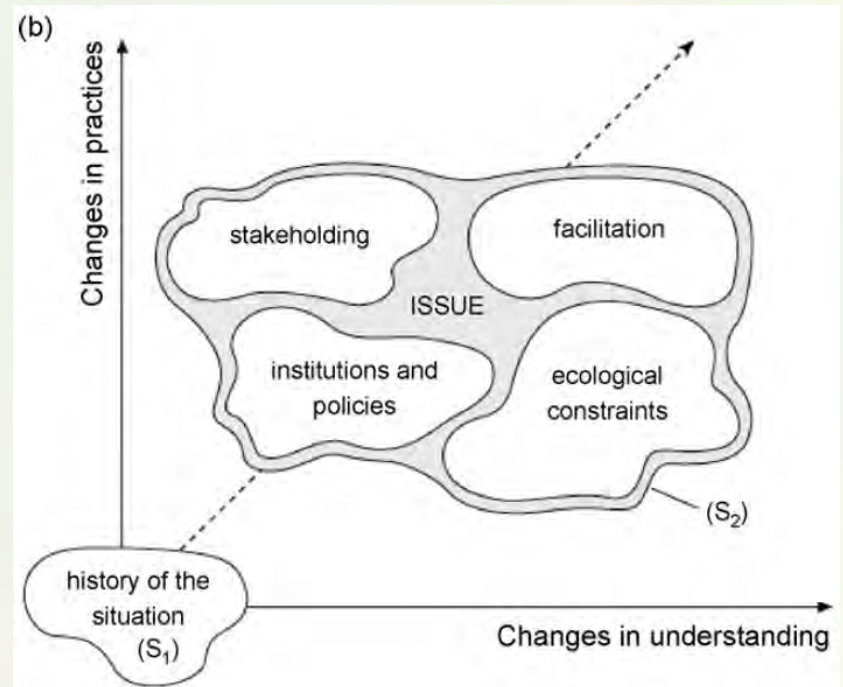
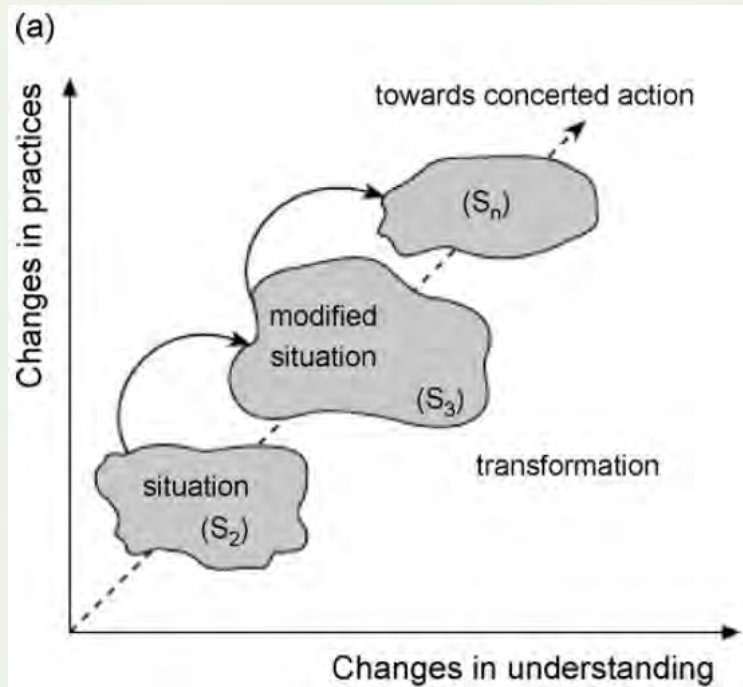


