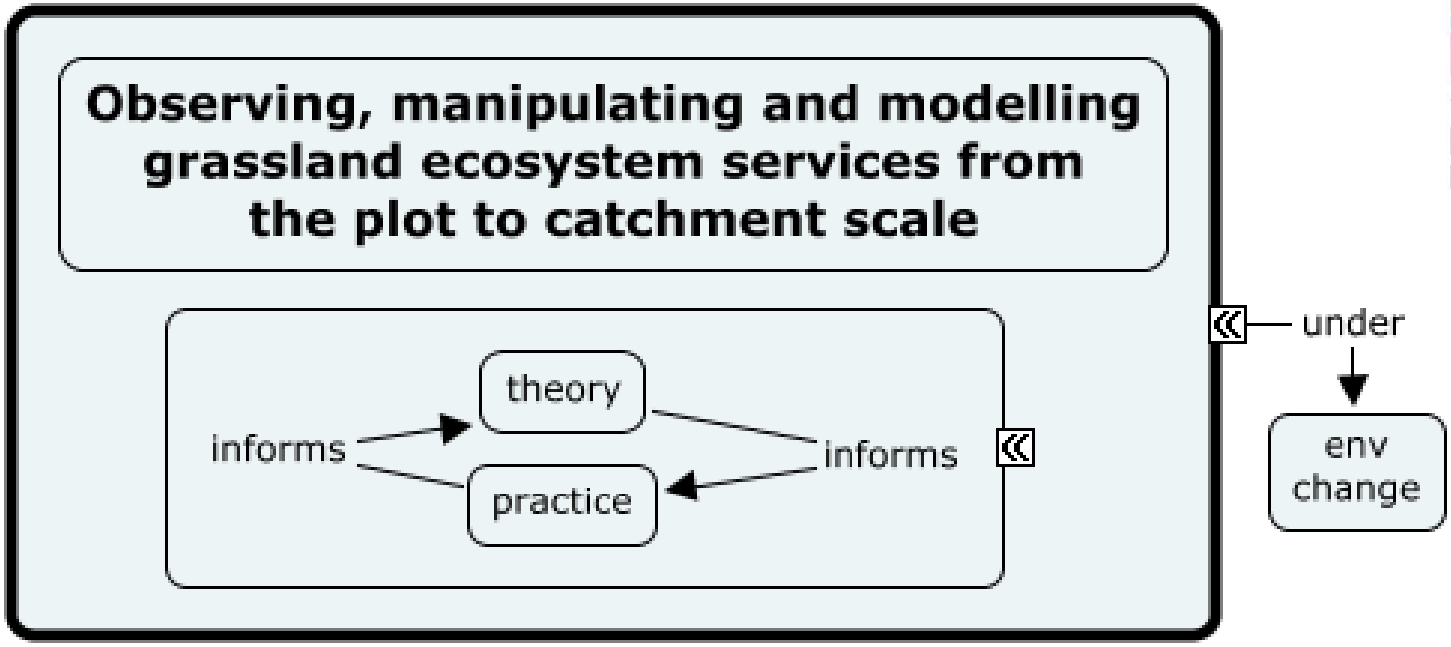
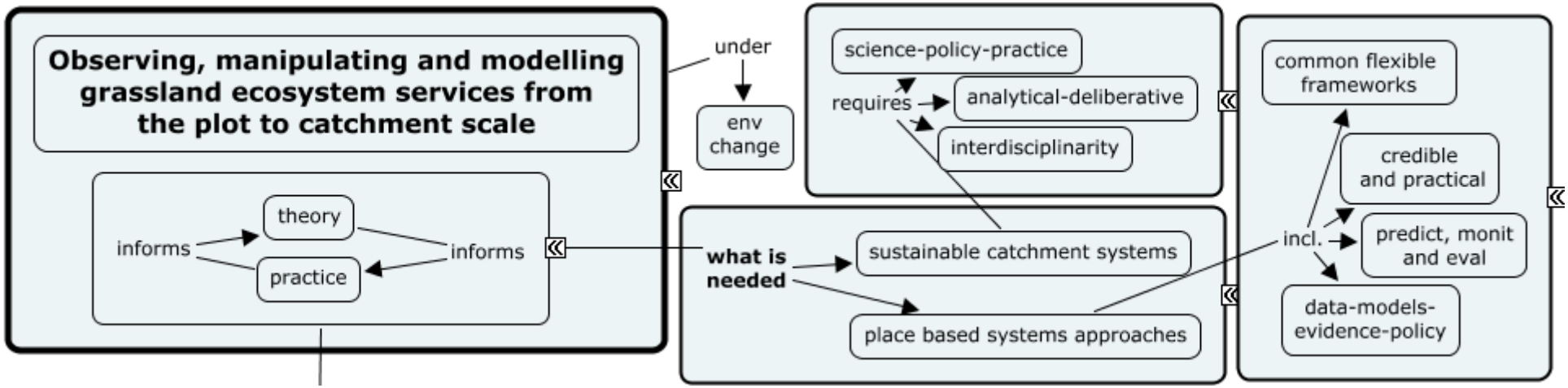


Kit (C.J.A.) Macleod and many colleagues

TERENO International Conference 2014

September 29th - October 2nd 2014
Rheinische Friedrich-Wilhelms-Universität Bonn, Germany



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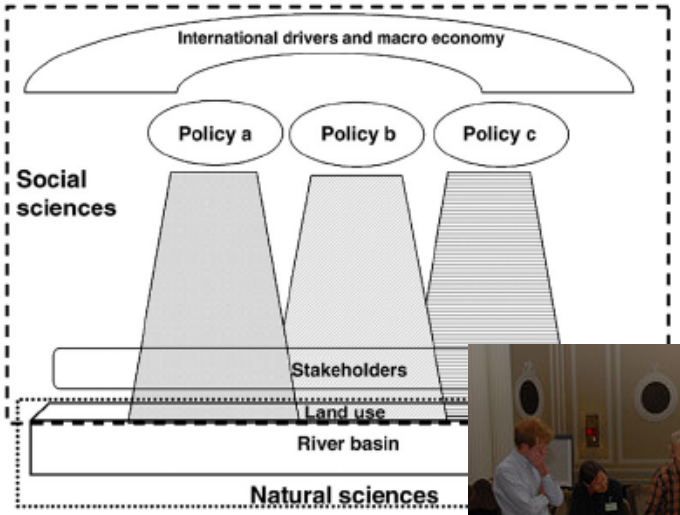
Available online at www.sciencedirect.com
ScienceDirect
Science of the Total Environment 373 (2007) 591–602

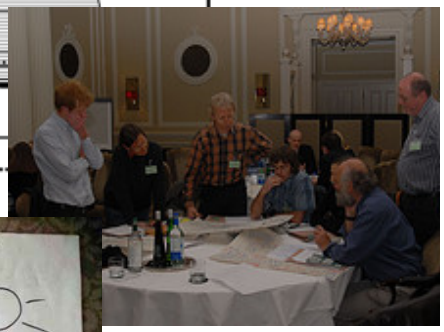
Science of the Total Environment
www.elsevier.com/locate/scitotenv

Integration for sustainable catchment management

Christopher J.A. Macleod *, David Scholefield, Philip M. Haygarth

Institute of Grassland and Environmental Research, North Wyke Research Station, Okehampton, Devon, EX20 2SB, UK





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Science of the Total Environment

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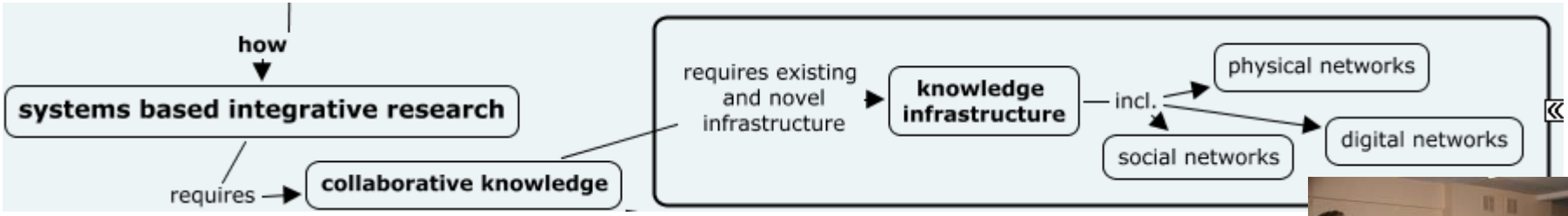
Editorial

