Identifying and tackling trade-offs: a progress report from Scotland

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Tackling trade-offs – key issues

- Many Government strategies and policies were developed in an era when trade-offs were not explicitly acknowledged...
- BUT land management decision-making is full of trade-offs – particularly between different sectoral interests (farming, forestry, conservation, industry, housing, infrastructure…)
- Managing trade-offs requires an integrated approach (at all governance levels) to maximise environmental and societal wellbeing.

Scotland – integrated governance

*"Scotland's economic prosperity depends upon the strengths and talent of our people, our **natural resources**, our infrastructure and how we are governed.*

*The overarching economic and regulatory environment in which we operate also determines key **social and environmental outcomes**."*

(Scottish Government Economic Strategy 2015)

Scotland's strategic approach

- Nested within Global, European and National approaches - includes regulation; guidance/plans; incentives; voluntary initiatives…
- Recognition of critical importance of the natural environment for economic and societal needs ✓
- Many strategies now address multiple benefits for environment and people, **and** are broadly supported by stakeholders in the environmental and rural land use sectors ✓ ✓
- Strong push for modelling and mapping tools to support decision-making…

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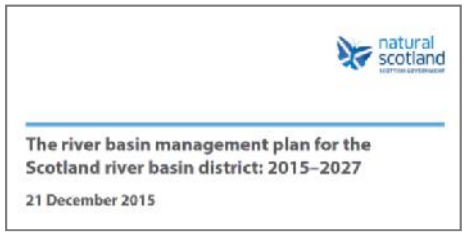
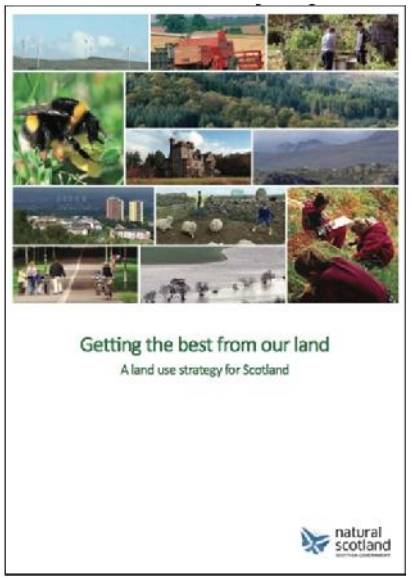
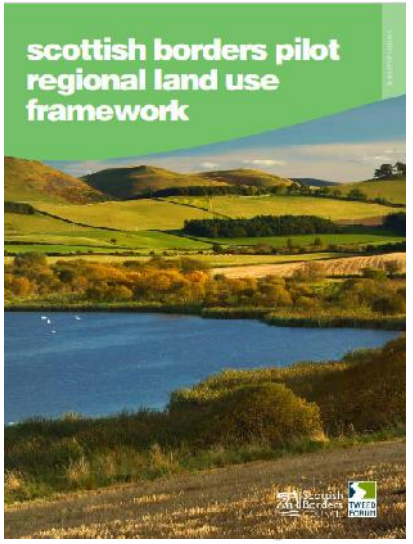
Convention on Biological Diversity



Scotland's Land Use Strategy

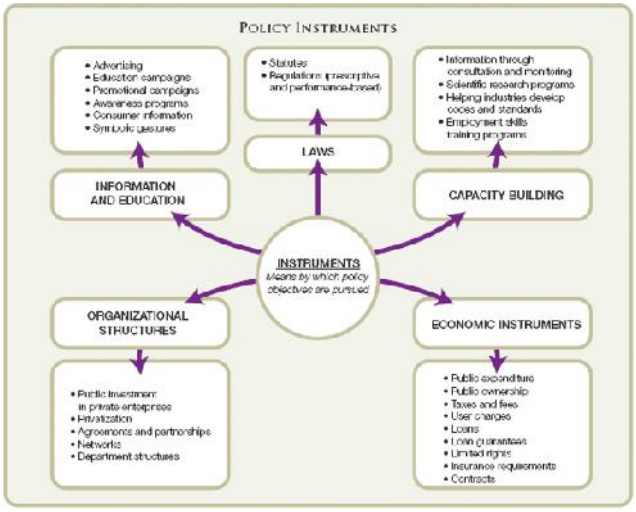
- A long-term vision for economy, environment and communities – to "*recognise, understand and value the importance of our land resources*"
- A 'steering' strategy, designed to promote more integrated, innovative land use decision-making for multiple benefits – Ecosystem Approach, trade-offs…
- Regional Land Use Pilots (2) were set up to help test and operationalise the strategy
- Our research is supporting implementation by developing /analysing approaches, trade-offs, tools and governance.

