Participatory selection of ecosystem services
Insights from
Lisbon Metropolitan Area, Portugal

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1. Context
2. Goal
3. Lisbon Metropolitan Area
4. Participatory approach
5. Results
6. Discussion
The importance and benefits of involving stakeholders in decision making are increasingly recognized.

Stakeholder participation should take place as early as possible and throughout the decision making process.
• It is still difficult to comprehensively assess a large suite of ES ➔ a selection of a narrower set of ES, on which to focus in a given assessment, is usually done

• Selection of ES is often done based on data availability, abundance of studies covering similar ES or on the state of development of existing tools
Documented and tested procedures to select ecosystem services, namely through participatory processes are scarce.

**Why is this important?**

Source: http://jgdiaries.com/
• The value of an ES is not only dependent on ecosystem structures, functions and processes but also on human preferences, cultural factors, institutions and other societal features

• It helps increasing the usefulness of ES assessments to stakeholders and policy processes, therefore increasing its impact on society
Goal

To explore a participatory approach for ES selection

This approach is designed to incorporate the views of different kinds of stakeholders in a planning context
Lisbon Metropolitan Area

Source: Instituto Geográfico Português
Lisbon Metropolitan Area

Legend
- Protected areas
- Artificial surfaces
- Agricultural and agro-forestry areas
- Forests, natural and semi-natural areas
- Wetlands
- Water bodies

Source: Instituto Geográfico Português
**Urban area that concentrates more people in Portugal:**
2,821,876 inhabitants in 2011

**3rd largest urban region in Iberian Peninsula after Madrid and Barcelona**
Participant approach

Stakeholder group
- Regional planning authority
- Local authorities
- National environmental authority
- Academia

Participatory moment
1st Group meeting
Most important ES (in terms of ES potential)

2nd Group meeting
Expected land use / land cover changes due to planning options

3rd Group meeting
ES affected by planning options

Participatory workshop
Most important ES (in terms of ES potential)
ES affected by planning options

Primary outputs

Final output
Priority ES considering:
- ES potential
- Planning objectives
## Results

### Focus group

<table>
<thead>
<tr>
<th>Section</th>
<th>Division</th>
<th>Group</th>
<th>Class</th>
<th>Number of votes</th>
<th>Aggregation (no. of participants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Nutrition</td>
<td>Biomass</td>
<td>Cultivated crops</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
<td>Ground water for drinking</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Materials</td>
<td>Water</td>
<td>Ground water for non-drinking purposes</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Regulation and maintenance</td>
<td>Mediation of flows</td>
<td>Mass flows</td>
<td>Mass stabilisation and control of erosion rates</td>
<td>6</td>
<td>A (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liquid flows</td>
<td>Buffering and attenuation of mass flows</td>
<td>4</td>
<td>A (4)</td>
</tr>
<tr>
<td></td>
<td>Maintenance of physical, chemical, biological conditions</td>
<td>Atmospheric composition and climate regulation</td>
<td>Hydrological cycle and water flow maintenance</td>
<td>7</td>
<td>B (6)</td>
</tr>
<tr>
<td>Cultural</td>
<td>Physical and intellectual interactions with biota, ecosystems, and land-/seascapes [environmental settings]</td>
<td>Intellectual and representative interactions</td>
<td>Heritage, cultural</td>
<td>7</td>
<td>C (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Entertainment</td>
<td>5</td>
<td>C (5)</td>
</tr>
</tbody>
</table>
# Results

## Focus group

<table>
<thead>
<tr>
<th>Domains for Vision Implementation (and targets)</th>
<th>Lines of Action</th>
<th>Key Objectives</th>
<th>Ecosystem services (CICES code; + / - / ?)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Sustainability and Synthey with Nature</td>
<td>C1. To ensure the functioning of the Metropolitan Ecological Network</td>
<td>To preserve biodiversity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Targets:</td>
<td></td>
<td>To increase public use green spaces</td>
<td></td>
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</tr>
<tr>
<td># Maintenance or increase of ERPVA area with land-use that favors nature and biodiversity conservation</td>
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</tr>
<tr>
<td># 80% of quarry areas with exhausted geological resources with Landscape and Environmental Recovery Plan</td>
<td>C2. To ensure the functioning of the natural systems</td>
<td>To ensure the quality of the Tejo/Sado aquifer</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Decrease in the population living in risk areas (flash flooding and landsliding)</td>
<td></td>
<td>Environmental reclaiming of contaminated soils</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Final energy intensity less than 137.4 tep/M€</td>
<td>C3. To use and enhance resources in a logic of sustainability</td>
<td>To diminish pressure on maritime and estuarine fronts</td>
<td></td>
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</tr>
<tr>
<td># 31% share of renewables in total final energy consumption</td>
<td></td>
<td></td>
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</tr>
<tr>
<td># More efficient mobility in terms of GHG</td>
<td>C4. To avoid and mitigate risks</td>
<td>To preserve soils with more agricultural and forest value</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Complying with legal limits for air quality</td>
<td></td>
<td>To enhance tourism in the rural space, ensuring synergies with the agricultural activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5. To invest in energetic sustainability as a lever for innovation and competitiveness</td>
<td>C6. To promote a more sustainable mobility</td>
<td>To know, conserve and enhance the geological heritage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>To reduce population exposure to natural, technological and environmental risks</td>
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<td></td>
<td></td>
<td>To reduce dependence in fossil fuel sources</td>
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<tr>
<td></td>
<td></td>
<td>To reduce energetic dependence from the exterior, increasing supply security</td>
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<tr>
<td></td>
<td></td>
<td>To increase energy efficiency and the exporting capacity of high technological intensity based on renewable energies and energy efficiency</td>
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<td></td>
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<td>To reduce emission of atmospheric pollutants</td>
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<tr>
<td></td>
<td></td>
<td>To increase energy efficiency</td>
<td></td>
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</tr>
</tbody>
</table>
## Results