Extractive

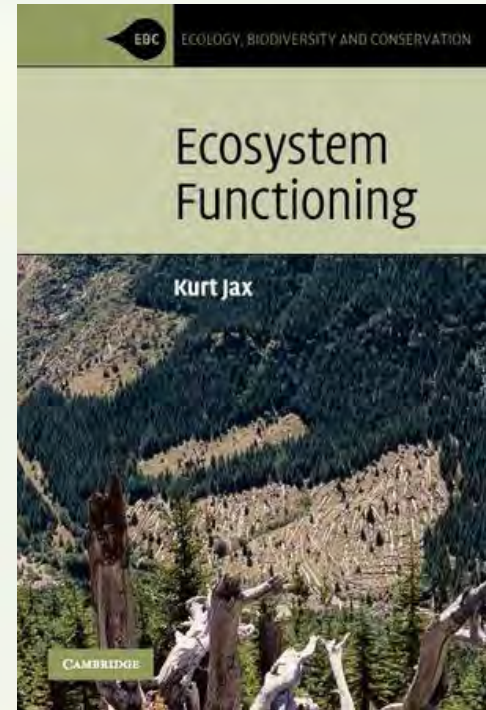
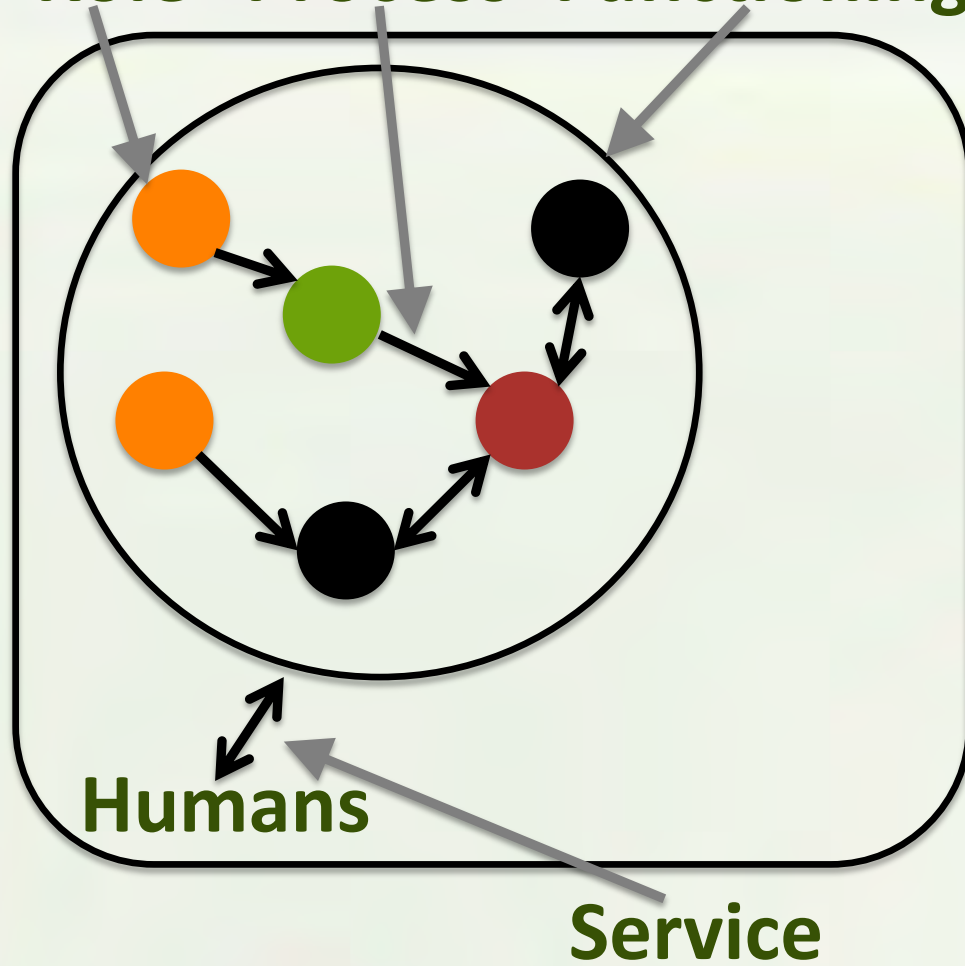