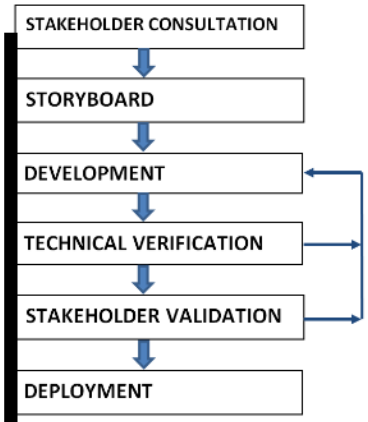
Integrating water and agricultural management under climate change

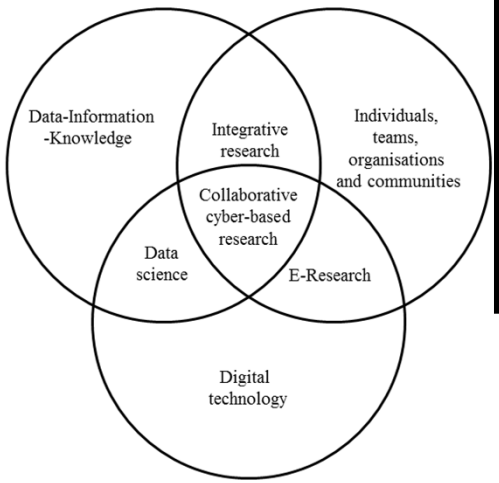


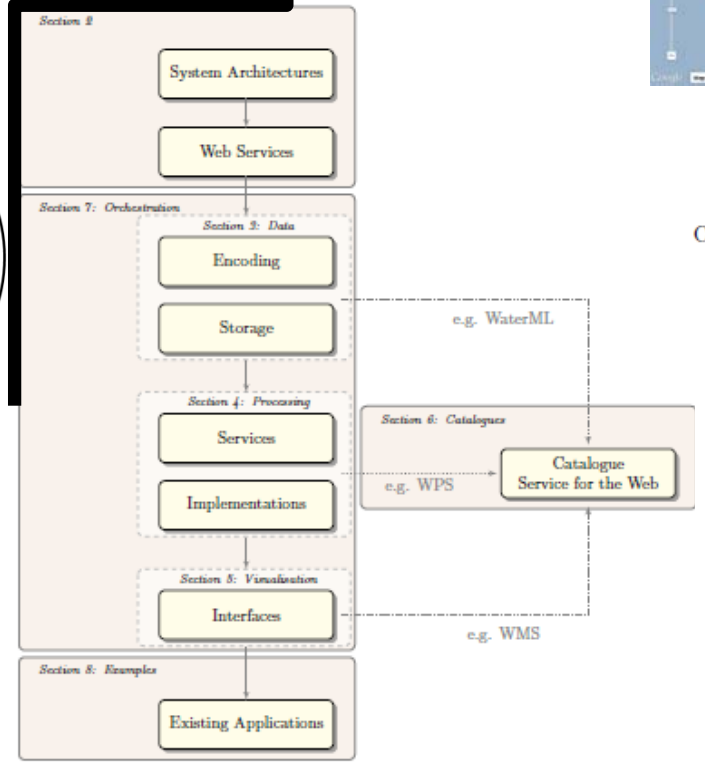
In: Collaborative Knowledge in Scientific Research Networks

Collaborative knowledge in catchment research networks: integrative research requirements for catchment systems science

Christopher (Kit) J.A. Macleod
James Hutton Institute, United Kingdom

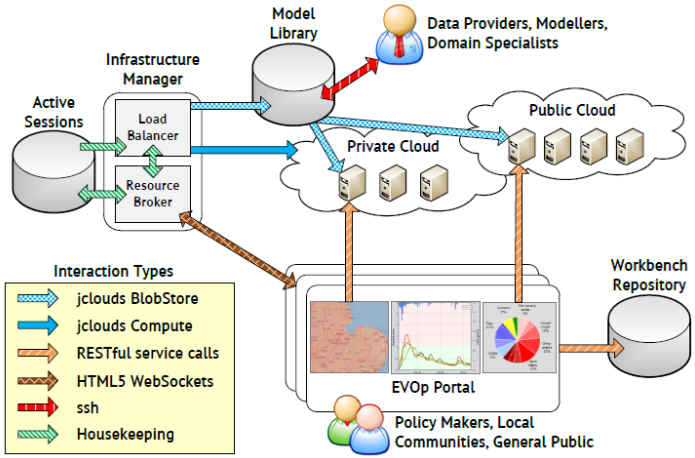






A Review of Web Technologies for Environmental Big Data

Claudia Vitolo[a], Yehia Elkhatib[b], Dominik Reusser[c], Wouter Buytaert[a], Christopher J. A. Macleod[d]



NATURAL ENVIRONMENT RESEARCH COUNCIL

Environmental Modelling & Software 39 (2013) 322–330

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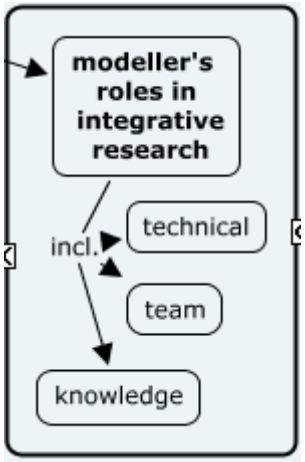
Environmental Modelling & Software

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

Modellers' roles in structuring integrative research projects☆

Marit E. Kragt [a,b,*], Barbara J. Robson [c], Christopher J.A. Macleod [d]

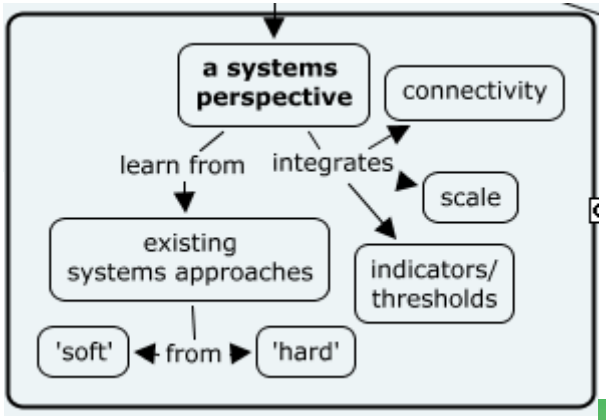


Step	Multiple roles of modellers
1. ID objectives and define RQs	Facilitator
2. Enabling procedures and structures	Facilitator
3. Preliminary conceptual model	Lead
4. ID knowledge gaps	Facilitator
5. (Inter)disciplinary studies	Knowledge broker
6. Refine conceptual model	Lead, facilitator
7. Quant system components	Knowledge broker
8. (Final) systems model	Technical specialist
9. Application/interpretation	Technical specialist
10. Communication	Facilitator

International Environmental Modelling and Software Society (iEMSs)
2010 International Congress on Environmental Modelling and Software
Modelling for Environment's Sake, Fifth Biennial Meeting, Ottawa, Canada
David A. Swayne, Wanhong Yang, A. A. Voinov, A. Rizzoli, T. Filatova (Eds.)
http://www.iemss.org/iemss2010/index.php?n=Main.Proceedings

What Can We Learn From Systems Based Approaches: From Systems Biology to Earth Systems Science?

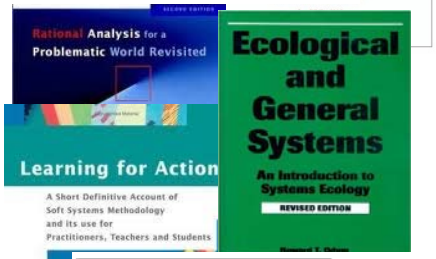
C.J.A. Macleod
North Wyke Research, North Wyke, Devon, EX20 2SB, UK; kit.macleod@bbsrc.ac.uk

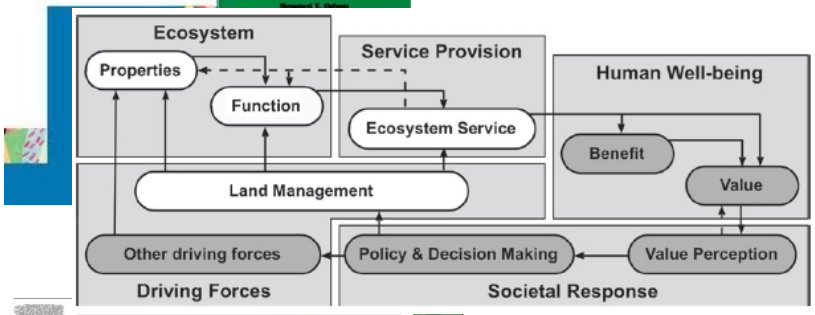


The Use and Abuse of Vegetational Concepts and Terms

A. G. Tansley

Ecology, Vol. 16, No. 3. (Jul., 1935), pp. 284-307.



