Can Land Use Change safeguard the future?

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Aberdeenshire Council: Irina Birnie, James Davidson

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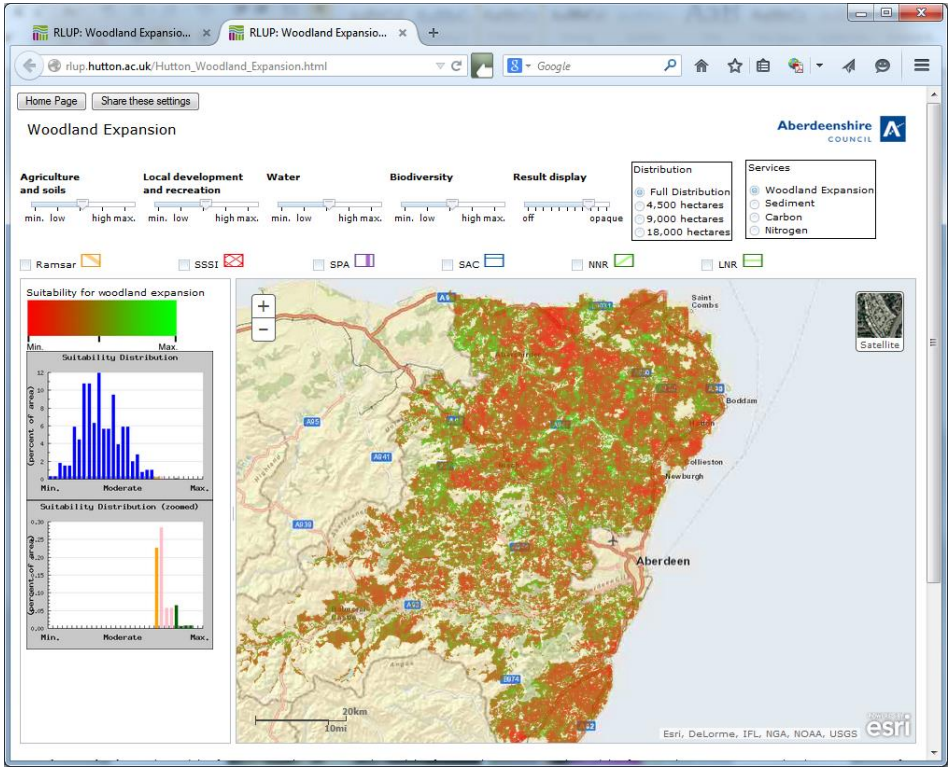
Structure:

- Rationale for the regional land use pilot (RLUP)
- Taking a strategic approach
- Applying it locally
- Messages



Land Use Strategy:
how can we reconcile these goals……

- Low carbon economy
- Safeguarding food production
- Halting biodiversity loss
- Enhancing recreation and community opportunities
- Sustainable water management

Applying an ecosystems approach to land use

Information Note

natural scotland

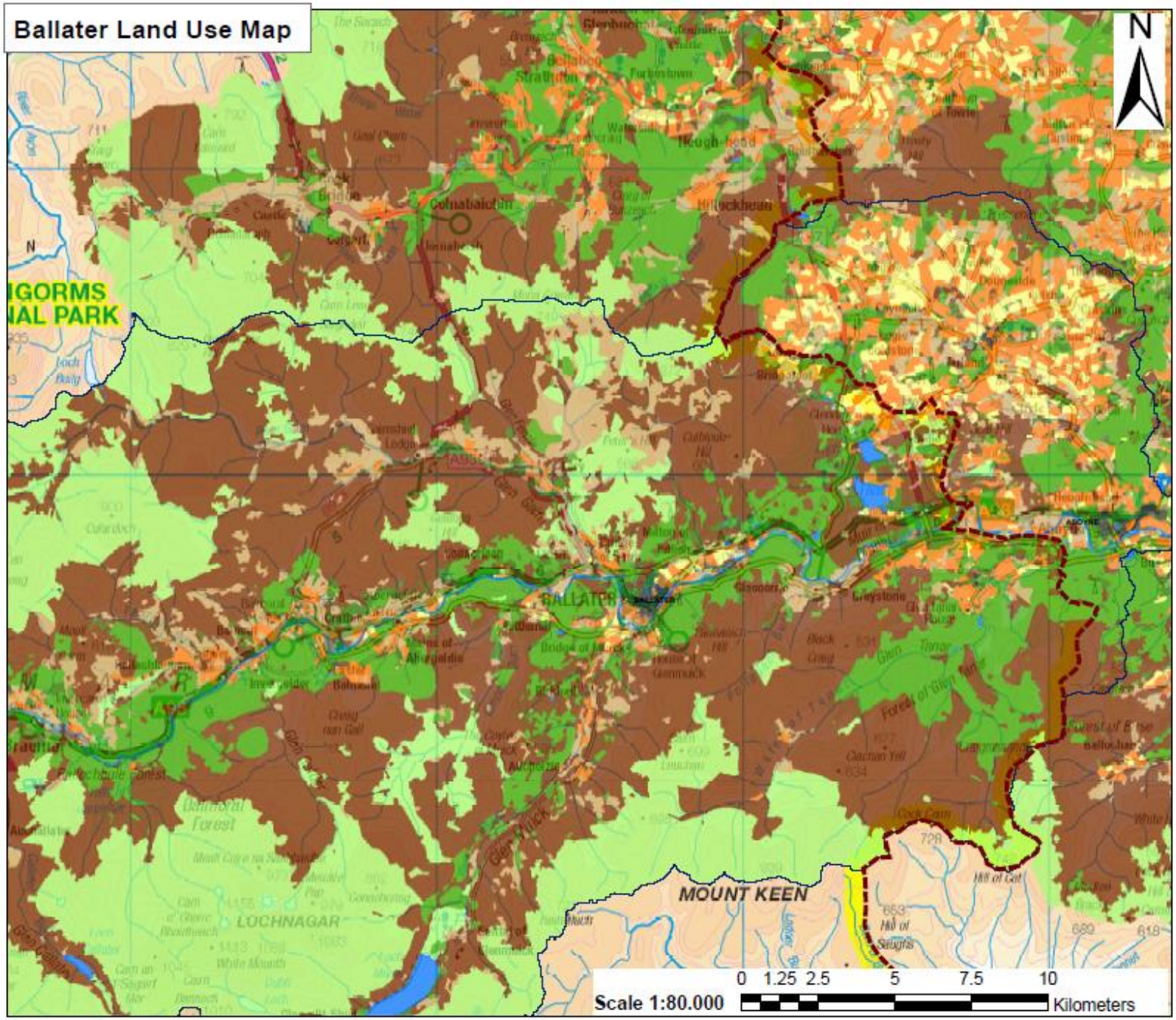
… whilst taking into account climate change?

Aberdeenshire RLUP tool

Aim: '*consider existing and future land uses in a collective and integrated way…., and to establish a mechanism to prioritise or guide decisions about possible competing or conflicting uses*'

- "…should have a strong spatial component and use ***detailed GIS*** as a basis for mapping…."
- a tool to aid decisions about ***land use change*** so as to better deliver policy objectives and highlight trade-offs, recognising ***drivers of change*** which influence land use and land use decision making
- Can we identify areas suitable for the proposed change (e.g. woodland expansion) but where other benefits (such as recreation opportunities) can be achieved or problems (such as poor water quality) reduced?

Ballater Land Use Map



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Legend

- Main Location
- Main Roads
- Dee Catchment
- Cairngorm National Park Boundary

Land Use / Land Cover

- Broadleaved woodland
- Coniferous woodland
- Arable land
- Improved grassland
- Semi-natural grassland
- Heather
- Montane, rock habitat
- Water
- Coastal
- Urban
- Suburban