Learning

Steyaert and Jiggins 2007



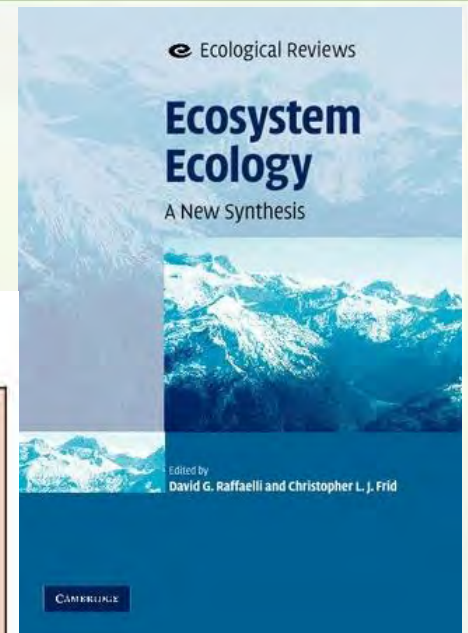
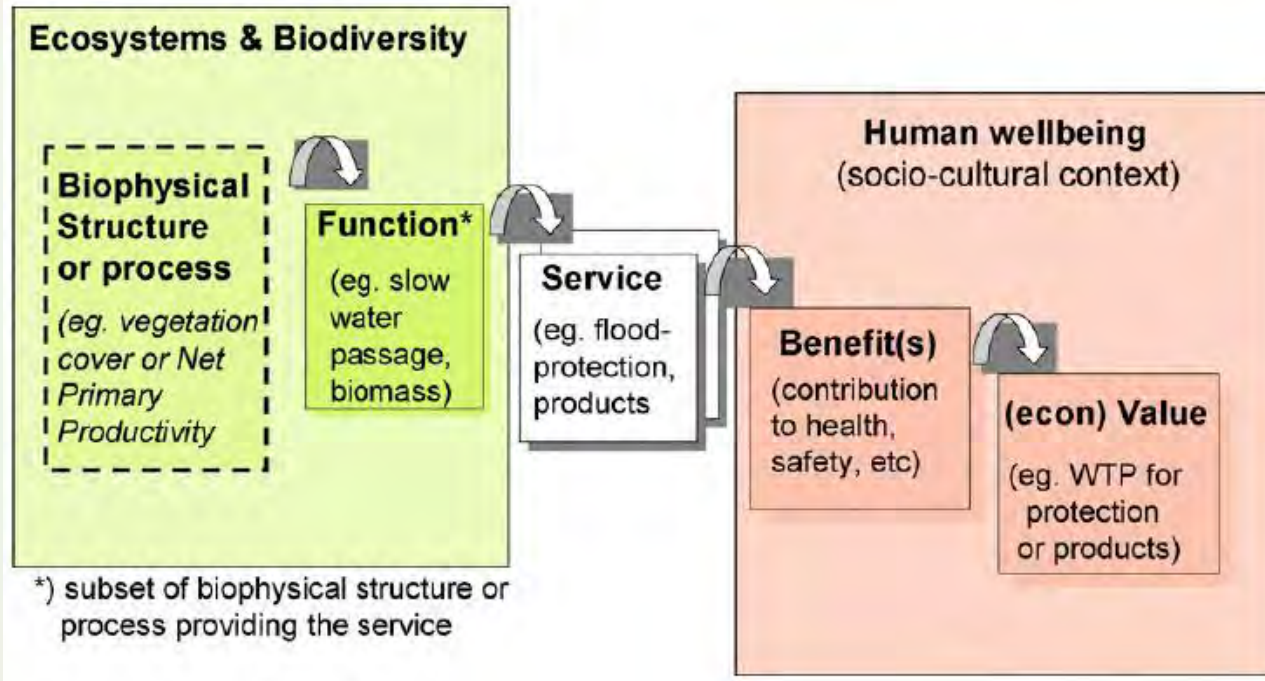
Role Process Functioning