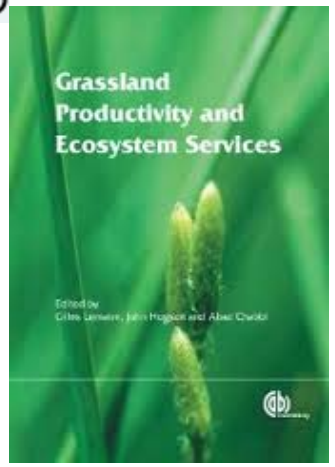


Framework for systematic indicator selection to assess effects of land management on ecosystem services

Alexander P.E. van Oudenhoven[a,*,1], Katalin Petz[a,1], Rob Alkemade[b], Lars Hein[a], Rudolf S. de Groot[a]

24 Temperate Grasslands in Catchment Systems: the Role of Scale, Connectivity and Thresholds in the Provision and Regulation of Water Quality and Quantity

Christopher J.A. Macleod and Robert C. Ferrier

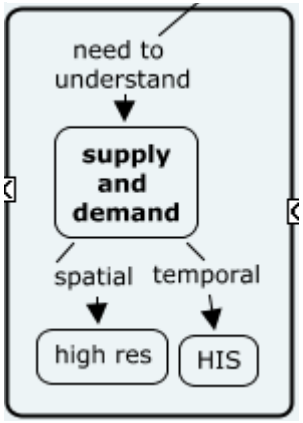


	Increasing spatial scale →				
	Plant	Pedon/plot	Field	Reach	Catchment
A					
Functions	Infiltration	Runoff generation	Drainage	Flood regulation	Water provision and flood regulation
Structures	Roots, soil structure	Botanical composition	Field drains	Channel morphology	Dams
Processes	Infiltration	Infiltration, evaporation		Ground–surface water interactions	Flow routing, abstraction
B					
Functions	Decomposition	Nutrient cycling	Filter, production	Clean water	Water quality
Structures	Soil aggregates	Soil structure and horizons		Connectivity to reach	River network
Processes	Denitrification		Crop production	De-gassing	Routing, nutrient spiralling

Advances in Agronomy, Vol. 109, 2010.

Interactions Among Agricultural Production and Other Ecosystem Services Delivered from European Temperate Grassland Systems

Emma S. Pilgrim,* Christopher J. A. Macleod,* Martin S. A. Blackwell,* Roland Bol,* David V. Hogan,† David R. Chadwick,* Laura Cardenas,* Tom H. Misselbrook,* Philip M. Haygarth,‡ Richard E. Brazier,§ Phil Hobbs,* Chris Hodgson,* Steve Jarvis,¶ Jennifer Dungait,* Phil J. Murray,* *and* Les G. Firbank*



Driving Factor \ Responding Factor	Agricultural production	Climate regulation	Air quality	Water quality	Hydrological regulation	Erosion regulation	Nutrient cycling	Biodiversity conservation	Landscape quality
Agricultural production		↕ ***	↓ ***	↓ ***	↕ **	↓ **	↓ ***	↓ ***	↓ ***
Climate regulation	↕ **		↑***	↑***	↑ **	↑ **	↕ **	↕ **	↕ **
Air quality	↕ **	↕ **		↑ ***	↑ *	0	↑ **	↑ ***	↑ ***
Water quality	↔	↕ **	↕ **		↕ **	0	0	↑ **	↑ **
Hydrological regulation	↕ **	↕ **	↔	↑ **		0	↑ ***	↑ **	↑ **
Erosion regulation	↑ **	↕ **	↑ **	↑ ***	↑ *		↕ **	↑ **	↔
Nutrient cycling	↑ ***	↑ **	↑ *	↑ ***	↑ **	↑ *		↑ **	↑ **
Biodiversity conservation	↕ **	↕ **	↔	↑ **	↑ **	↑ **	↑ *		↑ ***
Landscape quality	↕ *	↕ *	↕ *	↑ *	↑ *	↑ **	↕ **	↑ ***	

Advances in Agronomy, Vol. 109, 2010.

Interactions Among Agricultural Production and Other Ecosystem Services Delivered from European Temperate Grassland Systems

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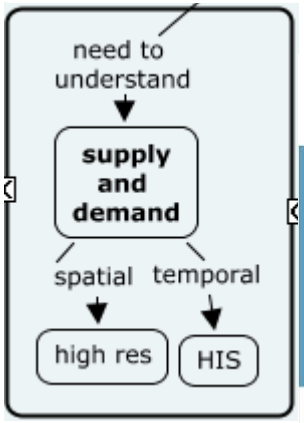


Responding Factor

Driving Factor	Agricultural production	Climate regulation	Air quality	Water quality	Hydrological regulation	Erosion regulation	Nutrient cycling	Biodiversity conservation	Landscape quality
Agricultural production		↕ ***	↓ ***	↓ ***	↕ **	↓ **	↓ ***	↓ ***	↓ ***
Climate regulation	↕ **		↑***	↑***	↑ **	↑ **	↕ **	↕ **	↕ **
Air quality	↕ **	↕ **		↑ ***	↑ *	0	↑ **	↑ ***	↑ ***
Water quality	↔	↕ **	↕ **		↕ **	0	0	↑ **	↑ **
Hydrological regulation	↕ **	↕ **	↔	↑ **		0	↑ ***	↑ **	↑ **
Erosion regulation	↑ **	↕ **	↑ **	↑ ***	↑ *		↕ **	↑ **	↔
Nutrient cycling	↑ ***	↑ **	↑ *	↑ ***	↑ **	↑ *		↑ **	↑ **
Biodiversity conservation	↕ **	↕ **	↔	↑ **	↑ **	↑ **	↑ *		↑ ***
Landscape quality	↕								

Supporting an ecosystem service approach at the local/catchment scale

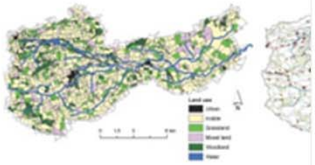
Kit (CJA) Macleod, Julia Martin-Ortega, Didac Jorda and Andy Vinten
The James Hutton Institute, Craigiebuckler, Aberdeen, Scotland • kit.macleod@hutton.ac.uk

This poster aims to generate discussion through: 1) presenting the approach taken and resu
where we 'co-constructed an initial common understanding of the Lunan catchment based o
approach with a broad range of stakeholders'; **and** 2) asking you 'What do you think is requi
service approach at the local/catchment scale?'

Lunan catchment workshop (14th March 2012)

Where and why?
The waters of the Lunan catchment are under pressure from a wide range of pressures.

Who was involved?
21 participants that included farmers and land owners, researchers, local fishery and river trust, SEPA, SNH and local environmental consultants.



How we organised the workshop?

Supporting an ecosystem service approach at the national scale

Kit (CJA) Macleod
The James Hutton Institute, Craigiebuckler, Aberdeen, Scotland • kit.macleod@hutton.ac.uk

The James Hutton Institute

CREW
centre of expertise for waters

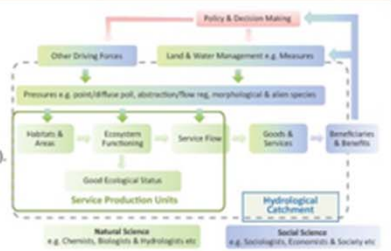
This poster aims to generate discussion through: 1) presenting the approach taken and results from a recent workshop where we 'co-constructed an initial common understanding of the ecosystem services associated with the water environment in Scotland'; **and** 2) asking you 'What do you think is required for taking an ecosystem service approach at the national scale?' and 'How can an ecosystem service approach be integrated with existing regulatory obligations e.g. WFD and approaches e.g. risk, EIA/SEA?'