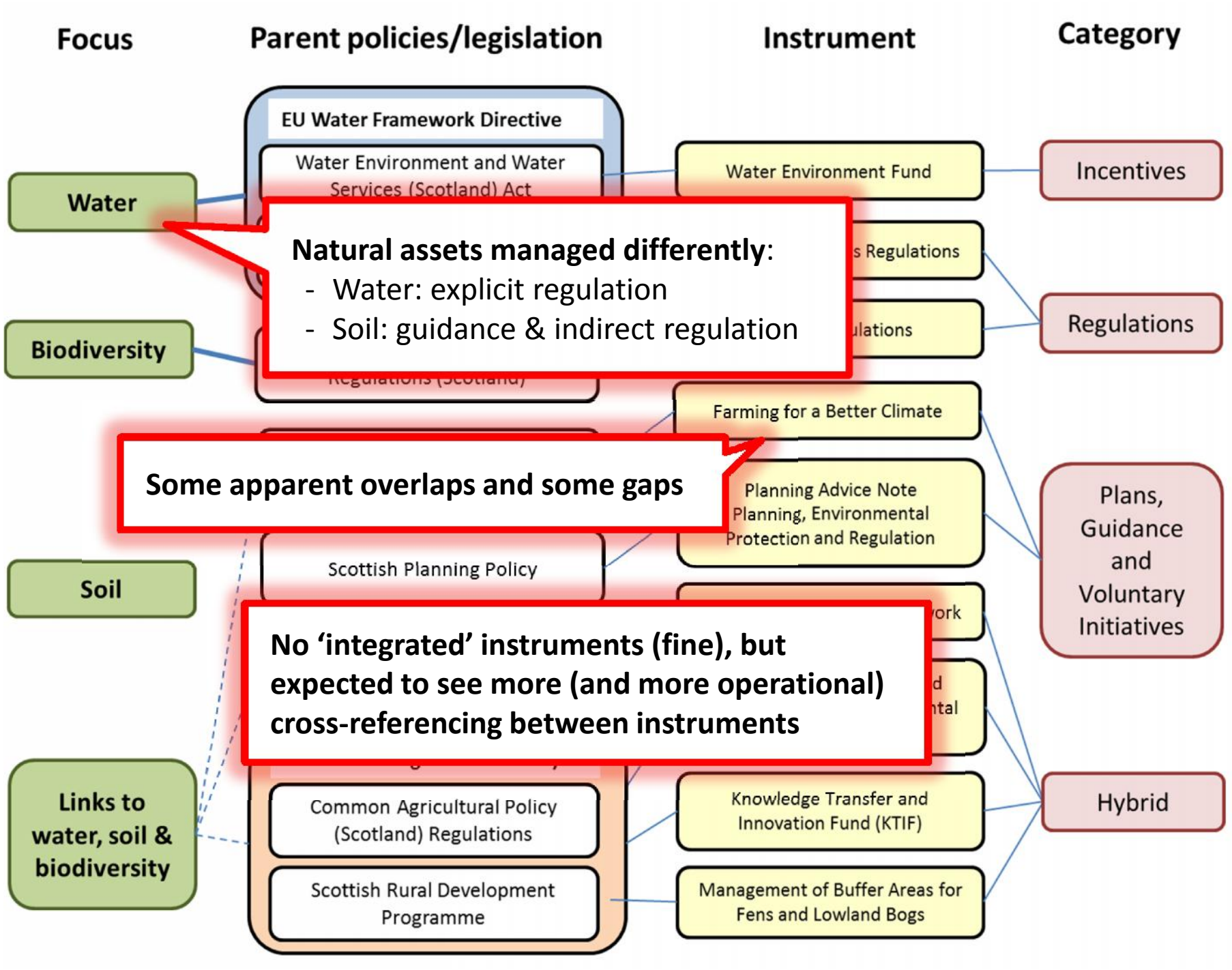




Integrated strategic visions need good policy integration…

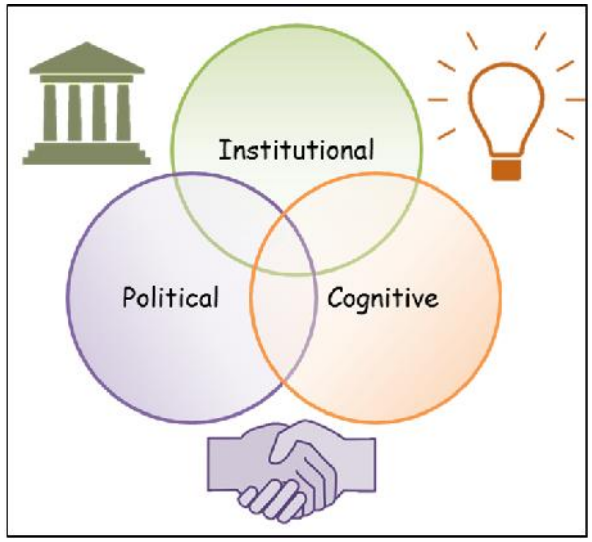
- LUS – strong strategic vision and ‘steer’, but do we have appropriate policy instruments to help deliver multiple benefits and address trade-offs?
- Highly ‘crowded’, complicated network of policy instruments – can lead to perceptions of ‘policy conflicts’
- Our research: examining policies affecting water, biodiversity and soil – selected 10 instruments (>50!) covering incentives, regulations and advice:




Focus
Parent policies/legislation
Instrument
Category
EU Water Framework Directive
Water Environment and Water Services (Scotland) Act
Water
Biodiversity
Soil
Links to water, soil & biodiversity
Water Environment Fund
Incentives
s Regulations
ulations
Regulations
Natural assets managed differently:
- Water: explicit regulation
- Soil: guidance & indirect regulation
Farming for a Better Climate
Some apparent overlaps and some gaps
Planning Advice Note Planning, Environmental Protection and Regulation
Scottish Planning Policy
Plans, Guidance and Voluntary Initiatives
ork
d
ntal
No 'integrated' instruments (fine), but expected to see more (and more operational) cross-referencing between instruments
Common Agricultural Policy (Scotland) Regulations