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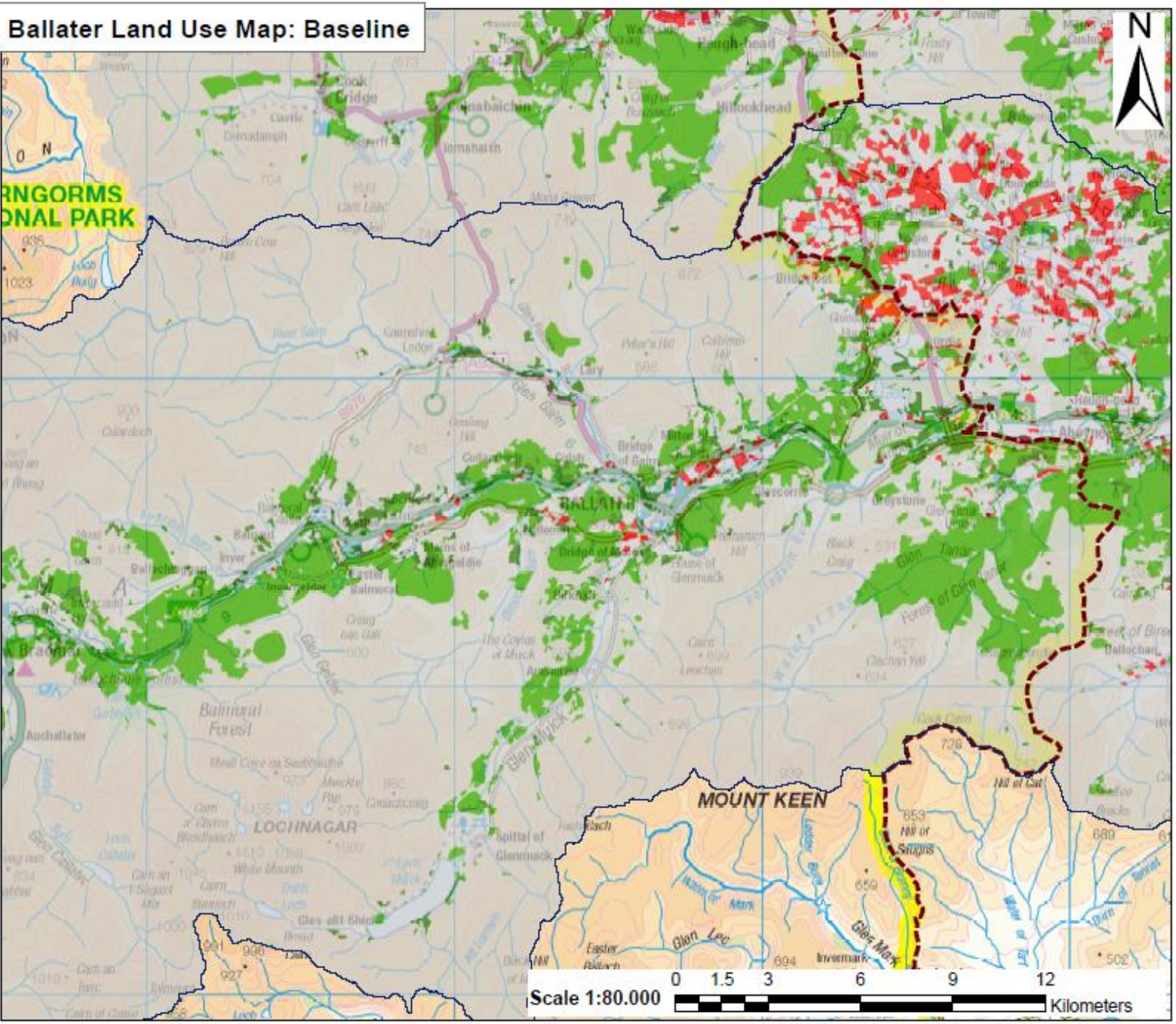
Ballater Land Use Map: Baseline



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Legend

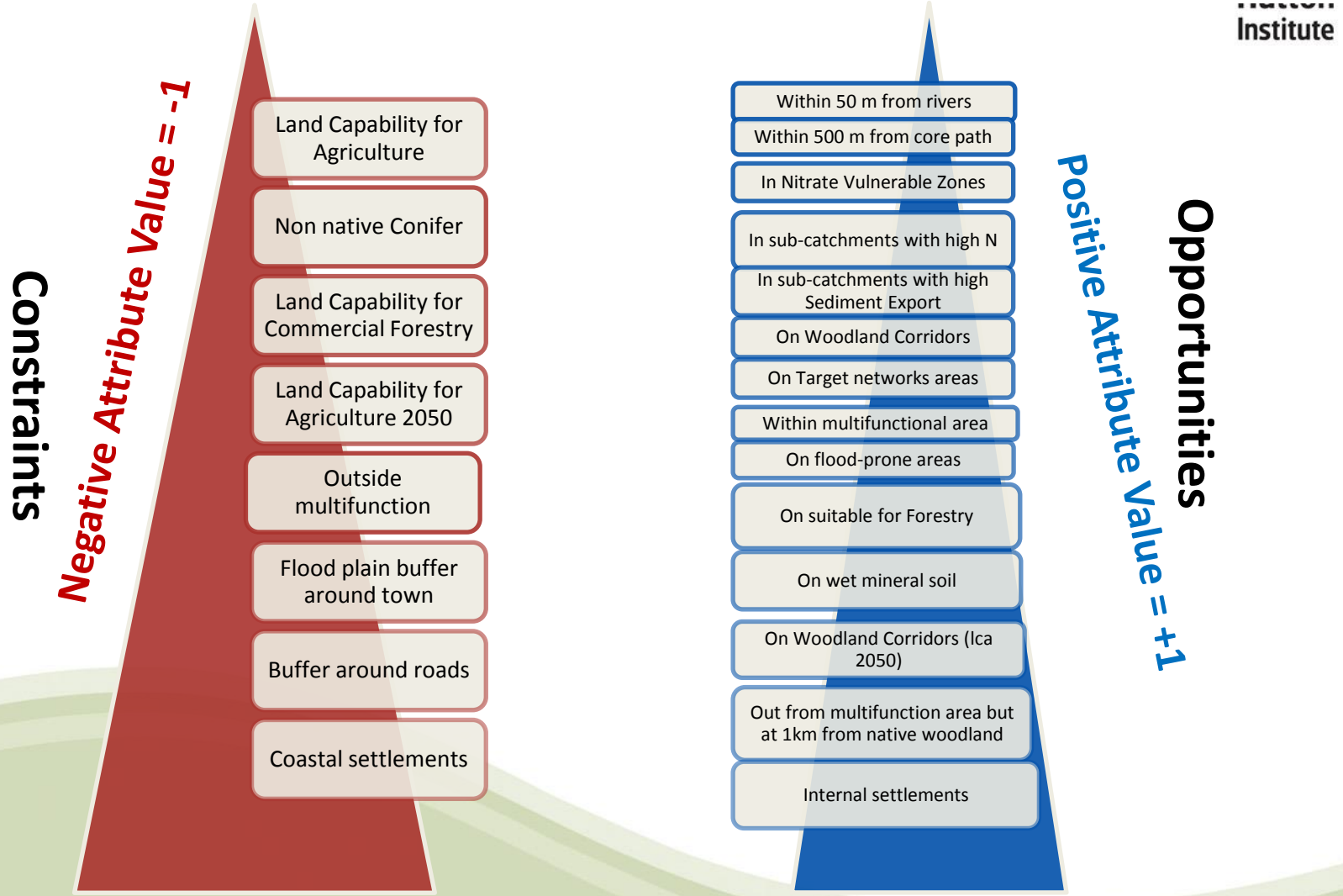
- Main Location
- Dee Catchment
- Cairngorm National ParkBoundary

Land Use / Land Cover

- Broadleaved woodland
- Coniferous woodland
- Arable
- All others

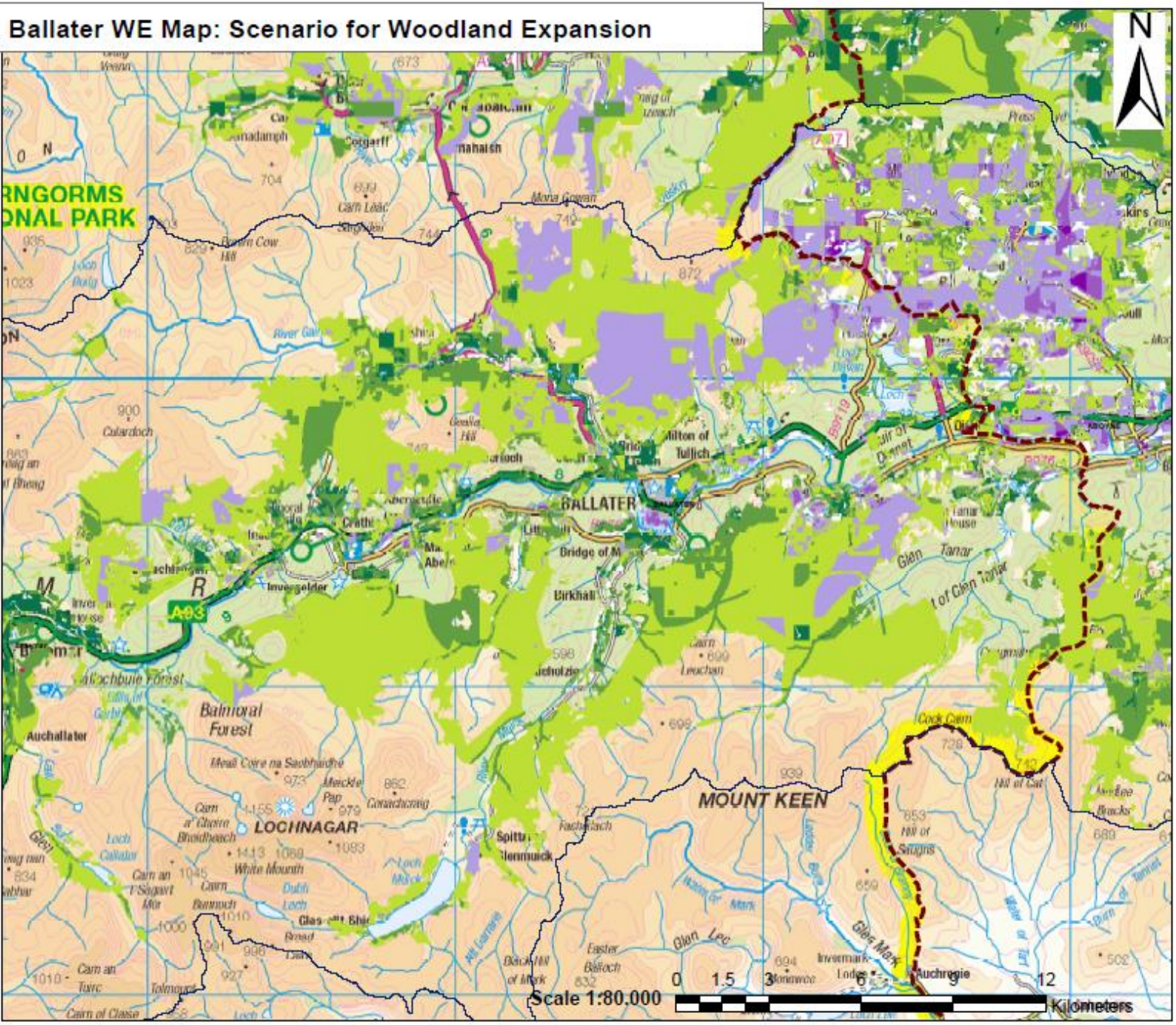
Mapped Criteria.