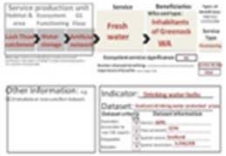
National scale workshop (22nd March 2012)

Why?
1) To test and further develop an approach to identifying ecosystem services and pressures associated with the water environment in Scotland; and 2) indentify, discuss and record practical indicators and associated spatial datasets that are currently available.

Who was involved?
13 participants that were split between SEPA and researchers (including an SNH rep).

How we organised the workshop?
Following an introduction that included a worked example, pairs (SEPA and researcher) populated ecosystem service linkage templates that link service production units, services and beneficiaries for different types of ecosystem services (Regulating and Maintenance; Provisioning; and Cultural and Social) (Haines-Young and Potschin, 2011).





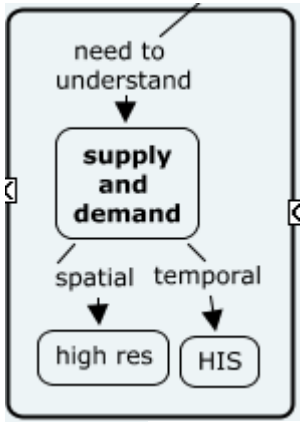
Vision: A Scotland where we fully recognise, understand and value the importance of our land resources, and where our plans and decisions about land use deliver improved and enduring benefits, enhancing the wellbeing of our nation.

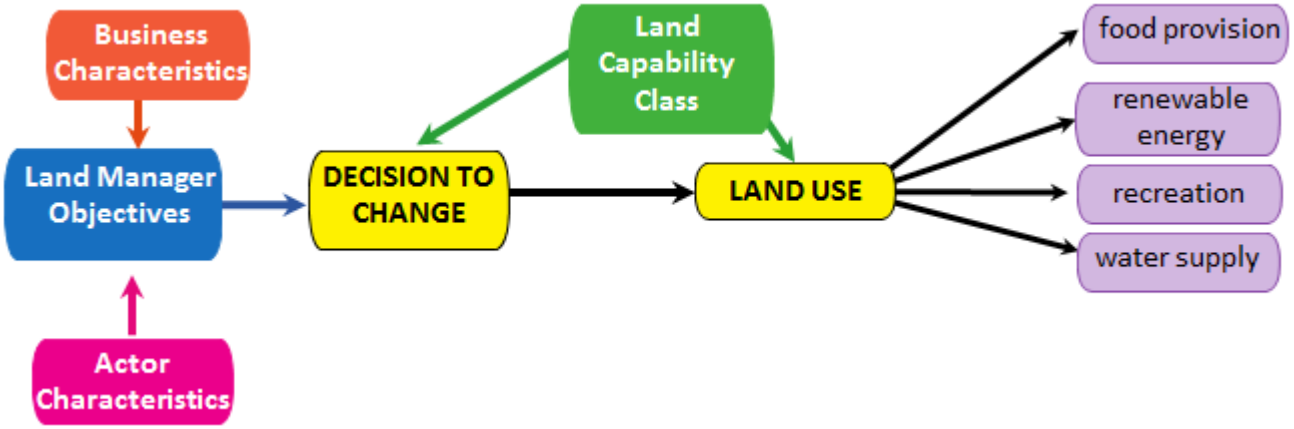
Justine Irvine & Alessandro Gimona

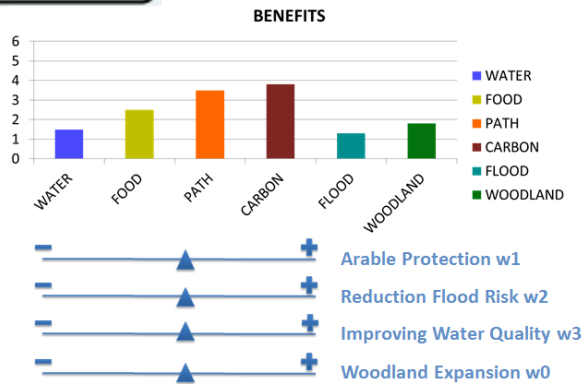
Getting the best from our land

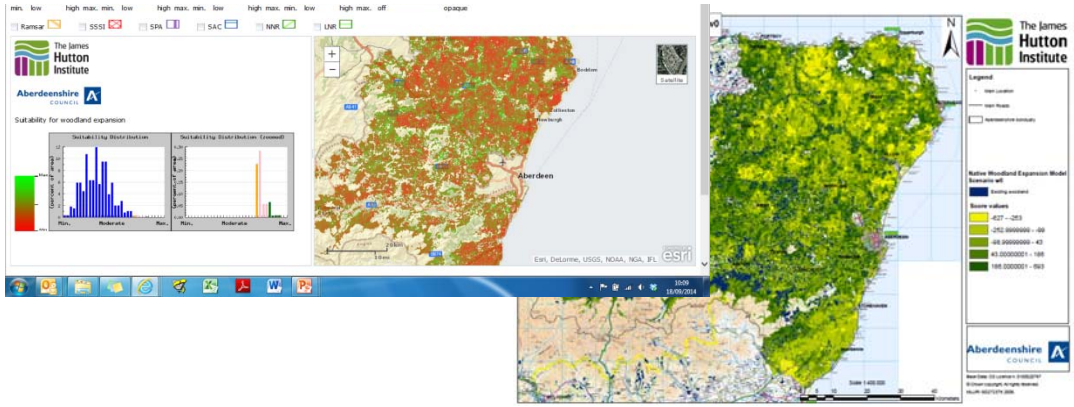
A land use strategy for Scotland

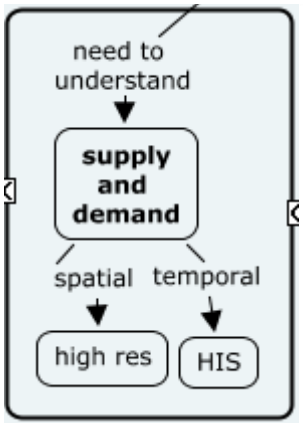
Regional Land Use Strategy Pilots: Working with stakeholder to develop a tool to aid decision making under env change.