### Focus group

<table>
<thead>
<tr>
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<th>Group</th>
<th>Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provisioning</td>
<td>1.1. Nutrition</td>
<td>1.1.1. Biomass</td>
<td>1.1.1.1. Cultivated crops</td>
<td>Cereals (e.g. wheat, rye, barely), vegetables, fruits etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.1.2. Reared animals and their outputs</td>
<td>Meat, dairy products (milk, cheese, yoghurt), honey etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.1.3. Wild plants, algae and their outputs</td>
<td>Wild berries, fruits, mushrooms, water cress, salicornia (saltwort or samphire); seaweed (e.g. Palmaria palmata = dulse, dillisk) for food</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.1.4. Wild animals and their outputs</td>
<td>Game, freshwater fish (trout, eel etc.), marine fish (plaice, sea bass etc.) and shellfish (i.e. crustaceans, molluscs), as well as equinoderms or honey harvested from wild populations; Includes commercial and subsistence fishing and hunting for food</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.1.5. Plants and algae from in-situ aquaculture</td>
<td>In situ seaweed farming</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.1.6. Animals from in-situ aquaculture</td>
<td>In-situ farming of freshwater (e.g. trout) and marine fish (e.g. salmon, tuna) also in floating cages; shellfish aquaculture (e.g. oysters or crustaceans) in e.g. poles</td>
</tr>
<tr>
<td>1.2. Water</td>
<td></td>
<td></td>
<td>1.1.2.1. Surface water for drinking</td>
<td>Collected precipitation, abstracted surface water from rivers, lakes and other open water bodies for drinking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1.2.2. Ground water for drinking</td>
<td>Freshwater abstracted from (non-fossil) groundwater layers or via ground water desalination for drinking</td>
</tr>
</tbody>
</table>
# Results

**Focus group**

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<thead>
<tr>
<th>Ecosystem services</th>
<th>Effect</th>
<th>Planning objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Production</td>
<td>+</td>
<td>To consolidate and improve agricultural and forestry areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To re-orient urban demand to rehabilitation of existing urban areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To reinforce and diversify the supply of infrastructured areas for economic activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To invest in urban rehabilitation instead of new construction for housing</td>
</tr>
<tr>
<td>111. Biomass</td>
<td>+</td>
<td>To enhance tourism in the rural space, ensuring synergies with the agricultural activity</td>
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<td>1111. Cultivated crops</td>
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<td>1115. Plants and algae from in-situ aquaculture</td>
<td>+</td>
<td>To transform AML in a pole of Sea research and exploitation</td>
</tr>
<tr>
<td>1116. Animals from in-situ aquaculture</td>
<td>+</td>
<td>To transform AML in a pole of Sea research and exploitation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To increment in a sustainable way fishing and aquaculture activities</td>
</tr>
<tr>
<td>112. Water</td>
<td>+</td>
<td>To ensure the quality of the Tejo/Sado aquifer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To preserve water quality and improve supply efficiency</td>
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<tr>
<td></td>
<td></td>
<td>To improve efficiency in water consumption</td>
</tr>
<tr>
<td>121. Biomass</td>
<td>+</td>
<td>To preserve soils with more agricultural and forest value</td>
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<td>122. Water</td>
<td>+</td>
<td>To ensure the quality of the Tejo/Sado aquifer</td>
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<td>To preserve water quality and improve supply efficiency</td>
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<td>13. Energy</td>
<td>+</td>
<td>To reduce dependency in fossil fuel sources</td>
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<td>To increase energy efficiency and the exporting capacity of high technological intensity based on renewable energies and energy efficiency</td>
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<tr>
<td>2. Regulation and maintenance</td>
<td>+</td>
<td>To re-orient urban demand to rehabilitation of existing urban areas</td>
</tr>
</tbody>
</table>
Focus group

