

# 5.4. Why to map?

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## Meaningful mapping

Maps for ecosystem services (ES) are made for a broad set of purposes. These include advocacy (awareness raising, justification, decision support), ecosystem assessment, priority setting, instrument design, ecosystem accounting, economic liability and scientific spatial analysis. Figure 1 illustrates the theoretical relationship between mapping purposes and quality requirements. Requirements concern notably spatial and temporal resolution, scientific accuracy and reliability and ease of understanding. Additional methodological requirements not represented in Figure 1 are the extent of the mapping exercise, the repeatability, the theme of the mapping (e.g. supply, demand, conflict maps etc.) and basics of cartography and mapping semantics (see chapters 3.1 and 3.3). These vary depending on the specific context of the mapping exercise (e.g. community development versus national assessment, see Figure 1).

Figure 1 can be interpreted across purposes for one specific requirement or across requirements for one specific purpose. For example, the expected clarity of a map meant for research use is lower than that aimed at policy advocacy. On the other hand, maps used by research should be highly reliable while those used for awareness raising (advocacy) do not require such high reliability.

Many current mapping applications focus on quantitative valuation and accounting. Typically, these maps are neither meant to be understood by a broad range of stakeholders nor do they necessarily require a high spatial resolution, but they should be highly accurate and reliable. This chapter illustrates

this for two specific examples concerning regional assessment and priority setting.

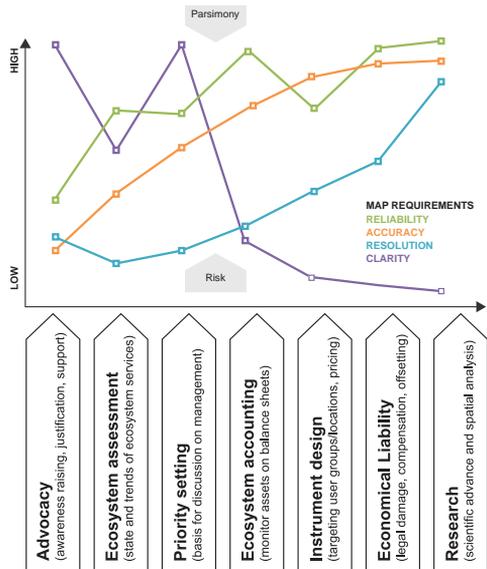


Figure 1. Ecosystem services mapping requirements according to purpose.

## Good enough is just perfect

Mapping quality requirements are bound by resource availability and by the risk of decisions based on them. The upper boundary of requirements is set by the principle of parsimony, stating that “among two good solutions, the simplest is always best”. This highlights the need for using the least resources or assumptions necessary to solve a problem. In other words, one should not spend excessive (project) time and/or (pub-

lic) money to map at a greater level of detail than necessary. For example, land use based maps (see Chapter 5.6), that can be produced repeatedly at relatively low costs (in terms of time and money) are sufficiently adequate for most purposes, while more reliable data can sometimes only be obtained at excessively high cost, or involving complex assumptions. Moreover, the time spent on a specific map should be traded off against the urgency of the purpose.

The lower limit of map quality requirements is determined by the societal impact of the decisions based on the mapping. Uncertainty (or absence of information on uncertainty) translates in a societal risk for adverse outcomes if decisions are based on wrong data. Public or policy advocacy for the importance of ES does not require highly accurate or detailed maps. However, communication maps cannot be used for purposes which have more stringent requirements, such as ecosystem accounting or economic liability: the risk for unfair or undesired outcomes is too high or unknown.

This brings us to the issue of the safe operating space for each type of map. Maps with lower requirements cannot be used for purposes which have higher requirements. On Figure 1, this goes both ways: for instance, maps made for scientific purposes need simplification to be clear enough for priority setting, assessment or advocacy, while assessment maps have to be detailed further to obtain the accuracy and reliability required for some scientific purposes.

## Maps are means, not ends

Maps are instrumental tools that are combined with other types of data and contextual information in order to achieve a certain

purpose (see Figure 1). This information can be quantitative and qualitative and is rarely spatially explicit. Knowing how maps will be combined with these non-spatial data and used in a specific context is essential for the mapping process. We illustrate this below by showing how maps are used as part of the diverse information for two common ecosystem service questions: a land use priority setting in a local context and a regional ecosystem assessment.