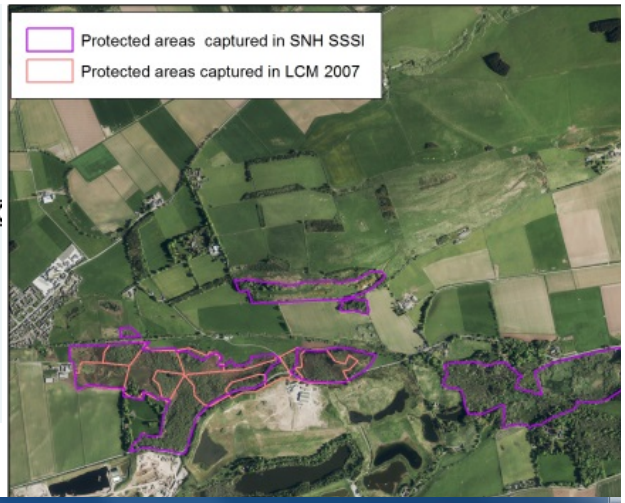


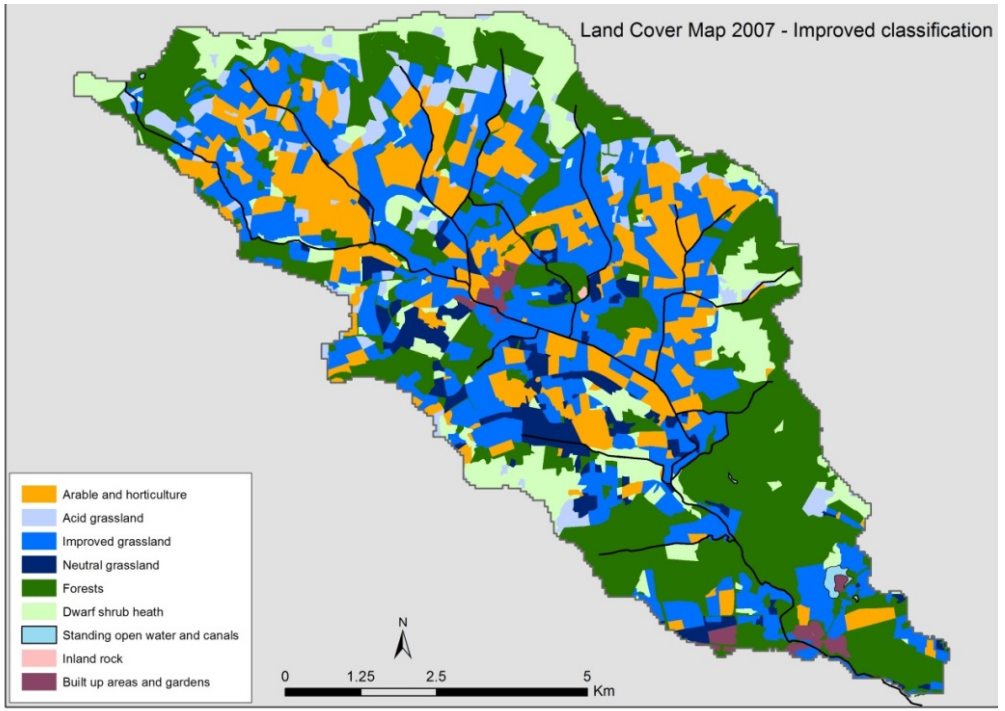


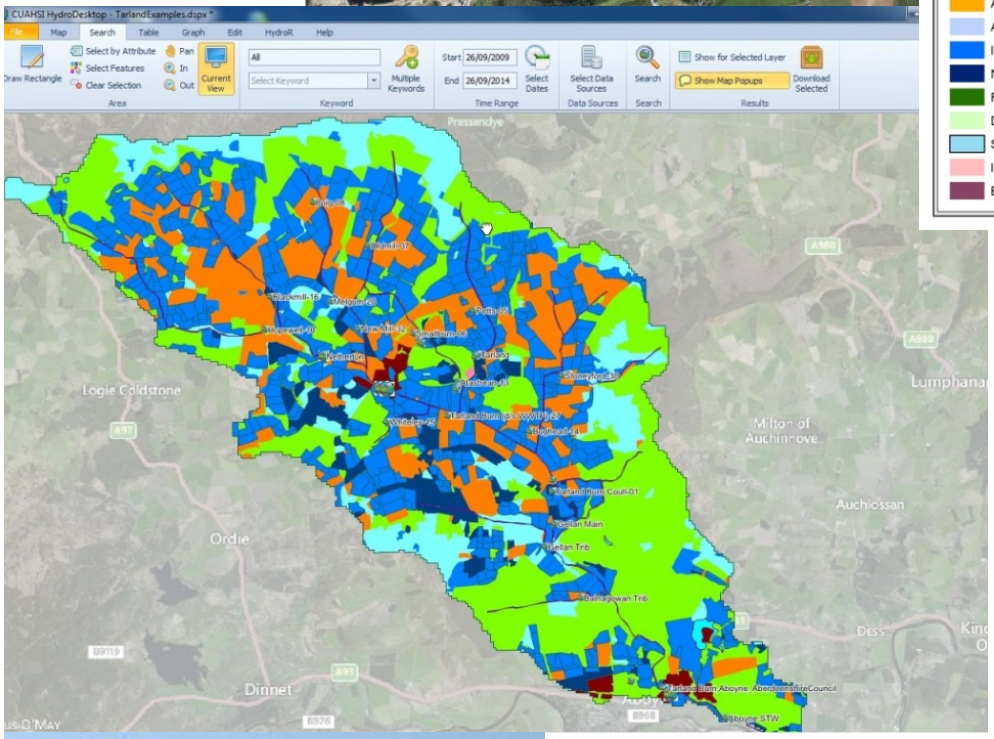


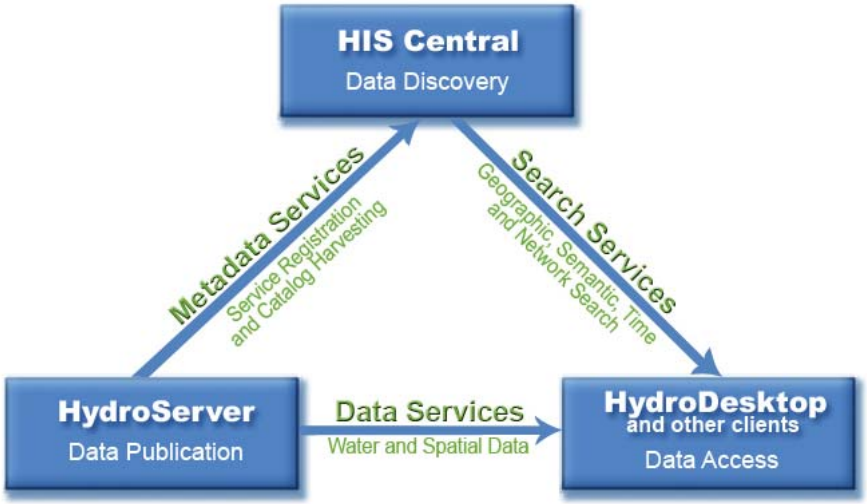



need to understand
supply and demand
spatial
temporal
high res
HIS


Protected areas captured in SNH SSSI
Protected areas captured in LCM 2007


Land Cover Map 2007 - Improved classification
Arable and horticulture
Acid grassland
Improved grassland
Neutral grassland
Forests
Dwarf shrub heath
Standing open water and canals
Inland rock
Built up areas and gardens
N
0
1.25
2.5
5
Km


Logie Coldstone
Milton of Auchinhove
Auchlossan
Ordie
Dinnet
Lumphanan


HIS Central
Data Discovery
Metadata Services
Service Registration and Catalog Harvesting
Search Services
Geographic, Semantic, Time and Network Search
HydroServer
Data Publication
Data Services
Water and Spatial Data
HydroDesktop
and other clients
Data Access


CUAHSI
HIS
Sharing hydrologic data

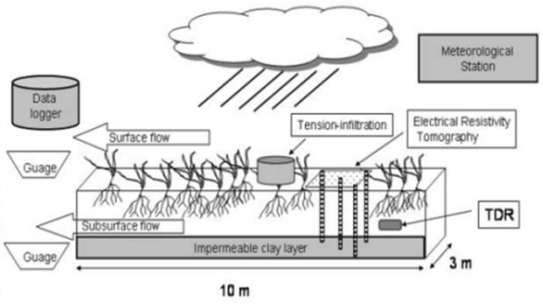
SCIENTIFIC REPORTS

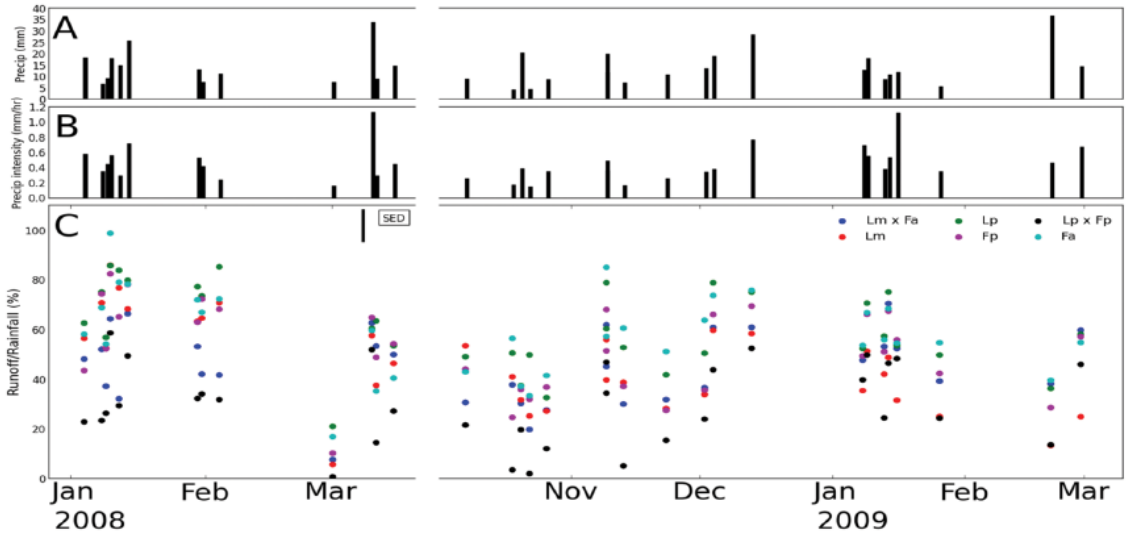
OPEN

A novel grass hybrid to reduce flood generation in temperate regions

SUBJECT AREAS:
HYDROLOGY
PLANT PHYSIOLOGY
ECOSYSTEM SERVICES

Christopher (Kit) J. A. Macleod[1,2], Mike W. Humphreys[3], W. Richard Whalley[4], Lesley Turner[3], Andrew Binley[5], Chris W. Watts[4], Leif Skøt[3], Adrian Joynes[1], Sarah Hawkins[3], Ian P. King[3,6], Sally O'Donovan[3] & Phil M. Haygarth[5]

