
Editorial: The contribution of protected areas to sustainability

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Abstract: Protected Areas (PA) clearly contribute to sustainable development. Biodiversity conservation, regional socio-economic development and a fair sharing of conservation benefits are major elements of protected areas. However, sustainability should be understood also from a positive, methodological perspective. Therefore the impacts and effectiveness of protected areas can be studied from various inter- and trans-disciplinary points of view and methodological approaches as major corner stones of PA-related research. The papers of this special issue highlight these complexities both from a positive perspective, as well as showing the importance of protected areas as significantly contributing to sustainable development.

Keywords: protected areas; sustainable development; positive and normative perspectives; methodological diversity.

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1 Introduction and background

Protected Areas (PA) may be labeled as the major cornerstones of sustainable development, and, of course, they contribute to sustainable development by conserving biodiversity (gene, species, ecosystems, and landscape diversity). Nowadays, major areas that are terrestrial and marine ecosystems are protected by one or more of the diverse international, national or regional frameworks. The World Database of Protected Areas lists more than 138,000 protected sites worldwide (WDPA, 2011). In Europe, more than 24% of the land is protected under Natura 2000 regulations (European Commission, 2011). It is interesting to note that the actual assessment of strategies for biodiversity conservation, along several selected indicators, shows that the establishment of protected areas is indeed one of the few indicators among a whole range of conservation dimensions pointing into a positive direction (CBD, 2011). While the conservation of biodiversity does, in fact, seem straightforward as a major objective and effect of protected areas, biodiversity loss is far from being halted. While the impacts of the loss of biodiversity on ecological and economic systems have been discussed for many years (e.g., Perrings et al., 1995), the rate of extinction is still extremely high (Pimm and Raven, 2000; Butchart et al., 2010; cf. Mace et al., 2010). This brief sketch of current developments indicates that the establishment of protected areas may be a necessary, but certainly not sufficient, condition to stop biodiversity loss.

While the establishment of protected areas can be considered important for biodiversity conservation, the diverse dimensions of sustainable development are touched by manifold elements in protected areas management. First of all, the establishment itself is not sufficient for biodiversity conservation, since the day-to-day operation of protected areas is crucial for the effective and efficient achievement of PA aims and objectives. Operating protected areas needs sufficient funding and a 'good governance' structure with clear responsibilities directed towards conserving biodiversity.

Secondly, protected areas are not only public ventures aiming at biodiversity conservation, but also have to account for the spatial, social, economic and political environments they are embedded in. PAs are often associated with the social dimension of sustainable development following the CBD's (Convention on Biological Diversity) aims to include all relevant stakeholders in decision-making and management processes in protected areas to allow for the fair sharing of conservation benefits. This also includes the empowerment of marginal social groups, governance structures with sufficient possibilities for stakeholder participation, and local and regional acceptance of conservation policies.

From an economic point of view, many protected areas are often 'used' as important vehicles to stabilise the regional economy (e.g., eco-tourism or essential local infrastructures), and for providing livelihoods for local communities otherwise dependent on direct resource consumption and exploitation.

The role of the sustainable development concept, according to this brief discussion, has both strong normative components as well as a positive (analytical, methodological) dimension. The normative implications of sustainable development are certainly those with prescriptions for accounting for the several dimensions of sustainable development – e.g., conservation of biodiversity, fair benefit sharing and social acceptance. The discussion above includes some normative components, since it refers to 'good governance' and effective and efficient management with sufficient funding of PA activities.

However, we would like to understand sustainable development also as an important positive (analytical) concept. In the current special issue of the *Journal of Sustainable Society*, the papers collected certainly include some normative concepts and conclusions. In addition, understanding sustainable development as an analytical tool and a scientific method allows us to analyse whether protected areas are managed efficiently, how ecosystems and species are interlinked, which regional (economic) impacts they have, how the legal frameworks are implemented and functioning, and how benefits are distributed within the relevant groups of stakeholders. As a methodological approach, sustainable development is a concept that offers a view of a problem from at least three perspectives (ecological, economic, and social). It is also an analytical concept in the sense that an inter-disciplinary approach to generate knowledge, and the connections between the realms of natural, social and economic sciences, are the major building blocks of analysing protected areas and their impacts. This broad understanding has also been stressed in the conceptualisation of the management of protected areas as a new scientific discipline (Getzner and Jungmeier, 2009). A trans-disciplinary approach is an additional important methodological component in sustainability-related research in protected areas.