how well does each pixel (parcel of land) matches 22 different criteria relating to suitablititly for native woodland.
Some criteria are +ve (the pixel is more suitable for woodland than a pixel if it matches this criteria)
Other criteria are -ve (the pixel is less suitable for woodland if it matches this criteria).



The tool predicts this for all pixels in Aberdeenshire except those that are excluded such as urban areas, existing woodland, montane habitats.

Ballater WE Map: Scenario for Woodland Expansion



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Legend

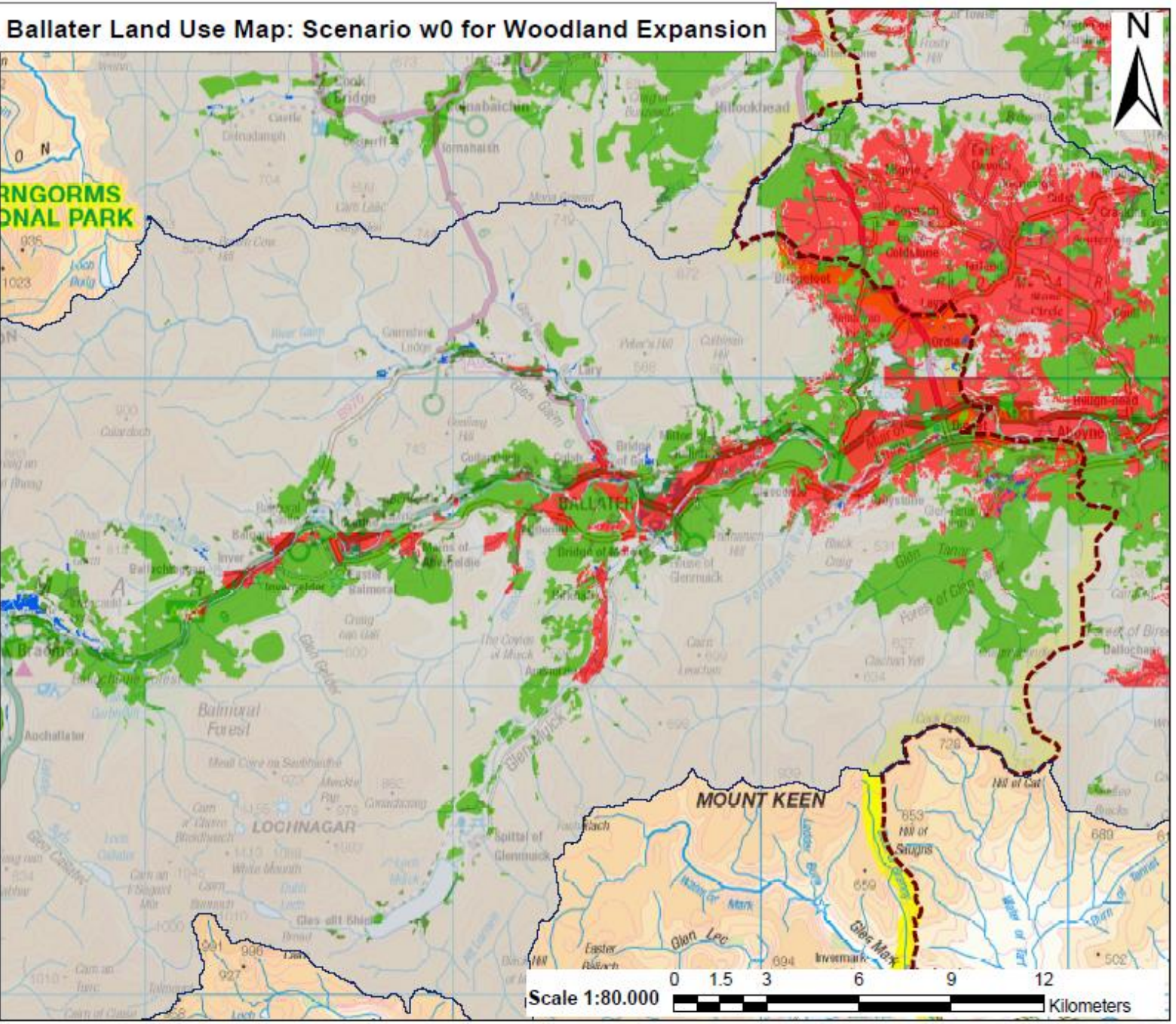
- Main Location
- Dee Catchment
- Cairngorm National ParkBoundary

-627 - -330
-329 - -176
-175 - -47
-46 - 1
2 - 103
104 - 252
253 - 693

Positive (sum = -1) and Negative (sum = +1) Criteria for Woodland Expansion Model (Native Broadleaved only)

Negative	Positive
Outside multifunction	Within 50m from rivers
Non native Conifer	Within 500m from core path
Land Capability for Commercial Forestry	In Nitrate Vulnerable Zones
Land Capability for Agriculture 2050	In sub-catchments with high N
Land Capability for Agriculture	In sub-catchments with high S
Flood plain buffer around towns	On woodland corridors
Buffer around roads	On target network areas
	Within multifunctional areas
	On flood-prone areas
	On suitable for forestry
	On woodland corridors (loa 2050)
	On mineral soil
	Out of multifunctional areas but 1km distance from native woodland
Each weights values 1/7 = 0.143	Each weights values 1/13 = 0.077

Ballater Land Use Map: Scenario w0 for Woodland Expansion



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Legend

- Main Location
- Dee Catchment
- Cairngorm National ParkBoundary

Land Use / Land Cover

- Broadleaved woodland
- Coniferous woodland
- Arable
- New NtvB inside conservation areas
- All others

Positive (sum = -1) and Negative (sum = +1) Criteria for Woodland Expansion Model (Native Broadleaved only)