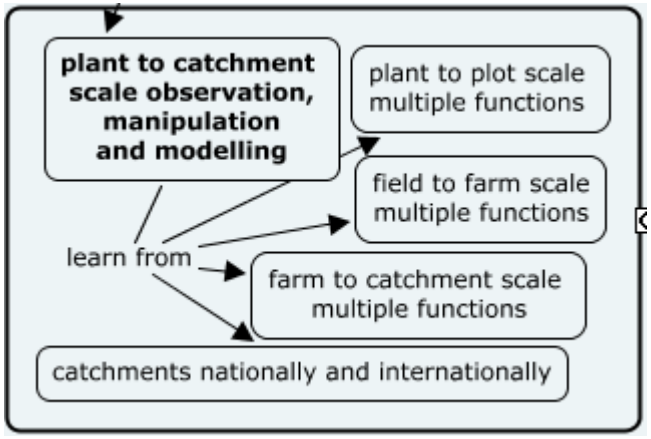




D

Year	2008																								2009							
DoY	4	8	9	10	12	14	30	31	35	60	69	70	74	280	293	295	299	313	313	317	322	327	336	338	347	7	8	12	13	15	25	52	59
Event	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Lm	56.5	70.9	52.6	85.9	76.9	68.4	63.5	64.7	70.9	5.7	57.7	37.6	46.4	53.6	31.8	25.3	27.3	39.8	56.0	38.8	41.0	28.3	34.0	59.8	58.5	35.5	51.4	42.2	48.9	31.7	25.1	13.4	25.0
Fa	58.2	69.0	54.2	98.9	79.2	78.4	72.1	67.1	72.5	17.0	59.8	35.3	40.6	43.1	37.3	33.4	41.6	57.4	85.2	60.7	56.5	51.2	63.9	73.8	75.9	53.8	67.0	56.0	68.5	54.6	54.8	39.6	54.9
Lm xFa	48.2	52.2	37.3	64.4	32.3	66.5	53.3	42.2	41.8	7.7	62.8	53.5	50.0	30.7	30.4	19.9	27.6	45.2	62.0	30.2	37.9	32.0	36.7	61.0	61.1	47.8	66.4	53.3	70.6	52.4	39.3	38.3	59.9
Lp	62.7	75.3	57.0	85.9	84.0	79.9	77.4	73.7	85.4	21.1	60.5	63.6	53.6	49.2	37.5	49.9	32.7	60.5	79.0	52.9	50.6	42.0	50.6	79.0	75.2	52.5	70.8	57.5	75.3	53.6	49.9	36.4	58.2
Fp	43.7	74.5	52.3	82.6	65.3	78.3	63.1	72.4	68.3	10.3	65.0	48.9	54.3	44.2	36.0	32.1	36.9	51.6	68.1	37.2	24.8	27.5	35.8	66.1	69.5	49.5	66.2	51.2	67.5	56.0	42.4	28.7	57.3
Lp x Fp	22.9	23.5	26.5	58.8	29.4	49.6	32.4	34.2	31.9	0.9	52.0	14.6	27.3	21.6	19.8	2.1	12.1	34.5	46.9	5.2	3.6	15.5	24.1	43.9	52.5	39.9	49.9	24.6	46.5	48.4	24.4	13.7	46.1

Rank order of runoff/ rainfall (%) events: Highest runoff … Lowest runoff



Changes in ecosystem structure, function and hydrological connectivity control water, soil and carbon losses in semi-arid grass to woody vegetation transitions

Alan Puttock,[1]* Christopher J.A. Macleod,[2] Roland Bol,[3] Patrick Sessford,[4] Jennifer Dungait[5] and Richard E Brazier[1]

