A Tool to Build the Capacity of Decision-makers to Adapt to Cross-sectoral Climate Change Impacts on Ecosystem Services

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Need for Integrated Assessment Tools

- Decision-makers need reliable science-based information to help them understand how ecosystem services might change under plausible future scenarios and how they should respond to the risks of such impacts and opportunities for adaptation.

- The EC White Paper on Adapting to Climate Change highlighted that climate change will affect biodiversity, ecosystems and ecosystems services as a key cross-cutting theme.

- However, it also indicated that information and research on climate change impacts and adaptation in Europe is not effectively shared across sectors and decision-making levels.

- **Conclusion**: there is a need for cross-sectoral, integrated assessment tools that take account of stakeholder concerns and requirements -> CLIMSAVE IA Platform.
The CLIMSAVE IA Platform

• Previously:
  – Models ‘belonged’ to the research community
  – Lack of flexibility for stakeholders (scenarios, quantification, sensitivity, uncertainty, outputs, etc.)

• The CLIMSAVE IA Platform intends to:
  – Be intuitive and accessible to all
  – Flexible / Interactive
  – Useful
  – Be an exploratory tool, not a DSS
Cross-sectoral focus

Urban

Biodiversity

Competition for land

Agriculture

Competition for water

Forests

Water

Coasts

Impacts
Simplified cross-sectoral linkages

Climate & socio-economic scenarios

Urban

Snow cover

Hydrology

Water availability

Flooding

Crop yields

Forestry

Pests & diseases

Rural land allocation

Water use

Biodiversity
## Ecosystem services indicators

<table>
<thead>
<tr>
<th>PROVISIONING</th>
<th>REGULATING</th>
<th>CULTURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food production</td>
<td>Carbon sequestration</td>
<td>Naturalness</td>
</tr>
<tr>
<td>Animal production</td>
<td>Water storage in basin</td>
<td>Attractiveness of agricultural landscapes</td>
</tr>
<tr>
<td>Bioenergy production</td>
<td>Water storage in soils</td>
<td>Attractiveness of forest landscapes</td>
</tr>
<tr>
<td>Fibre production</td>
<td>Flood protection</td>
<td>Charismatic or iconic wildlife</td>
</tr>
<tr>
<td>Timber production</td>
<td>Pollination</td>
<td>Species for hunting</td>
</tr>
<tr>
<td>Drinking water</td>
<td>Vegetation influence on local climate</td>
<td>Areas protected for nature</td>
</tr>
<tr>
<td>Cooling water</td>
<td></td>
<td></td>
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<tr>
<td>Irrigation water</td>
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<tr>
<td>Wild food plants</td>
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Stakeholder engagement process

• Developing and testing methodology at two scales: Europe and Scotland.

• Professionally facilitated stakeholder engagement process with 3 workshops per scale.

• Workshops focus on the development of socio-economic scenarios and feedback on the IA platform.

• The final workshop assessed impacts and adaptation for ES using the IA platform.
Participatory socio-economic scenarios

Europe

- Gradual
  - Effective Solutions by innovation
    - I. We are the World
    - IV. Riders on the Storm
  - Uneffective: Rollercoaster
    - III. Should I Stay or Should I Go

Scotland

- Disparate
  - Surplus: Resource scarcity and lifestyle
    - II. Mad Max
    - III. The Scottish Play
  - Deficit: Equitable
    - I. Tartan Spring
    - IV. Mactopia
The Impacts screen of the IA Platform

Allows you to:

• Carry out a sensitivity analysis
• Model the impacts of different future climate and socio-economic scenarios
• Explore the effects of uncertainty within a scenario
Sensitivity analysis

Explore how changing the baseline climate affects model results.

Explore how changing the baseline socio-economic assumptions affects model results.
Scenario analysis

Socio-economic scenarios were developed by stakeholders during the CLIMSAVE project.

See how impacts change for different scenarios.

Select your:
- Time period (2020s or 2050s)
- IPCC Emissions scenario
- Climate model (5)
- Climate sensitivity (medium is default)
- Socio-economic scenario
Example results: Drinking water in 2050s

**Icarus**
- GDP: 0
- Popn: -9%
- Wsave: -35%

**We are the World**
- GDP: +94%
- Popn: +3%
- Wsave: +29%

**Should I Stay**
- GDP: -36%
- Popn: +23%
- Wsave: -60%

**Riders on the storm**
- GDP: +54%
- Popn: +16%
- Wsave: +45%
Explore scenario uncertainty

Default slider positions developed by CLIMSAVE stakeholders

Green (for “Go”) range is stakeholder-derived scenario uncertainty

Yellow (for “Caution”) range to explore greater uncertainty

Red (for “Stop”)
Moving to the adaptation screen fixes the scenarios.

Marker shows setting from the Impacts screen.

Difference between the marker and the slider represents the amount of adaptation.

Green range represents credible adaptation within the scenario.
Two other IA Platform screens

Cost-effectiveness screen:
- Set of specific adaptation measures ranked in order of their cost-effectiveness ratio that meet the adaptation target.
- Options for altering implementation time, discount rate or unit cost and the method for quantifying uncertainties in the cost estimates.

Vulnerability screen:
- Meta-model of adaptive capacity based on indicators for 5 capitals (natural, manufactured, human, social and financial) combined with metrics of potential impacts.
- Options to map vulnerability hotspots per ecosystem service or aggregated across several ecosystem services.
Conclusions

• The CLIMSAVE IA Platform is an interactive exploratory web-based tool to enable a wide range of stakeholders to improve their understanding surrounding climate change adaptation for a range of ecosystem services from the agricultural, forestry, biodiversity coastal, water and urban sectors.

• Its holistic framework (cross-sectoral, climate and socio-economic change) is intended to complement, rather than replace, the use of more detailed sectoral tools used for local predictions.

• The linking of models for the different sectors enables stakeholders to explore and understand the interactions and trade-offs between different ecosystem services, rather than viewing their own policy area in isolation.