Negative	Positive
Outside multifunction	Within 50m from rivers
Non native Conifer	Within 500m from core path
Land Capability for Commercial Forestry	In Nitrate Vulnerable Zones
Land Capability for Agriculture 2050	In sub-catchments with high N
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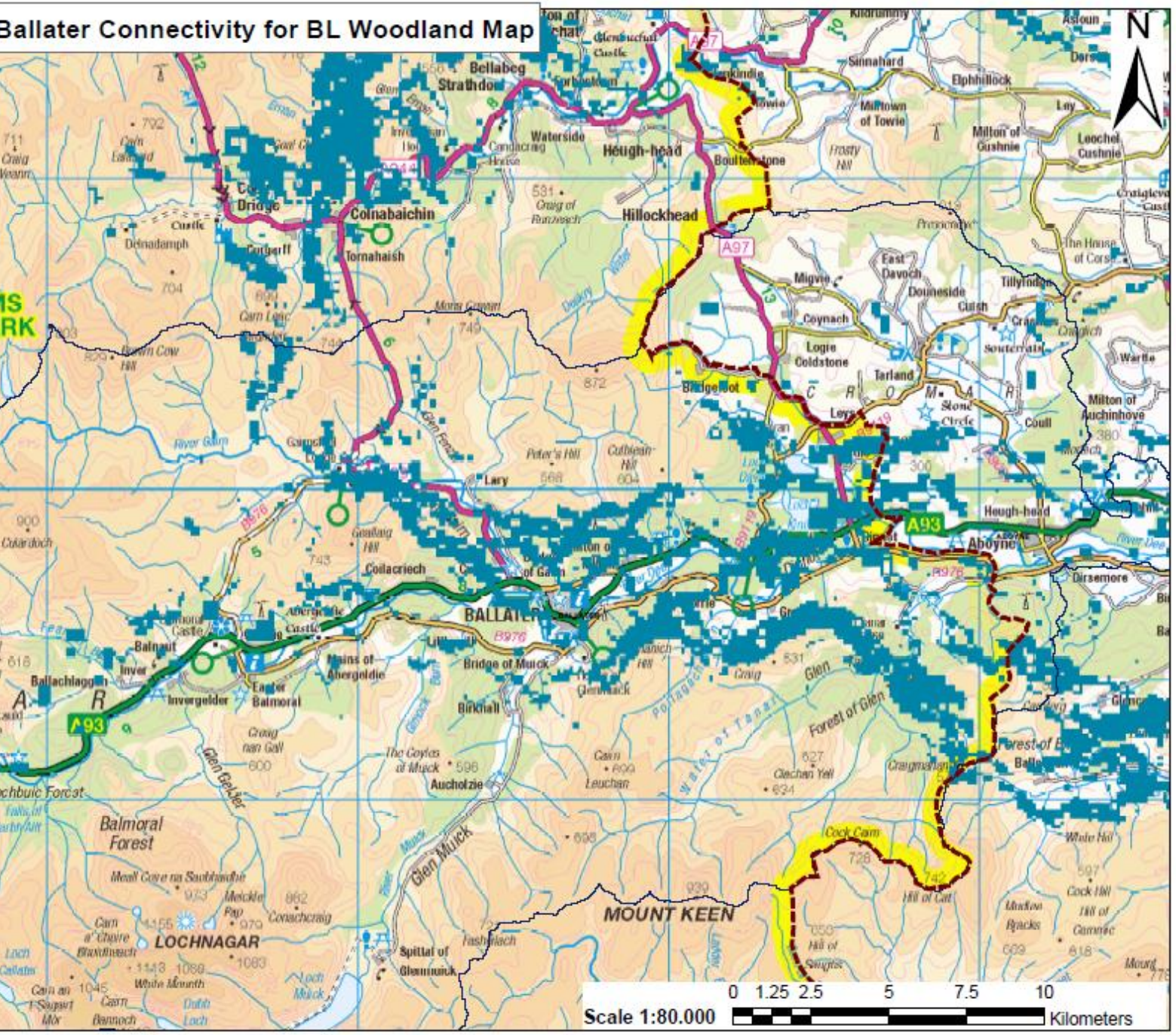
	On woodland corridors (ca 2050)
	On mineral soil
	Out of multifunctional areas but 1km distance from native woodland
Each weights values 1/7 = 0.143	Each weights values 1/13 = 0.077

Ballater Connectivity for BL Woodland Map



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rlup.hutton.ac.uk/Hutton_Woodland_Expansion.html

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Woodland Expansion

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Agriculture and soils min. low high max.

Local development and recreation min. low high max.

Water min. low high max.

Biodiversity min. low high max.

Result display off opaque

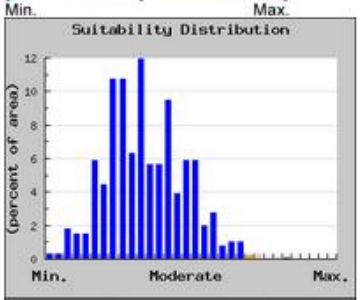
Distribution
- Full Distribution
- 4,500 hectares
- 9,000 hectares
- 18,000 hectares

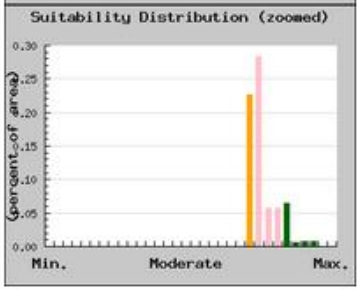
Services
- Woodland Expansion
- Sediment
- Carbon
- Nitrogen