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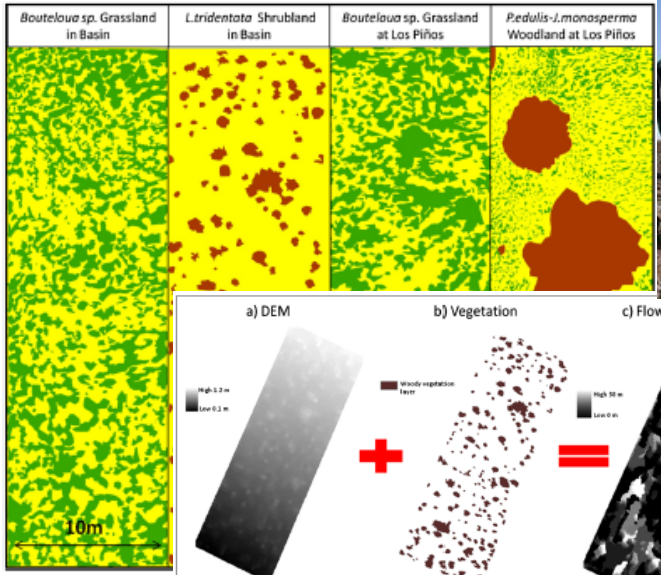
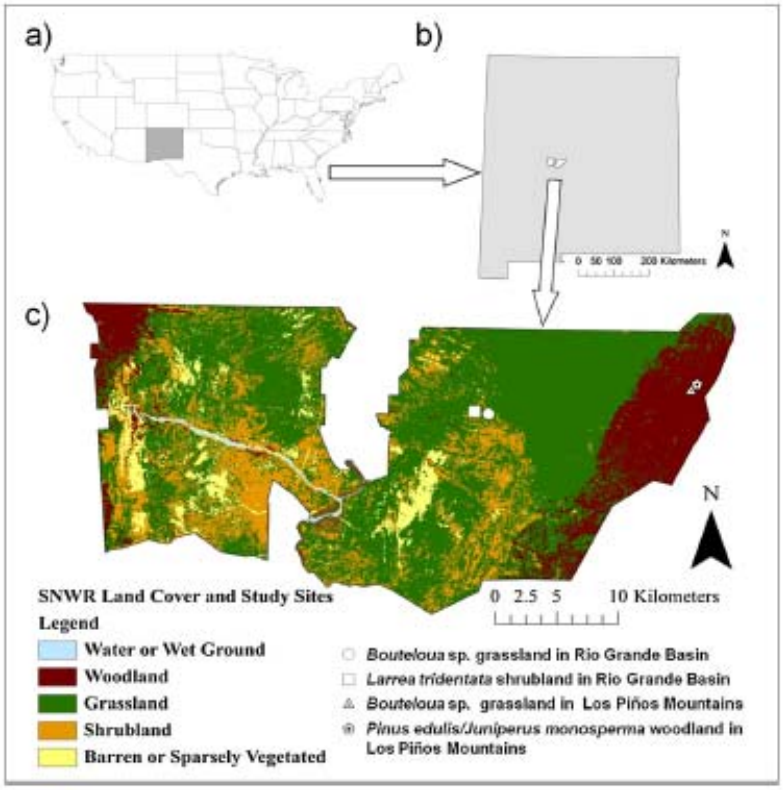
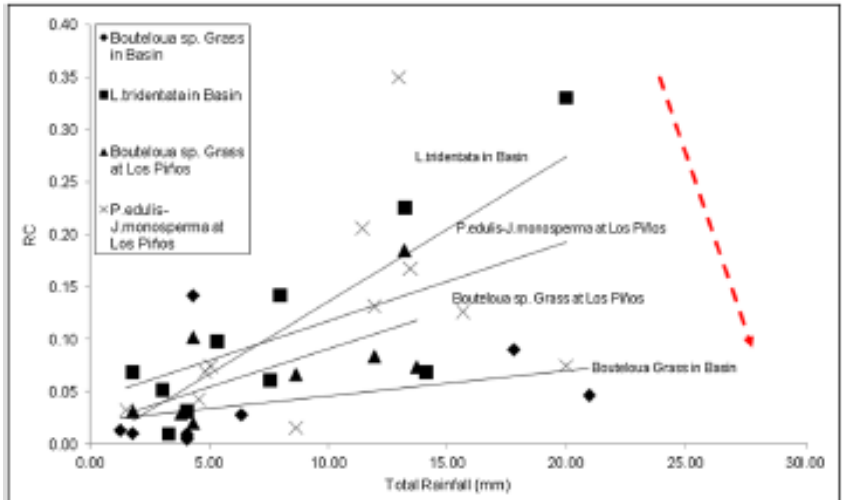
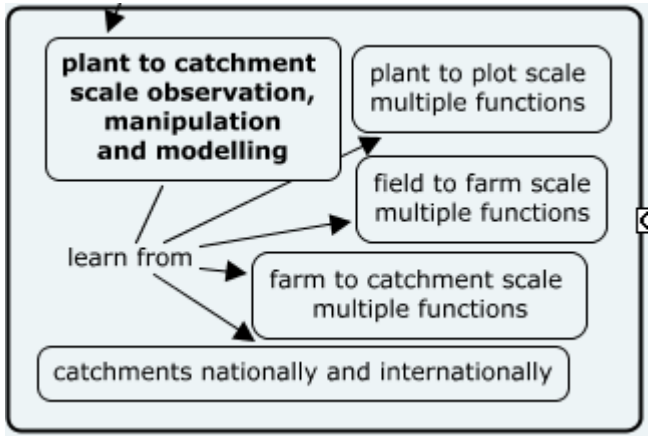
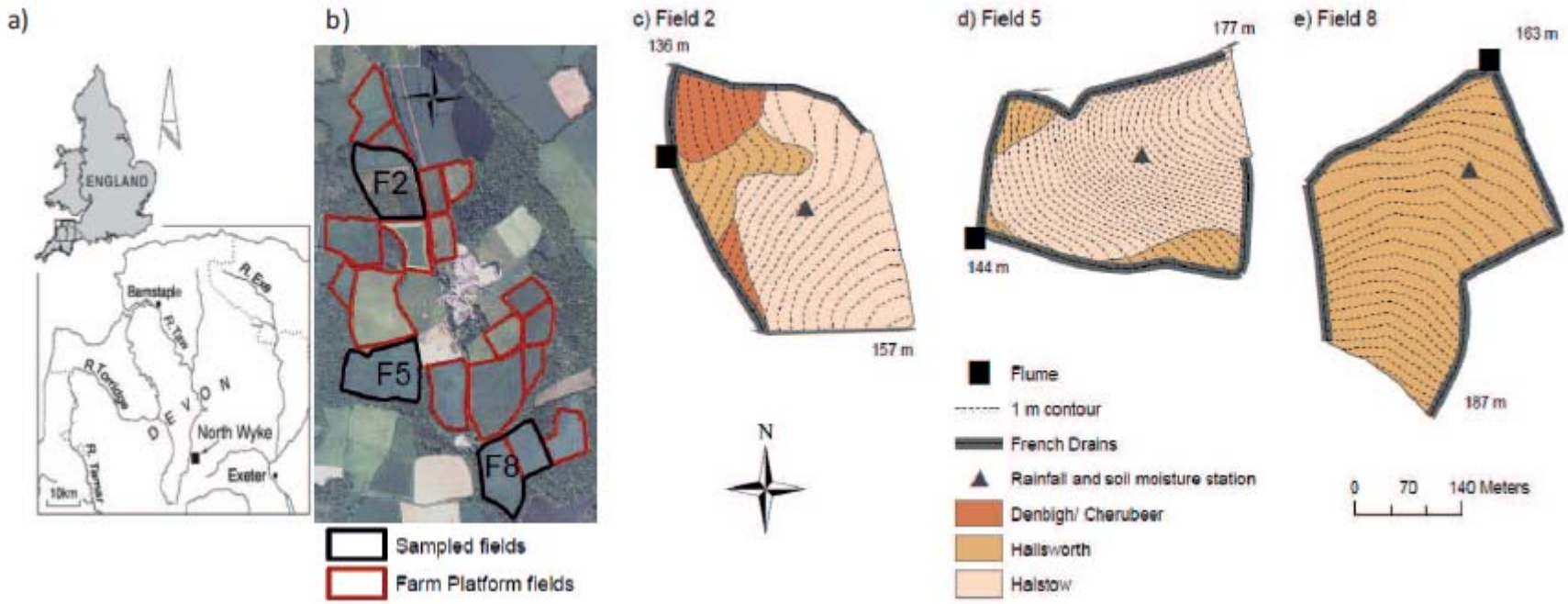
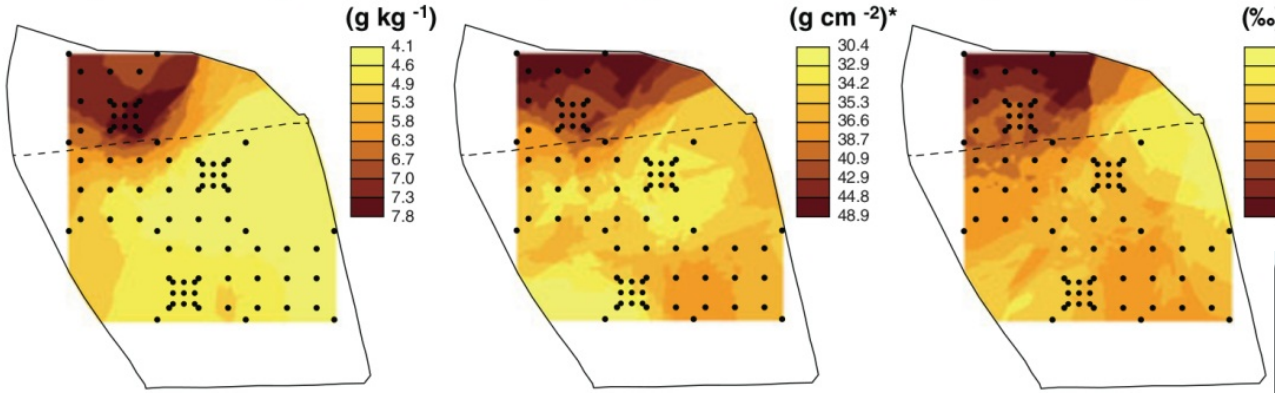