Scottish Rural Development Programme
Knowledge Transfer and Innovation Fund (KTIF)
Management of Buffer Areas for Fens and Lowland Bogs
Hybrid

Improving delivery – key issues

- Doing things ‘differently’ is not always easy… needs time and skilled input
  - e.g. introducing the Ecosystem Approach has many ‘sticking points’ – need to be identified and addressed
- New approaches are not ‘silver bullets’ (e.g. PES) - their pros and cons need to be well understood before application
- Important to exploit ‘windows of opportunity’ – i.e. when problem, politics and capacity align…



Data, approaches and tools to inform and support land use policy in Scotland

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- Mapping natural capital – what, where, what 'state'?
- Ecosystem Services (actual, potential)
- Global change context…
- Stakeholder analysis – how and where used and by whom? Impacts? (spatial and temporal)
- Governance – authority, decision-making, accountability (regulatory context; social structure; decision-makers; critical issues…)

Data integration via modelling

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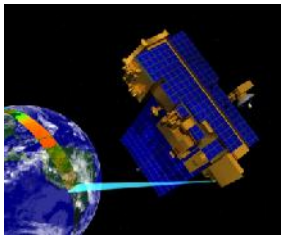
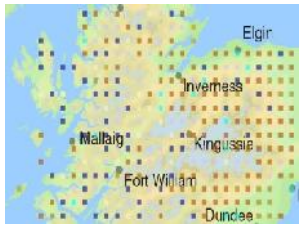
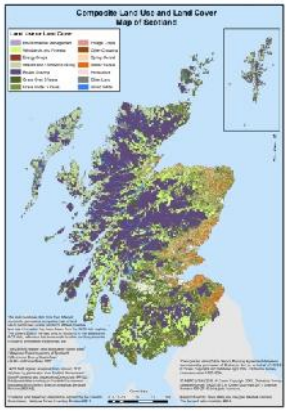


