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Application and evaluation of an indicator set to measure and promote sustainable development in coastal areas

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ABSTRACT

Increasing problems in and pressures on coastal zones and subsequent high-ranking political initiatives to deal with these problems have resulted in several efforts to measure state of and progress towards sustainability in coastal zones. The project SUSTAIN developed an indicator-based methodology and scoring system which allows municipalities as well as district and regional authorities to evaluate their sustainability performance. The results shall serve as a policy and strategic planning tool and improve the management of coastal zones. Ten groups applied the indicator set in two contrasting Baltic coastal municipalities, Neringa in Lithuania and Warnemünde in Germany. Nine groups were composed of five students, and the tenth group had a single expert. The variability of results from different groups is high for both study sites and on every data aggregation level. The data's limited reliability and reproducibility hinders regional, national and European inter-comparisons between sites. Indicator applications for time series are also problematic due to limited data availability, quality, and spatial resolution, as well as shortcomings in the indicator set and the human factor. The role of evaluators and their background and spatial heterogeneity are discussed, and recommendations are given. Overall, the interactive application process supports a learning-focused process for building awareness of sustainability and favours strategic planning. In combination with the QualityCoast labelling system, the SUSTAIN methodology can provide convincing practical benefits for municipalities.

1. Introduction

In 2006, the European Council adopted the EU Sustainable Development Strategy. It defines a vision of sustainability in which economic growth, social cohesion and environmental protection are integrated and the needs of the present generation are met without compromising the ability of future generations to meet their own needs (European Council, 2006). European coastal zones can be subjected to intense levels of activities, and many of them face problems of deteriorating natural, socio-economic, and cultural resources. To solve these problems, the European Parliament and the European Council adopted a Recommendation on Integrated Coastal Zone Management (ICZM) in 2002 (CEC, 2002). The European Commission defines ICZM as a dynamic, multidisciplinary and iterative process designed to promote sustainable development of coastal zones. Increasing problems in coastal zones and high-ranking political initiatives promoting ICZM have resulted in indicator-based efforts to measure the state of and the progress towards sustainability in coastal zones (Olsen, 2003; Pickaver et al., 2004). Indicators are popular because they provide a simplified view of complex phenomena, quantify information, and make it comparable. Indicators are regarded as important tools in European coastal and maritime policy (Meiner, 2010) and have been used for years to monitor the EU Sustainable Development Strategy.

Given their political usefulness, many coastal indicator sets have been developed on a national (Henocque, 2003; Sarda et al., 2005; Hoffmann, 2009), European (Burbridge, 1997; Van Buuren et al., 2002; Pickaver et al., 2004) and world-wide scale (Ehler, 2003; Olsen, 2003; Belfiore et al., 2006). Many exercises in applying indicator sets (Lescrauwaet et al., 2006; Schernewski et al., 2006; Pickaver, 2009; O'Mahony et al., 2009) and critical evaluations of indicator sets (Breton, 2006; Wallis, 2006; Bell and Morse, 2008) have also taken place. Despite improvements, they revealed several weaknesses, e.g. inadequate recognition and awareness of the indicators' functions, being overly technical and insufficiently oriented towards policy assessment and

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evaluation and the decision making process (Breton, 2006; Lyytimäki, 2011).

The Guiding Principles for Sustainable Development (CEC, 2005a) mention the coherence between local, regional, national, and global actions, and the review of the EU Sustainable Development Strategy (CEC, 2005b) points out the importance of the local and regional levels. According to the EU, integrated management of the coastal zone requires strategic, coordinated, and concerted action at the local and regional levels (CEC, 2002). Thus, coastal municipalities and districts play an important role in sustainable development, and measuring their current state of sustainability and effort is a major task. However, the acceptance of existing indicator sets at these administrative levels is very poor. Some reasons include complexity, a lack of necessary expertise, data requirements, time costs, results which require interpretation, an uncertain benefit, and a lack of motivation.

Within the project SUSTAIN, a set of indicators has been designed to measure sustainable development in coastal areas on a local and regional level (SUSTAIN partnership, 2012a). The indicator set is linked to a scoring and preference methodology, the DeCyDe tool developed by Isotech Ltd, Cyprus (SUSTAIN partnership, 2012b, Loizidou and Loizides, 2012). The entire methodology can be adjusted to the needs of municipalities and will serve as a decision support and strategic planning tool.

