Ecosystem services of protected areas in Slovenia

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***Abstract* - Protected areas (PAs) provide important and valuable ecosystem services (ESs) to society. The main goals of the project NatGuidES are to prepare a typology of (sub)ecosystems and spatial units for identifying ESs in PAs, establish an ES identification, mapping and evaluation protocol, and test them in selected pilot PAs. So far, a conceptual framework and draft typology have been co-created with experts and stakeholders in a participatory manner.**

INTRODUCTION

Ecosystem services (ESs) are the benefits that people receive from ecosystems (MEA, 2005). Protected areas (PAs) provide important and valuable ESs to society, such as the binding of atmospheric carbon, retention of pollutants and preventing them from leaching into groundwater, and offering an attractive space for recreation and tourism activities (e.g. Hummel et al., 2019). PAs are also an important generator of local spatial identity (ibid.), which may offer developmental opportunities.

While Slovenia has managed to prevent the degradation its ecosystems to a very high degree, developmental pressures on ecosystems are still great. The project NatGuidES aims to address these threats through identifying, mapping and evaluating the ESs of PAs in an effort to improve the understanding of these issues and raise awareness of the benefits that PAs provides to humans. The project's working hypothesis is that PAs provide a different array and a greater extent of ES to different beneficiaries across all spatial levels as compared to non-protected areas; a confirmation of this hypothesis would help to further substantiate protecting natural areas to both the general public and local inhabitants, helping to mitigate conflicts often associated with PA status.

Scientific research on the ESs of PAs is a relatively new but growing field. To begin with, the underlying theoretical framework of ES research is still developing. Practically, this manifests in a number of different typologies; the three main typologies are the one utilised by the MEA (Millennium Ecosystem assessment, 2005), the TEEB (The economics of ecosystems and biodiversity; TEEB, 2010) and the CICES (Common international classification of ecosystem services; CICES, 2011) typology, of which the latter seems to be gaining ground in international acceptance (Hummel et al., 2019). Furthermore, there are a number of conceptual models describing the relationship and flow of benefits from ecosystems to humans as the final beneficiaries; of these, the cascade model developed (see Fig. 1) by Haines-Young and Potschin (2010) seems to be prevalent in use, though it is far from uncontested (see e.g. Costanza et al., 2017).

An issue in ES research particularly relevant for the management of PAs is the ethical reservation felt by some researchers (e.g. Spash, 2008) and quite often by PA managers (Hummel et al., 2019). Protecting nature as a provider of benefits to humans rather than for its own sake is unpalatable to many in nature conservation; this aversion is even stronger with regard to ES valuation, especially where monetary techniques are applied. This misgiving is rejected by prominent ES researchers such as Costanza et al. (2017), however, who argue that this is an overly simplistic interpretation of the concept of ESs.

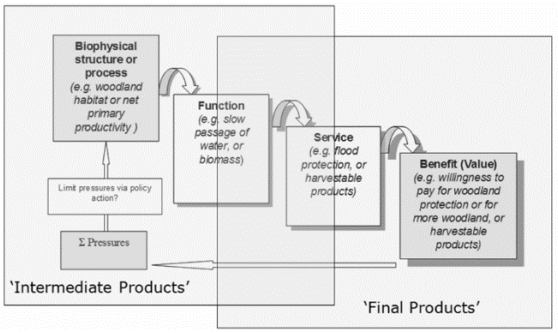

Figure 1: The cascade model of Ecosystem services (Haines-Young and Potschin, 2010)

Finally, despite the increasing interest of both decisionmakers and practitioners in the ESs concept, it is a field that is chronically lacking in reliable data. This issue, which is closely related to the lack of standardised definitions, is currently often addressed through the use of expert opinion, simplifications and proxies, in many cases to the detriment of the transferability of mapping, assessment and valuation exercises.

