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Integrating ecosystem services into coastal and marine governance

Li, Ruiqian

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— CHAPTER 1 —



Introduction

1.1 Background: The need to integrate ecosystem service (ES) thinking in coastal and marine governance

The health of global coastal and marine ecosystems is in serious decline due to multiple stressors, such as over-fishing, pollution, sand grooming, and various other activities on terrestrial land, along the coasts and in the ocean (Worm et al., 2006). Moreover, coastal and marine natural resources are limited in space and amount. Users are, therefore, competing for space and services, leading to an adverse influence on each other and cumulative impacts on the ecosystem (Douvere & Ehler, 2009a). These uncoordinated human uses and interactions, along with an increasing expansion of human populations in coastal regions, are likely to further accelerate ecosystem degradation and ecological service losses (Foley et al., 2010). This is aggravated by climate change, which increases the vulnerability of coastal and marine protection features. For example, climate change causes coral bleaching and ocean acidification, which threatens reefs and reduces fisheries' production, tourism and other coastal protection features (Barbier et al., 2011). More stakeholders and economic sectors make pleas for voluntary negotiations regarding the inevitable conflicts related to their usage, by taking into account their diverse values and interests. In particular, understanding the economic characteristics and value of the natural resources is required for finding straightforward market solutions to the trade-offs, such as developing market-based instruments (Bateman et al., 2011; Christie et al., 2006; Gómez-Baggethun & Muradian, 2015). However, there is a lack of knowledge of human-nature relationships and the true value of coastal and marine resources. The feasibility and implementation of market-oriented thinking and instruments in natural resource governance still require critical examination. The increase in the number of actors and policy instruments also involves geography, defined by ecosystems, which may not always be appropriate for the existing governance arrangements (Loft et al., 2015).

To deal with these governance issues, the concept of ecosystem services (ESs) has been promoted, which generally refers to the direct and indirect contributions of ecosystems to human well-being (De Groot et al., 2010; TEEB, 2010). ESs define and characterize the multiple provisions from land and sea, based on the variations of classification schemes (e.g., Costanza et al., 1997; De Groot et al., 2010). ES thinking offers a new anthropocentric justification for conserving species and ecosystems, based on human dependencies from the services that they provide (Lamarque et al., 2011). Specifically, coastal and marine ESs can be considered as the land-sea conditions and processes through which species are maintained, with diverse goods and services (e.g. sea food, water purification, and fuel) being produced to benefit the human population (Alvarez-Romero et al., 2011; Villasante et al., 2016). Thus, coastal and marine governance should sustain human well-being from ESs, which requires changing the traditional ways of managing coasts and oceans worldwide (Douvere, 2008).

Rather than a sector-by-sector governance approach, the future of coasts and oceans requires a holistic and integrated governance framework to address the aforementioned stressors and complexities (Katsanevakis et al., 2011). Recent literature has advanced arguments that support a widely accepted ecosystem approach with regard to coastal and marine management (e.g. Arkema et al., 2006; Barbier et al., 2008; Foley et al., 2010). A range of overarching international conventions, treaties and legislations acknowledge the need to consider the human influence on the marine environment and manage human activities through a holistic ecosystem approach (Katsanevakis et al., 2011). Some examples are the Convention on Biological Diversity (CBD), the Food and Agriculture Organization of the United Nations (FAO) Conduct Code for Fisheries, the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Agenda 21, the EU Marine Strategy Framework Directive, the EU Recommendations on Integrated Coastal Zone Management, and the Green Paper on the Future Maritime Policy for European Oceans and Seas.

The ecosystem approach refers to “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way” (CBD, 2000), which is often used interchangeably with ecosystem-based management. What exists at the centre of the ecosystem approach is ES thinking (Douvere & Ehler, 2009a; Rosenberg & McLeod, 2005). In other words, the approach “focuses on understanding the relationship between human society and the ecosystems that support it and how this can inform management decisions” (Farmer et al., 2012, p.4). The core goal of the ecosystem approach is to maintain coastal and marine functional relationships and processes within ecosystems “in a healthy, productive and resilient condition so that they can sustain human uses of the ocean and provide the goods and services humans want and need” (Katsanevakis et al., 2011, p.808). The principles underpinning the ecosystem approach also encompass ES thinking. For example, the principles emphasize reflecting the value of ESs completely, taking decisions at an appropriate spatial scale, identifying and involving all relevant stakeholders who stand to gain or lose the benefits of ESs in the planning process, and taking into account ecosystem functioning (Defra, 2010).

However, in spite of a broad acceptance of the ecosystem approach and relevant guidelines and principles, ES thinking continues to be mainly a conceptual understanding in a scientific debate (Douvere & Ehler, 2009b). It has been argued that ES thinking does not take existing governance processes and institutional arrangements as a starting point, which leads to the absence of direct solutions for social-ecological issues (Primmer & Furman, 2012). In this context, an institutional focus is considered essential. Institutions refer to the humanly devised constraints that establish structure to facilitate human interactions, which include formal, as well as informal rules (North, 1990a; 1991). Governance strongly relies on institutions to embed ES thinking to coordinate users’ interactions and address social-ecological matters

(Turnpenny et al., 2014).

To promote the implementation of ES thinking, an institutional focus on ES governance has emerged in particular, recently (Mann et al., 2015; Primmer et al., 2015). Numerous empirical studies, scientific reports, and practical initiatives have articulated a focus on land-use governance to support a greater application of ES thinking (e.g., Bateman et al., 2013; De Groot et al., 2010; Scarlett & Boyd, 2015). In this context, the territorial ESs, produced by forest, agriculture, urban green space, river and grassland, have received considerable attention (e.g., Bolund & Hunhammar, 1999; Corbera et al., 2009; Zhang et al., 2007). However, the governance of coastal and marine ESs still falls short of a substantial investigation into its integration in practice (Douvere & Ehler, 2009a; Foley et al., 2010). Currently, the degree to which ES thinking is interpreted in coastal and marine governance is highly variable on the ground (Ehler, 2013). In practice, many coastal and marine governance objectives and strategies tend to miss critical ecological and social elements, as emphasized in the scientific debate (Arkema et al., 2006). In addition, the existing institutional arrangements mainly focus on single-species conservation and sector-based utilization of certain ESs (Agardy et al., 2011; Douvere, 2008; Foley et al., 2010). Moreover, hierarchical arrangements have generally played a dominant role, leaving limited space for taking advantage of market-based instruments for governing ESs.

Therefore, only a limited knowledge is available to date, about how to integrate ES thinking into coastal and marine governance. In particular, a comprehensive institutional understanding of this required integration that builds on practical experiences seems lacking. This thesis aims to address this knowledge gap to improve coastal and marine governance.

