

Ecosystem Approach Working Group Workshop #2

2. Appraising indicators for ecosystem services

Objective: The afternoon session will be devoted to exploring which indicators could be used for the assessment of ecosystem services in Scotland, with specific reference to priority ecosystem services identified in the morning session.

Background: The concept of “ecosystem services” has been developed to define how ecosystems deliver a range of benefits for human-kind through ecosystem goods and services (generally shortened to ecosystem services). The development of this concept has largely been driven by a demand to integrate environmental and economic accounting to support improved decision-making by considering both market and non-market benefits derived from ecosystem goods and services. Considerable effort is being applied to develop accounting systems which use ecosystem services as the units to measure, monitor and track changes in the supply of benefits that people receive, and to use this information in decision-making. However it is widely recognised that there has been a general lack of effort applied to developing indicators (with standardised units) for ecosystem services (c.f. Boyd and Banzhaf, 2006).

Filling the ES indicators gap: We need to progress from indicators of ecological, biological or environmental properties and processes to indicators that can inform on the quantity, quality and vulnerability of benefits that can be maintained and supplied by the stocks (“natural capital”) and flows (“ecosystem services”) from ecosystems. The links between ecosystems and benefits can be viewed as a cascade, as shown in Figure 1. It is important to be clear at which stage in the cascade an indicator is being applied and, crucially, to understand the relationship between an indicator and the ultimate benefit.

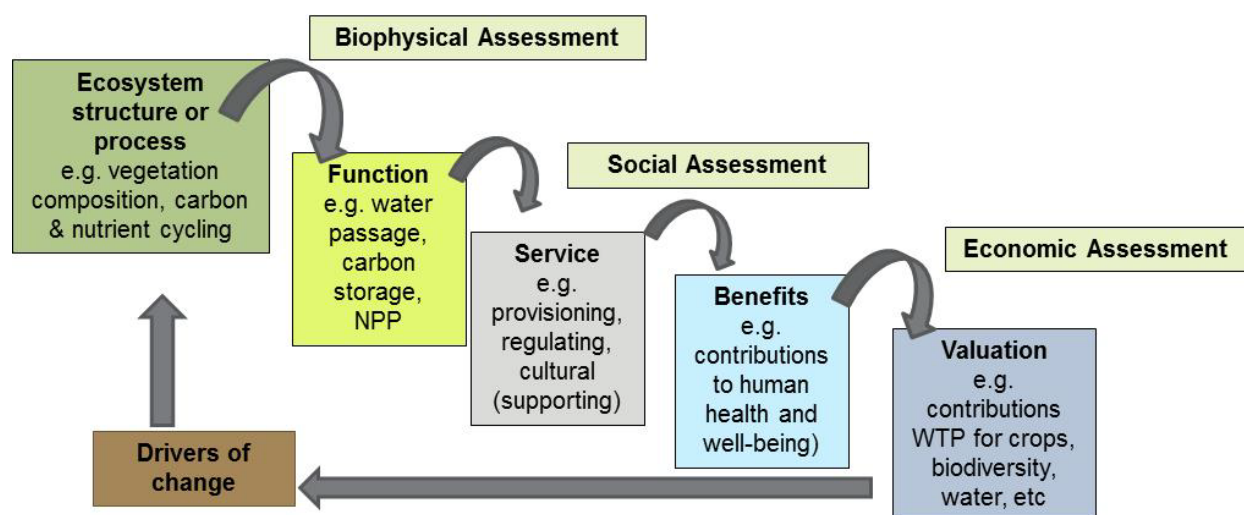


Figure 1. Simplified framework of relationships between ecosystem services and benefits. Adapted from Haines-Young and Poschin 2010.

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Table 1 uses the cascade to demonstrate the links between biophysical, service and benefits for regulating wastes. By breaking this down, we begin to see where indicators are already available or in use, or where gaps exist.

Table 1. The ecosystem services cascade. An example from regulation of wastes to illustrate the chain from biophysical through ecosystem services to benefit and valuation. Adapted from the common ES classification proposed by the EEA (EEA, 2010).

| ES group | stock | flows | service | examples | indicative benefits | value | |
|----------------------|---|----------------------------|------------------------------|---|-------------------------|----------------------------------|--------------------------------------|
| | BIOPHYSICAL | | SOCIAL / HUMAN | | | ECONOMIC | |
| Regulation of wastes | functional structure of plant and microbial communities | bio-remediation | remediation using plants | phyto-accumulation, rhizo-deposition | removal of pollutants | improve / reduce risks to health | reduced health care costs |
| | | | remediation using microbes | in situ bioremediation; ex situ bioreactors | removal of pollutants | | reduced loss in biodiversity |
| | soil quality | dilution and sequestration | dilution | solute reduction | reduction of pollutants | reduced risk to wildlife | reduced costs for water purification |
| | | | filtration | sediment capture | retention of pollutants | | reduced off-site costs |
| | | | sequestration and adsorption | removal of odours | retention of pollutants | | better quality of life |

Assessing indicators for ecosystem services: There are many 1000's of potential indicators of ecosystem services that have been proposed for use. A relatively simple, consistent and objective approach is needed to assess which indicators are most applicable in Scotland. There are widely accepted general criteria that should be used when developing an indicator that will be fit-for-purpose. For example, is an indicator relevant, reliable, understandable and providing early warning or timely? We can apply these criteria to identify strengths and weaknesses in current and potential indicators of ecosystem services. Within an ecosystem services context, we can also include criteria that detail which stages in the ES cascade (i.e. biophysical, social and economic) that an indicator is used, what service focus, what are the related benefits, etc. This helps to identify how an indicator is or can be used in monitoring, valuation and decision-making.

The afternoon of the EAWG2 workshop will be devoted to exploring which indicators of ecosystem services are already in use within Scotland and what potential indicators could be used in Scotland with respect to a number of high-level policy goals. Using the information generated in the afternoon, the fitness-for-purpose and knowledge gaps in indicators for ecosystem services will be explored. Following the EAWG2, the EST be asking stakeholders to engage in an exercise to capture more detailed information on current and potential indicators of ecosystem services.