Despite these shortcomings, an increasing amount of research is attempting to address the ESs of PAs in a comprehensive and transferable way, employing a variety of methods ranging from top-down spatial mapping to bottom-up participatory mapping (see e.g. Hummel et al., 2019, for a review). For example, Eastwood et al. (2016) have shown that PAs consistently provide a higher level of ESs than unprotected ones and that the difference can mainly be attributed to cultural and regulating ESs. Similarly, Spanò et al. (2017) found that ES hotspots generally appear inside PAs. By contrast, Palomo et al. (2013) show that ES hotspots do not necessarily appear in PAs, while areas of *demand* (service-benefitting areas) for the ESs provided by PAs generally appear in adjacent areas.

METHODOLOGY

The main goals of the project are to prepare a typology of (sub)ecosystems and spatial units for identifying ESs in PAs, establish an ES identification, mapping and evaluation protocol, and test them in selected pilot PAs (5). According to the conceptual framework (see Fig. 2) developed by the project group, the first step in this process is to identify the specific ecosystems and other spatial units in these areas that enable the provision of ESs (cf. Luck et al., 2009). To this end, the MAES (Maes et al., 2013) typology of ecosystems, as well as a number of other land use and land cover typologies such as the Corine Land Cover, are currently being examined in terms of their utility for the needs of the project, as well as data availability at the appropriate scale.

The core project group has employed a participatory approach (Cornwall and Jewkes, 1995) to research since the outset; in practice, this has meant that the relevant experts and stakeholders in conservation science, policy and practice, as well as

ES specialists, were consulted in a workshop (33 attendees) as early as the development of the project's conceptual framework, and have contributed actively (through online meetings) to the currently ongoing identification of (sub)ecosystems and spatial units. The stakeholders themselves were identified through the research group's experience and familiarity with the Slovenian institutional environment, as well as based on further recommendations from those contacted.

RESULTS

So far, the project has had two main results. Firstly, the co-created conceptual framework has been constructed as an adaptation of the Haines-Young and Potschin cascade model in which the two leftmost elements in the cascade (biophysical structure and function) are merged into one element (ecosystems), while the following elements have been added:
- indicators and methods for the evaluation of ESs,
- the aspect of the natural conditions of PAs and the impact of management,
- (sub)ecosystems and spatial units providing ESs
- a comparison of ESs in PAs and unprotected areas (Fig. 2)

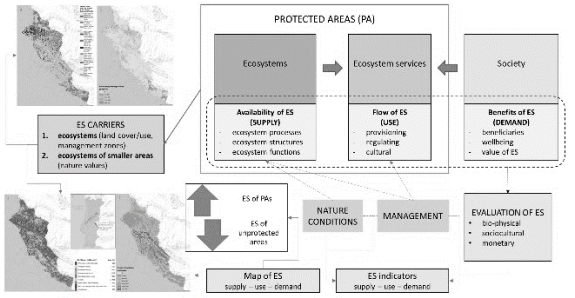

Figure 2: The NatGuidES conceptual framework.

The second result, which we currently regard as preliminary, is the classification of the (sub)ecosystems and spatial units that act as ES providers. It is roughly based on the MAES typology, but includes further subtypes not included in the original classification, as proposed and discussed by the experts attending the workshops and online meetings. For example, the MAES categories 'cropland' and 'grassland' have been merged into agricultural land, but broken down into several subtypes (meadows, pasture, fields and permanent crops), which are broken down to even smaller units.

DISCUSSION AND CONCLUSION

Regardless of the issues faced by ES researchers and practitioners that we outlined in the introductory section, it is generally accepted that ES research is a field that can contribute to more sustainable land use, as well as to mitigating conflicts between PA managers, landowners and users (Berghöfer and Dudley, 2010). While the field may be experiencing some initial difficulties, we think that exercises such as the one being conducted in NatGuidES are necessary to further develop our understanding of the relationship between ecosystems and the benefits that humans receive from them, with the ultimate goal of fostering the sustainable use of natural resources in the long run. As stated by Costanza et al. (2017), "There is not one right way to assess and value ecosystem services. There is however a wrong way, that is, not to do it at all."

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