Altogether, we employed nine student groups and one professional expert to apply this indicator set in two Baltic case studies, the German seaside resort Warnemünde and the Lithuanian coastal municipality Neringa. Objectives were to evaluate a) if the indicator set suitably reflects the state of or progress towards sustainability, b) if it delivers reliable, reproducible results, and c) if it allows for comparisons between different time periods and between different regions. The role of important controlling factors for and the practical relevance of indicator results for planning and management, as well as future perspectives, will be discussed.

2. Study sites and methods

2.1. Study sites Warnemünde and Neringa

The SUSTAIN indicator set was tested in two contrasting coastal study sites in the Baltic Region, the seaside resort Warnemünde in Germany and the coastal municipality of Neringa in Lithuania (Fig. 1).

Warnemünde is part of the city of Rostock, and with 6670 inhabitants (2011) covers an area of 5.9 km^2 and has about 6 km of coastline. It was founded in the 12th century and remained a small coastal fishery town until the 19th century, when the town was discovered by tourists and seaside holidays at the German Baltic coast became popular. Today, tourism is the major source of income, and Warnemünde belongs to the most important of German seaside resorts. The town provides over 10 000 tourist beds and recorded 313 000 guest arrivals in 2012 and more than 1 000 000 tourist overnight stays (Statistisches Amt Mecklenburg-Vorpommern, 2012). The annual degree of bed capacity utilisation is only 27.9%, which reflects the dependency on summer bathing tourism and a relatively short season. A solid pier in Warnemünde protects the entrance of Rostock harbour and causes ongoing accumulation of sand. As a result, the town has a broad sandy beach about 3 km long, and a growing dune belt protects against storm surges. The beach, which has been awarded the Blue Flag, attracts additional visitors from the city of Rostock (204 000 inhabitants in 2011) as well as day visitors from Northern Germany, especially from Berlin. Consequently, the beach is crowded during the summer season.

Located at the entrance of Rostock harbour and Breitling bay, Warnemünde became an important ship-building location during the 20th century, but the industry has faced a serious decline during the last two decades. After German reunification in 1990 and the resulting political changes in the entire Baltic region, sport-

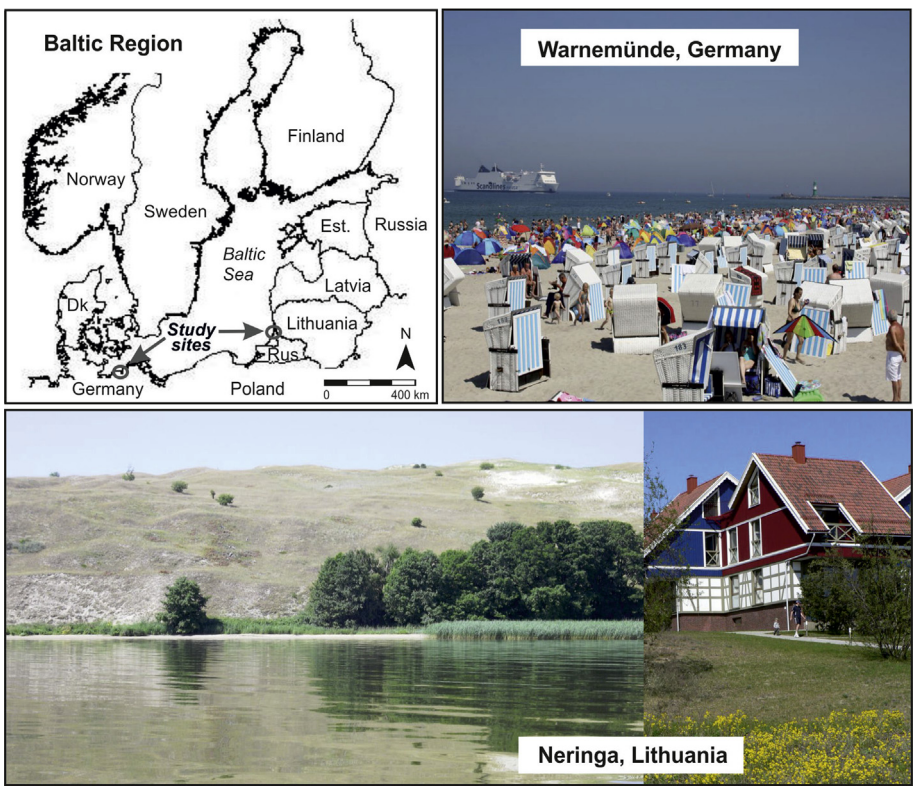

Fig. 1. Location and impressions of the Baltic study sites Warnemünde, Germany and Neringa, Lithuania.

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