



Public Goods and Ecosystem Services

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Introduction and ‘State-of-the-art’

Public goods represent a particularly complex category of environmental resources.⁴ The increasing importance of the concept of public goods in national and international legal frameworks, particularly relating to questions surrounding the role of private or public actors in providing and maintaining public goods (e.g., Fowler and Biekart, 2011), presents a suite of challenges for biodiversity, Ecosystem Services (ES) and Natural Capital (NC) science and policy. For the research community, these include: identifying which aspects of the natural environment constitute public goods; how this status may change as a result of management decisions; and how such goods may be recognised, desired, or required differently by diverse groups in society; how security of supply can best be achieved; and how these issues affect equity, social justice, and human well-being. For OpenNESS, another important consideration is how access to (and benefits from) public goods associated with ES are affected by the actions and interactions of stakeholders and the issues this then raises for governance and ecosystem management.

A public good is a resource that is *non-excludable*, *non-rivalrous*, and open to all in its consumption. The UK National Ecosystem Assessment describes a public good as “a good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted (UK NEA, 2011, p.1455⁵). Typical examples of public goods include clean air, soil water storage that yields flood control, and beautiful views over a landscape. Whilst there is much overlap between the concepts of ES and public goods, they stem from different theoretical backgrounds (environmental science and (neoclassical) economics), leading to some confusion in how the terms should be linked in policy and practice (Dwyer et al., 2015). Many classes of ES show features of public goods, in particular with regards to non-excludability, which is to some extent responsible for either the under-provision or overuse of the respective ES. However, while ‘public goods’ describes or characterises many ES, this is not always accurate and there are also other characteristics of ES (e.g., uncertainty, jointness, irreversibility) that are important considerations for governance or management (Brown et al., 2007; OECD, 2001). Ecosystem services may be either rival (i.e. finite) or non-rival (i.e. not subject to physical consumption, or otherwise renewable), and either exclusive (e.g., if access is limited to certain groups) or non-exclusive (i.e. common pool resources). Brown et al. (2007) classify several ES under these criteria; an example of a rival, exclusive ES that does not qualify as a public good would be consumptive recreation, such as hunting or fishing, on a confined private property (or other property from which some people might practically be excluded). Non-consumptive recreation opportunities (e.g., hiking or gardening) on an uncongested (i.e. not overcrowded) private property would be an example of a non-rival, yet exclusive ES. Rival but non-exclusive ES would include renewable living resources harvested from the wild, such as fish or medicinal plants. Such ES that have some degree of rivalry or excludability may be considered quasi-public goods, as opposed to pure public goods.

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⁴ Note that not all public goods are environmental in nature (e.g., lighthouses and road signs are public goods), nor do they have to be ‘goods’ in the physical sense (e.g., national health schemes, global climate regulations, and birdsong are public goods).

⁵ This definition is also adopted in the OpenNESS Glossary, available at: <http://www.openness-project.eu/glossary>

Adding to the difficulty of characterisation, the term ‘common goods’⁶ (or ‘common pool resources’) defines goods that are rival and non-excludable (such as fish stocks in an ocean). Whilst the differences between these various classes of goods may be clear in principle based on rivalry and excludability, in practice the distinction may be difficult to make. Some ES may be difficult to categorise, and may be considered either as public or common goods or both, depending on particular access and use arrangements or different stakeholders’ perspectives (Felipe-Lucia et al., 2015; OECD, 2001). Furthermore, in reality pure public goods are perhaps rather the exception.

The need for some form of governance for public goods, e.g. to avoid overuse or under-provision, usually arises only when there is some degree of rivalry or when changes in land management or ownership threatens non-excludability. Whilst the supply of fresh water via aquatic ecosystems may be seen as a public good, over-exploitation by one person or group in a discrete location may limit the availability of freshwater to other users at that location (thus making it a common good, rather than a public good, for stakeholders affected at that site). Additional complications may arise when public goods, or the natural resources associated with them, enter private or semi-private ownership or where their delivery is dependent upon privately held land (Ostrom and Ostrom, 1999), or where state intervention (perhaps required to prevent over-exploitation) necessarily results in access restrictions or costs for beneficiaries. Alternately, technological progress might also change management options, for example, to promote excludability (e.g. using satellite data for monitoring access, or high fences), or not.