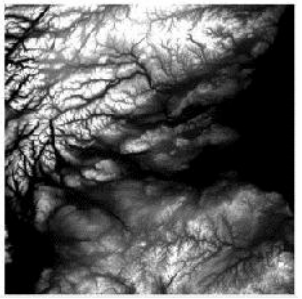
Earth Observation
MODIS
Landsat
Sentinel1 (radar)
Sentinel2 (optical)



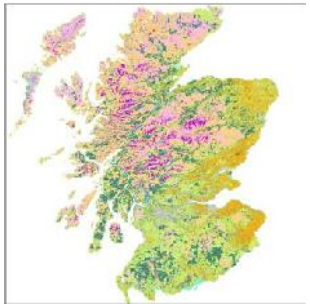
Soil
NSIS Soil Properties database



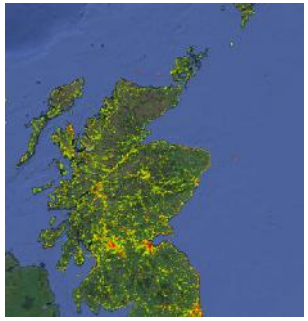
Land Cover/Use
LCM2007
Forest Inventories
Agric census data



Digital Terrain Model
50m to 5m

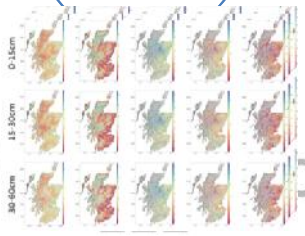


Natural Heritage
Habitats
Protected areas
Spp. distributions
Cultural artefacts



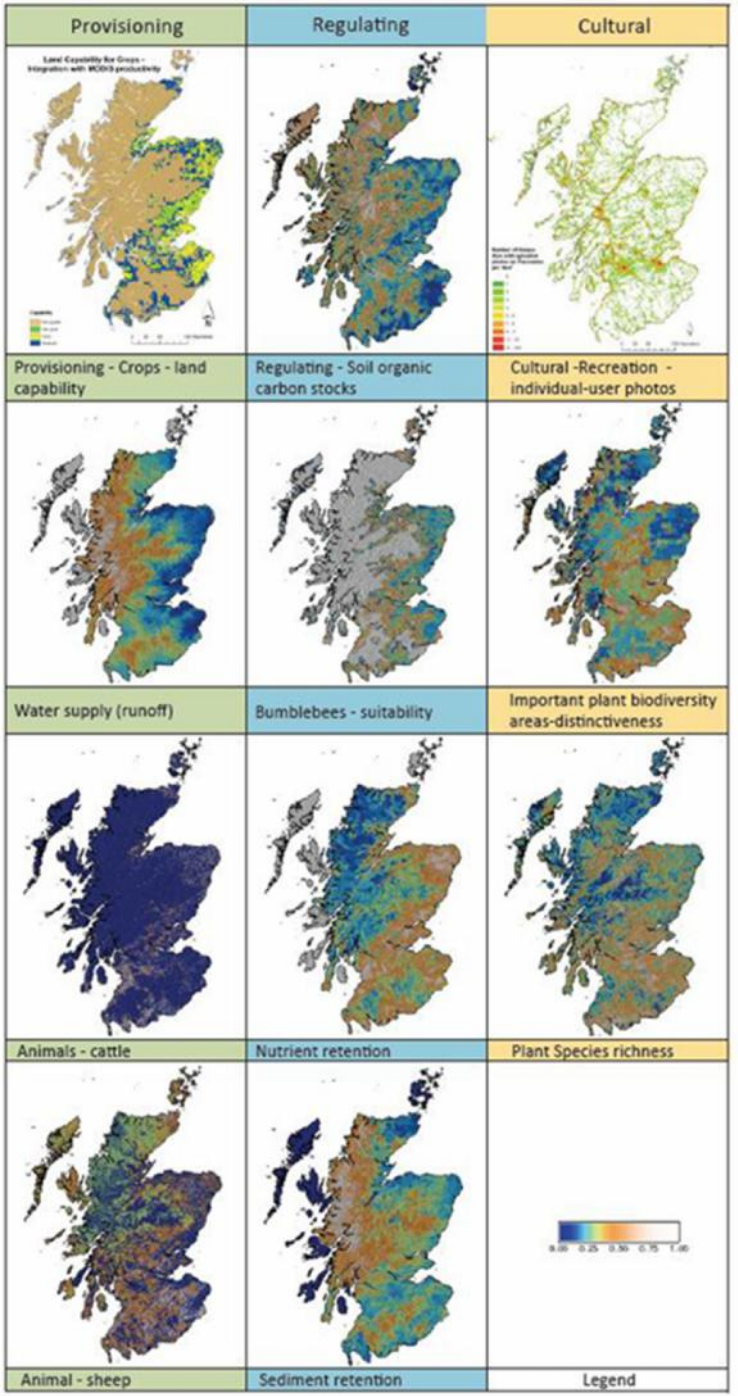
Volunteered Geographic Information
Photos submitted to Google Earth