Jax 2005 Oikos

‘functioning’ stands for the network of processes

Functioning → services

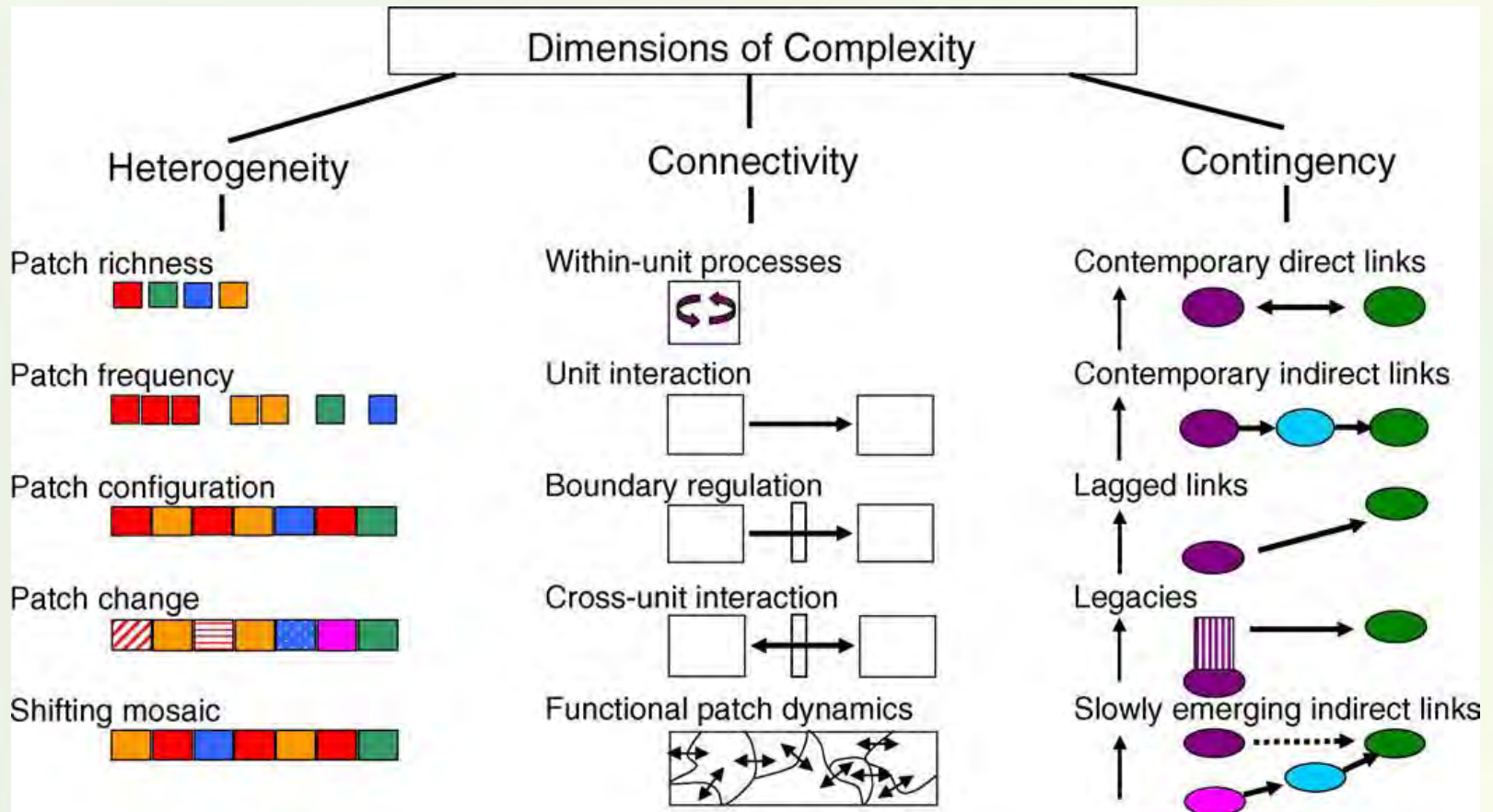


de Groot *et al.* 2010