1.2 The case of China

In the last few decades, several countries have attempted to undertake coastal and marine governance toward ecosystem-based management, such as Belgium, the United Kingdom, Germany, Finland, Australia, the United States, Japan, and China (Crowder et al., 2006; Ehler, 2013; Douvere, 2008; Leslie & McLeod, 2007; Pitcher et al., 2009). In particular, China has presented an urgent demand for improving its coastal and marine governance in the context of immense social and economic development. In China, coastal and marine industries have experienced a rapid development since the 1990s (Li, 2006). The Gross Ocean Product (GOP) was about 6.5 billion RMB in 2015, accounting for 9.6% of the GDP. This GOP has increased by 22% since 1997 (SOA, 2016). This rapid development, which is underpinned by the over-exploitation of coastal and marine services, has caused substantial pollution and damage along the coast and in the ocean, even threatening local well-being. For instance, Jiaozhou Bay – a large semi-enclosed bay located on the south bank of Shandong Peninsula, China – had reduced by one-third from the late 1950s to the early 2000s, due to large-scale reclamation for

economic industries (Ge & Zhang, 2011; Gu et al., 2007). This directly resulted in losses of wetland habitats, natural coastline, tidal volume, water purification capacity, and biodiversity at the local level (Ma & Lu, 2015). The multiple use conflicts fell out of fragmented sectoral administration and conventional governance processes. Some examples are the conflicts between aquaculture and shipping, reclamation and wetland resource use, and offshore oil development and fisheries (Cao & Wong, 2007; Yu, 1994). As a consequence, the Chinese government had to reflect on existing policies regarding coastal and marine governance.

Associated with the publication of China's Ocean Agenda 21 in 1996 and the Development of China's Marine Program in 1998, sustainable ocean management has become a critical strategy, which has driven the optimization of coastal and marine development structure (Wu et al., 2012). An increasing focus has been put on strengthening the legal and regulatory basis of coastal and marine governance, such as the enforcement of the Law on the Use and Development of Sea Areas, as well as the development of the State Oceanic Administration. A range of coastal cities, such as Qingdao, Xiamen, Tianjin, Dalian, and Ningbo, have also actively specified their corresponding municipal regulations accordingly, especially with respect to rigorous marine environmental standards and coastal monitoring. These regulative efforts tend to hierarchically structure coastal and marine governance (Lau, 2005). Apart from this context, growing attention has been focused on developing market-oriented strategies and decentralization in ES governance. Subsequently, integrated coastal zone management, marine spatial planning, special marine protected areas, marine nature reserves, marine ecosystem restoration and coastal protection initiatives, as well as market-based instruments have been widely adopted in Chinese coastal areas as conservation strategies (Douve, 2008; Ma et al., 2013; McCleave et al., 2003; Peng et al., 2006; Shi et al., 2001; Wu et al., 2012). For instance, as a pioneer city for the "blue" economic development in East China, Qingdao has adopted trading measures to allocate sea use right and attempted to stimulate collective activities on a basin scale in Jiaozhou Bay, to address the tension between economic development and nature conservation. These policies and institutions have showcased efforts to accommodate ES thinking to shape the behavior of actors and the utilization of natural resources, which has facilitated the advance of the Chinese coastal and marine governance at the national, municipal, and local levels.

1.3 Challenges regarding the integration of ES thinking into coastal and marine governance

China and other coastal countries have encountered two key challenges regarding the integration of ES thinking into their coastal and marine governance. The first challenge is to highlight ESs and their interrelationships that may have been conceptualized in coastal and marine governance. This means uncovering the extent of the dependence that coastal

populations have on ecosystems and how coastal governance actually includes ESs. In particular, it has been argued that understanding the visibility of ESs in strategic plans is critical (Wilkinson et al., 2013). Coastal strategic planning is an important component of coastal and marine governance, which has the capacity to frame ES concepts to mobilize and focus attention. Coastal strategic planning also has an overarching influence on policy instruments, statutory procedures, and other thematic plans that are likely to incorporate ESs (c.f. Albrechts et al., 2003). Exploring how the coastal strategic plan may embrace the complex features of ESs is helpful for making intelligent decisions and securing changes (Balducci et al., 2011; Friedmann, 2004; Healey, 2009). Traditionally, many countries, including China, have designed their coastal strategic policies without conscious linkages to the ES concept. Only the most recently issued policies refer to it explicitly (Hansen et al., 2015; Piwowarczyk et al., 2013; Rall et al., 2015). Therefore, a disconnection exists between ES concepts and actual coastal strategic plans. Consequently, it is essential to uncover the implicit and explicit references to ESs, the conceptual understanding of the benefits provided by Nature, the consideration of interrelationships among different ESs in coastal strategic plans, as well as policy instruments for coordination.

From an institutional perspective, the second key challenge is to ensure the required institutional support for the integration of ES thinking in coastal and marine governance (Loft et al., 2015; Frantzeskaki & Tilie, 2014; Matzdorf & Meyer, 2014). Typically, coastal and marine ecosystems are governed as delimited geographical units under sectoral institutional arrangements and practices. Such typical fragmentation of institutional arrangements may interfere with an overarching ES vision and cause obstacles in dealing with complex interactions among the ES uses (Carpenter et al., 2009; Frantzeskaki & Tilie, 2014; Primmer, 2011). Moreover, the awareness of the more intrinsic values of coastal and marine ESs is emerging (e.g., climate regulation and the maintenance of coral reefs). This introduces new topics, in addition to requiring more integrative and cooperative institutional arrangements, to be capable of better responding to ecological dynamics (Primmer & Furman, 2012). For instance, China has struggled to improve the structure of marine economy, increase the capacity of marine monitoring and encourage the local restoration of ecological functions to face the impacts of climate change (The State Council of China, 2011). Furthermore, to better operationalize ES thinking, institutional arrangements are expected to facilitate more ES-related tools (e.g., measurement, valuation, and payments for ESs) to support decision making (Kosoy et al, 2007; Vatn, 2010; Wunder, 2005). Therefore, the potential influence of the existing institutional arrangements for coastal and marine governance on the feasibility of ESs should be investigated.

As argued above, there is a need to improve the quality of coastal and marine governance worldwide. Insights are required into how coastal and marine governance could integrate ES

thinking. China, as a major developing country in the world, has presented a strong need to gear coastal and marine governance towards ecosystem-based management. In doing so, it has accumulated rich practical experiences, as well as encountered the two key challenges regarding the integration of ES thinking. Therefore, from an institutional perspective, this thesis will advance the integration of ES thinking into coastal and marine governance, with learnings from the Chinese case. The main goal of this research is to provide theoretical and empirical lessons to improve coastal and marine governance.

1.4 Theoretical basis

1.4.1 Coastal and marine governance

Increasingly, ES thinking has been affecting the content, structure, and process of governing coasts and oceans through policies. The widely-used catchwords of the actions at the time include “coastal and marine governance,” “marine spatial planning,” “integrated coastal zone management,” “ocean zoning,” “marine environmental planning,” and “integrated water management” (Crowder et al., 2006; Douvere & Ehler, 2009a; Forst, 2009; Mitchell, 2005; Peel & Lloyd, 2008; Piwowarczyk et al., 2013). These terms have overlapping meanings, with some of these terms being used interchangeably. There is no consistent terminology to cover the various policies regarding coastal and marine areas. This thesis adopts “coastal and marine governance” as the main term to refer to the range of governance mechanisms, processes, strategies, and organizations through which all relevant actors perform diverse actions, interact with each other, and influence the outcomes of the management of coastal and marine natural resources (drawing on Lemos & Agrawal, 2006; Rival & Muradian, 2013). Accordingly, a range of actions, such as coastal strategic planning, marine spatial planning, marine environmental protection area establishment, and integrated coastal zone management can be considered as typical coastal and marine governance activities.