Models



Land use options tool – MELODIC

- Interactive, web-based mapping tool to support deliberations about land use decisions for multiple benefits
- Produces ES-derived ‘opportunity maps’ – individual and combined functionality and trade-offs
- Users can explore different priorities (personal, policy) and visualise the consequences for land use/ES delivery
- Main limitation: data (esp. local scale).



Example output – forest expansion with focus on enhancing water cycling

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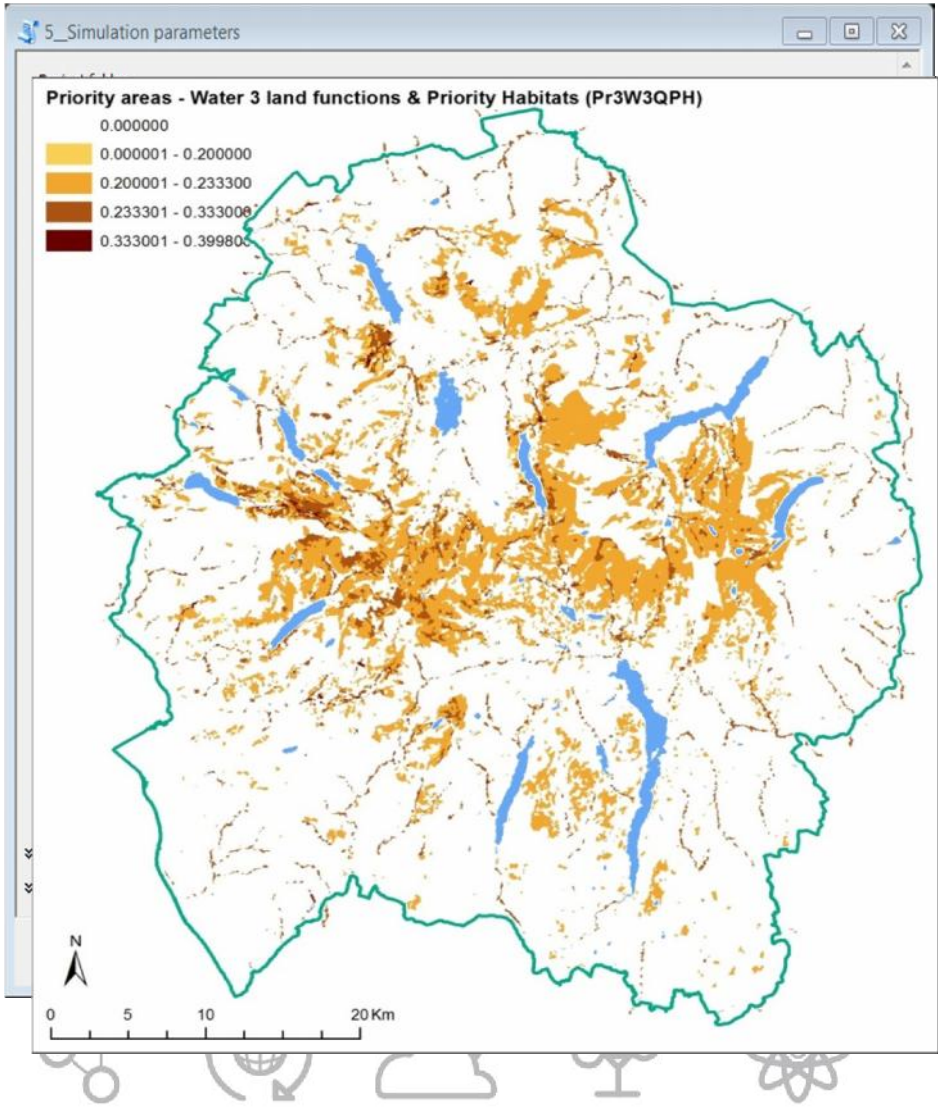
- Three land-water functions with equal weights:
  - water cycling – purification
  - water cycling – nutrients
  - erosion regulation
- Woodland expansion (10,000ha)
- No arable decrease
- No LU change in Protected Areas

Powerful aid to decision-making.