Haines-Young and Poschin 2010

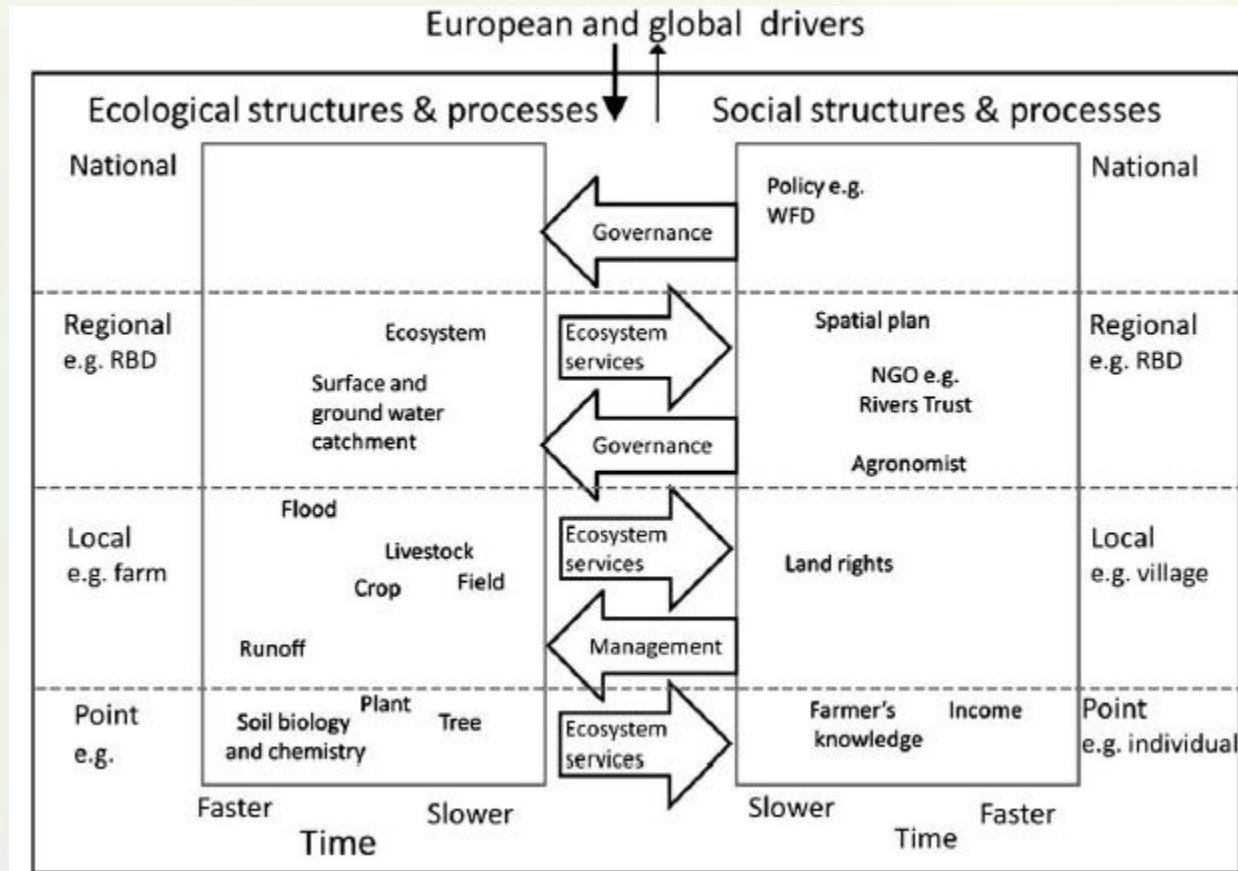
Complexity

Cadenasso *et al.* 2006

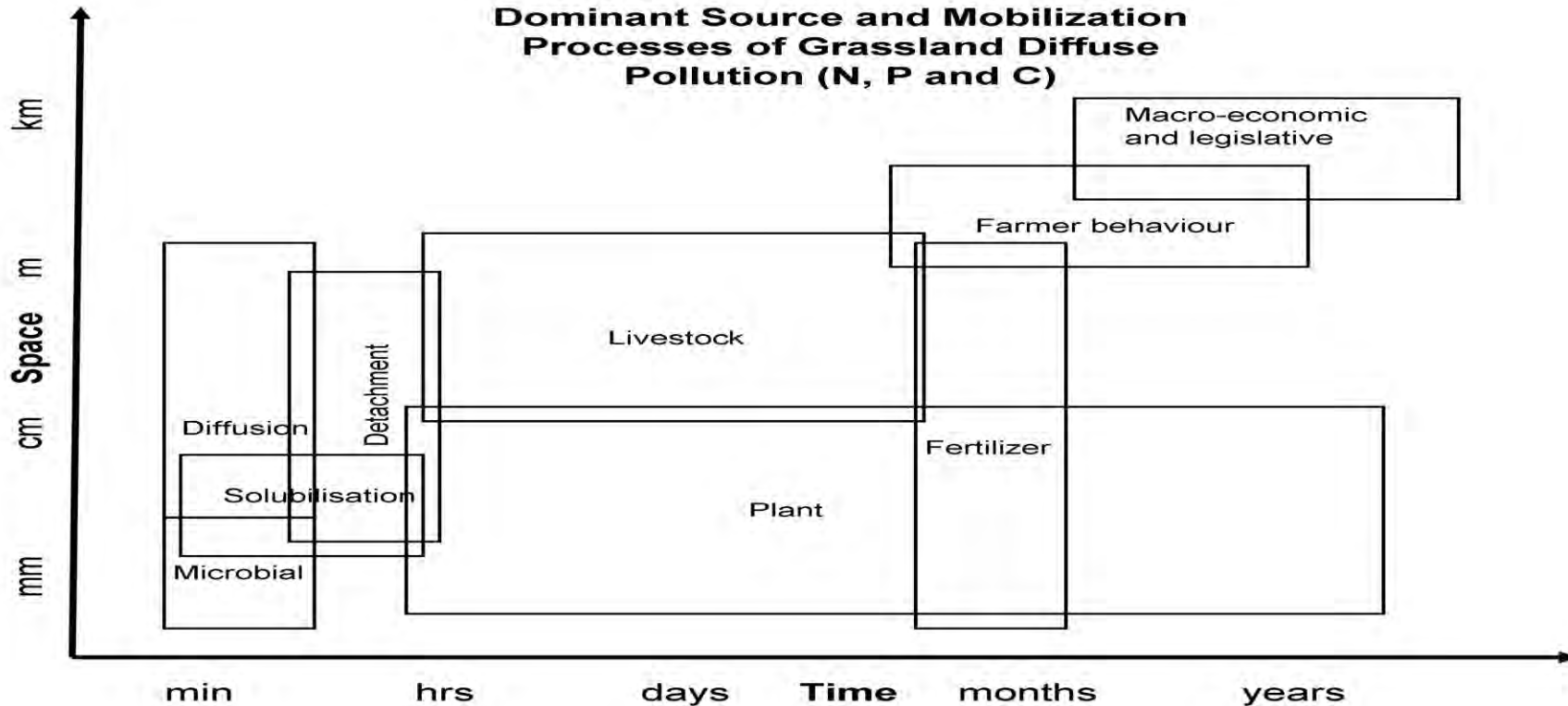


Scale

