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Editorial

Coastal systems in transition: From a 'natural' to an 'anthropogenically-modified' state

This Ocean & Coastal Management special issue “Coastal Systems in Transition” has its origin in the eponymous ECSA 56 conference in Bremen (Germany) in 2016. There was a subtitle for the conference: “From a 'natural' to an 'anthropogenically-modified' state”, which indicates that humans play an increasingly important role for Estuarine and Coastal Sciences. The explanatory text of the conference states: “Human-induced global climate and regional environmental change dramatically modify the structures and functions of coastal systems driving them into a new system state. The altered resource potentials and ecosystem services then, in turn, significantly affect the livelihoods of the population.” This two-sided coin is central to this special issue: We are the only ones who can change, and for example through effective governance induce change in others, to reduce pressure on coastal ecosystems. Apart from that, we also have to think about how to respond to altered types and availability of resources and ecosystem services.

If we further decompose what leads to unprecedented transitions in coastal systems, one can distinguish between the direct and indirect human-induced drivers of coastal change. This provides a more nuanced examination into how and why coastal systems are transitioning from a natural to an anthropogenically-modified state. For example, resource use and pollution are leading to direct changes on the coast, and quite often to a necessary change of our governance and use of coastal systems. Indirect drivers are for example climate change, with complex latent effects from rising global average temperatures and acidification, but also acute changes to coastal areas due to increased flooding or altered storm surge regimes. Though it is clear that these direct and indirect drivers form a complex web of interdependencies between societies and ecosystems, it can be convincingly argued that they each are, to a large degree, induced by human behaviour.

It is important to study ecological systems to understand what is transitioning on the coast and how. Those issues are dealt with in the twin issue from the conference in Estuarine and Coastal Shelf Sciences, edited by Inga Nordhaus et al. (forthcoming).

This special issue of Ocean & Coastal Management deals with social-ecological systems from a social science perspective. Humans have become the most important keystone species, the dominant drivers of change in social-ecological systems (Crossland, 2005). Therefore analysing *us* merits increased attention. Apart from providing a proper ecological system understanding, the natural sciences are indispensable

for determining ecological points of reference (e.g., species and their biomass, species richness, biodiversity, ecosystem functioning). The social sciences, apart from providing proper social system knowledge, however, are also critical to understand how these points of reference pass through a normative lens to translate to management targets (Fenichel et al., 2013) or how management and governance can influence behavioural changes to meet these targets (Fujitani et al., in this issue). We know that a ‘healthy’ ecosystem is necessary for human wellbeing (MEA, 2005). However, we also know that important social and economic factors enter the “preference function” of people, who have to invent, agree, live, and enforce the required governance changes as well as adapt their behaviour. This is where marine social sciences come into play and where this special issue is a contribution to a strongly required holistic analysis.

Studying coastal transitions from a social science perspective is a fascinating endeavour because coasts contain numerous spatially overlapping and interacting systems (Schlüter et al., 2013). The coast is the interface between land and sea. Historically, and until recently, land and sea have been seen as independent from each other, from both a scientific and regulatory perspective (Adams et al., 2014). However, despite their substantial differences in social-ecological system characteristics, they are strongly intertwined, not only through the water flow downstream within a catchment area, but also, for example, through fishes swimming upstream, or shipped goods being delivered inland (Álvarez-Romero et al., 2011). These intertwined systems create new dynamic interactions and characteristics with interlinked social, ecological and social-ecological sub-systems (Schlüter et al., 2018) and are characterised by rapidly growing pressures due to increased use, for example, constant migration into coastal areas (Cassels et al., 2005), increased need for fish protein, to feed a skyrocketing population (FAO, 2016), increasing coastal tourism, or innovations which allow us to use coastal resources in new ways (Spalding et al., 2017).

Just as historically land and sea have been viewed as distinct from a regulatory or scientific perspective, the framing of a system in the marine sciences as either social, ecological or social-ecological is evident in the literature (Partelow et al., 2018). Looking at each system independently is already a complex enough endeavour. Also following a system theory perspective (Luhmann, 1995) one could argue that the systems are to a large degree self-determined and only have a limited ability to communicate with other systems. However, social, ecological

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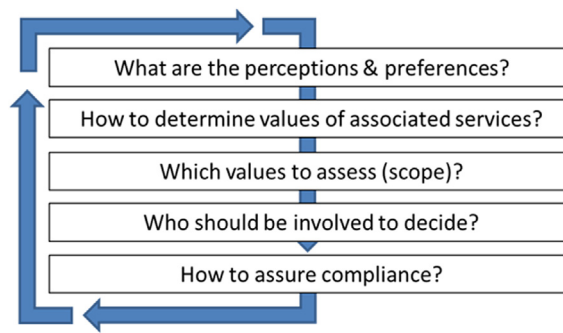


Fig. 1. Overarching questions considered for guiding coastal transitions towards sustainability in this special issue.

and social-ecological systems are integrated in multiple ways (de Jonge et al., 2012). Particularly coastal systems highlight the ambiguity of these system boundaries and the difficulties in defining them (Partelow et al., 2018).

