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Ecological Connectivity and its Contribution to a Green Economy

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Abstract

Policies to enhance ecological connectivity generally affect the quality of biodiversity and ecosystem services (ES), and may thus also have an impact on society and the regional economy. The question is, however, whether these policies support a green economy using natural resources efficiently, pollution is reduced, biodiversity loss is prevented, the economy is socially inclusive, and at the same time contribute to (regional) economic development. Economic impacts of ecological policies are often hardly quantifiable but impact chains emphasizing use and non-use values of ES help to establish links between ecological policies and the regional economy. The results show that connectivity policies may have a potential to positively affect regional economy and, in addition, to support the concept of green economy. Their actual contribution depends on the ecological, economic and social contexts, and on the way of implementation.

Keywords

Ecological connectivity, ecosystem services, regional economy, green economy, impact chain

Introduction

Measures for ecological connectivity gain in importance because of the increasing awareness that (on-site) protected areas alone are not able to protect biodiversity in the long term (KOHLER & HEINRICHS 2011: 5). In the last ten to fifteen years nature conservation activities focused, consequently, also on connectivity policies. The focus changed from on-site nature conservation in separated protected areas to policies connecting protected areas. One may even talk of a paradigm shift in nature conservation. The Alpine Network of Protected Areas (ALPARC) carried out several projects based on this paradigm change (e.g. ECONNECT, greenAlps). These projects resulted, amongst others, in the definition of eight pilot regions for ecological connectivity (PLASSMANN et al. 2016).

In the pilot regions several activities to improve connectivity have been carried out during the last years. Connectivity measures already implemented show positive effects not only for the ecological system but also for the local and regional economy. The appreciation of connectivity policies, however, is still rather loose in local politics and the local population. The aim of this study is to support the mainstreaming of ecological connectivity by visualising the economic impacts of connectivity measures. Therefore, connectivity measures are connected to several sustainable development notions including the recent 'green economy' concept.

The 'green economy' concept denotes an economy in which the natural systems set the limits for economic activities (LOISEAU et al. 2016: 364). The proposed structural changes in society and economy, which take care of nature's limits, lead to a more small-scaled and decentralized economy. Consequently, the use of natural resources is reduced to sustainable limits and is pursued efficiently, pollution is reduced, biodiversity loss is prevented, the economy is socially inclusive, and at the same time contribute to (regional) economic development (LOISEAU et al. 2016: 362). Economic growth (resilient, green) can only take place within the sustainable limits.

Connectivity policies can be defined as nature-based solutions within the concept of a green economy and, thus, may positively contribute to the local and regional economy. The question is, however, how and to which extent such measures correspond to the concept of green economy and contribute to the regional economy. As empirical analyses and data is not readily available for studying these effects, conceptual impact chains can be used to analyse and visualise the economic contribution of connectivity measures. Their contributions, thereby, are described by the amount of conserved, changed or newly provided ecosystem services (ES).

Methods and analysis

The aim of this study is not to quantify or even monetize the economic value of conserved, changed or newly provided ESs because investments in connectivity measures often are small in comparison with other investments such as infrastructure spending. Hence, it is hard to trace the economic impacts of such connectivity policies. The aim of this paper therefore is to describe the economic impact as tangible as possible. Therefore, a logic model, namely the instrument of impact chains, is used.

For creating an impact chain, it is necessary to build up broad knowledge about the objectives and the realisation of the connectivity measure. Especially, information is needed about which goods or services are provided by the connectivity measure in question and which impacts result from these goods and services for different groups of people. In the end, impact chains should describe under a theoretical framework how connectivity measures are implemented to fulfil its targeted objectives (cf. RAUSCHER et. al 2012: 5). One of the advantages of this description is that ecological impacts can be assigned directly to the relevant connectivity measure and also dependencies and links between connectivity measures and local and regional economic developments can be drawn. In addition, impact chains take not only direct or indirect use values but also non-use values of ESs into account in their evaluation process.

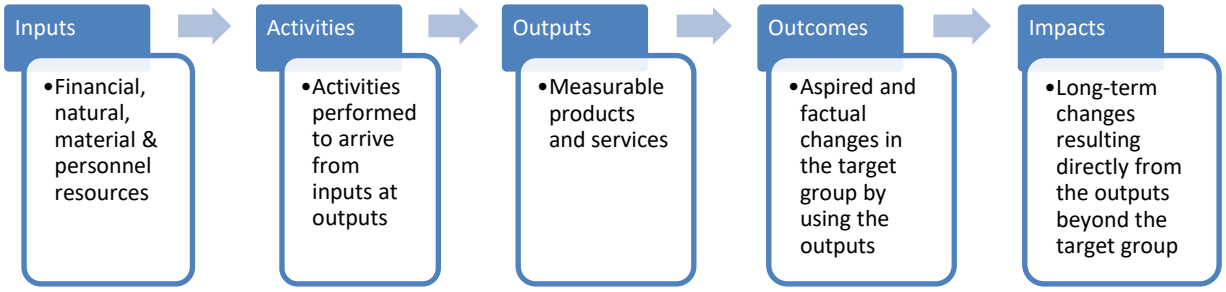

Figure 1: Elements of an Impact Chain
Source: Own representation based on RAUSCHER et. al 2012, CLARK et al. 2004, and ENERGYPEDIA.INFO 2015.