• All effects considered positive ➔ not surprising given regional spatial plan’s contents

• It could be possible to identify potential trade-offs between ES, associated with planning objectives. In this case it is possible to identify planning objectives that will have synergistic (positive) effects on ES

• Some effects are actually more related with services provided by human systems than by natural systems (e.g. eliminate non-classical houses ➔ positive effect on disease control and aesthetic value)
Results

Participatory workshop

• Pre-workshop questionnaire
• Training session
• Break-out groups
• Plenary voting
## Results

### Participatory workshop

#### Pre-workshop questionnaire

<table>
<thead>
<tr>
<th>Section</th>
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<td></td>
<td></td>
<td>Ground water for drinking</td>
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<td>Mediation of flows</td>
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<td>Mass stabilisation and control of erosion rates</td>
<td>14</td>
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<td></td>
<td></td>
<td></td>
<td>Flood protection</td>
<td>16</td>
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<td>Regulation and maintenance</td>
<td>Maintenance of physical, chemical, biological conditions</td>
<td>Atmospheric composition and climate regulation</td>
<td>Global climate regulation by reduction of greenhouse gas concentrations</td>
<td>13</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Micro and regional climate regulation</td>
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</tr>
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## Results

### Participatory workshop

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<td></td>
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<td>16</td>
</tr>
</tbody>
</table>
## Results

### Participatory workshop

Drivers vs. ecosystem services matrix

<table>
<thead>
<tr>
<th>Driving forces</th>
<th>Affected ecosystem services (CICES code; + / - / ?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion of agricultural area</td>
<td></td>
</tr>
<tr>
<td>Decrease of forest area</td>
<td></td>
</tr>
<tr>
<td>Expansion of industrial area</td>
<td></td>
</tr>
<tr>
<td>Urbanization of non-urban areas</td>
<td></td>
</tr>
<tr>
<td>Implementation of new transportation infrastructure (e.g. roads, railways)</td>
<td></td>
</tr>
<tr>
<td>Dispersed settlements</td>
<td></td>
</tr>
<tr>
<td>Expansion of green urban space</td>
<td></td>
</tr>
<tr>
<td>Urbanization of river, estuarine and coastal margins</td>
<td></td>
</tr>
</tbody>
</table>
Results

Participatory workshop

Most important drivers

• **Water consumption** (5/6 groups)

• **Expansion of urban green space** (3/6 groups)

• Urbanization of coastal, estuarine and fluvial margins
• **Territorial fragmentation**
• **Total energy consumption**
• **Passenger transport in own transportation** (2/6 groups)
Results

Participatory workshop

Break-out groups

• Besides **maintenance of the hydrological cycle and water circulation** there was no observed convergence into any ES
Participatory workshop

Plenary voting

• Clearly converged on the services of **superficial and ground water for drinking**, followed by **mediation of liquid flows** (**hydrological cycle and water flow maintenance** was actually the only item to get votes from all stakeholder groups ➔ coherent with previous results)
Participatory workshop

Plenary voting

- Maintenance of physical, chemical, biological conditions especially focusing on Atmospheric composition and climate regulation and more specifically on Global climate regulation by reduction of greenhouse gas concentrations also concentrated many participants’ votes
Discussion

• Possible to identify priority ES for spatial planning, according to the views and opinions of a group of different types of stakeholders

• Identification of priority ES can be useful for:
  – spatial planning processes, usually faced with scarce resources and with the need to prioritize issues for decision making
  – Scoping process in SEA
  – Initial/rapid ES assessment

This might not be the goal for other processes, it is dependent on the scope and goals of a given process or initiative
• Use of CICES table

  – **Advantages:** allows flexibility ➔ stakeholders can refer to very specific ES (at class level) or to more general ES (ultimately at section level)

  – **Disadvantages:** not very user-friendly (too technical) ➔ for the context of this research, the use of not so technical ES classification systems (e.g. MA) could have facilitated the participatory process
• Results of the case study represent the views of a limited number of stakeholder groups (with particular features like high educational level)

• In a real planning process, a broader number of stakeholder groups should be represented ➔ stakeholder mapping will vary according to context, scope, goals and other aspects of a given planning process
Further steps:

• Preliminary analysis of results focused on agreements, looking at disagreements can also be revealing and useful for the planning process.

• Integrating results of participatory process with a structured analysis of the regional spatial plan and the biophysical features of the region.
Discussion

Identification of (most relevant) ecosystem services

Biophysical features

Spatial plan

Stakeholder preferences

Scenario building

Scenario 1

Scenario 2

Scenario 3

BAU

Assessing future developments

Data availability and quality

BAU Scenario 1 Scenario 2 Scenario 3?
Thank you for your time!

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