The Earth’s biodiversity – as an aggregate – may also be considered a global public good; e.g. the enjoyment derived from appreciating or experiencing a diverse flora is usually not restricted or diminished by others having the same enjoyment. However, note that in each of the cases above – air, water, landscapes, and biodiversity – their status as pure or quasi-public goods may depend upon the specifics of their use and the governance structures in place. Alternative uses can have an impact on the availability of these resources and on the capacity of individuals or groups of people to access or benefit from them - if, for example, air, water, and landscapes which provide benefits to some communities become receptors for pollution, and if aspects of biodiversity become privatised through changes in land ownership or perhaps through patenting (where a pure or quasi-public good ES may cease to be non-excludable and non-rivalrous). These characteristics might change over time due to natural, technical or other changes – for example, increased scarcity arising from climate change impacts or the development of new monitoring technologies.

Many ES are considered global or regional public goods, when their use or value occurs in extended areas and in more than one country. An attribute of biodiversity that qualifies as a global public good is its inherent potential for provision of benefits – recognised or otherwise – to society at large (i.e., through ecosystem services). Activities that threaten biodiversity also threaten this capacity. Tietenberg (2001) points out that, due to their multiple interdependencies, individual species can have a value to society far beyond their intrinsic value (or beyond any direct market value or use value). Genetic diversity, whilst being critical to species survival, is also crucial to the delivery of ES and associated public goods. Individual species - perhaps not yet identified - may be essential to the functioning of ecosystems and thereby to security of stocks and flows of ES. Perrings and Gadgil (2003) examine the implications of considering such goods at different scales. They argue that conservation effort directed at preserving biodiversity at a global scale can overlook the local importance of biodiversity as a public good. Preserving a particular species at the global level, with acceptance for some local extinction, may secure its future internationally, meet a global biodiversity target, and provide a pure public good in the sense of maintaining its intrinsic existence value. However, if such a species is of local ES value, then localized loss or disappearance of that species may result in the loss of ES and NC and diminishing public goods and related benefits to local communities.

⁶ It is worth also noting similarities between the concept of public goods and the distinct notion of ‘public good’ or ‘common good’ in the sense of something for ‘societal wellbeing’ or for the ‘good of the public/society’. Conversely, it should be recognised that biodiversity and conservation strategies may potentially have negative effects (disservices) which may be considered ‘public bads’ (e.g. Bostedt, 1999) – for example, wetland ecosystems as a habitat for malaria vectors, or where strict protected area regimes exclude local communities from accessing local natural resources.

The loss of public goods through ecosystem degradation and loss of ES creates specific difficulties for governments, business, and civil society. Recognising the complexity of the ecological and social contexts within which public goods from ecosystems are provided and utilised, some commentators have argued the need for complex and polycentric systems of governance, engaging and dispersing responsibilities amongst a wide variety of actors (Gatzweiler, 2006). Economic realities also tend to limit the possibility for the conservation of ES solely through public finance mechanisms. Kroeger and Casey (2007) examine the potential of market-based mechanisms to sustain ES, including public good-type ES. Focusing on agricultural ES, and drawing on Salzman and Ruhl (2000), one problem they identify is that ES markets do not operate as pure markets, where rivalry and excludability are the norm, and where the value of the ES is determined by the market itself. In ES marketplaces, private interest in the quality of the good provided may be weak due to lack of exclusive access to the good in question. Therefore, many ES markets for public goods (e.g. emissions trading markets, conservation banks, and wetland mitigation banks) are government-constructed, and are dependent upon strict regulation, monitoring, and enforcement. Such mechanisms must be able to track the variations in ES values across time and space. The institutional mechanisms required to support such markets, including standardisation of transaction rates and values, are difficult to establish, and can make such markets unviable or not cost-effective.