In general, impact chains consist of four to five elements (see Fig 1.). In the beginning of an impact chain **Inputs** are required. These inputs can be in form of financial, natural, material or personnel resources. Based on this input **Activities** produce **Outputs**. Consequently, outputs are the measurable products and services resulting from the activities. If the outputs are known already, the activities are often not considered in the impact chain. The use of these 'new' products and services by the target group should lead to the aspired changes, which are summarised as **Outcomes** in the impact chain. Different to the outcome the **Impacts** represent '... the portion of the total outcome that happened as a result of the activity of the venture, above and beyond what would have happened anyway' (CLARK et al. 2004: 7).

The analysis of ecological connectivity measures follows a twofold approach. On the one hand, twelve connectivity measures from the catalogue of possible measures to improve ecological connectivity in the Alps (KOHLER & HEINRICHS 2011) are selected. Data and information about objectives and probable consequences (outcomes, impacts) for ecosystems and their services to fill in the impact chain are extracted directly from the catalogue.

On the other hand, three already realized connectivity measures are analysed from the pilot regions 'Northern Limestone Alps', 'The Rhaetian Triangle' and 'The French Department Isère'. The impact chain is filled with real data, in contrast to the connectivity measures from the catalogue. The data was collected with the help of stakeholders from the pilot regions. Based on a predetermined structure ecological managers developed a profile for their respective connectivity measures. The information from this profile, in the end, is used to produce an impact chain for the relating connectivity measure.

Results

All connectivity measures have in common that financial resources are needed as an initial input for the implementation of the measure (see for details WITHALM & GETZNER, 2017). Thus, local or regional economic impacts are indisputable, but the size and extent of the impacts, of course, depends on the amount of financial recourses. As the financial inputs mostly not exceed 10,000 to 100,000 EUR for the realisation of one measure, the economic impacts are also hardly recognizable. There are exceptions, like the control of invasive species or the revitalisation of flowing waters, which entail costs of up to 1 Mio. EUR. Nevertheless, investments in connectivity measures can have initiating impacts independent from the amount of financial input for further local or regional economic development and will have social and ecological impacts for residents.

The analysis shows, moreover, that connectivity measures can substantially support the concept of a green economy. The reason is on the one hand, that connectivity measures are mostly based on local and regional strengths. The concentration on these strengths may make the region more resilient. In rare cases even new economic pillars may develop from the implementation of connectivity measures (e.g. new products or niches for new companies). Landscape conservation with sheep grazing, for example, includes economic impacts by products from sheep farming like wool, meat and dairy products. The implementation of the 'Network Natural Forest' in the pilot region 'Northern Limestone Alps' even stimulated the development of a new tourism agency in the region. Economic impacts concentrate, however, on the tourism and agricultural sectors. On the other hand, a strong concentration on natural capital and a protection of biodiversity is visible as life cycle maintenance and habitat and gene pool protection play in almost all measures an important role.

Discussion

It seems that connectivity measures bring about positive economic effects for a region in most cases. The impact is, however, dependent on where the measure is implemented, who implements the measure and how it is implemented. Consequently, it is not granted that connectivity measures have positive economic impacts for a region. Nevertheless, measures for ecological connectivity may be a good starting point to support regional development, because of their concentration on local and regional strengths.

Several connectivity measures emphasize, however, on environmental education and awareness-raising of ecological connectivity. The aim is to educate the local population as well as visitors concerning nature and biodiversity. These measures entail only indirect and insecure economic impacts. These impacts are, thus, not even to some extent predictable. Furthermore, it may take a long time until real economic impacts are noticeable.

Although connectivity measures carry a potential to entail positive economic impacts, one has always to consider the actual circumstances. Consequently, a general statement about the regional economic impact of connectivity measures is not possible.

Conclusion

Increasing ecological connectivity is a complement to PAs; its main contribution is the protection and conservation of biodiversity. As the implementation of connectivity policies requires financial resources, the regional economy is always affected. These impacts are very limited, because investments are often very small. The big profiteers are, however, the tourism and the agricultural sectors. Furthermore, connectivity measures are mainly small-scaled projects and, thus, affect only the local or regional economy; most measures do not lead to negative impacts owing to the reduction of available natural resources (e.g., land for development, extractive uses). The strengthening of local potentials may therefore contribute to the green economy concept.

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