What comes of these diverse and highly interconnected systems is a balancing act between the ecological, social and economic, to represent the diversity of preferences in a societal process and agree upon a sustainable path for coastal transformations while remaining aware of for whom it will be sustainable (Bromley, 1989, 2001). This is a multifaceted challenge, not least due to immense system diversity, that requires tremendous social science disciplinary diversity (Markus et al., 2018), for example, from economics, sociology, political sciences, law, social anthropology, history, and geography. Further, methodological diversity on how to approach the research questions and analyse data are crucial in such a problem-oriented field of research.

The contributions in this special issue focus on the inevitable transition taking place in the social system for governing the ever changing social-ecological system of the coast. We have organised the various contributions following five overarching questions that are a necessary part of this process towards sustainability (See Fig. 1). First, four papers are looking at human perceptions and understandings of and preferences for the coastal environment. Perceptions, understandings and preferences influence and are influenced by values associated with the coastal environment. Therefore, in a second step, three papers expand on innovative techniques for estimating values we associate with coastal social-ecological systems. Economic ecosystem service valuation deserves, and probably requires, a discussion about what and how to value ecosystem services (Spash, 2007). Therefore in a third step three papers particularly consider this issue for coastal environments. After analysing how to value the coast and its services, the question arises, who should take the decision about the direction in which coastal transformation should occur. In a fourth step, three papers are discussing the inclusiveness of decision processes, convincingly showing how important the involvement of various stakeholders is for a sustainability transformation. Once changes in governance systems are agreed upon, compliance is of central importance for managing coastal systems (Ostrom, 1990; Velez et al., 2012). In the following we weave a thread through the various contributions by looking briefly at each of them.

1. Perceptions and preferences

Understanding which path of transition people “choose” for the coast might first start with the investigation of their perceptions (Bennett, 2016; Beyerl et al., 2016; Breckwoldt et al., 2018). They will strongly influence the willingness of those people to contribute to a sustainable path or support a particular environmental policy. Brandon Ward et al. (this volume) analyse in their article perceptions of economic and conservation benefits people have in relation to a Marine Protected Area (MPA) in Newfoundland. Using a survey with 180 respondents, Principal Component Analysis and qualitative supporting

evidence they find that beliefs of people about potential economic and conservation benefits play a key role in whether they support or oppose the creation of the MPA. Knowing whether support exists, and what determining beliefs underpin support is important, as social licence to operate is a key factor of success (Voyer et al., 2015). Many MPAs just exist as paper parks (World Bank, 2006) and studies such as this one are important to not only gauge support but understand opposition, in order to map the way forward. In a next step one can raise the question, how they would support marine conservation.

The paper of Abdul Halik and Marco Verweij (this volume) is particularly focused on the diversity of existing perceptions. Using Cultural Theory, mainly developed by the social anthropologist Mary Douglas (Douglas and Wildavsky, 1982), and a large scale survey done in three different communities in Sulawesi, Indonesia, they can support the body of research done in a Western cultural context with non-Western findings; communities always consist of a huge spectrum of perceptions. They find everywhere large proportions of the four world-views and relations to nature (Thompson et al., 1990) provided by cultural theory. If this is what characterises those communities, only poly-rational solutions to coastal protection, considering the various world views and relations to nature, will get the above mentioned social licence and become effective (Verweij et al., 2006). Blue-print solutions focusing on one type of governance, might it be, for example, a hierarchical or a *laissez faire* approach doomed to failure.

Further, in determining support for policy it is important to understand specific situations and contexts instead of depending on broad assumptions or stereotypes, as demonstrated by Kathryn Graziano and Richard Pollnac (this volume) with regards to gender. They take us from Indonesia to the neighbouring Philippines using also a large N study, randomly sampling marine resource users from 30 villages in three provinces. Focusing on climate change and adaptation they find that gender explains significant differences in various domains. Yet in contrast to other studies, they find that surveyed women are less connected to nature and more risk tolerant than men. However, this does not lead to differences in conservation attitudes. Despite the same awareness about the issues at stake, they are less likely to attend outreach activities. This shows on the one hand that the role of gender is very context dependent (Agarwal, 1994), depending on norms, culture and place, women might be more nature friendly or risk tolerant (Goldbach et al., 2018), but it also shows, similar to Halik and Verweij that considering this diversity is important for effective policy implementation.

Katie Nelson et al. (this volume) uses economic experiments to understand the above-mentioned question about the willingness of local people to support or contribute to the MPA of Wakatobi, Sulawesi, Indonesia. Astonishingly they find that people are significantly more willing to give money instead of time using field experimental methods. Andreoni's warm glow theory is used to explain this counterintuitive result (Andreoni, 1995). They combine their analysis of donation behaviour with distributional preferences of each individual. People might act differently when thinking about distribution within their

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