2 The structure of the special issue

This special issue is a collection of papers following a call for papers with a broad range of topics in the field of protected areas and their contribution to sustainability.

Burnett et al. (2014) open this special issue with a theoretical paper discussing the sustainability concept with reference to the notion of protected areas as ‘islands of sustainability’. The inclusion of this paper in the current special issue is important since it clarifies one of the most important theoretical frameworks of establishing and managing protected areas from the viewpoint of sustainability. The authors present a specific concept of sustainability with three pillars, ecological-economic inter-linkages, dynamic efficiency, and equity between generations. Dynamic efficiency – i.e., optimising (maximising) social welfare, given the benefits and costs of conservation versus development or extraction of resources – leads both to the optimal choice of areas for conservation (protected areas) as well as determining endogenously the boundaries of such areas over time. That means that simply defining an area as protected, and holding the boundaries constant over time as an exogenous intervention might not be optimal for sustainability. As the benefits and costs of conservation and development are changing over time, so might the boundaries of protected areas be adapted over time. Measuring and valuing the benefits of conservation is, of course, a delicate task. The authors explain their concept through examples of fisheries (marine protected areas), forests, and groundwater preservation. It is also interesting that the dynamic efficiency concept in relation to protected areas as ‘islands of sustainability’ confronts some of the usual static thinking of PA management. Maybe one of the most important insights of this paper is the notion that protected areas do not necessarily contribute to sustainability as defined by the three pillars mentioned above. Protected areas might very well set aside land with high opportunity costs and small conservation benefits. However, the authors also acknowledge the existence of transaction costs of dynamic management. For instance, changing the boundaries of protected areas might involve high costs of negotiations with stakeholders, adapting land use contracts, and modifying management plans and

governance structures. Some of these costs might even be so high that static, protected areas with rather fixed boundaries may be advisable even from the dynamic efficiency point of view which the authors address.

Robinson et al. (2014) explore an additionally important dimension of sustainable development by highlighting the importance of incentives for biodiversity conservation and exploitation potentially conflicting with the local communities' dependence on ecosystem services. The authors present a case study of a marine park in Tanzania. Economic decisions made by local households are modeled in a mathematical decision model in which the individual incentives and interests as well as potential policy interventions are combined. Policy programs intervene by means of enforcement of management rules, projects for securing the livelihood of local communities in order to reduce their dependency on directly using ecosystem services such as fish, and by encouraging technology changes. The paper shows that it is essential, both for biodiversity conservation as well as to secure sufficient livelihoods, that instruments and strategies are combined, and that an enforcement of rules – especially in peripheral, low-income regions – without providing sound paths to finding new sources of income or changing the technology of resource use, confronts local communities with high economic and social burdens. Sustainability is, therefore, acknowledged in manifold aspects in the paper. Biodiversity conservation can be guaranteed in the long run, only if the incentives to use resources are changed. This directly connects to the linkages between securing the livelihood of local communities (the social and economic dimensions of sustainable development) and new technology and management frameworks while ecological sustainability in the sense of the recovery of fish stocks in marine parks is in place.

Jungmeier (2014) takes up the theoretical discussion laid out in the two earlier papers and presents a concept of a 'third generation' of protected areas. The author systemises the research and consulting projects for protected areas in Austria along pre-defined dimensions and indicators, such as the underlying scientific disciplines, the forming principles, and the fields of activity concerned. Historically, biodiversity conservation was implemented by passing a law stating that a certain plot of land would be devoted to conservation without considering the issue in its full dimensions including the inevitable management processes. The main disciplines that were involved were (certainly) the ecological and legal studies. However, more disciplines and more instruments for setting up protected areas have been developed since the early 1970s. The paper presents an intriguing argument for protected areas that could now be labeled 'third generation'. The range of scientific disciplines that have been taken into consideration to establish and manage protected areas has increased dramatically. The forming principles not only include ecological standards and research, but also extend to 'good governance', participation of all the relevant stakeholders, and a new understanding of the socio-sphere as a part of the biosphere. Finally, also the management tasks have gained in complexity by including not only ecological (natural-science based) knowledge but also a broad range of management and personal skills of PA staff.

