

Aberdeenshire Regional Land Use Pilot

Consequences of future land use change under different policy priorities: the tool

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RLUP tool

- Rationale for the tool
- Brief description
- Main messages

Note:-

- This is a pilot
- Testing the concept
- Work in progress

RLUP tool

- “...a framework to support decisions about **land use change**.....”.
- “should have a strong spatial component and use detailed GIS as a basis for mapping”
- guide decisions about **land use change** in the area so as to better deliver policy objectives, reduce conflicts and maximise complementarities
- important to recognise the **drivers of change** which influence land use and land use decision making in an area (2050 horizon)
- Effectiveness means identifying areas that are appropriate for the proposed change (e.g. woodland expansion) but where other benefits (such as recreation opportunities) or problems (such as poor water quality) can be identified.



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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**

Land Use Strategy goals (= complexity)

Example indicative policy issues/responses under the broad policy goals



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Low carbon economy	Safeguarding food production	Halting biodiversity loss	Enhancing recreation opportunities	Sustainable water management
<p>Increase woodland cover</p> <p>Avoid trees on deep peat soil</p> <p>Avoid woodland removal.</p> <p>80% renewable energy.</p> <p>Reducing GHG emissions.</p> <p>Mitigate the impact of timber transport.</p> <p>Peat restoration.</p>	<p>Safeguard against inappropriate use.</p> <p>Reducing GHG emissions (NO & CH4).</p> <p>Dealing with changing pests and diseases</p> <p>Appropriate crops</p> <p>GAEC</p>	<p>Farm woodland</p> <p>Protected areas</p> <p>SBS, LBAPs</p> <p>Soil functions</p> <p>Invasive, non-natives</p> <p>Deer</p> <p>Ecological networks</p> <p>Pollution</p> <p>ESA</p> <p>Aichi Biodiversity targets (CBD)</p>	<p>Avoid woodland removal</p> <p>Farm woodland</p> <p>Green space</p> <p>Livelihoods</p> <p>Cultural tradition</p> <p>Health and well-being</p> <p>Urban green space</p> <p>Access</p> <p>Tourism</p> <p>Sense of identity</p> <p>Food</p> <p>Community</p> <p>Transition network</p>	<p>Extreme weather events</p> <p>Flood prevention</p> <p>Water quality</p> <p>Pollution control</p> <p>Abstraction</p>

Land Use Strategy goals

Example indicative policy issues under the broad policy goals in the LUS



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Some of the 22 criteria in the tool



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Policy Scenarios (starting points)

- 1. Woodland Expansion** This scenario illustrates the suitability of each parcel of land for change to native woodland as assessed by 22 policy relevant criteria (Criteria are equally weighted).



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Setting priorities:

The user can produce maps of native woodland suitability that reflect their own policy priorities and objectives.

By moving a slider (altering the weighting) the user is affecting the input layers (22 criteria) used to calculate the suitability and hence produce the map to visualise the effect

For example: Safeguarding production: “Agriculture and prime land”:

“In the context of woodland expansion, what does the map look like if we alter the protection of land for agriculture?”

This slider alters the weighting of these criteria:

- Land Capability for Commercial Forestry (-ve);
- Land Capability for Agriculture 2050 (-ve);
- Land Capability for Agriculture (-ve);
- On wet mineral soil (+ve);
- Non native Conifer (-ve).

Increasing the weighting reduces its suitability of that parcel for native woodland if it is:

- prime land now, and likely to be in the future
- If it already commercial woodland
- If it is non-native conifer

Policy Scenarios (starting points)



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- 1. Woodland Expansion** This scenarios illustrate the suitability of each parcel of land for change to (native) woodland given equal weighting to the criteria that are relevant to whether or not a parcel of land is suitable.
- 2. Prime Land Protection** a map of woodland suitability when prime land protection has three times the weighting of the other criteria and therefore downgrades the suitability for woodland in areas that are currently and have the potential to become prime land.
- 3. Reducing Flood Risk** a map of woodland suitability when planting trees on riparian strips is has three times the weighting of the other criteria. This creates a map that increases the suitability of area for woodland if it also is likely to help reduce flooding.
- 4. Improving Water Quality** a map of woodland suitability when planting trees in areas with high N and sediment run-off has three times the weighting of the other criteria. This creates a map that increases the suitability of area for woodland if also helps improve water quality.
- 5. Woodland and Landscape Character** a map of woodland suitability by positively weighting the suitability of land for woodland if it is within 2 km of internal settlements and decreases woodland suitability within 2 km of the coast. (Recognition that landscape character in relation to woodland may differ from place to place.
- 6. Woodland and Public Access** a map of woodland suitability as above increase the suitability of woodland if it is close to paths (access by people).