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Perceptions, preferences and needs

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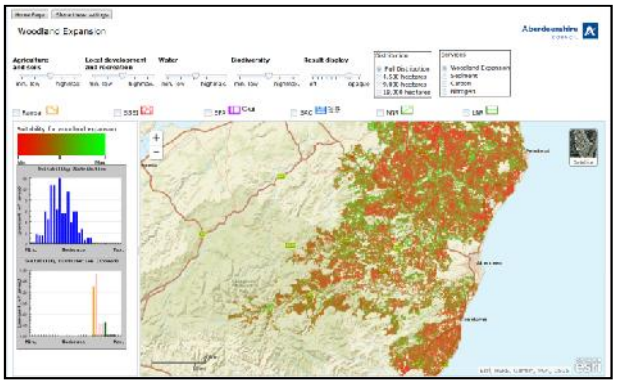
- Socio-ecological systems cannot be optimised to specific 'best' outcomes – people have different preferences, needs and perceive trade-offs differently…



- Critical elements for application of tools:
  - Defining multiple criteria in decision-making and allowing stakeholders to weight them according to their own values
  - Process of collective deliberation to achieve consensus on resolving trade-offs.

Perceptions, preferences and needs

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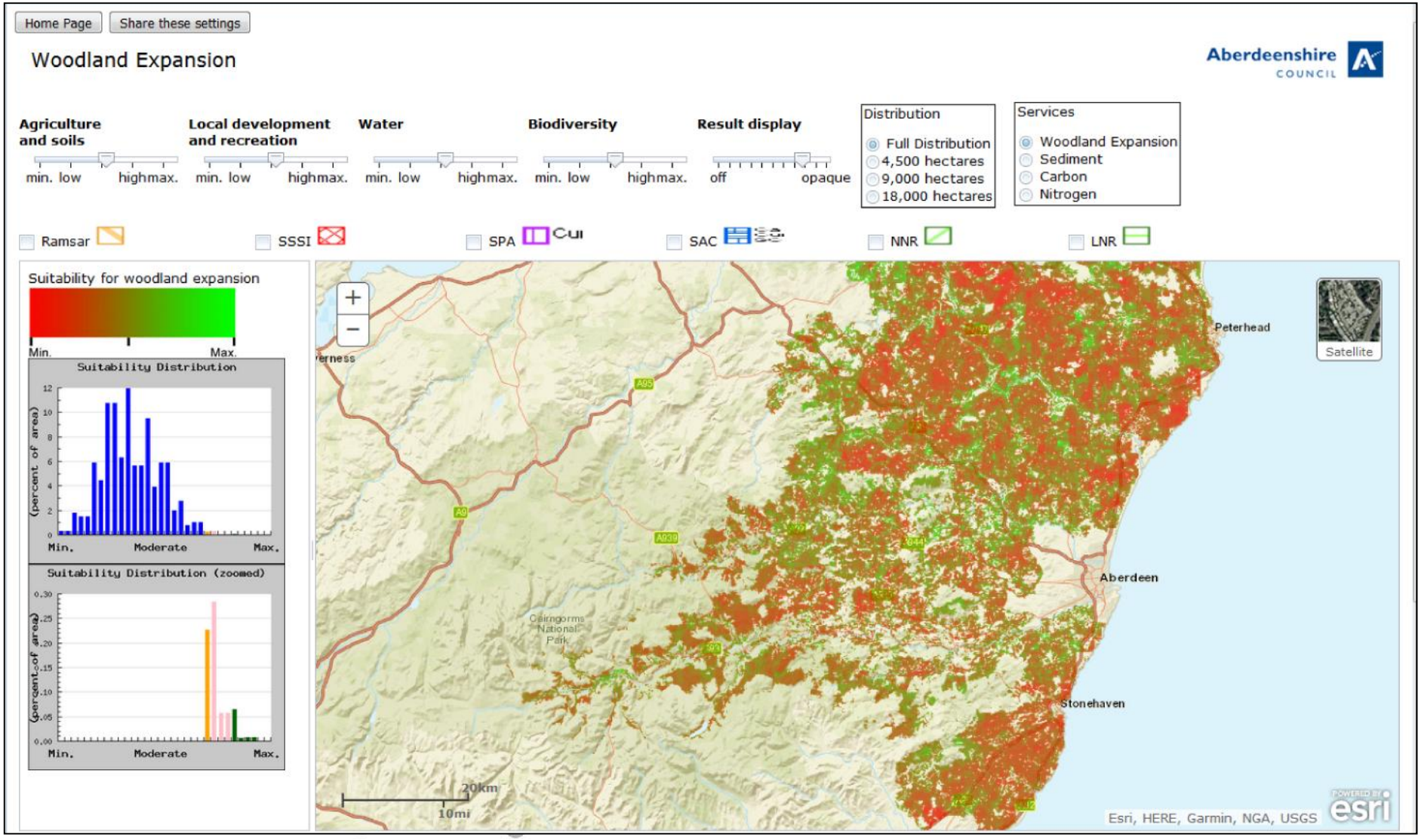