Borsdorf et al. (2014) apply the theory of institutions to protected areas and discuss the explanatory power of this theory by taking six biosphere reserves around the world as examples of their empirical work. The authors discuss the four dimensions of institutional theory – path dependence, fit, scale, and interplay – to assess and describe their case study areas. A first and important result of their study is the notion that biosphere reserves have primarily been established by top-down approaches – contrary to the very

intention of biosphere reserves to combine conservation, sustainable development and benefit sharing. A major contribution to the relevant literature is the author's application of the above-mentioned dimensions of institutional theory. They classify and describe their case-study biosphere reserves along these dimensions. For instance, the dimension of path dependence offers innovative insights into current management practices (e.g., governance structures, such as the level of participation of stakeholders) that cannot easily be changed once a certain framework has been established. The 'fit' of the biosphere reserve concept into the specific region describes whether the concept and the different elements of governance and management go well together. Their assessment of the case study areas suggests that the concept fits well into the regional contexts. The dimensions of scale and interplay offer again new insights into the position of biosphere reserves within the multilevel governance, and potential conflicts between reserves and other institutions. The authors arrive at the conclusion that biosphere reserves are institutional settings significantly contributing to sustainable development, and that they can be embedded into the region's characteristics by providing a co-operative framework for landscape and resource management.

Getzner et al. (2014) present a study comparing two prominent national parks with regard to their governance structure, management strategies, and the implications for and dependencies on regional (sustainable) development. The Austrian case study area is a region with a high pressure of visitors, and a long history of biodiversity conservation with correspondingly long planning and implementation periods. The governance and management system is very sophisticated with a balanced system of authorities, governing bodies, and the inclusion of stakeholders. In the Norwegian national park, the pressure of visitors is lower, and the governance structures are leaner with respect to complexity and institutional and organisational composition. However, the comparison between these two parks also highlights the importance of history and national differentiation of decision powers. The federal constitutional approach in Austria has led to diverse regional frameworks, while the Norwegian institutional setting is a more centralised one. In addition, the understanding and the importance of the diverse roles and aims of protected areas is different in both countries, thus also leading to context-specific governance structures. All in all, the paper shows that the connection of management strategies to regional development is not straight forward. On the one hand, management strategies and governance structures are affected by economic conditions and regional strategies, such as tourism, industrial branches and natural resources. On the other hand, the range of aims, and the concrete policy instruments shape the regional economy, for instance, by emphasising the importance of eco-tourism or by allowing a certain utilisation of natural resources.

Little et al. (2014) evaluate management strategies in an Australian marine park by means of a simulation model. The authors' focus lies particularly in the development and use of an integrated management strategy evaluation framework combining physical, biological, as well as socio-economic information and processes. A range of different scenarios and strategies is modeled in order to show the potential biological as well as social effects, for instance, of fish depletion, and of changes of the park boundaries. In addition, the paper stresses the existence of various trade-offs between ecological and social objectives of the park, and discusses the diverse impacts of strategies on these two important dimensions of sustainable development. As such, the paper is also an important contribution to PA research by applying a new methodological framework integrating the major sustainability dimensions for scientific analyses.

A case study of Lake Kerkini (Greece) is presented by Manou (2014) with a focus on the manifold legal regulations and the frameworks, both national and international. The author describes this legal framework by highlighting the diversity, but also the potential conflicts between different regulatory institutions. The focus of the study is on the participation of the stakeholders who were asked to indicate the most pressing problems of establishing and managing the case study site. Although legal regulations exist, they are currently not fully implemented and enforced; the funding and training of park staff seems to be inadequate, a management plan is not in place, and a sufficient monitoring system is not established. The author clearly shows that it is not sufficient to pass respective laws for nature conservation. For protected areas to contribute to sustainable development, an effective and efficient management has to be in place which includes a strong regulatory framework to be implemented and enforced. But even with strong frameworks, protected areas need the support of communities and stakeholders.