There were two main considerations in adopting “coastal and marine governance” as the key term. Generally, in the case of ESs, governance refers to the institutionalization of mechanisms (hierarchical, market, and hybrid mechanisms) for facilitating interaction and coordination by defining, constraining, and shaping the expectations of stakeholders and the value of natural resource management (Paavola, 2007; Rival & Muradian, 2013). The term “governance” implies the integration of issues and consequences of ecological, economic, and social governance (Peters, 2011). It implies all the relevant stakeholders and sectors in the processes of coordination and regulation that shape the actions of people in a society (Alexander, 2006). Accordingly, “coastal and marine governance” covers a wide scope of environmental, economic and social governance arrangements, such as natural resource planning (e.g. fishery, wetlands, water, and landscape), environmental protection, shipping, mining, energy, tourism, and education. Other terms that are listed above, usually have constraints on such broad

integration. Secondly, “governance” prominently emphasizes the importance of coordination by highlighting the relationships among the state, the market, and the community (Giddens, 2000; Lemos & Agrawal, 2006), particularly by including “non-state actors that may have been previously excluded from the policy process, but are indeed highly influential” (Loft et al., 2015, p.152). Historically, “spatial planning,” “zoning,” and “management” are essentially government-based practices, with limited involvement of private ownerships and the market (see Ehler & Douvère, 2007; Sorensen, 1997). These terms conventionally stress that the use of the sea and the coast is controlled and regulated in public interest through statutory processes. In general, “governance” refers to more incentives through market exchanges and initiatives of social groups to make collective decisions, in comparison with other terminologies. “Coastal and marine governance”, therefore, provides a larger context for this thesis, within which the integration of ES thinking into a set of governance actions through diverse ways can be explored.

1.4.2 Economic institutionalism

Economic institutionalism has played a critical role in understanding and reinforcing ES governance based on ES thinking. The majority of coastal and marine ESs can be considered as common-pool goods (Muradian, 2013; Ostrom et al., 1999), implying that they have a greater difficulty in excluding beneficiaries due to their inherent mobility (e.g. the provision of fisheries) or their open access. They also share a feature of rivalry, which means the benefits derived by some users from ESs generally reduces the availability of services for others. Accordingly, the governance of coastal and marine ESs has been considered a “struggle to govern the commons” or a “collective action problem” (Dietz et al., 2003). Essentially, the key issues for coastal and marine policymaking with ES thinking are interaction and coordination. To address these problems, economic institutionalism offers a suitable line of thinking, since it emphasizes the role of interaction in the determination of political outcomes, as well as attributes the origin of institutions to voluntary agreement among actors (Hall & Taylor, 1996). This school of thought distinguishes itself from other institutionalisms by explaining how to structure the interactions of the actors by rules and allow gains from exchange and coordination, thereby dealing with a series of collective action dilemmas and producing better social-ecological outcomes (Hall & Taylor, 1996). On the basis of the assumptions mentioned above, a range of scholars have provided different analytical views. For instance, Ostrom (1990; 2009) offers a basic and systematic understanding of rules, by distinguishing the analytical levels in which different choice processes take place. Alexander (1992; 2006) agrees with this thinking, while stressing on interactions among agencies and institutions that affect action and behavior in a multi-level analysis. Alexander also highlights the role of transaction costs in inter-organizational coordination, by referring to the transaction cost approach developed by Coase (1960), North (1990b), and Williamson (1995).

With regard to coastal and marine governance, economic institutionalism is a useful lens to analyze how institutions can coordinate transactions among actors who stand for the interests of their benefits from diverse ESs (Paavola & Adger, 2005). Such transactions can occur through hierarchical governance modes, market governance modes, or hybrid governance modes, which combines various governance elements and arrangements of the former two (Vatn, 2010). To perform effective ES governance in a certain mode, understanding the transaction characteristics can shed light on strategy implementation and governance outcomes (Paavola & Adger, 2005). Economic institutionalism highlights the influence of social capital and the market on transactions. From this perspective, market-oriented institutions have been increasingly developed to stimulate economic incentives and voluntary agreements under regulatory arrangements to coordinate the interactions among ES users. This type of institution is visible in coastal and marine governance worldwide, such as the fishery allocation based on individual tradable quotas (Squires et al., 1995).

This thesis focuses on institutions, which represent “regularities of human action in situations structured by rules, norms, and shared strategies, as well as by the physical world” (Crawford & Ostrom, 1995, p.582). Institutions steer governance, which means both, formal and informal institutions, concretize governance by determining the objectives, managing the processes, affecting the motivations, and facilitating coordination (Loft et al., 2015; Peters, 2011). Devising and implementing rules, procedures, and organizational structures to affect actions, so as to match suitable governance modes to a given transaction attribute, is considered as institutional design (Alexander, 2001; 2006). This thesis highlights rules that are central to structuring various policy situations (Hodgson, 2004). It has been argued that effective governance draws on the formulation and enforcement of rules (Ostrom & Basurto, 2011). Specifically, effective governance focusses on setting objectives, defining, and applying rules for achieving those objectives, and managing the consequences of these rules (Vatn, 2010). Moreover, this research also emphasizes the importance of governance instruments, which are a concrete method to accomplish the defined goals of ES governance. Essentially, governance instruments have a close linkage with institutions, as their formulation and implementation are actually a set of institutional arrangements made by rules (Böcher, 2012).

This thesis brings together a range of economic institutionalist perspectives to comprehend the integration of ES thinking into coastal and marine governance.

1.5 Research Objective and Research Questions

Based on the discussion in the previous sections, the main objective of this thesis can be formulated as follows:

Provide a comprehensive institutional understanding of the extent to which ecosystem services thinking is integrated in Chinese coastal and marine

governance, in order to clarify the importance of attuning institutional arrangements with coastal and marine ecosystems, thereby providing theoretical and empirical lessons to improve coastal and marine governance.

The overarching research question of this thesis is:

How may ecosystem services thinking be integrated in coastal and marine governance from the perspective of economic institutionalism, specifically in the case of China?

As discussed in Section 1.2, in general, two challenges have been observed in the integration of ES thinking into coastal and marine governance: (1) highlighting ESs and their interrelationships, particularly in coastal strategic planning; and (2) ensuring required institutional support for the integration. Consequently, the overarching research question will be investigated from these two challenges. This thesis consists of four individual articles (Chapters 2–5), which are mutually supplementary. Each article answers one specific research question (RQ) that copes with the challenges of integration to meet the main objective. The final chapter (Chapter 6) will synthesize findings from the four articles to answer the overarching research question.

RQ 1: To what extent may specific ESs be recognized and incorporated in coastal and marine governance and to what extent are existing institutions capable of managing those services?