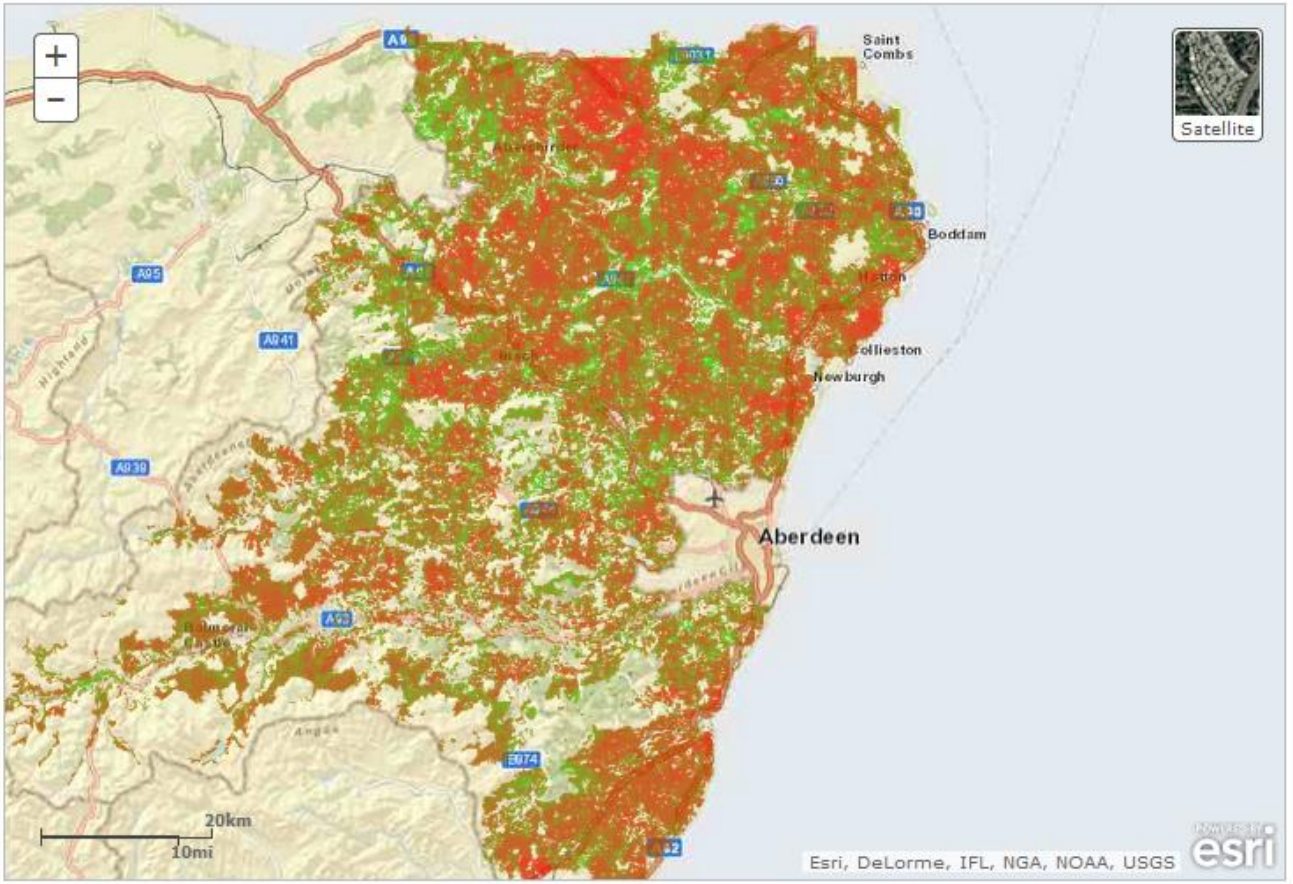
Ramsar | SSSI | SPA | SAC | NNR | LNR

Suitability for woodland expansion

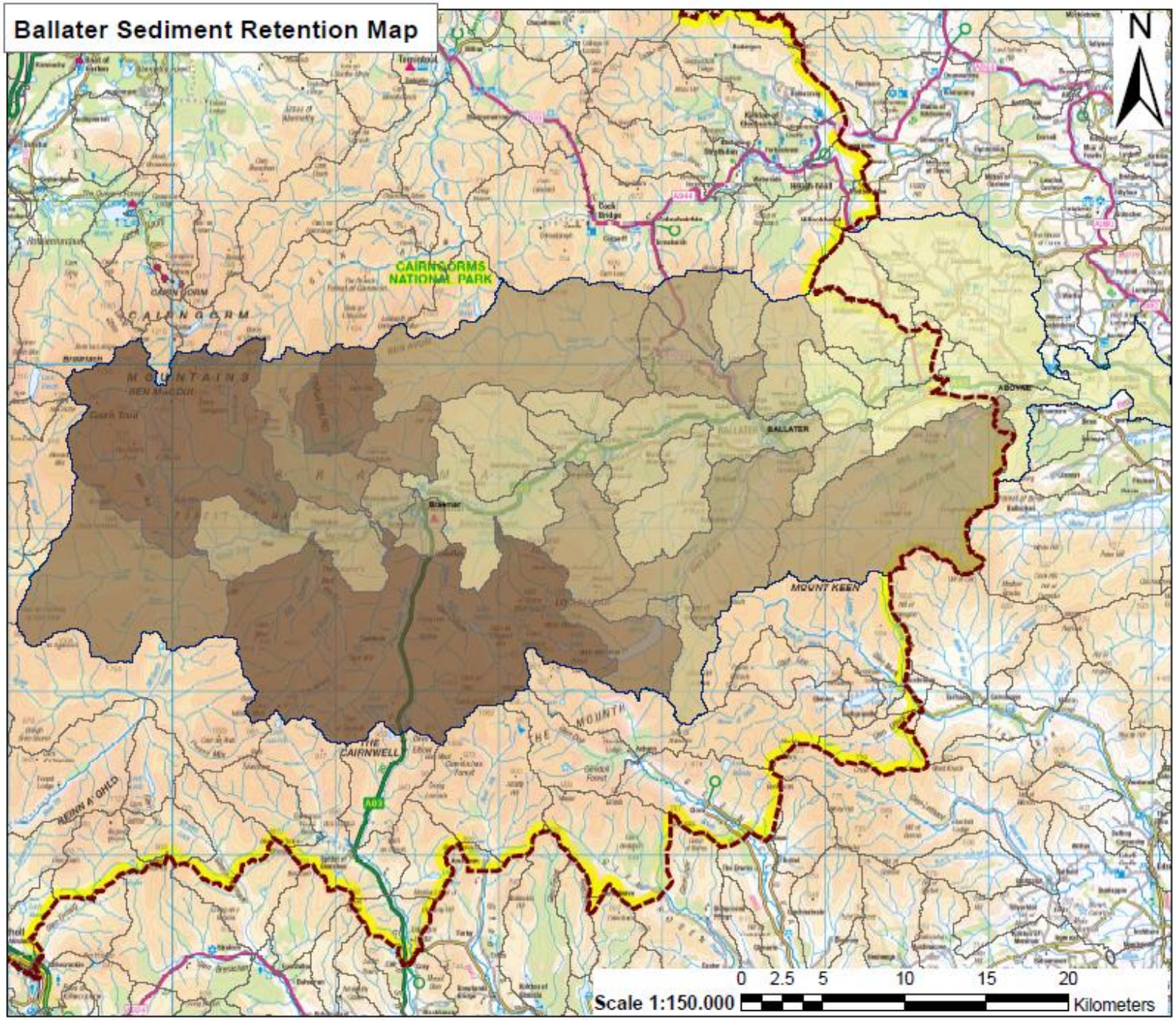
Min. Max.







Ballater Sediment Retention Map



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Legend

- Main Location
- Main Roads
- Dee Sub-catchment
- Cairngorm National Park Boundary

Sediment Retention (Kg/ha)

- 0.49 - 3.05
- 3.06 - 6.62
- 6.63 - 8.97
- 8.98 - 12.76
- 12.77 - 28.94

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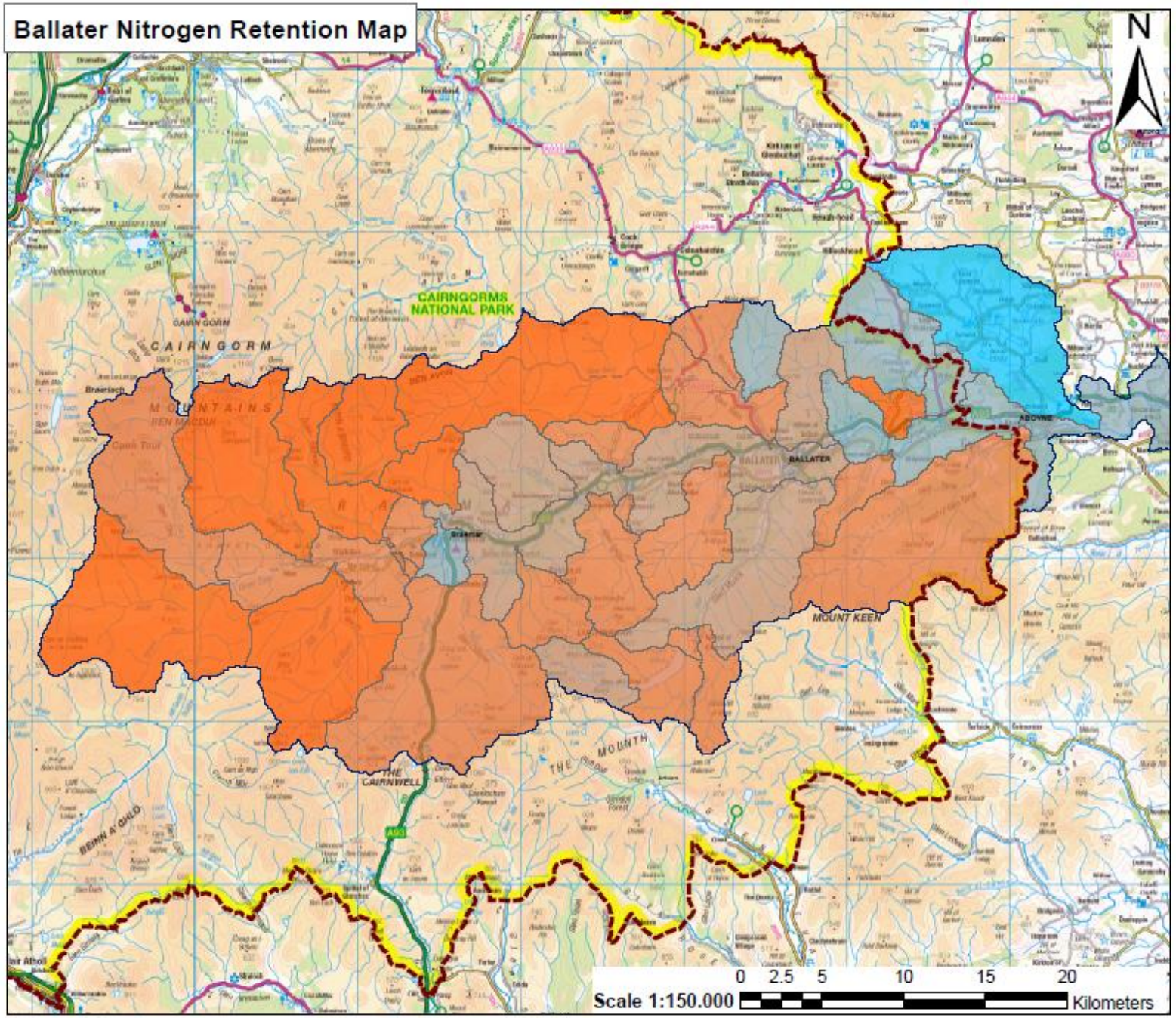
Ballater Nitrogen Retention Map



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Legend

- Main Location
- Main Roads
- Dee Sub-catchment
- Cairngorm National Park Boundary

Nitrogen Retention (Kg/ha)