Gantioler et al. (2014) present a study on the costs and benefits of the European Union's Natura 2000 network of protected areas. The establishment and the current management of the Natura 2000 network absorbs substantial public funds; it is estimated that the entire network costs about EUR 6 billion per year (annualised one-off and operating expenditure) which amounts to about EUR 63 per hectare and year. These 'costs' comprise public expenditure and may well be higher, as opportunity costs of conservation, as well as other costs in the private sector (e.g., transaction costs) are not included. From a sustainability point of view, it is of great importance, whether the benefits of the network exceed the costs. The authors stress that the existing conservation benefit estimates are less founded than the cost estimates, and that there are many obstacles in calculating robust benefit values. The broad benefit estimates presented and discussed in the paper are well above the costs, and may be 10–100 times more than the costs. Even if we account for the wide range and uncertainties of benefit estimates, it can be concluded that the establishment of the Natura 2000 network not only contributes to conserving biodiversity as an important component of sustainable development, but that the network is also efficient in economic terms, given the great positive difference between the benefits and costs. As a limitation to this important result, it can, of course, not be concluded whether there might be a different, more cost-effective network that could achieve the same level of biodiversity conservation with lower cost. However, we find that the paper by Gantioler et al. (2014) is also an interesting complement to the first paper of the current issue (Burnett et al., 2014) because it shows how hard it might be in practical conservation policy decisions to achieve dynamic efficiency, since costs and benefits might not only vary over time but are also highly uncertain.

The final paper in this special issue by Lange (2014) describes international co-operation in managing protected areas as a prerequisite for sustainable development both, in ecological as well as socio-economic terms. Taking three case studies from Germany/Netherlands, Austria/Germany, and Slovenia/Italy, the author shows how international co-operation, between protected areas on both sides of (administrative) borders, functions, and also describes the pitfalls and barriers to such co-operation. It is also remarkable that, even for neighboring parks existing for a long time, co-operation is not straightforward, but requires resources in terms of time, money, and personnel. There is co-operation if park institutions on both sides of the international border consider the benefits of co-operation to be greater than the cost. From an ecological point of view, examples are presented which show that co-operation increases ecological sustainability, for instance, with regard to the size of the habitats for migratory species,

thus increasing the reproduction rate. From a socio-economic point of view, the international co-operation of park managements increases cultural exchange, and may also improve the region as tourist destinations on both sides.

3 Discussion, summary and conclusions: directions for future research

The range of the current special issue clearly shows the above-mentioned variety of dimensions in the complex field of protected areas and their impacts *and* dependence on sustainable development. On the one hand, protected areas serve as positive examples to study biodiversity conservation from the biological, ecological, social, political and economic sciences points of view. However, the papers also show that interdisciplinary approaches are only one, though important, component of protected area studies. As the generation of information and knowledge is inherently location-specific, the trans-disciplinary nature of research has to be acknowledged. All contributions to this special issue rely on the tacit knowledge of the stakeholders, and the authors have been involved in decision-making and management processes in protected areas. Sustainable development therefore also provides a methodological framework in which to study the complex field of protected area management. The papers also show that sustainability research, in the context of protected areas, is not a regional or local phenomenon, but rather an international field of research, since the case study areas presented in the current volume are taken from protected areas in Europe, Africa, Australia and South America, and they are concerned with all kinds of ecosystems (marine, fresh water, terrestrial eco-systems).

On the other hand, it becomes clear that protected areas are very much influenced and embedded in the local, regional, and national contexts. The studies of the current special issue show that there is no general “blueprint” for the establishment and management of protected areas. Local specifics can be found on all spatial levels, such as that of eco-system and species dynamics, socio-economic development of communities and regions, and national frameworks and policy agendas. While the methods to study protected areas, e.g., eco-system modeling, assessment of management effectiveness, governance structures, PA management tools, may be transferred between sites, each and every site needs special attention on account of the very local dynamics and dependencies. As such, protected areas open a wide range of objects to study with regard to sustainable development.

With regard to the dependence of protected areas on their regional context, the papers in the current volume additionally highlight the fact that protected areas cannot be sustained as ‘islands of sustainability’ alone. Protected areas depend on their surroundings in diverse dimensions, from ecological linkages (e.g., water quality in the surrounding aquifers) to socio-economic pressure, and sufficient funding by public and private bodies. Biodiversity conservation thus needs an integrated, overall strategy to be effective. While protected areas clearly contribute to the manifold aims of sustainable development, their long-term effectiveness in halting biodiversity loss is limited in an otherwise unsustainable world.

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