RQ 1 aims to deal with the two challenges related to the integration of ES thinking. This question is about making specific ESs visible in coastal and marine governance, especially coastal strategic planning, as well as assessing the institutional capacity that may affect the visibility. To answer this research question, the first aim of Chapter 2 is to identify the explicit level of the different categories of ESs, in order to assess to what extent ESs are acknowledged and mentioned in coastal strategic planning. This aim will be achieved through the application of a content analysis method, which permits the identification of coastal and marine characteristics. In addition, Chapter 2 also aims to detect the institutional strengths and weaknesses that have been relevant for the appearance of ESs. To achieve this aim, the multi-level framework of institutional design analysis, as proposed by Alexander (2005, 2012), will be adopted, since it enables a comprehensive analysis of the institutional context for coastal strategic planning from three levels. Particularly, the emphasis on Alexander's framework on organizational structures, inter-organizational interactions, coordination, and process is useful for understanding the essential implication on ES governance as an initial step for further institutional design. The coastal strategic planning, with regard to an important geographical area in East China, namely Jiaozhou Bay, will be examined for understanding the visibility of ESs and the existing institutional capacities for governing the ESs.

RQ 2: How to identify the interrelationships among ESs (trade-offs and synergies) that may have been integrated in coastal and marine governance?

As discussed in Section 1.3, a main obstacle in integrating ESs into coastal and marine governance is their complex and dynamic interrelationships, which is particularly relevant to trade-offs and synergies (Mach et al., 2015). RQ 2 deals with the first challenge with respect to improving the visibility of the ES interrelationships. To deal with this challenge, RQ 2 aims to find a way to identify the ES interrelationships that may have been integrated in coastal and marine governance, capturing the complex aspects of ESs and human activities. To realize this aim, a four-step method will be formulated, drawing on content analysis and the ES-interrelationship mechanisms, as proposed by Bennett et al. (2009). These mechanisms provide a more causal description of the ES interrelationships, with a graphical way to demonstrate the causalities. The coastal strategic plans of Jiaozhou Bay will be revisited to examine the integration of ES trade-offs and synergies. The objective of developing the four-step method is to inform planners and relevant stakeholders about the importance and possible ways of assessing ES interrelationships, communicating conflicting interests, and discussing solutions.

RQ 3: How may rules-in-use facilitate the integration of ES thinking within coastal and marine governance?

RQ 3 mainly addresses the second key challenge of ensuring required institutional support for the integration of ES thinking, as it focuses on rules-in-use for coastal and marine governance. As explained in Section 1.4.2, scholars generally hold the view that governing ESs effectively relies on the rules upon which governance depends and on how rules are enforced (Ostrom & Basurto, 2011). Rules are critical to comprehend the integration of ES thinking into coastal and marine governance. For instance, analyzing the rules is helpful in clarifying which ecological and economic information is necessary for coordination, which eco-friendly use patterns could be chosen, how to make collective decisions to meet the local demands of certain ESs, etc. Thus, RQ 3 aims to systematically understand how the rules-in-use may facilitate the integration. The Institutional Analysis and Development (IAD) framework developed by Ostrom (2009) provides a systematic set of generic rules that coordinate the behaviors and interactions of the actors in a governance action situation in a broad and dynamic social-ecological context. These rules will be adopted as the theoretical basis. Subsequently, following an extensive literature review, a set of ES-specific rules and an evaluative framework for coastal and marine governance will be developed. The coastal strategic planning for Qingdao, a pioneer coastal city in China, will be analyzed with respect to adopting innovative strategies and rules to sustain social-ecological development, following the evaluative framework, to draw empirical lessons.

RQ 4: How may coastal and marine governance facilitate market-based instruments (MBIs) for ESs?

RQ 4 is formulated to analyze the use of MBIs for coastal and marine ESs. Hence, it also deals with the second key challenge related to the required institutional support. The integration of ES thinking is a demanding process, requiring practical policy instruments that could make the process more tangible (Douvere & Ehler, 2009a). RQ 4 zooms in on MBIs, which can be considered as institutional arrangements for dealing with ES issues. MBIs set up diverse economic incentives in order to encourage behavioral changes towards sustaining ESs (Boisvert et al., 2013; Lockie, 2013), increasingly affecting the outcomes of ES allocation and uses. A sound knowledge of MBIs is crucial for the practical implementation of the integration of ES thinking into coastal and marine governance. In Chapter 5, the governance of MBIs for ESs has been characterized on the basis of the following four distinctive aspects: price, regulatory support, coordination, and spatial consideration. Based on these four aspects, three typical MBIs in Chinese national coastal and marine practice will be investigated in depth to obtain empirical experiences.

1.6 Research Strategy

To gain insights into the integration of ESs in coastal and marine governance, this thesis focuses on the case of China, adopting a qualitative research approach. Qualitative research “works at accepting multiple realities through the study of a small number of in-depth cases” (O’Leary, 2013, p.105). To explore the RQs, this thesis uses the case-study approach as the methodology. At the same time, the qualitative approaches of academic literature reviews, semi-structured interviews, and content analysis of documents were adopted to collect and analyze the research data. The value of these approaches is that it provides an insight into the Chinese social-ecological complexities, to reveal the processes, interactions, perceptions, rules, and experiences that affect the integration of ES thinking into coastal and marine governance.

1.6.1 A case study approach

The case study is an important research strategy, which empirically “investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003, p.13). Coastal and marine ESs and governance practices must be observed and understood in their real-life context. Therefore, this thesis focuses on a specific social-ecological context, in which ESs and these practices are embedded. The case study approach has the advantage of cultivating an environment, in which ‘how’ and ‘why’ questions relevant to the initiatives and experiences regarding sustainable ESs can be easily explored. It will be helpful in finding the answers to the overarching research question. Moreover, the empirical results of a case study approach are generally considered to be useful in improving a theoretical understanding of the field of

ES governance (e.g., Atkins et al., 2011; Böcher, 2012; Hejnowicz et al., 2014; Matzdorf & Meyer, 2014).

Accordingly, this thesis draws on a single case study of Chinese coastal and marine governance, with a multi-level analysis. It involves multiple governance levels, including the local level with respect to Jiaozhou Bay geographical area (RQ 1 in Chapter 2 and RQ 2 in Chapter 3), the municipal level with respect to Qingdao city (RQ 3 in Chapter 4), and the national level with respect to China (RQ 4 in Chapter 5). These sub-units of analyses can “add significant opportunities for extensive analysis, enhancing the insights into the single case” (Yin, 2003, p.46). These nested governance levels are integrated to reveal the holistic aspects of the method of integration of ES thinking into the Chinese coastal and marine governance.

The specific governance levels with respect to Jiaozhou Bay and Qingdao were chosen based on their representativeness of the coastal governance problems in China. As mentioned in Section 1.2, Jiaozhou Bay and Qingdao have gained important strategic positions in Chinese coastal areas. Their sustainable development has been at stake due to threats from a long history of over-extraction, severe pollution, storm surge, climate change, etc. (Gu et al., 2007). The two cases have been an important part of the existing coastal debate in China. A range of policy documents, scientific reports, as well as interviewees are available for data collection. More importantly, Jiaozhou Bay and Qingdao have developed several pilot policies and institutional initiatives to deal with coastal and marine issues for years (see Section 1.2). The two cases could demonstrate the existing efforts of the Chinese governance, which include ESs in coastal strategic policies.