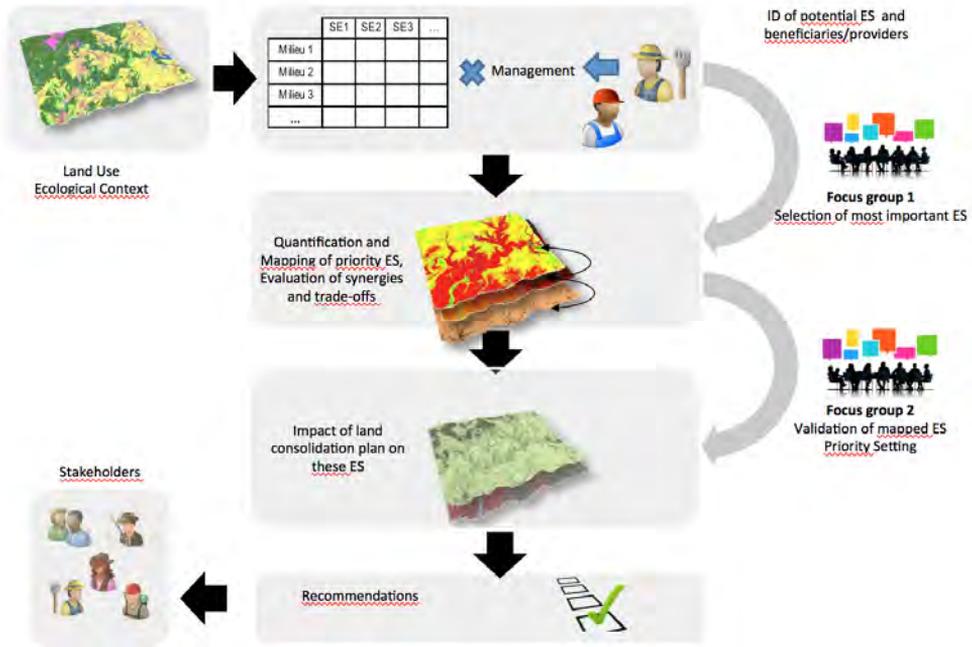
## The modest mapper

In this final section, we provide guidelines for critical map-makers to engage in effective ES mapping. While most of these will seem evident, they are rarely applied in practice. Following these guidelines will improve effectiveness of ecosystem service maps to impact actual decision-making and contribute to scientific advance.

- Clearly define the purpose for which mapping is needed. Plenty of maps are created without clear purpose and later applied for the wrong purpose.
- Determine the minimum reliability, accuracy, resolution and clarity required. The risk for undesired outcomes grows if maps are used for higher impact decisions.
- Assess the resources (time and money) needed to meet these requirements. Highly expensive, detailed or complex maps are not necessarily more effective.
- Delineate the safe operating space of your maps. The map-maker, being aware of the power and limitations of maps, bears responsibility to caution against wrong or risky application (see Chapter 6.4).
- Target the form and communication of maps fitted to the process they are used in. Maps are essential for many processes, but project purposes are never just maps.

## Box 1. Local example priority setting for land consolidation to optimise ES provision

ES mapping at the local scale is often used to set priorities and guide decision-making to optimise ES provision. This example describes how ecosystem service maps were combined with biophysical models and valuation data to serve a participatory land-consolidation plan for three municipalities in Wallonia, Belgium. It is co-constructed by the administrations, scientists and local stakeholders. The project's objective is to design a replicable methodology, based on hands-on experience in a first case study. Figure 2 describes the methodological framework further.