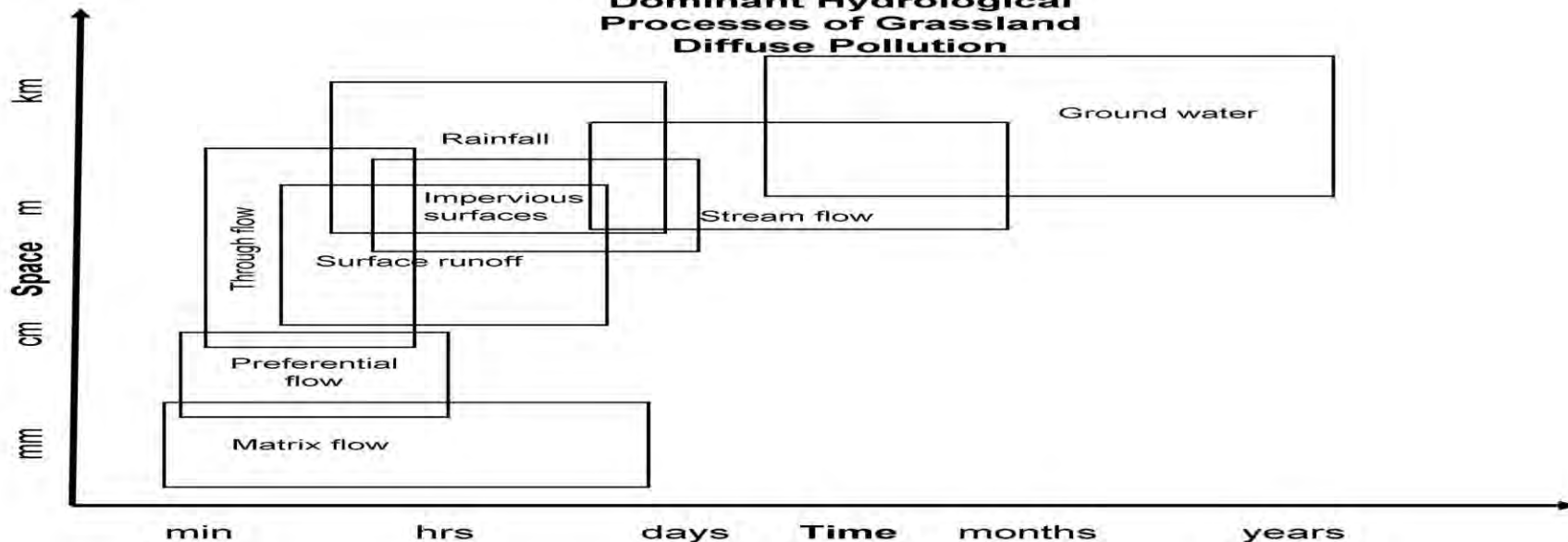
Macleod and Haygarth 2010



Dominant Source and Mobilization Processes of Grassland Diffuse Pollution (N, P and C)