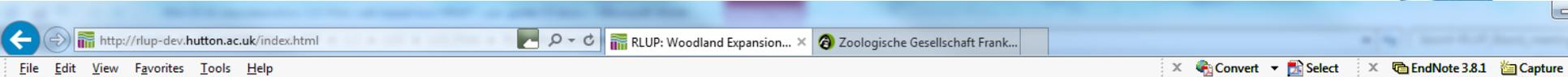


Ecosystem services

The tool will allow the user to visualise the changes in three ecosystem services from current conditions (baseline) as modified in the policy scenarios and by the policy slider preferences:

- **Sediment export:** the efficiency that each land use type retains sediment. The model takes into account the land use type as well as slope.
- **Nitrogen retention:** the efficiency that each land use type retains nitrogen. The predictions take into account the fact that crops receive more inorganic N but also retain it in the crop more effectively than woodland. Woodland only receives atmospheric N.
- **Carbon:** The carbon change from baseline is represented as CO₂ equivalent. The change in the total net flow of CO₂ is calculated by adding the CO₂ emissions from the soil, vegetation and livestock and displaying as a ratio of current levels.

The map outputs therefore show the predicted change in Sediment exported, Nitrogen retained and net flow of carbon from each sub-catchment under each of the land configuration options generated by the tool.



Aberdeenshire Regional Land Use Pilot

An interactive tool to support land use decision making

Please read [this page](#) and the information on [Land Use Policy Areas](#) and [Policy Sliders](#) before using the Tool

This is a prototype developed to explore how multiple benefits might be assessed and none of the output represents any recommendations for land use change from JHI, Aberdeenshire Council or the Scottish Government.

This site is designed to help support decisions about **land use change** in order to target funding (grants and subsidies) to areas where these will be most effective.

Effective support for land use change means identifying areas that are appropriate for the proposed change (e.g. woodland expansion) but where this land use change could also either provide other benefits (such as recreation opportunities) or reduce problems (such as poor water quality).

This tool allows the user to explore how land use might change under a medium prediction for climate change when considering a number of policy relevant themes.

Policy Areas: There are six policy areas (scenario starting points) accessible by clicking on the buttons at the top of the [tool page](#). These starting points relate to policy areas that are relevant to the Land Use Strategy and result of up-weighting certain criteria that are most relevant to that policy area. These are starting points from which the user can explore land cover changes.

Policy Sliders: Within each of these policy areas, the user is able to vary other criteria to explore the consequences of changing the weighting (policy priorities) of different sets of criteria on the pattern of land cover. The tool then illustrates the consequences of this for sediment export, nitrogen retention and carbon stocks at a sub catchment level.

Further Information on carbon pools (soil, vegetation and livestock) and nitrogen retention and sediment is available by clicking on the link.



Home Page Share these settings

Woodland Expansion



Agriculture and soils **Local development and recreation** **Water** **Biodiversity** **Result display**