Within the case study approach, three research activities were undertaken for empirical investigation. The following three sections will introduce the academic literature reviews, semi-structured interviews, and content analysis of the documents, respectively.

1.6.2 Providing analytical guidelines and generalization bases: Academic literature review

According to O'Leary (2013), the production of new knowledge fundamentally relies on past knowledge and needs to be set within a broad context of past research. The RQs 1–4 in this thesis were addressed by starting with extensive reviews of academic literature. The literature reviews were used for understanding current issues and trends, developing analytical guidelines, as well as situating results in the scientific discourse on ESs and coastal and marine governance.

First, relevant literature was collected for review in order to provide a background on debate hotspots, emergent issues and potential developing trends (Yin, 2003). Given the multi-disciplinary nature of the subject of ESs, the literature that has been collected is not only

relevant to ES theory and coastal and marine governance, but also to ecological economics, environmental economics, natural resource management, land use planning, etc. For each RQ, different key words, such as “ecosystem services,” “environmental services,” “coastal management,” “marine planning,” “strategic planning,” “governance,” “institution,” “trade-offs,” and “market-based instruments” were used to access a variety of electronic databases, including Science Direct and Web of Science. Subsequently, abstracts were read to eliminate anything unrelated to the RQs. The remaining readings were annotated and analyzed.

On the basis of this review, an analytical framework was formulated for each RQ. The collected academic literature provided input to theoretical guidelines for directing the research process and exploring ES integration into coastal and marine governance. In this thesis, the multi-level framework of institutional design (RQ 1), the four-step method for analyzing the integration of ES interrelationships (RQ 2), the ES-specific framework of rules-in-use (RQ 3), and the four distinctive governance aspects of MBIs (RQ 4) were elaborated based on intensive reviews of previous studies.

Lastly, the literature review was also used for the generalization of the findings. The literature review served the purpose of arguing and positioning the results from the Chinese case studies, within the international debate. In this way, the importance of enhancing the visibility of ESs in policies and the usefulness of the four-step method for coastal strategic planning, were generalized (RQ 1 and RQ 2). To be aware of the added value of the institutional analyses in this thesis, the institutional implications of improving the governance of coastal and marine ESs were also linked to previous studies that have been reviewed (RQs 1–4).

1.6.3 Acquiring in-depth knowledge: Semi-structured interviews

Semi-structured interviews were conducted to collect primary data for an in-depth investigation of the institutional arrangements, the pros and cons, as well as the potential solutions for governing coastal and marine ESs. In particular, this method was used for understanding the rules-in-use of coastal strategic planning for Qingdao (RQ 3), and the implementation of MBIs for ESs in Chinese national coastal and marine governance (RQ 4). Meanwhile, expert interviews were also employed to cross check the results from the document analysis throughout the entire research process (RQs 1–4).

The interviews were aimed at understanding the experiences of Chinese coastal and marine governance. Accordingly, interviewees were selected based on their involvement in the development of strategic coastal plans, a certain knowledge background, as well as working experience on coastal and marine governance. The selection focused on experts, planners, and officials who were directly involved in coastal and marine governance or had extensive working experience in policy development with regard to the case. These interviewees were

capable of reflecting on the choices, developing trends, processes, outcomes, and suggestions with respect to the case. In all, thirty-four respondents from relevant research institutes and different administrative entities participated in this research (See Appendix A). To make the interviews and results more structured, interview guidelines were designed, which cover a set of questions around small research themes (See Appendix B). At the same time, the interview guidelines provided space for elaborating other relevant insights (Liamputtong & Ezzy, 2005). Two rounds of interviews were conducted between 2014 and 2015. The interviews were transcribed for further analyses. All the original interview transcripts are available in the form of individual documents.

1.6.4 Collecting and analyzing research data: Content analysis

Content analysis is considered to be a method of interpreting speech, along with providing qualitative and quantitative findings (O'Leary, 2013). This thesis adopted this method for data collection and analysis (RQs 1–4). The first stage started with an extensive collection of both, primary and secondary, data. The primary data consisted of documents, legislations, administrative regulations, government statements, technical guidelines, and standards related to coastal strategic planning. The secondary data included national program reports, sectoral statistics, research work published by research institutions, newspapers, etc. The key documents are listed in Appendix C. These documents provided the specific context, initiatives, trends, and developing efforts of Chinese coastal and marine governance. These documents, together with the interviews, provided a rich empirical data resource.

The second stage of this research method was an in-depth analysis of the primary and the secondary data. This thesis considerably relied on the coding, categorizing, and thematic indication of the content analysis. To ensure consistency of coding among policy documents and interview transcripts, coding systems were designed for the content analyses in Chapters 2–5 (See Appendix D). These coding systems included coastal and marine specific ESs (RQ 1 and RQ 2), the coding system of ES-specific rules (RQ 3), and the coding system of the MBI-related arrangements (RQ 4). Subsequently, with the assistance of Atlas.ti software, all the policy documents and the interview transcripts were mainly coded in a deductive manner, based on the coding systems. This step led to the aggregation of codes in terms of building up families (or themes) relevant to the research questions. Such qualitative examination is critical to understanding how ESs and ES interrelationships are regarded in coastal strategic plans (RQ 1 and RQ 2), as well as how rules and institutional arrangements support the integration of ES thinking (RQ 3 and RQ 4). It is the qualitative interpretation that helps resolve the ‘how’ questions.

This thesis also used the linguistic ‘quantification’ function of the content analysis to partly answer RQ 1. Content analysis can “involve linguistic ‘quantification’ where words and text

are units of analysis that are tallied...refer to thematic analysis through coding” and also be “taken up in studies where occurrence is assumed to indicate important trends” (O’Leary, 2013, p.270). Therefore, to answer RQ 1, in the coding and aggregating process, the occurrence of codes pertaining to different ESs was counted. The linguistic ‘quantification’ function was eventually helpful in identifying the explicit levels of different categories of ESs.

1.7 Outline of Thesis

This thesis is structured in line with the four research questions formulated in Section 1.5. Chapter 2 will answer the first research question by starting with a content analysis of coastal strategic plans of Jiaozhou Bay, while exploring the consideration of specific ESs. It will reveal the visibility of ESs in coastal strategic plans. This chapter further presents an institutional analysis to detect the institutional strengths and weaknesses that could be relevant to the consideration of ES. Chapter 3 delves deeper in the visibility of ESs, by promoting a four-step method to identify the interrelationships among ESs and human drivers that could have been integrated in coastal strategic plans. In this way, Chapter 3 answers the second question by revisiting the case of Jiaozhou Bay. Chapter 4 provides an insight into the specific rules for the governance of coastal and marine ESs, by developing an evaluative framework to answer the third question. To this end, the framework of ES-specific rules directs the empirical analysis of the coastal strategic planning in Qingdao. Subsequently, the fourth research question is addressed in Chapter 5. This chapter zooms in on a specific policy instrument to deal with ES issues, namely the MBIs that function in Chinese national coastal and marine governance. Chapter 5 presents an in-depth analysis of the governance of three typical MBIs, which are helpful in making the integration of ES thinking more tangible.