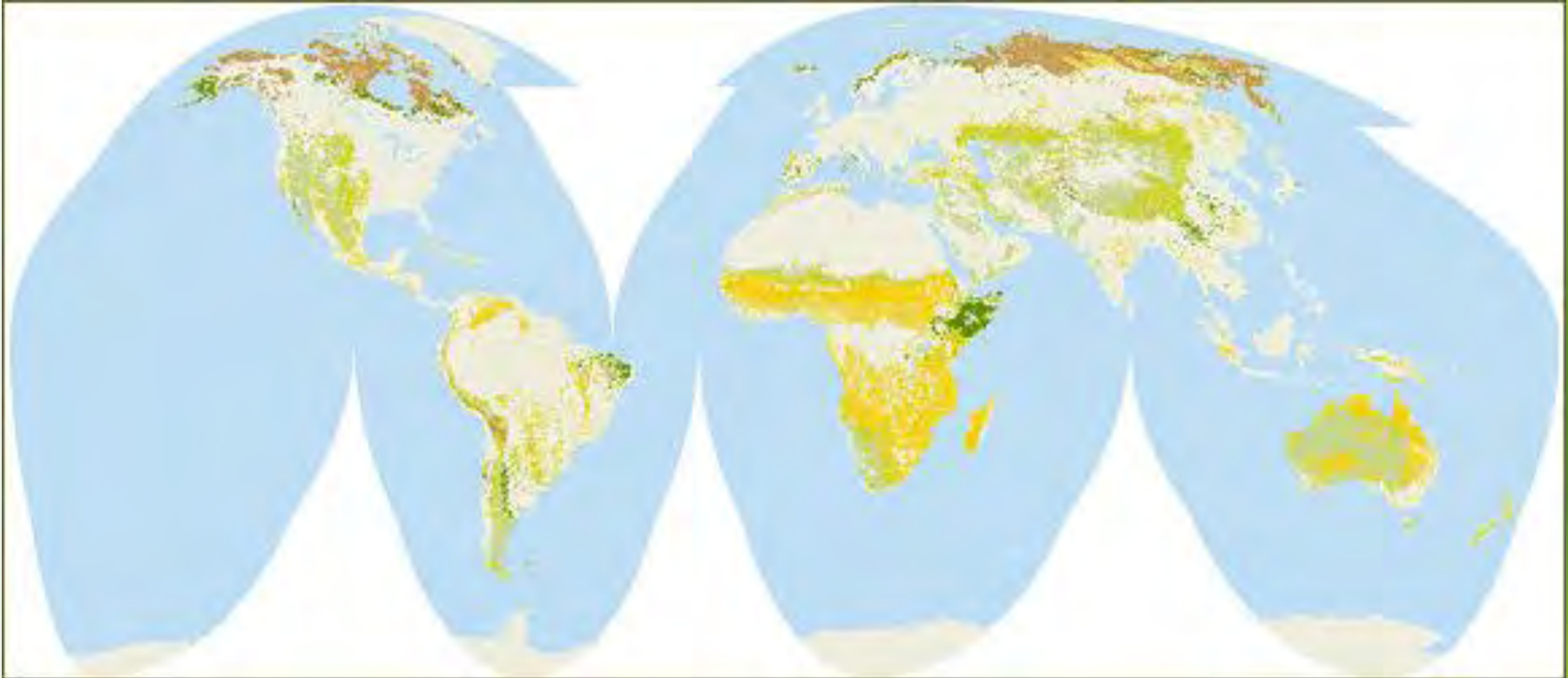


Dominant Hydrological Processes of Grassland Diffuse Pollution

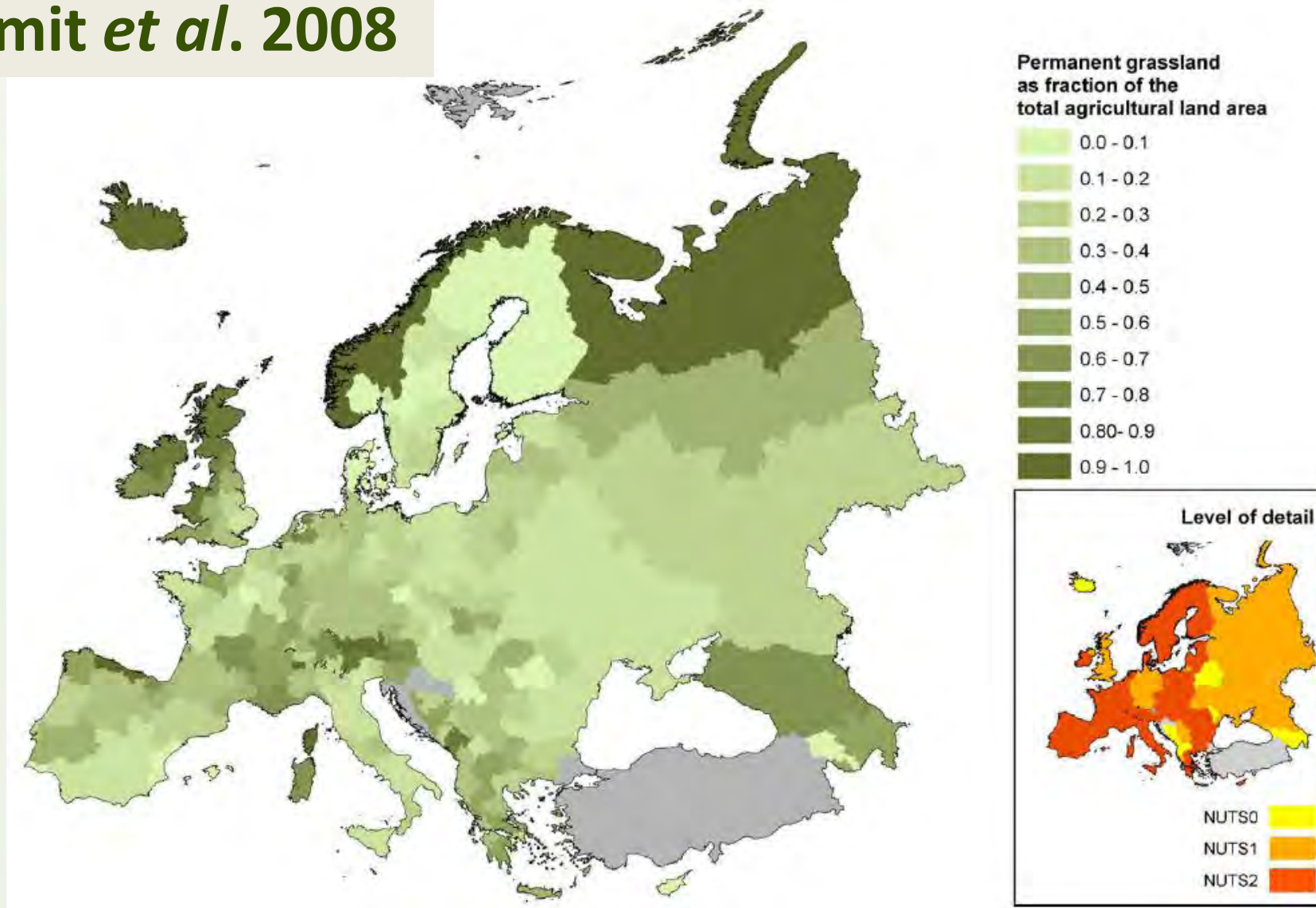


Why grasslands?

