Supplement 3: Selecting ecosystem service and condition indicators for mapping and assessment

For any ES to be included in the assessment, one (or more) matching indicator is needed, that actually represents the service as closely as possible. For some services this is a rather trivial choice, while for others some abstractions, combinations or specifications of certain aspects have to be made. We performed an iterative heuristic specification-selection process for an initial list of ES: all ES highly ranked in the preference assessment plus the few 'predefined' ESs named in the original Niraj-MAES project proposal which was accepted for funding. In line with the project goals ES that can be mappable (quantifiable in a spatially explicit way) were give preference. In choosing indicators methodological and conceptual aspects - based on MAES and CICES recommendations - were also integrated. Our approach for topic / indicator selection thus amalgamates funder's priorities (follow the MAES assessment framework, with particular attention to economic aspects), lead partner priorities (a local NGO interested in local awareness and capacity raising) and scientific partner priorities (application of the best available assessment approaches and techniques). The elementary "steps" of this process (the individual decisions and their justification) are documented in **Tables 3.1** and **3.2**.

As a next step indicators were defined more precisely, and appropriate methods were identified for modelling them, which lead to the list of planned ES indicators presented in Table 2 in the main text of this article.

Table 3.1: The indicator selection process for the ES resulting from the preference assessment.

Rank	ES name in preference assessment	Methodological and data considerations	Proposed ES indicator name
1	Water regulation	As the factors for slowing down runoff and increasing infiltration are largely the same that determine erosion rates, we propose an indicator in common with erosion control	Water retention & erosion control (erosion)
2	Tourism	As the contribution of ecosystems to tourism is determined largely by the same natural factors as the contribution of ecosystems to the development of local identity, we propose an indicator in common with local identity	Touristic attraction & local identity (tourism)
3	Local identity	See above at tourism.	Touristic attraction & local identity (tourism)

4	Timber	Assigning an indicator to this service was relatively straightforward and problem-free.	Wood and timber (timber)
5	Wild edible plants	The definition was agreed to be broadened to contain wild fruits, medicinal herbs & edible mushrooms according to the most important "wild crop" types of the region (which is in line with the photos shown during the elicitation survey)	Medicinal and edible plants and mushrooms (gathered)
6	Soil fertility	This ES is considered both as an ecosystem state descriptor (cascade level 1), and as a final service (cascade level 2) which provides inputs for agriculture (contributing crucially to agricultural products). See also the comments below for "extensive orchards", and the comments for "agriculture crop production" in **Table 3.2**.	Soil fertility (fertility)
7	Extensive orchards	Fruits from orchards can be both seen as an ecosystem service and an economic product (depending on how you set the production boundary). Following MAES recommendations in order to avoid double counting we consistently consider agroecosystems as parts of the human economy, and their main products as economic products. On the other hand, as ecosystem services we choose to consider (and quantify) the natural inputs into agroecosystems (e.g. soil fertility, pollination) as well as the by-products (e.g. nectar from crops) of these systems. (Beyond conceptual problems, the low rank that this service scored during the preference assessment process also contributed to dropping it.)	--

8	Pollination and honey	As most of the arguments received during the preference assessment was related to honey, we moved honey (nectar) provisioning capacity to our primary focus. (The abundance of pollinators is also influenced by the abundance of nectar sources, so the resulting indicator will still describe pollination, too.) Even though this ES has been ranked relatively low, we still kept it as an indicator to be developed because of its relative straightforward link to ecosystems and economy, the fact that the resulting indicator is also related to a regulating service important for crop production (pollination), and as the related provisioning service (honey) was mentioned among the predefined services of our project proposal.	Honey provision and pollination (honey)
9	Climate regulation	Even though in terms of total number of mentioning this service was ranked only the 9th, whenever it was mentioned it was mentioned at one of the first positions. Furthermore, "carbon sequestration" was also one of the predefined services, so we included this service in our indicator work.	Carbon sequestration (carbon)
10	Hay and fodder	This ES would have been dropped because of the low rank received – but was still kept as the SAB expressed its strong preference for having this regionally and historically important service evaluated. Furthermore, "hay production" was one of the predefined services in our application.	Natural forage and fodder (hay)
11	Erosion control	This ES would have been dropped because of the low rank received – but was still kept because soil erosion can be mapped using the same indicator as water regulation, the ES ranked highest in our preference assessment.	Water retention & erosion control (erosion)
12	Game / Hunting	This ES was dropped because of the low rank received	--

Table 3.2: The indicator selection process for the ES from the predefined ES list.

ES name used	Methodological and data considerations	Proposed ES indicator name (+short name)
Agriculture crop production	Agricultural crops can be both seen as an ecosystem service and an economic product (depending on how you set the production boundary). Following MAES recommendations in order to avoid double counting we consistently consider agroecosystems as parts of the human economy, and their main products as economic products. Thus we do not try to quantify the "capacities" for individual crop types at the second cascade level -- we quantify instead the natural inputs into agroecosystems (e.g. soil fertility, pollination) here. However on the level of actual use (third level of the ES cascade) we also include agricultural crop production into the discussion.	Soil fertility (fertility), honey provision and pollination (honey)
Hay production	The SAB also promoted this ES as regionally important in the past and potentially also in the future. The service was generalized to all kinds of livestock fodder from (semi-) natural grasslands	Natural forage and fodder (hay)
Provisioning services from seminatural ecosystems (e.g. fish, game, mushrooms, honey)	Wild plants and mushrooms gathered was also highly ranked by the preference assessment.	Medicinal and edible plants and mushrooms (berry), honey provision and pollination (honey)
Carbon sequestration	See comments for "climate regulation" in **Table 3.1**	Carbon sequestration (carbon)
Habitat for biodiversity	This service, frequently considered as a "supporting service", can most appropriately be conceptualized as an ecosystem state descriptor (cascade level 1) in the ES cascade framework.	Habitat naturalness (naturalness)
Recreational potential	The features landscape offers for recreation and creating emotional attraction are mostly the same that are capable of attracting tourists, therefore this service was integrated in "Touristic attraction"	Touristic attraction & local identity (tourism)