Finally, Chapter 6 provides a reflection and conclusion on the basis of the findings from the preceding chapters. It will provide a general understanding of how ESs appear in coastal and marine governance and how the integration of ES thinking could be supported by institutions. The final chapter also offers suggestions with regard to governance efforts, which planners and policy makers could follow to improve their practice in the coastal and marine field. The contributions of this study to the theoretical debates will be presented, followed by a methodological reflection. At the end, suggestions for further research will be provided.

References

- Agardy, T., Di Sciara, G.N., Christie, P., 2011. Mind the gap: addressing the shortcomings of marine protected areas through large scale marine spatial planning. *Marine Policy*, 35(2), 226–232.
- Albrechts, L., Healey, P., Kunzmann, K. R., 2003. Strategic Spatial Planning and Regional Governance in Europe. *Journal of the American Planning Association*, 69(2), 113–129.

- Alexander, E.R., 1992. A transaction cost theory of planning. *Journal of the American Planning Association*, 58(2), 190–200.
- Alexander, E.R., 2001. A transaction-cost theory of land use planning and development control: towards the institutional analysis of public planning. *The Town Planning Review*, 45–75.
- Alexander, E. R., 2006. Institutional design for sustainable development. *Town Planning Review*, 77(1), 1–27.
- Alvarez-Romero, J.G., Pressey, R.L., Ban, N.C., Vance-Borland, K., Willer, C., Klein, C.J., Gaines, S.D., 2011. Integrated land-sea conservation planning: the missing links. *Annual Review of Ecology, Evolution, and Systematics*, 42, 381–409.
- Arkema, K.K., Abramson, S.C., Dewsbury, B.M., 2006. Marine ecosystem-based management: from characterization to implementation. *Frontiers in Ecology and the Environment*, 4(10), 525–532.
- Atkins, J.P., Burdon, D., Elliott, M., Gregory, A.J., 2011. Management of the marine environment: integrating ecosystem services and societal benefits with the DPSIR framework in a systems approach. *Marine pollution bulletin*, 62(2), 215–226.
- Balducci, A., Boelens, L., Hillier, J., Nyseth, T., Wilkinson, C., 2011. Introduction: Strategic spatial planning in uncertainty: theory and exploratory practice. *Town Planning Review*, 82(5), 481–501.
- Barbier, E.B., Hacker, S.D., Kennedy, C., Koch, E.W., Stier, A.C., Silliman, B.R., 2011. The value of estuarine and coastal ecosystem services. *Ecological Monographs*, 81(2), 169–193.
- Barbier, E.B., Koch, E.W., Silliman, B.R., Hacker, S.D., Wolanski, E., Primavera, J., Granek, E.F., Polasky, S., Aswani, S., Cramer, L.A., Stoms, D.M., 2008. Coastal ecosystem-based management with nonlinear ecological functions and values. *science*, 319(5861), 321–323.
- Bateman, I.J., Harwood, A.R., Mace, G.M., Watson, R.T., Abson, D.J., Andrews, B., Binner, A., Crowe, A., Day, B.H., Dugdale, S., Fezzi, C., 2013. Bringing ecosystem services into economic decision-making: land use in the United Kingdom. *science*, 341(6141), 45–50.
- Bateman I.J., Mace, G.M., Fezzi, C., Atkinson, G., Turner, K., 2011. Economic analysis for ecosystem service assessments. *Environmental and Resource Economics*, 48(2), 177–218.
- Bennett, E.M., Peterson, G.D., Gordon, L.J., 2009. Understanding relationships among multiple ecosystem services. *Ecology letters*, 12(12), 1394–1404.
- Boisvert, V., Méral, P., Froger, G., 2013. Market-based instruments for ecosystem services: institutional innovation or renovation?. *Society & Natural Resources*, 26(10), 1122–1136.
- Böcher, M., 2012. A theoretical framework for explaining the choice of instruments in environmental policy. *Forest Policy and Economics*, 16, 14–22.
- Bolund, P., Hunhammar, S., 1999. Ecosystem services in urban areas. *Ecological economics*, 29(2), 293–301.
- Cao, W., Wong, M.H., 2007. Current status of coastal zone issues and management in China: a review. *Environment International*, 33(7), 985–992.
- Carpenter, S.R., Mooney, H.A., Agard, J., Capistrano, D., DeFries, R.S., Díaz, S., Dietz, T., Duraiappah, A.K., Oteng-Yeboah, A., Pereiraj, H.M., Perrings, C., Reidl, W.V., Sarukhan, J., Scholes, R.J., Whyte, A., 2009. Science for managing ecosystem services: Beyond the millennium ecosystem assessment. *Proceedings of the National Academy of Sciences*, 106(5), 1305–1312.

- CBD, Convention on Biological Diversity, 2000. Conference of the Parties 5, decision V/6 (Nairobi, Kenya). May, 15–26. Available from: <http://www.cbd.int/decision/cop/?id=7148>
- Christie M., Hanley, N., Warren, J., Murphy, K., Wright, R., Hyde, T., 2006. Valuing the diversity of biodiversity. *Ecological Economics*, 58(2), 304–317.
- Coase, R.H., 1960. The problem of social cost revisited. *The Journal of Law & Economics*, 15(2), 427–437. Corbera, E., Soberanis, C.G., Brown, K., 2009. Institutional dimensions of Payments for Ecosystem Services: An analysis of Mexico's carbon forestry programme. *Ecological Economics*, 68(3), 743–761.
- Costanza, R. d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., van den Belt, M., 1997. The value of the world's ecosystem services and natural capital. *Nature*, 387(6630): 253–260.
- Crawford, S.E.S., Ostrom, E., 1995. A grammar of institutions. *American Political Science Review*, 89(03), 582–600.
- Crowder, L.B., Osherenko, G., Young, O.R., Aframe, S., Norse, E.A., Baron, N., Day, J.C., Douvère, F., Ehler, C.N., Halpern, B.S., Langdon, S.J., McLeod, K.L., Ogden, J.C., Peach, R.E., Rosenberg, A.A., Wilson, J.A., 2006. Resolving mismatches in US ocean governance. *SCIENCE-NEW YORK THEN WASHINGTON-*, 313(5787), 617–618.
- De Groot, R.S., Alkemade, R., Braat, L., Hein, L., Willemsen, L., 2010. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecological Complexity*, 7(3), 260–272.
- Defra, 2010. Delivering a Healthy Natural Environment. An Update to “Securing a Healthy Natural Environment: An Action Plan for Embedding an Ecosystems Approach Department for Environment, Food and Rural Affairs, London.
- Dietz, T., Ostrom, E., Stern, P.C., 2003. The struggle to govern the commons. *Science*, 302(5652), 1907–1912.
- Douvère, F., 2008. The importance of marine spatial planning in advancing ecosystem-based sea use management. *Marine Policy*, 32(5), 762–771.
- Douvère, F., Ehler, C.N., 2009a. New perspectives on sea use management: initial findings from European experience with marine spatial planning. *Journal of Environmental Management*, 90(1), 77–88.
- Douvère, F., Ehler, C.N., 2009b. Marine Spatial Planning: A Step-by-Step Approach toward Ecosystem-Based Management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. UNESCO, Paris. Available from: <http://www.unesco-ioc-marinesp.be/uploads/documentenbank/d87c0c421da4593fd93bbee1898e1d51.pdf>
- Ehler, C.N., 2013. An Introduction to Marine Spatial Planning. Coral Triangle Initiative Support Program. In Muradian, R. (2013). Payments for marine and coastal ecosystem services and the governance of common pool natural resources. *Economic Incentives for Marine and Coastal Conservation: Prospects, Challenges and Policy Implications*, 53–68. Available from: http://www.coraltriangleinitiative.org/sites/default/files/resources/6_An%20Introduction%20to%20Marine%20Spatial%20Planning.pdf
- Ehler, C.N., Douvère F., 2007. Visions for a sea change. Report of the first international workshop on marine spatial planning. Intergovernmental oceanographic commission and