- 12.71 - 21.9
- 21.91 - 26.88
- 26.89 - 37.98
- 37.99 - 65.92
- 65.93 - 110.33

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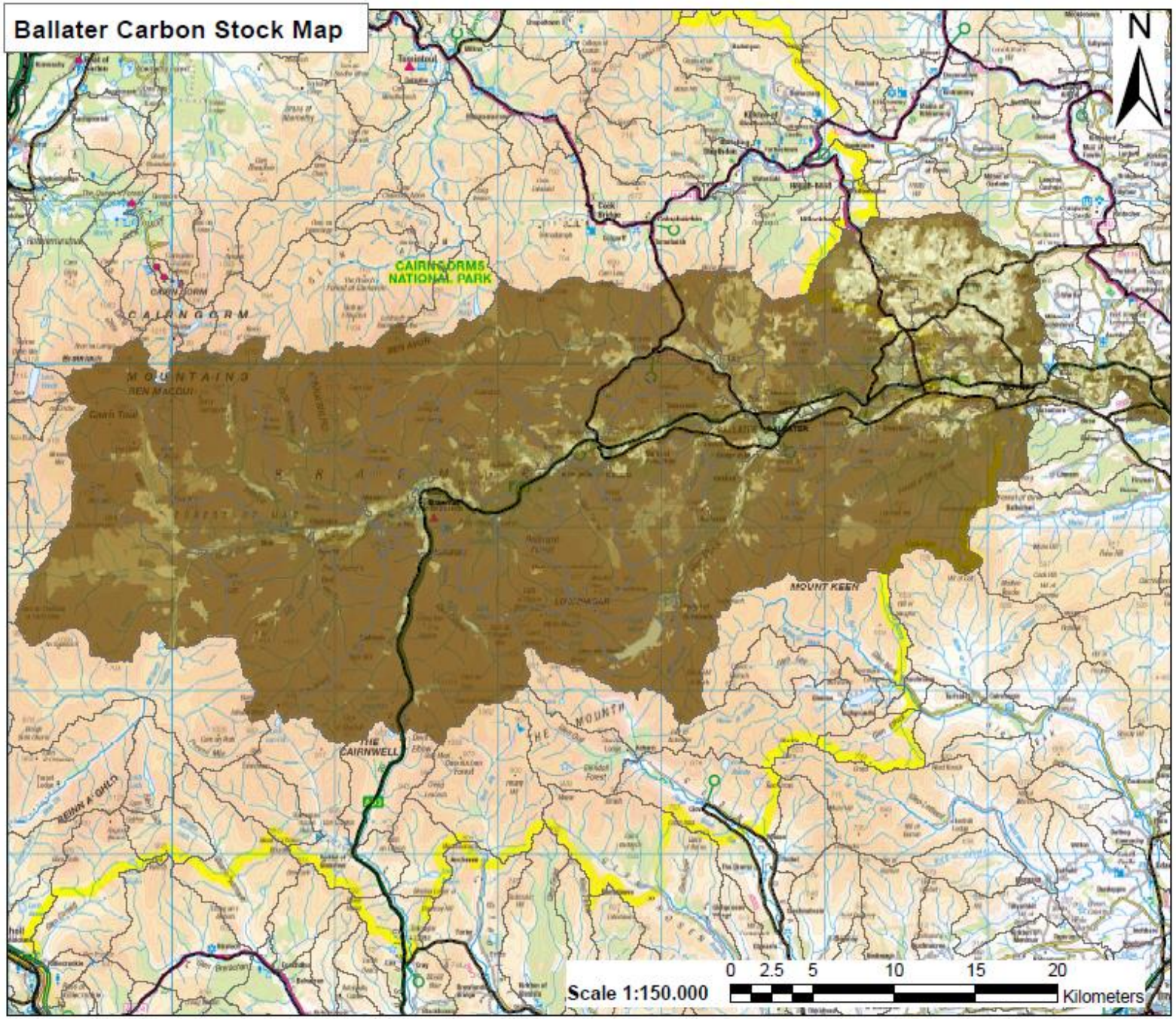
Ballater Carbon Stock Map



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Legend

- Main Location
- Main Roads
- SEPA sub-watershed

Carbon Stock (Tons CO2-eq/ha)

- 49.56 - 57.8
- 57.81 - 106.42
- 106.43 - 180.59
- 180.6 - 206.96
- 206.97 - 259.7

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Conclusions (from a strategic perspective)…

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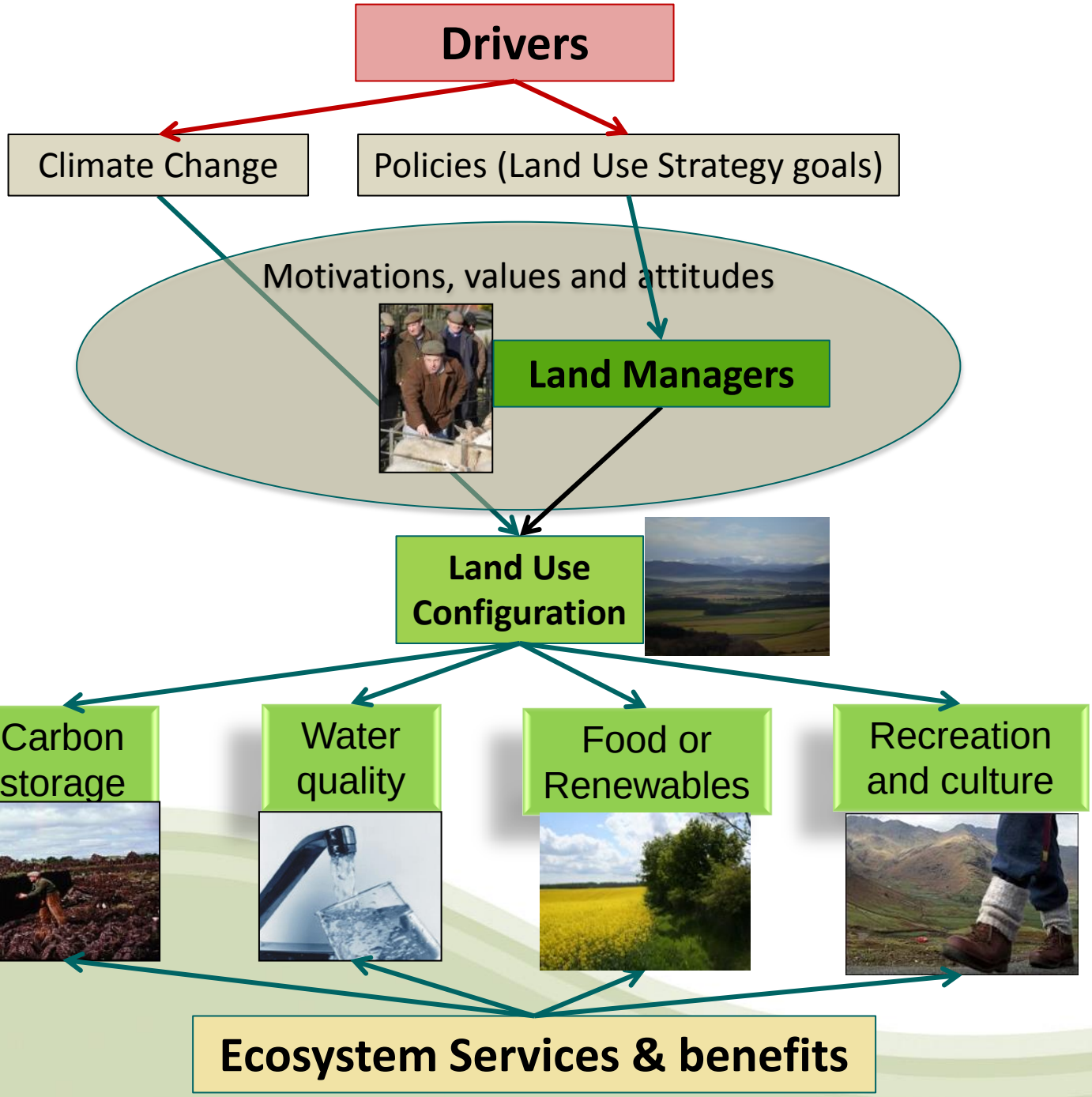
The tool explores how policy priorities may affect land cover under a medium climate change scenario (2050) **prompting users to think about change** and its implications

The tool allows the user to **visualise in a relatively simple way, large amounts of data and complex calculations** that link land, water, access, carbon and biodiversity issues**.**

The tool is interactive: tool **users have the option to reconfigure the map** by up or down-weighting some of the criteria

The tool could help planners to identify areas where land use change could **deliver multiple benefits**, and to explore the **consequences of pursing different policy goals** on other benefits these ecosystems provide.



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Applying the Strategic plans locally:

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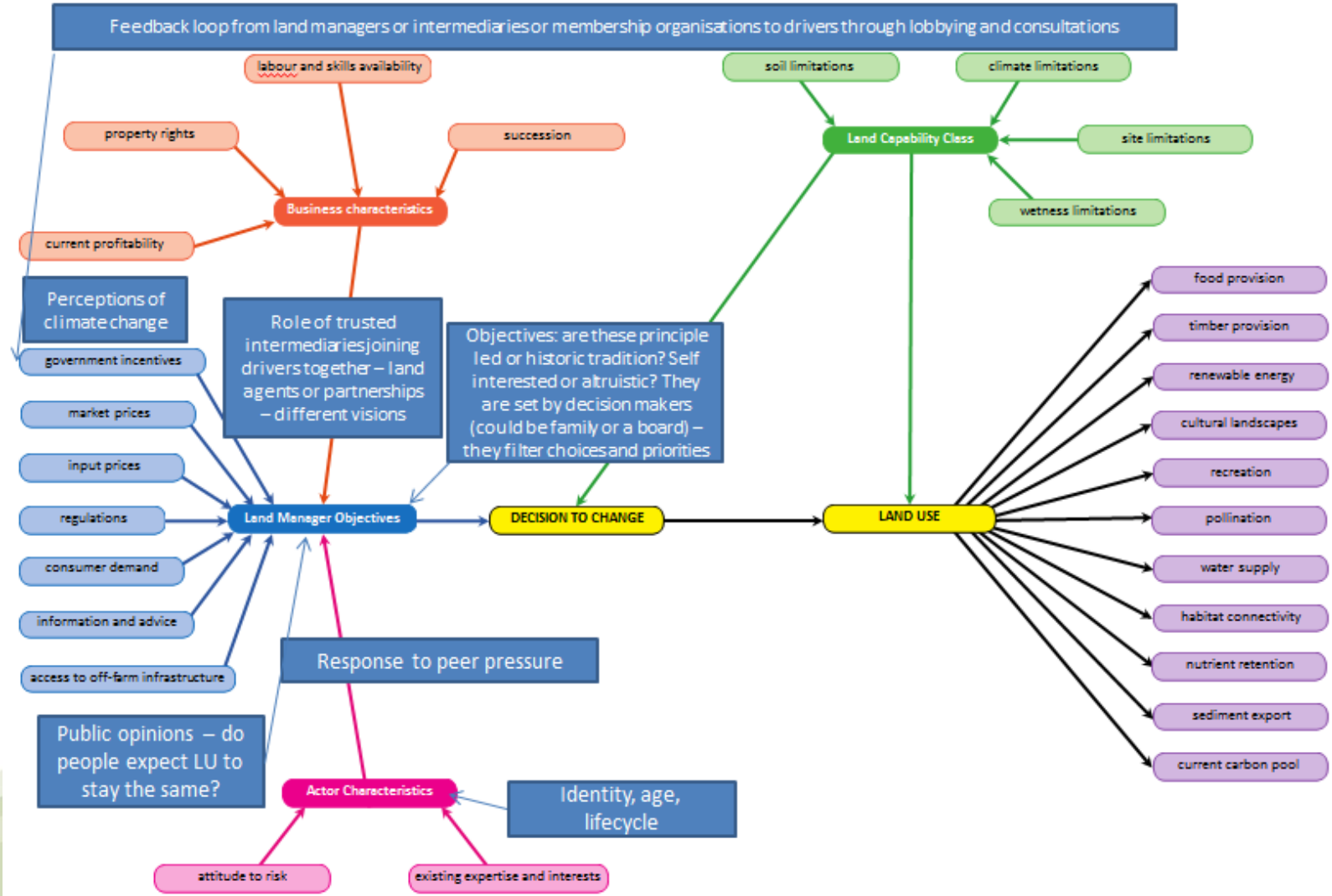
To address this we engaged with the land managers and other stakeholders in the local focus areas (inc upper Dee area inside CNP)

- Benefits from the area
- Drivers that affect their decision making,
- Evaluation of potential future scenarios

But,

- Tool is not complicated enough!!!
- Only considers land use change: *and not land management*

Complex Systems



Missing feedback loops:

- quality and quantity of services should inform drivers and decisions

Decisions over land use in the future is complex

- We **do not know** what the future holds
- We do know that there is **likely to be some change** e.g. climate, Common Agricultural Policy, world market prices, population expansion
- **Need to plan** for the future so that land use continues to provide what society needs (i.e. both public and private benefits),
- Can we **identify issues and problems** and maybe plan to reduce the impact of these?

Scenarios

Explore three plausible future scenarios.

- ……evaluating and comparing them allows us to **consider the consequences** of current drivers on a broad range of objectives in the future
- Taking into account climate change (median for 2050: warmer overall, wetter winters, drier summers)
- This is not about defining an ‘optimal’ strategy but sets out to explore the implications of policies aimed at managing for multiple benefits

Possible future scenarios

Aspects	Go With The Flow	Nature@Work	World Markets
Policy Direction	Sustainable intensification – **balancing increasingly productive land use with environmental minimum standards** for water and protected areas	Push to **maximise delivery of multiple benefits whilst protecting natural capital**;	Belief in global market forces - presumption that **the most efficient practices will persist** etc
Incentives	Slowly moving away from production subsidies to incentivising environmental outcomes	environmental incentives increase and food production only incentivised where it also produces other environmental benefits	Removal of all incentives – the market will reward high value commodities; payment for ecosystem services schemes to ensure clean water, etc
Regulations	Maintain environmental, food health and biosecurity standards in line with European Directives	Strengthened. Fines for land managers if other services fall below a certain level	Removal of all environmental , food and biosecurity regulations – the market will reward 'clean' producers
Input Prices	fluctuating with increased fuel costs slightly offset by renewables	Increase markedly due to low carbon economy	Lowering of input prices due to fierce competition and cheap biofuels
Commodity Prices	Low prices paid to land manager but off-set by SFP (see incentives above)	Premium prices paid for locally produced food, timber and energy	large units producing quantities of low value products for major retailers;

Evaluation criteria for the future

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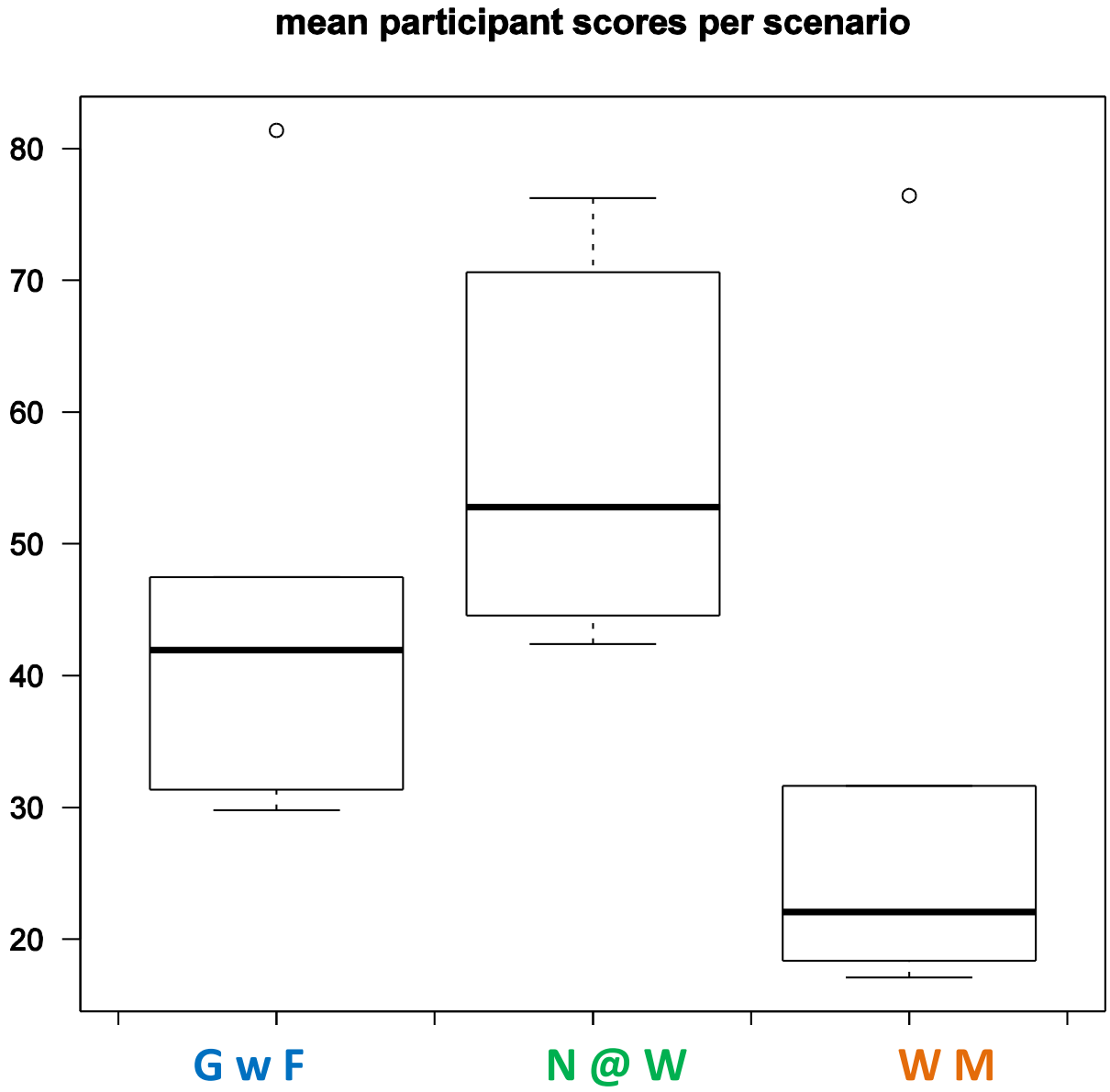
Criteria from the previous two workshops

Economic criteria	Social criteria	Environmental criteria
• Infrastructure provision • Availability of labour and skills • Income generation • Control of pests & diseases • Local energy security	• Health and well-being • Landscape beauty • Access to recreational opportunities • Environmental awareness • Local community cohesion	• Carbon capture • Sediment retention on land • Nutrient retention on land • Protected species conservation • Protected habitat conservation