Citation: World Resources Institute - PAGE, 2000



Smit *et al.* 2008



Bibby, 2009

The extent of different land uses in the UK (2008).

	Percentage of country		
	Agricultural land		
	Crops and bare Fallow	Grasses and rough grazing ^a	Other ^b
England	<i>30.05</i>	<i>37.08</i>	<i>5.13</i>
Wales	<i>3.17</i>	<i>72.29</i>	<i>0.96</i>
Scotland	<i>7.07</i>	<i>66.42</i>	<i>1.93</i>
Great Britain	19.80	50.26	3.66
Northern Ireland	<i>3.79</i>	<i>72.85</i>	<i>0.70</i>
United Kingdom	18.90	51.52	3.50

Source: Department for Environment, Food and Rural Affairs; Ordnance Survey; Forestry Commission; Forest Service.

Italics refer to percentages and non-italics to absolute values. Bold refer to composite areas.

a Includes grasses over and under 5 years old, and sole right and common rough grazing.

b Set aside and other land on agricultural holdings, e.g. farm roads, yards, buildings, gardens, ponds. Excludes woodland on agricultural holdings (included in 'Forest and woodland').















Functioning ; Multi-functioning ; Science-Policy

-Highlight the limitation to derive information on land use (system) or land function from land cover data based on satellite images.

-The spatial and temporal dynamics in grazing are a cause of the non-linear relation between grassland and its functions.

Journal of Environmental Management 90 (2009) 1327–1335

Contents lists available at ScienceDirect

Journal of Environmental Management

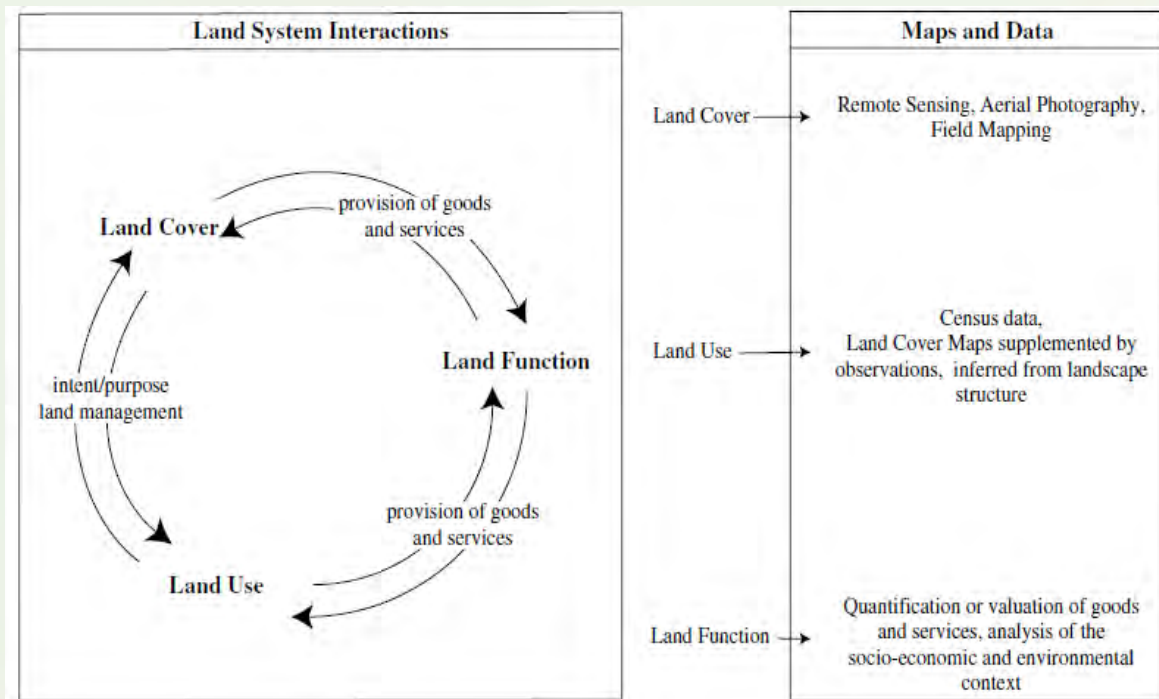
journal homepage: www.elsevier.com/locate/jenvman

ELSEVIER

Review

From land cover change to land function dynamics: A major challenge to improve land characterization

Peter H. Verburg^{a,*}, Jeannette van de Steeg^b, A. Veldkamp^a, Louise Willeman^a





**Centre for
Ecology & Hydrology**

NATURAL ENVIRONMENT RESEARCH COUNCIL

LANCASTER
UNIVERSITY



Phosphorus mobilisation with sediment and colloids through drained and undrained grasslands



NORTH WYKE
RESEARCH