- man and the biosphere programme. IOC manual and guides No. 48. IOCAM Dossier No. 4. Paris: UNESCO.
- Farmer, A., Mee, L., Langmead, O., Cooper, P., Kannen, A., Kershaw, P., Cherrier, V., 2012. The ecosystem approach in marine management. EU FP7 KNOWSEAS Project. ISBN 0-9529089-5-6.
- Foley, M.M., Halpern, B.S., Micheli, F., Armsby, M.H., Caldwell, M.R., Crain, C.M., Prahler, E., Rohr, N., Sivas, D., Beck, M.W., Carr, M.H., 2010. Guiding ecological principles for marine spatial planning. *Marine Policy*, 34(5), 955–966.
- Forst, M.F., 2009. The convergence of Integrated Coastal Zone Management and the ecosystems approach. *Ocean & Coastal Management*, 52(6), 294–306.
- Frantzeskaki, N., Tilie, N., 2014. The dynamics of urban ecosystem governance in Rotterdam, the Netherlands. *Ambio*, 43(4), 542–555.
- Friedmann, J., 2004. Strategic spatial planning and the longer range. *Planning Theory and Practice*, 5, 50–6.
- Ge, Y., Zhang, J.Y., 2011. Analysis of the impact on ecosystem and environment of marine reclamation – A case study in Jiaozhou Bay. *Energy Procedia*, 5, 105–111.
- Giddens, A., 2000. *The Third Way: The renewal of democracy*. Polity Press, Cambridge.
- Gómez-Baggethun, E., Muradian, R., 2015. In markets we trust? Setting the boundaries of Market-Based Instruments in ecosystem services governance. *Ecological Economics*, 117, 217–224.
- Gu, D., Zhang, Y., Fu, J., Zhang, X., 2007. The landscape pattern characteristics of coastal wetlands in Jiaozhou Bay under the impact of human activities. *Environmental Monitoring and Assessment*, 124(1-3), 361–370.
- Hall, P.A., Taylor, R.C., 1996. Political science and the three new institutionalisms. *Political Studies*, 44(5), 936–957.
- Halpern, B.S., McLeod, K.L., Rosenberg, A.A., Crowder, L.B., 2008. Managing for cumulative impacts in ecosystem-based management through ocean zoning. *Ocean & Coastal Management*, 51(3), 203–211.
- Hansen, R., Frantzeskaki, N., McPhearson, T., Rall, E., Kabisch, N., Kaczorowska, A., Kain, J.H., Artmann, M. and Pauleit, S., 2015. The uptake of the ecosystem services concept in planning discourses of European and American cities. *Ecosystem Services*, 12, 228–246.
- Healey, P., 2009. In search of the “strategic” in spatial strategy making. *Planning Theory and Practice*, 10, 439–57.
- Hejnowicz, A.P., Raffaelli, D.G., Rudd, M.A., White, P.C., 2014. Evaluating the outcomes of payments for ecosystem services programmes using a capital asset framework. *Ecosystem Services*, 9, 83–97.
- Hodgson, G.M., 2004. *The Evolution of Institutional Economics: Agency, Structure, and Darwinism in American Institutionalism*, London: Routledge.
- Katsanevakis, S., Stelzenmüller, V., South, A., Sørensen, T.K., Jones, P.J., Kerr, S., Badalamenti, F., Anagnostou, C., Breen, P., Chust, G., D’Anna, G., 2011. Ecosystem-based marine spatial management: review of concepts, policies, tools, and critical issues. *Ocean & Coastal Management*, 54(11), 807–820.
- Kosoy, N., Martinez-Tuna, M., Muradian, R., Martinez-Alier, J., 2007. Payments for environmental services in watersheds: Insights from a comparative study of three cases in

- Central America. *Ecological Economics*, 61(2), 446–455.
- Lamarque, P., Quétier, F., Lavorel, S., 2011. The diversity of the ecosystem services concept and its implications for their assessment and management. *Comptes Rendus Biologies*, 334(5), 441–449.
- Lau, M., 2005. Integrated coastal zone management in the People's Republic of China – An assessment of structural impacts on decision-making processes. *Ocean & Coastal Management*, 48(2), 115–159.
- Lemos, M.C., Agrawal, A., 2006. Environmental governance. *Annual Review of Environment and Resources*, 31(1), 297–325.
- Leslie, H.M., McLeod, K.L., 2007. Confronting the challenges of implementing marine ecosystem-based management. *Frontiers in Ecology and the Environment*, 5(10), 540–548.
- Li, H., 2006. The impacts and implications of the legal framework for sea use planning and management in China. *Ocean & Coastal Management*, 49(9), 717–726.
- Liamputtong, P., Ezzy, D., 2005. *Qualitative research methods*. Melbourne, Oxford University Press.
- Lockie, S., 2013. Market instruments, ecosystem services, and property rights: assumptions and conditions for sustained social and ecological benefits. *Land Use Policy*, 31, 90–98.
- Loft, L., Mann, C., Hansjürgens, B., 2015. Challenges in ecosystem services governance: Multi-levels, multi-actors, multi-rationalities. *Ecosystem Services*, 16, 150–157.
- Ma, C., Zhang, X., Chen, W., Zhang, G., Duan, H., Ju, M., Li, H. and Yang, Z., 2013. China's special marine protected area policy: trade-off between economic development and marine conservation. *Ocean & coastal management*, 76, 1–11.
- Ma, Y.J., Lu, L.S., 2015. Studies on the legal issues of environmental protection of the Jiaozhou Bay. *Marine Sciences*, 3, 122–126. (in Chinese)
- Mach, M.E., Martone, R.G., Chan, K.M., 2015. Human impacts and ecosystem services: Insufficient research for trade-off evaluation. *Ecosystem Services*, 16, 112–120.
- Mann, C., Loft, L. and Hansjürgens, B., 2015. Governance of Ecosystem Services: Lessons learned for sustainable institutions. *Ecosystem Services*, 16, 275–281.
- Matzdorf, B., Meyer, C., 2014. The relevance of the ecosystem services framework for developed countries' environmental policies: A comparative case study of the US and EU. *Land Use Policy*, 38, 509–521.
- McCleave, J., Xiongzi, X., Huasheng, H., 2003. Lessons learned from 'decentralized' ICM: an analysis of Canada's Atlantic Coastal Action Program and China's Xiamen ICM Program. *Ocean & Coastal Management*, 46(1), 59–76.
- Mitchell, B., 2005. Integrated water resource management, institutional arrangements, and land-use planning. *Environment and planning A*, 37(8), 1335–1352.
- North, D.C., 1990a. Institutions and Their Consequences for Economic Performance. In: Cook, K.S. and Levi, M. (eds.) *The Limits of Rationality*. University of Chicago Press: Chicago and London, 383–401.
- North, D.C., 1990b. *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press.
- North, D.C., 1991. Institutions. *Journal of Economic Perspectives*, 5(4), 97–112.
- O'Leary, Z., 2013. *The essential guide to doing your research project*. London, Sage.
- Ostrom, E., 1990. *Governing the Commons: The Evolution of Institutions for Collective*