Much interest in public goods from ecosystems in Europe has focussed on agricultural outputs, with considerable interest in concepts of multifunctionality in land use (e.g., OECD, 2001; Wiggering et al., 2006) and in the development of policy and market mechanisms for delivery of public goods from rural lands (e.g., European Commission, 2015). Recent work by the EU CLAIM project⁷ (focusing on services provided by agricultural landscapes) found that the lack of market prices for many public good-type ES affected general awareness and valorisation; for example, whilst many ES were often considered locally important for reasons of heritage or social identity, their potential to support wider regional social or economic objectives was often not recognised unless the ES were seen as having some direct market value. The policy implication is that “a more efficient and continuous communication strategy between scientists, decision makers, local administrations and civil society” should be considered in order to increase awareness and support for enhancement and sustaining of public-good type ES (CLAIM, 2015, p.26). CLAIM also considered that awareness and demand for public goods is often determined by regional specificities (e.g., the protection function of local ecosystems is well appreciated in regions where natural hazards exist that are buffered by landscape elements), with a policy implication that governance strategies with regard to public good-type service provision have to be specific to local conditions and to local social, economic, and cultural contexts.

This then relates to a further issue, which is the degree to which members of the public will support investment in the conservation of public good-type ES. Dallimer et al. (2014) surveyed the willingness of citizens in three EU countries to pay for the maintenance of nationally and internationally used public good-type ES and found that greatest support was expressed for sustaining ES that provided greatest local benefits. Investments to secure ES that provide public goods to populations overseas were less well supported. This assessment looked purely at preference, and did not fully account for the importance of such public goods to human well-being, or examine the issue of substitutability of public goods for alternatives. These factors may affect an individual’s or community’s willingness to pay for conservation, or to accept compensation for loss. Krisch (2014) further points out that such local and national concerns increasingly affect international consensus and implementation of multilateral agreements, suggesting that existing legal frameworks and governance mechanisms focussing on global public goods are ill-suited to a growing interest in prioritising national interest (i.e. public goods most important to national populations and priorities).

Power differentials are an important factor when considering the preferences and responsibilities of stakeholders towards public good-type ES. A recent study by Felipe-Lucia et al. (2015) illustrates how management choices affecting ES can interact with power differentials between stakeholders to alter the

⁷ “Supporting the role of the Common agricultural policy in Landscape valorisation: Improving the knowledge base of the contribution of landscape Management to the Rural economy”; see www.claimproject.eu .

degree of rivalry and excludability of related public goods, through differentiated capacity to utilise or impair natural resources. Such changes might also arise as the result of changing demographics; Stone et al. (2015) highlight how displacement of communities after natural or man-made disasters can lead to local tensions over use of and access to ES. Refugees or displaced peoples, whose rights of property and formal employment in their new location may be denied, sometimes rely heavily on ES available in their relocation areas. Such cases highlight the importance of considering power relationships in policies for securing public good-type ES, and of reducing related social inequalities and conflicts (see also the SP on Social Justice, Kretsch and Kelemen, 2016).

Open issues to be discussed

1. The concept of public good-type ES may provide a useful entry point for stakeholder dialogues on ES / NC and their role in securing human well-being. This may be particularly useful in local and regional contexts where values attributed to landscape elements and related public good-type ES may relate to specific local perspectives or concerns. Consideration of such public goods can give more insight into use and non-use values, and of local vs. global benefits of ES, and enable a more detailed understanding of pressures and of local responsibilities for management. These considerations are taken further in the ConSite project (see <http://www.nina.no/consite>).
2. A better and more differentiated understanding of the concepts of rivalry and excludability may also offer insight into conflicts associated with the use or governance of ES and NC, particularly where changes in land ownership, land-use, or management practices may lead to public good-type ES moving beyond the reach of certain stakeholders. Resolving such conflicts, or avoiding them through appropriate governance and management structures, also requires an understanding of power differentials and relationships between stakeholders (including issues of competition over access and management). Therefore, stakeholder analysis which incorporates assessment of influence and capacity may help to illuminate situations where public good-type ES move into more rivalrous or exclusive domains.
3. Changing demographics, including increased migration into and within the EU, may be expected to change demand for public good-type ES (in terms of scale and diversity of demand) at local, national, and regional scales in the coming decades, presenting both challenges and opportunities for governance. Management of public good-type ES for culturally diverse communities raises issues of well-being, equity, and social justice, particularly in relation to issues of empowerment, engagement, access, and benefit sharing.
4. The status of public goods is a neglected aspect of conceptual and practical ES studies in the scientific literature. Linking public good-type ES to ES classifications and further characteristics of the ES cascade can generate an interesting new synthesis relevant for OpenNESS.

Significance to OpenNESS and specific Work Packages⁸

WP1 (Key challenges and conceptual frameworks): Linking public goods with the ES concept can promote more robust assessments of competitiveness and well-being issues. By linking biodiversity, ecosystems and social and economic goals, ES concepts can strengthen arguments for safe-guarding public good-type ES.