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Distribution

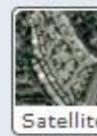
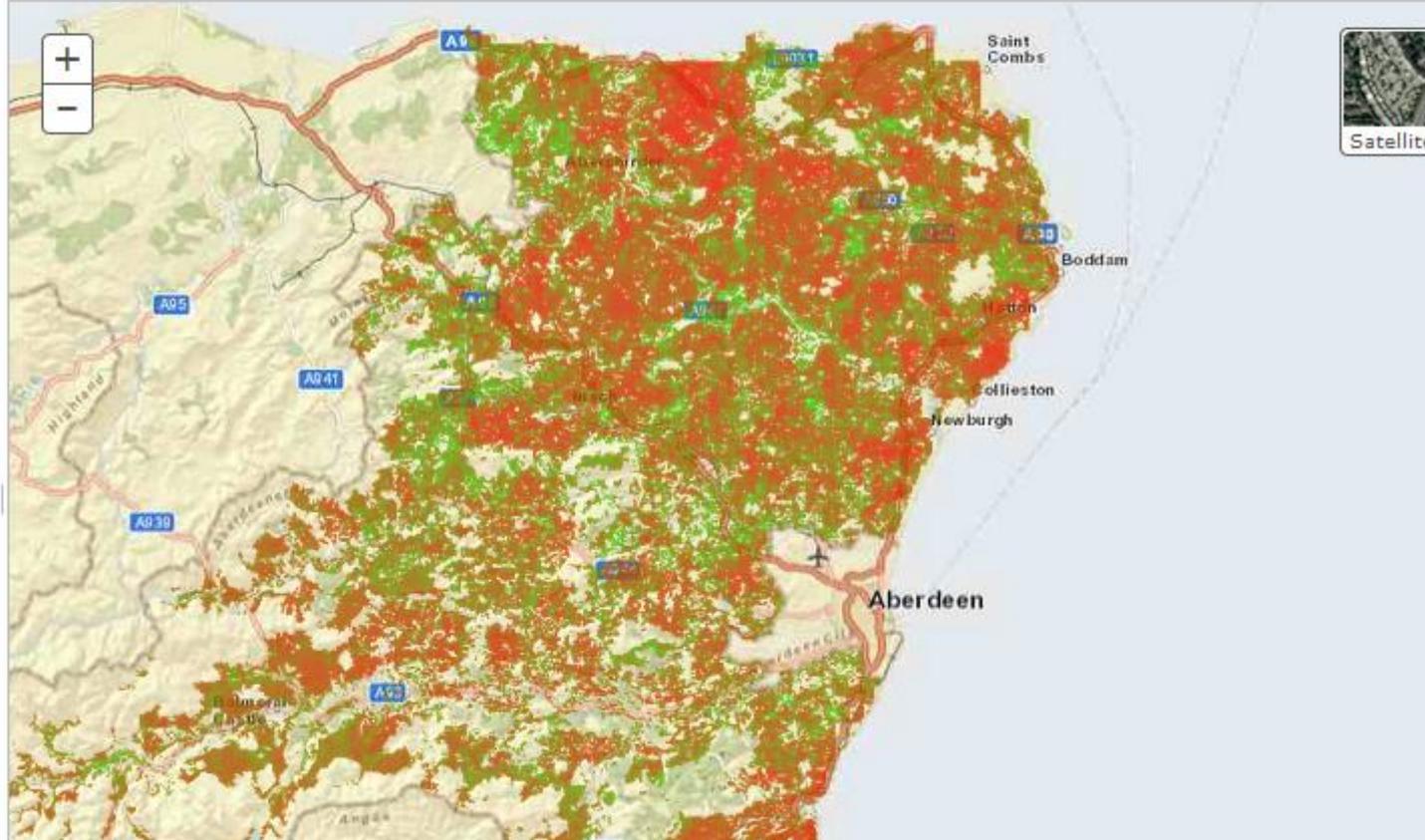
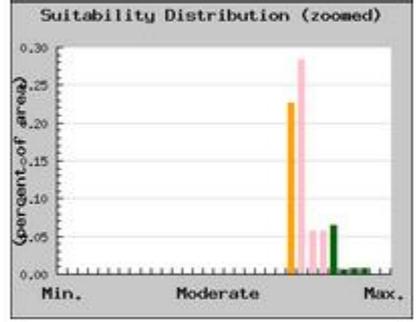
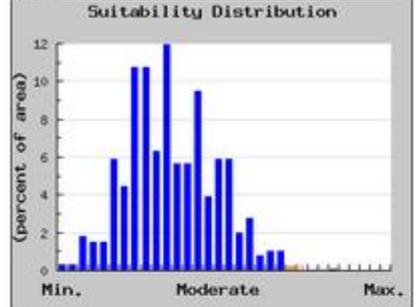
- Full Distribution
- 4,500 hectares
- 9,000 hectares
- 18,000 hectares

Services

- Woodland Expansion
- Sediment
- Carbon
- Nitrogen

Ramsar SSSI SPA SAC NNR LNR

Suitability for woodland expansion



Woodland Expansion



Agriculture and soils **Local development and recreation** **Water** **Biodiversity** **Result display**

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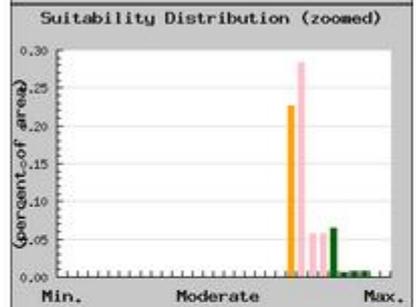
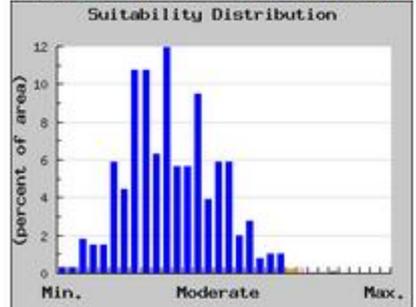
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Suitability for woodland expansion



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Woodland Expansion



Agriculture and soils **Local development and recreation** **Water** **Biodiversity** **Result display**