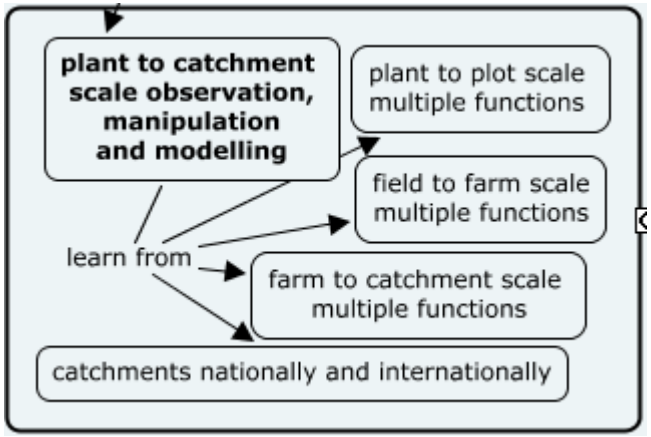


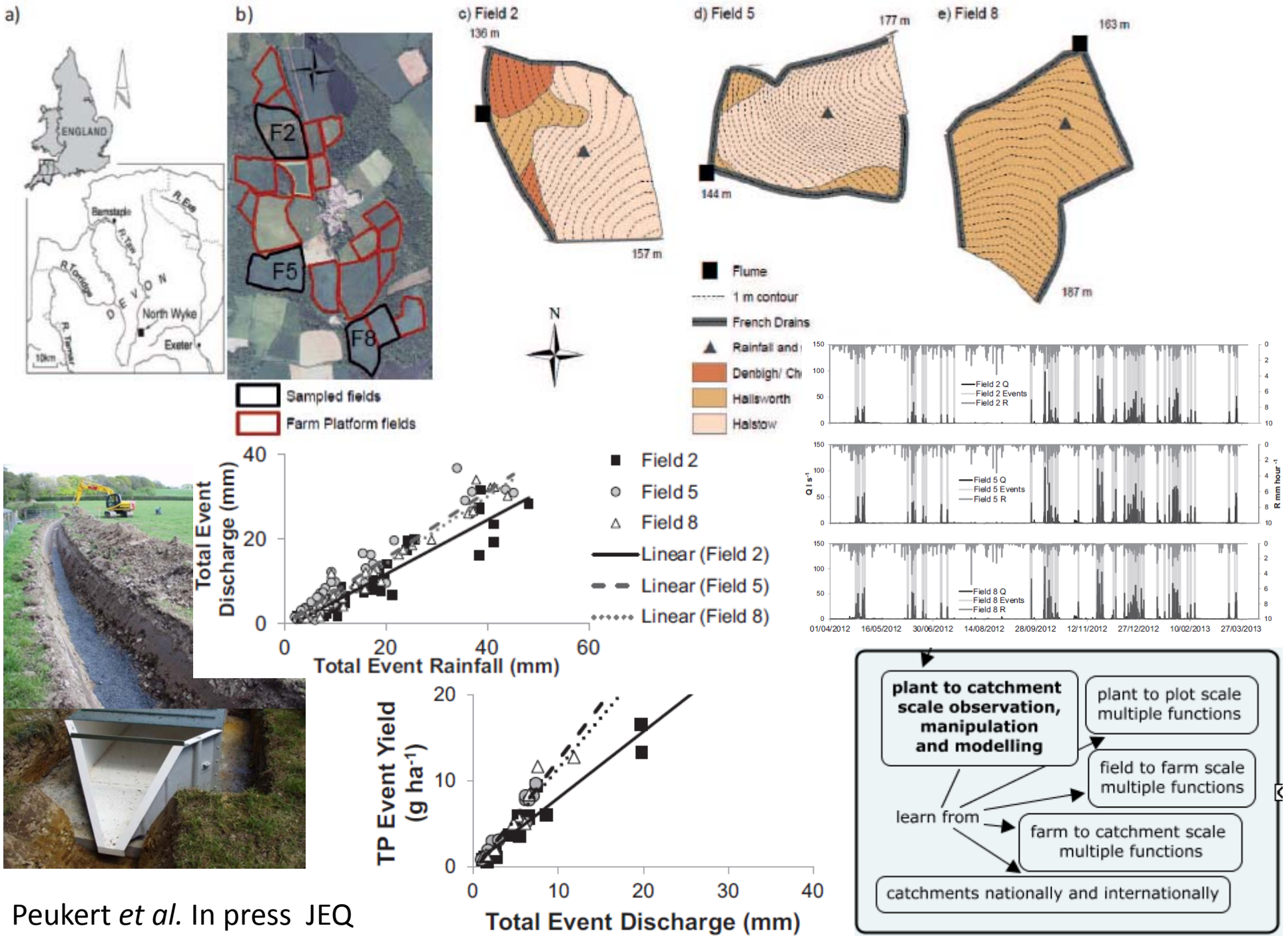


Rapid Commun. Mass Spectrom. **2012**, *26*, 2413–2421
(wileyonlinelibrary.com) DOI: 10.1002/rcm.6336

Understanding spatial variability of soil properties: a key step in establishing field- to farm-scale agro-ecosystem experiments†

Sabine Peukert[1,2], Roland Bol[2,3], William Roberts[2,3], Christopher J. A. Macleod[4,5], Phillip J. Murray[2], Elizabeth R. Dixon[2] and Richard E. Brazier[1]*





Peukert *et al.* In press JEQ

Demonstration Test Catchments

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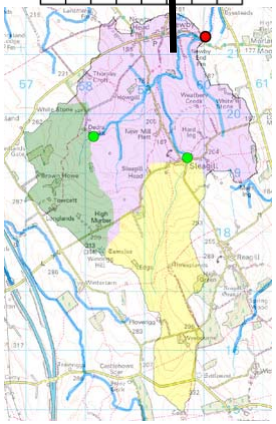
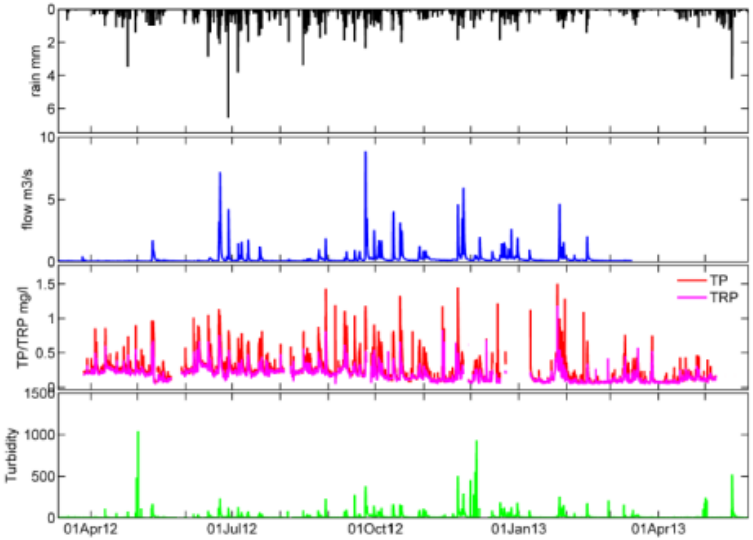
0 850 1,700 3,400 Meters



NutCat 2050

Estimating nutrient transport in catchments to 2050



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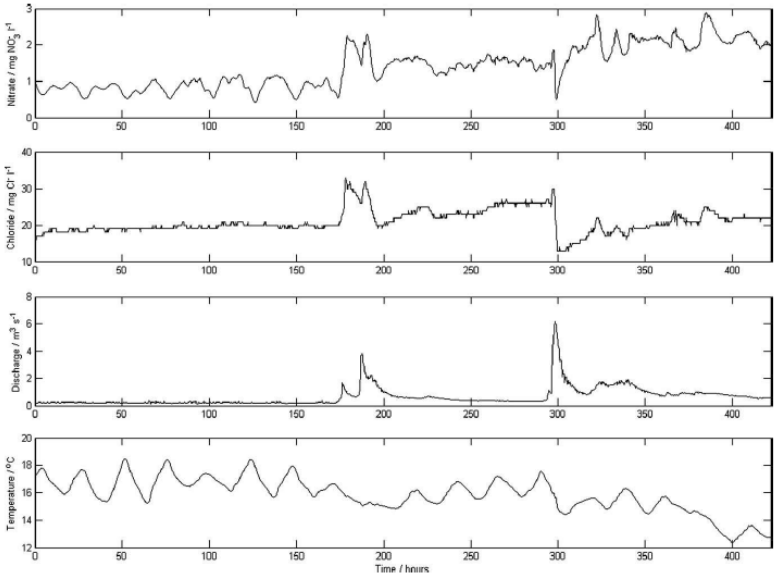
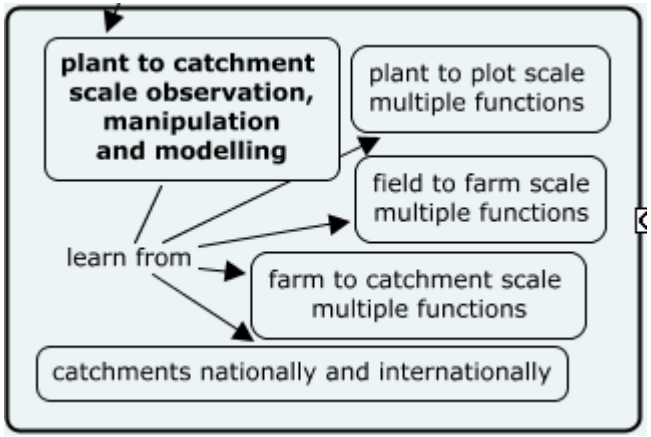
The wavelet packet transform: A technique for investigating temporal variation of river water solutes

A.E. Milne [a,*], C.J.A. Macleod [b], P.M. Haygarth [b], J.M.B. Hawkins [b], R.M. Lark [a]



EUFORIC (European Freshwater Observatories for Research In Catchments) is a distributed infrastructure in 11 countries.



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Thank you for listening