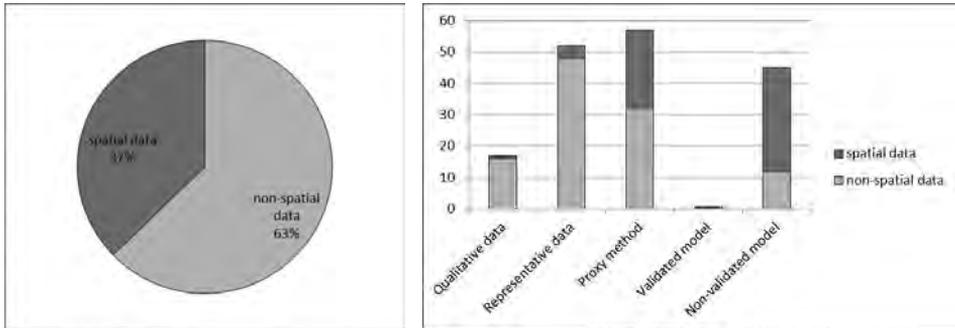


**Figure 2.** Methodological framework for integrated valuation of ES to set priorities for land consolidation in Wallonia: Maps are central, necessary parts of a yet broader process (from Baptist et al. 2016).

After selecting a list of locally relevant ES and, based on a typology of ecosystems, biophysical assessment and social valuation are carried out. The biophysical assessment includes mapping and quantification of selected ES based on indicators obtained from a hydrological model and scenario development of potential ecosystem service supply. Social analysis comprises stakeholder analysis, societal valuation according to these stakeholders, participatory validation of the biophysically mapped ES and participatory mapping of ecosystem service demand. These supply and demand maps are then used to guide participatory comparison of land-consolidation actions. For instance, maps of biophysical indicators were compared with demand maps to highlight locations for which there is potential improvement of supply. Technical experts of land consolidation then suggest potential measures (e.g. installation of new hedgerows, creation of new water retention basins, new flower strips along a walkway etc.) to be implemented in the final land consolidation plan. This example clearly demonstrates that maps are used as a central means in combination with various other data, methods and actions, to achieve a broader objective shared by various stakeholders and lead to improved decision-making.

## Box 2. Regional example - regional ecosystem assessment

National and regional ecosystem service assessments seek to assess the state and trends of ES in their region, with the purpose of monitoring their evolution and informing policies. The state of ES comprises information on the demand, the supply, the balance between demand and supply, the use of ES, ecosystem functions underpinning them, drivers of change, impacts on human well-being and governance. Spatial data - also in regions with high data-density - are not available for all aspects of all services and for some aspects the spatial dimension is even irrelevant.



**Figure 3.** Proportion of spatially explicit (distribution available on Flanders scale) data throughout the ecosystem service chapters (left panel) and per data type (right panel).

The Flanders regional assessment has assessed demand, supply, balance between these two and interactions between use of services. These statements were based on a detailed review of all data and information in 16 ecosystem service chapters to obtain one single concise table on the state of ES with known reliability. Despite the focus of the chapters on maps, the data underpinning this assessment are only partly spatially explicit and range over different data types which are synthesised in key findings (Figure 3). Although the separate maps can be used to answer specific questions, the context of a regional assessment requires synthesising maps into short conclusive statements or non-spatially explicit indicators for policy communication. Therefore, the statements derived from the 78 maps to inform the regional state assessment were verified and reviewed by all the involved map-makers.

In conclusion, maps which are integrated in communication, decisions or even research will be reduced to quantitative or qualitative findings and combined with other data and information to obtain final outcomes. Mapping will be more effective when engaging in the specific context, by targeting and communicating the maps to the specific purpose and by tuning maps to the diverse information they are combined with.

In many cases, maps are a starting point for an open discussion about what the maps need to indicate and about the assumptions made in the underlying models. Using maps top-down as 'objective data' often discards nuanced reality of a local context and is counterproductive in most real-life decision processes. To ef-

fectively apply maps, the ES map-maker needs to involve:

- Interdisciplinary engagement: learn from existing practices and cooperate with other research fields, such as environmental decision support, communication science, participatory processes, etc. to avoid classic pitfalls.

- Trans-disciplinary engagement: consider the use of co-design approaches from the very start. Nowadays, stakeholder involvement is an essential indicator for end-user satisfaction and final uptake of the developed maps and the only reality check the ES-map-maker has.

Ecosystem service mapping can be highly rewarding in terms of impact on real-world decision-making. This requires leaving the comfort zone of single disciplines and clear data layers and finding the right balance between scientific demands, user demands, functionality and available resources. For every mapping project again.

## Further reading

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