WP2 (Regulatory frameworks and drivers of change): Assessments of the drivers of environmental change and of existing and emerging regulatory frameworks can help to identify opportunities for securing co-benefits to multiple sectors from ES that are public goods. It can also help to highlight areas for improved governance, such as diversified responsibilities amongst stakeholders and incentive mechanisms to secure public good-ES provision. This may include opportunities for co-financing of conservation strategies and promote local engagement.

⁸ For a brief description of the OpenNESS Work Packages see: <http://openness-project.eu/about/work-packages>

WP3 (Biophysical control of ecosystem services): Mapping of public good-type ES, and identifying the spatial extent of rivalry and exclusivity, can provide a useful support tool for decision-makers concerned with investments in locally important ES, and may provide an additional tool for engagement with the business sector.

WP4 (Valuation of the demand for ecosystem services): Land-use change and governance decisions affecting public good-type ES may be the source of conflicts at multiple scales. Valuation mechanisms and participatory approaches that take account of differing local, national, and regional preferences may be an important tool to addressing these. It is also important to analyse the ability of different value articulating institutions to deal with public goods (cf. Vatn, 2009).

WP5 (Place-based exploration of ES and NC concepts): Several of the OpenNESS case studies are concerned (implicitly or explicitly) with environmental (and other forms of) public goods. There may be opportunities to identify the relationships between the four challenges (i.e. human well-being, sustainable ecosystem management, governance, and competitiveness) and public good supply /delivery at the local scale, and how this may affect decision making relating to biodiversity, ES and NC. A particular area of interest may be to explore the connection between community / regional resilience and provision of public good-type ES, and how these may be affected by ecosystem change or by various ecosystem management approaches.

WP6 (Integration: Synthesis and Menu of Multiscale Solutions): Recommendations for integrating ES / NC concepts into decision making across sectors and across spatial and temporal scales can include guidance on identifying critical environmental public goods (those with greatest contribution to human well-being and / or competitiveness) and assist development of appropriate public and private investment and management options, including market-based mechanisms.

Relationship to four challenges⁹

<p>Human well-being:</p> <p>Environmental public goods provide a range of social, cultural, and economic benefits that support well-being. Conversely, loss of access to public goods can negatively impact well-being (e.g., pollution of air or water supplies damaging a public good and impacting directly on health). Linkages between global and local concepts of public good-type ES and well-being should be considered.</p>	<p>Sustainable Ecosystem Management:</p> <p>There has been much research into the provision of environmental public goods through ecosystem management, particularly relating to agriculture. Provision of public good-type ES can be an important co-benefit of landscape management and nature conservation strategies, ensuring social and / or economic returns on investment in natural capital.</p>
<p>Governance:</p> <p>Governance mechanisms to secure or enhance delivery of public good-type ES must recognise the complexity inherent in ecosystems as well as in the social contexts within which they are provided and utilised. Market-based mechanisms alone are unlikely to be sufficient to secure provisioning of ES; where markets are considered, the interests and motivations of all stakeholders should be addressed. Local participatory ES assessment processes can help to enhance local awareness of public good-type ES and thus promote a better governance at the local / regional level.</p>	<p>Competitiveness:</p> <p>Security of stocks of environmental public goods may contribute to social, economic, and environmental dimensions of competitiveness, though valorisation depends upon the awareness and capacity of stakeholders. This may be complicated by privatisation of public good-type ES or related elements of biodiversity and NC. Difference in local vs. global demands for and values of public good-type ES should also be considered.</p>

⁹ There are certainly more societal challenges; the reduced number presented here is due to the four major challenges mentioned in the work programme of FP7 to which OpenNESS responded.

Recommendations for the OpenNESS consortium

OpenNESS should work towards the inclusion of public goods into ES concepts, assessment, and valuation, accounting for the specific preferences, concerns, and values of stakeholders in local contexts. Greater understanding of issues of rivalry and excludability and of the factors affecting the supply, demand, competition, and security of public good-type ES, including issues of stakeholder agency and competition over resources, may generate a more complete picture of the linkages between ES and societal challenges, and provide a more robust basis for governance and ecosystem management.

'Must Read' Papers:

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