- Action, New York, Cambridge University Press.
- Ostrom, E., Burger, J., Field, C.B., Norgaard, R. B., Policansky, D., 1999. Revisiting the commons: local lessons, global challenges. *Science*, 284(5412), 278–282.
- Ostrom, E., 2009. *Understanding institutional diversity*. Princeton, NJ: Princeton university press.
- Ostrom, E., Basurto, X., 2011. Crafting analytical tools to study institutional change. *Journal of Institutional Economics*, 7(3), 317–343.
- Paavola, J., Adger, W.N., 2005. Institutional ecological economics. *Ecological Economics*, 53(3), 353–368.
- Paavola, J., 2007. Institutions and environmental governance: a reconceptualization. *Ecological Economics*, 63(1), 93–103.
- Peel, D., Lloyd, M.G., 2008. Governance and planning policy in the marine environment: regulating aquaculture in Scotland. *The Geographical Journal*, 174(4), 361–373.
- Peng, B., Hong, H., Xue, X., Jin, D., 2006. On the measurement of socioeconomic benefits of integrated coastal management (ICM): Application to Xiamen, China. *Ocean & Coastal Management*, 49(3), 93–109.
- Peters, B.G., 2011. Governance as political theory. *Critical Policy Studies*, 5(1), 63–72.
- Pitcher, T.J., Kalikoski, D., Short, K., Varkey, D., Pramod, G., 2009. An evaluation of progress in implementing ecosystem-based management of fisheries in 33 countries. *Marine Policy*, 33(2), 223–232.
- Piowarczyk, J., Kronenberg, J., Dereniowska, M.A., 2013. Marine ecosystem services in urban areas: Do the strategic documents of Polish coastal municipalities reflect their importance?. *Landscape and Urban Planning*, 109(1), 85–93.
- Primmer, E., 2011. Analysis of institutional adaptation: integration of biodiversity conservation into forestry. *Journal of Cleaner Production*, 19 (16), 1822–1832.
- Primmer, E., Furman, E., 2012. Operationalising ecosystem service approaches for governance: Do measuring, mapping and valuing integrate sector-specific knowledge systems? *Ecosystem Services*, 1: 85–92.
- Primmer, E., Jokinen, P., Blicharska, M., Barton, D. N., Bugter, R., Potschin, M., 2015. Governance of Ecosystem Services: A framework for empirical analysis. *Ecosystem Services*, 16, 158–166.
- Rall, E.L., Kabisch, N., Hansen, R., 2015. A comparative exploration of uptake and potential application of ecosystem services in urban planning. *Ecosystem Services*, 16, 230–242.
- Rival, L., Muradian, R., 2013. Introduction: Governing the provision of ecosystem services. In: Muradian, R. and Rival, L. (eds.). *Governing the provision of ecosystem services*. Heidelberg, New York, London, Springer, 1–17.
- Rosenberg, A.A., McLeod, K.L., 2005. Implementing ecosystem-based approaches to management for the conservation of ecosystem services. *Marine Ecology Progress Series*, 300, 270–274.
- Scarlett, L., Boyd, J., 2015. Ecosystem services and resource management: institutional issues, challenges, and opportunities in the public sector. *Ecological Economics*, 115, 3–10.
- Shi, C., Hutchinson, S.M., Yu, L., Xu, S., 2001. Towards a sustainable coast: an integrated coastal zone management framework for Shanghai, People's Republic of China. *Ocean & Coastal Management*, 44(5), 411–427.

- SOA, State Oceanic Administration, 2016. 2015 Statistical Bulletin of China's Marine Economy. Available from:
http://www.soa.gov.cn/zwgk/hygb/zghyjjtjgb/201603/t20160307_50247.html
- Sorensen, J., 1997. National and international efforts at integrated coastal management: definitions, achievements, and lessons. *Coastal management*, 25(1), 3–41.
- Squires, D., Kirkley, J., Tisdell, C.A., 1995. Individual transferable quotas as a fisheries management tool. *Reviews in Fisheries Science*, 3(2), 141–169.
- TEEB, The Economics of Ecosystems and Biodiversity, 2010. Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB. September, 15. Available from: <http://www.teebweb.org>.
- The State Council of China, 2011. 2011 China's Policies and Actions for Addressing Climate Change. Available from: http://www.gov.cn/jrzq/2011-11/22/content_2000047.htm
- Turnpenny, J., Russel, D., Jordan, A., 2014. The challenge of embedding an ecosystem services approach: patterns of knowledge utilisation in public policy appraisal. *Environment and Planning C: Government and Policy*, 32(2), 247–262.
- Vatn, A., 2010. An institutional analysis of payments for environmental services. *Ecological Economics*, 69(6), 1245–1252.
- Villasante, S., Lopes, P.F., Coll, M., 2016. The role of marine ecosystem services for human well-being: Disentangling synergies and trade-offs at multiple scales. *Ecosystem Services*, 17, 1–4.
- Wilkinson, C., Saarne, T., Petersnon, G.D., Colding, J., 2013. Strategic spatial planning and the ecosystem services concept – A historical exploration. *Ecology and Society* 18, 37.
- Williamson, O.E., 1995. Transaction cost economics and organization theory. In: *Organization Theory: From Chester Barnard to the Present and Beyond*. Williamson, O.E. (ed.), New York, Oxford University Press, 207–256.
- Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K.A., Stachowicz, J.J., Watson, R., 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science*, 314, 787–790.
- Wu, X.Q., Gao, M., Wang, D., Wang, Y., Lu, Q.S., Zhang, Z.D., 2012. Framework and practice of integrated coastal zone management in Shandong Province, China. *Ocean & Coastal Management*, 69, 58–67.
- Wunder, S., 2005. Payments for environmental services: some nuts and bolts (No. CIFOR Occasional Paper no. 42, 24). DOI: 10.17528/cifor/001760.
- Yin, R.K., 2003. Case study research: Design and methods (3rd Ed.). Thousand Oaks, USA, Sage Publications.
- Yu, H., 1994. China's coastal ocean uses: conflicts and impacts. *Ocean & Coastal Management*, 25(3), 161–178.
- Zhang, W., Ricketts, T.H., Kremen, C., Carney, K., Swinton, S.M., 2007. Ecosystem services and dis-services to agriculture. *Ecological Economics*, 64(2), 253–260.