Best future option given the criteria



Impact on regulating services

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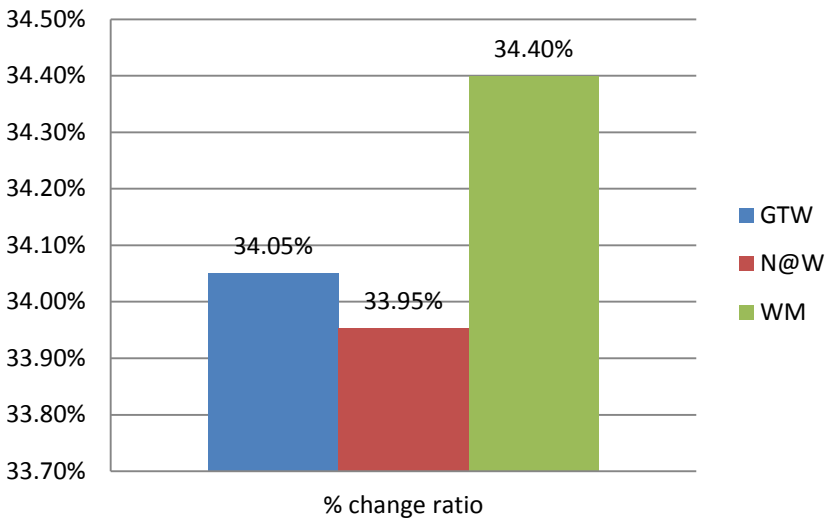
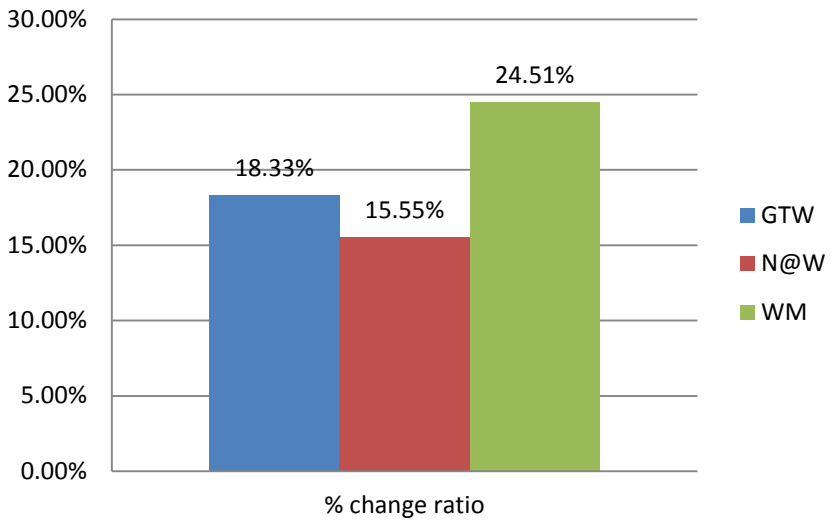
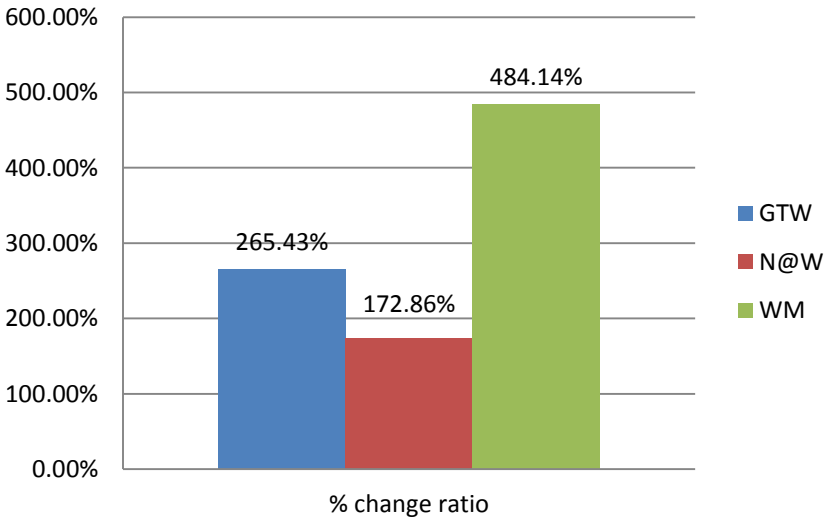
Sediment Export from Baseline %



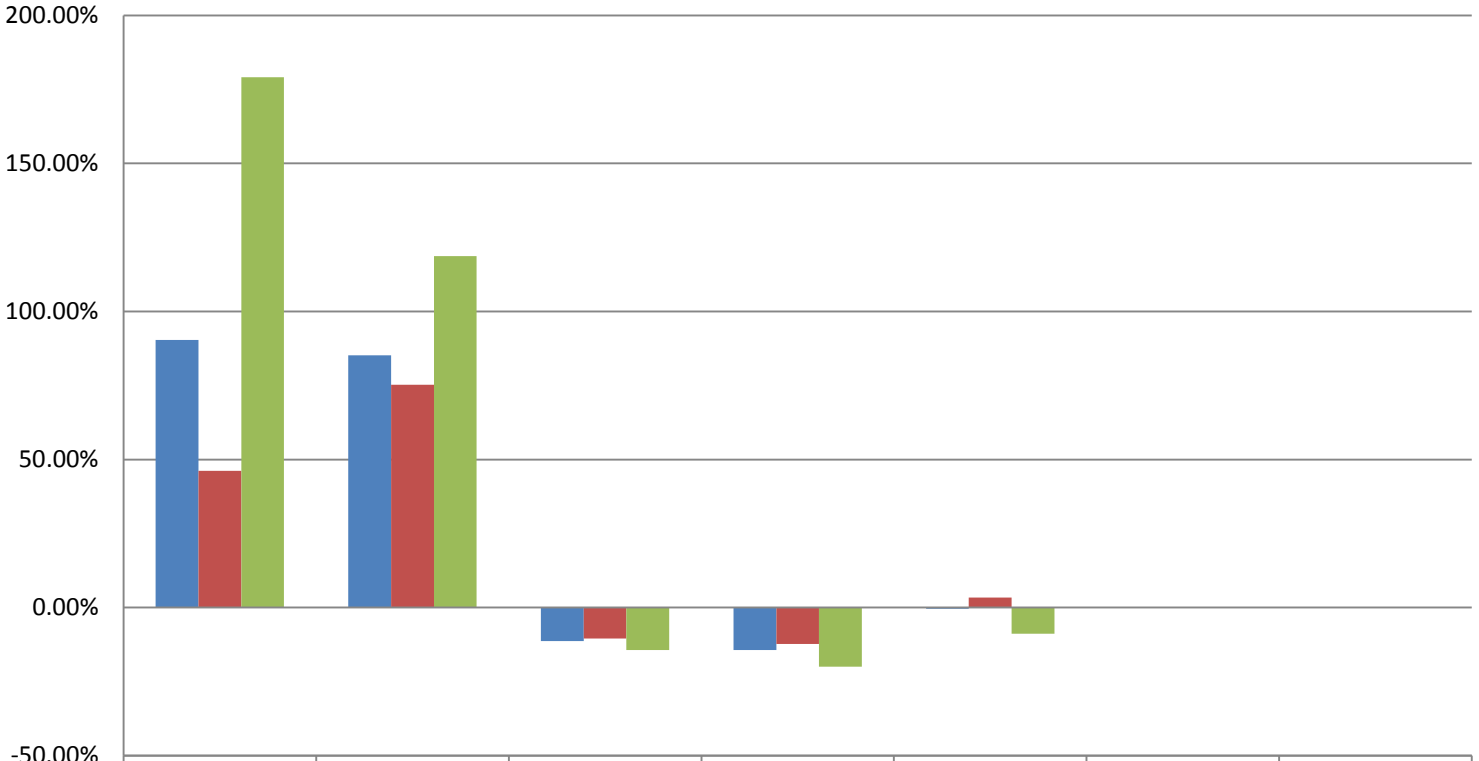
Nutrient Export from Baseline %



Carbon Emission from Baseline %



What changes in Land Use*



	% arable	% improved grassland	% semi-nat grassland	% rough grazing	% woodland	% other	% development
GWTF	90.40%	85.21%	-11.32%	-14.38%	-0.41%	0.00%	0.00%
N@W	46.18%	75.27%	-10.45%	-12.26%	3.36%	0.00%	0.00%
WM	179.10%	118.67%	-14.32%	-19.94%	-8.80%	0.00%	0.00%

* Analysis focussed on those likely to change their land use only

Key messages from stakeholders

- *Landscapes produce bundles of ecosystem services*: (different to the sum of the individual benefits)
- Local *stakeholders understand system complexity*, could identify potential solutions and were aware of benefits arising from natural assets
- Ecosystem services *delivery depends both on land use but also on the land management* regime (this is in part responsible for the mis-match between models and local knowledge)
- *RLUP increased people's ability to think about multiple issues* associated with land use and illustrated differences and similarities in views
- Services & Benefits are at *threat from climate change*

Thank you

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Acknowledgements

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- More information at: http://www.hutton.ac.uk/research/workshops