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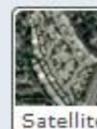
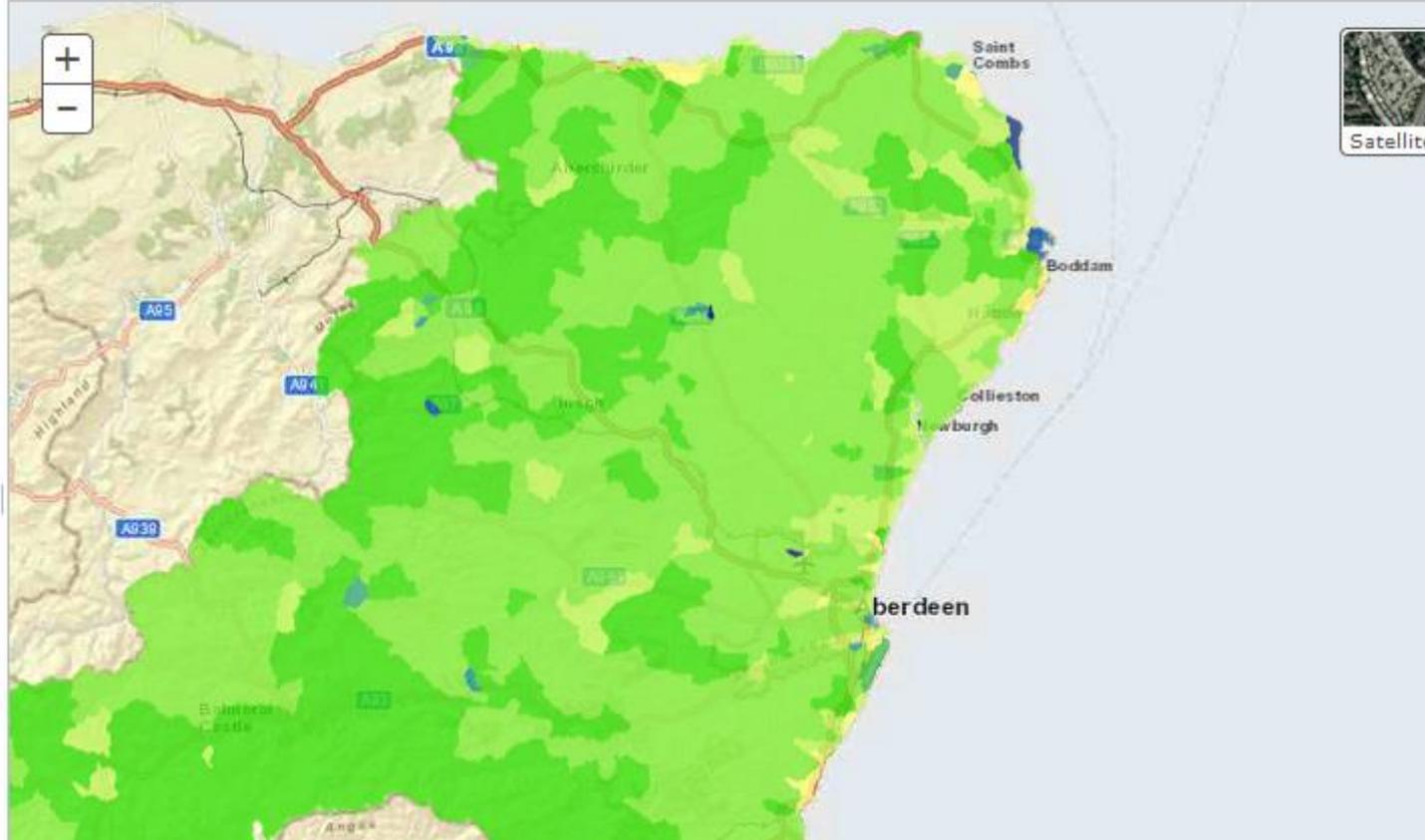
Ramsar SSSI SPA SAC NNR LNR

Ecosystem Service: Change in Nitrogen Retention



The colour scheme depicts a change in the amount of the nitrogen being exported within each sub-catchment. A value of 0.5 means that under the chosen scenario half of the nitrogen is being exported compared to the base-line export. A value of >7 means at least a seven fold increase in nitrogen export and therefore a significant reduction in the ecosystem service being provided.

We used the literature to determine the efficiency that each land use type retains nitrogen. The model takes into account net run-off and topography. The predictions take into account the fact that crops receive more inorganic N but also retain it in the crop more effectively than woodland. Woodland only receives atmospheric N. For each scenario of land configuration the map outputs therefore show the change in Nitrogen retention





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Conclusions.....

The tool explores how climate 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 (and others) to identify of areas where land use change could **deliver multiple benefits**, and to explore the **consequences of pursuing different policy goals** on, for example other benefits these ecosystems provide.

Whilst there is a wealth of data, there are gaps.

Remember, the aim was not to produce a vision for land use but a process to aid decision making for multiple benefits



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Development.....

The tool needs to consider other lenses or perspectives such as commercial forestry, agriculture etc.

The tool needs to incorporate more meaningful measures of landscape character and biodiversity

The pilot has forged a **strong relationship between research (JHI) and policy (AC) and practice (local stakeholders)**. We need to build on this.

The tool could help with the **development of regional level objectives** for the management of land. e.g. the indicative woodland strategy

Incorporate the premise that **Land use was not only about environmental issues but also social and economic aspects**



<http://rlup.hutton.ac.uk/>