

Agenda item 3

Ecosystem services, indicators and DPSIR frameworks (Drivers, Pressure, State, Impact, Response)

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Introduction

The governance and management of ecosystem service provision and the role of indicators in shaping and informing policy is becoming a major area of interest and debate. The Montréal Process may be well placed to contribute to this discussion and increase the uptake and impact of the existing C&I framework through better alignment with forest ecosystem service and DPSIR frameworks.

Forest ecosystem services and the value of indicators

The concept of forest ecosystem goods and services has become widely embraced by forest policy makers, forest managers and the wider forest research community. The attractiveness of the concept lies in the use of systems dynamics to describe complex forest ecosystem functions and processes and their linkages to human wellbeing (Müller and Burkhard, 2012; De Groot et al, 2010).

Within this context, ecological indicators may be regarded as communication tools which help to simplify complexity and describe the interrelationships between the forest ecosystems and human needs and demands (Müller and Burkhard, 2012).

Assuming that ecological indicators may be used to describe and/or measure ecosystem services, how then may they be used to support decision-making processes?

Organising information in human-environment systems using DPSIR

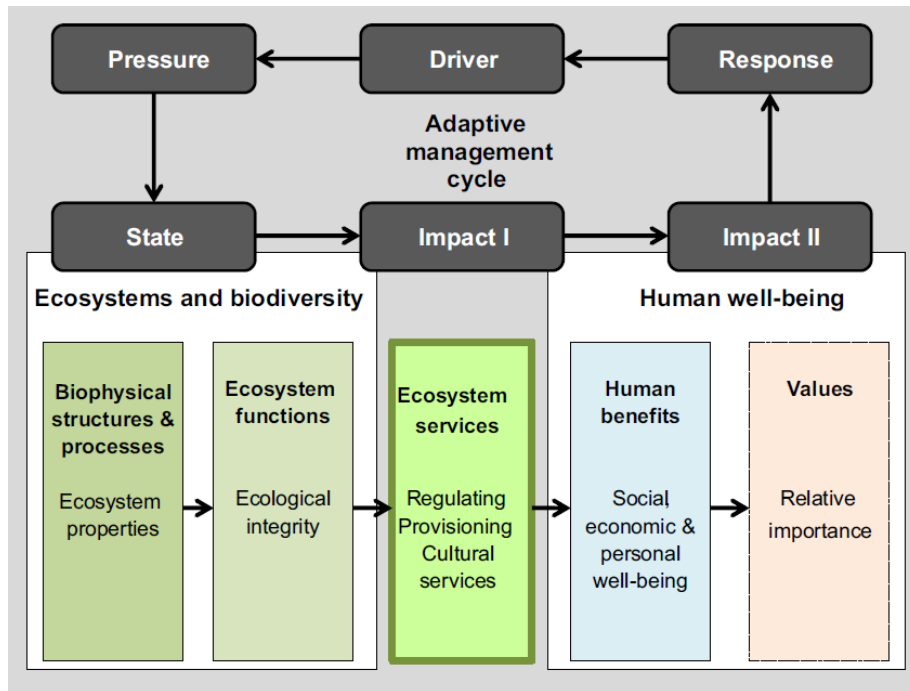
The DPSIR approach is increasingly being used to rationalise the complex interactions present in 'causal' relationships associated with change in forest ecosystems generated by human activity. Anthropogenic **drivers**, including changes in social, economic and cultural settings generate **pressures** on forest ecosystems. These pressures may alter the **state** of forests and associated human systems – resulting in varying levels of **impacts**. Based on the determined or perceived level of negative impact, governmental or institutional bodies may seek to design interventions or **responses** to minimise or mitigate these effects (Müller and Burkhard, 2012).

Indicators may be used at all stages of the DPSIR approach. Their value being directly related to:

- i. The indicator being a true measure of the 'object of interest';
- ii. Robust ecosystem service based rationales to support indicator selection;
- iii. The availability of data;
- iv. An awareness of uncertainties and the reliability of indicators;
- v. Optimal use of groups of related indicators and data; and,
- vi. The ability to link indicators in meaningful causal relationships.

Figure 1 below illustrates an approach to the integration of DPSIR and ecosystem service provision through an adaptive management cycle and a cascade of ecosystem service provision (Haines-Young and Potschin, 2012).

Figure 1: Adaptive Management Cycle and ecosystem service cascades (Haines-Young and Potschin, 2010)



The *state* in this model is described as biophysical structures and processes (ecosystem properties) which cascade into ecosystem functions (ecological integrity). When taken together, they provide a range of services that contribute human wellbeing.

To be of value in an institutional setting, and to inform DPSIR approaches, indicators should be 'policy relevant' – that is, with the capacity or scope to inform, either in a descriptive or evaluative way, each of the five stages of the 'cascade' and the adaptive management cycle shown above (Müller and Burkhard, 2012).

Questions:

- ***What are the benefits of an ecosystem service/DPSIR approach to the Montréal Process and to soil and water reporting?***
- ***How may the existing Montréal Process C&I framework be used within a forest ecosystem service/DPSIR approach?***

References

De Groot et al, 2010. Integrating the ecological and economic dimension in biodiversity and ecosystem service valuation. In: Kumar. P. (Ed.), *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*. Earthscan, pp 11-40.

Haines-Young R.H. and Potschin M.P., 2010. The links between biodiversity and ecosystem services and well-being. In: Rafaelli, D., Frid, C., (Eds.), *Ecosystem Ecology: A New Synthesis*. BES Ecological Review Series. CUP. Cambridge, pp. 110-139.

Müller, F., Burkhard, B., 2012. The indicator side of ecosystem services. *Ecosystem Services* 1, 26-30.