Stakeholders – participatory methods to engage with individuals and communities

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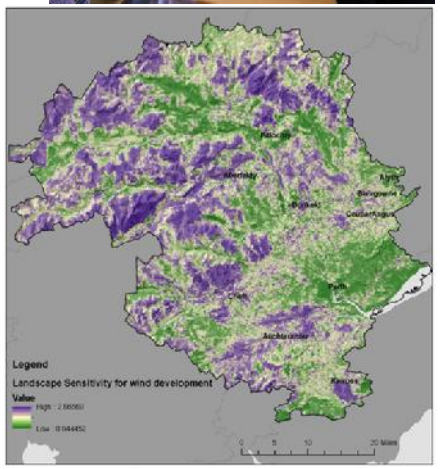
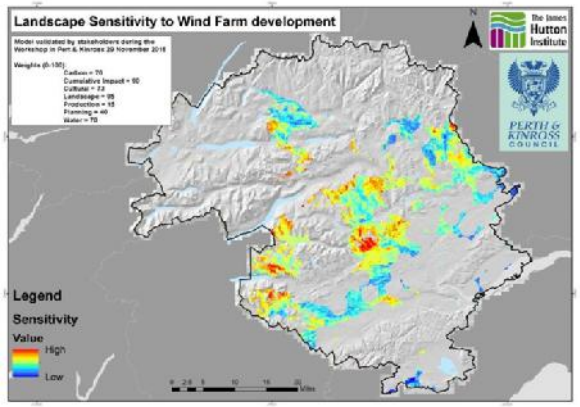
- Growing toolkit of participatory methods to facilitate collective analysis, understanding and consensus-building
- = Key component of successful application of land use mapping tools – allows exploration ***and discussion*** of consequences and trade-offs for different choices
- ES approach found to be effective at setting the context and highlighting cross-sector issues.





Summary key issues for modelling and mapping synergies and trade-offs

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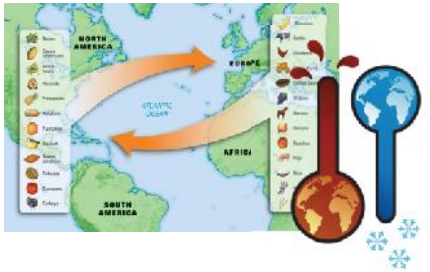

Critical requirements (not just data!):

- Understand and incorporate what and who is affected by and involved in trade-offs (e.g. forest expansion v farmland)
- Recognise the role of scale (space and time) in analysing and addressing trade-offs
- Acknowledge social and political processes of decision-making, and complexity involved in governing socio-ecological systems.

Recognising limits – hard choices

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- Some trade-offs are inevitable – synergies cannot always be found, however good the tools and deliberative processes…
- Research can provide evidence for decision-making; address uncertainty; highlight issues, etc
- BUT trade-off choices are made by: Government (policy design); Govt, NGOs, private sector (funding/other support); land managers (implementation) – with strong influence from consumers and other citizens
- Research is just part of the governance process – we must ensure that our evidence is robust, visible, effective (science-policy-practice) and influential! ☺

THANK YOU

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