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Sea-Use Planning as a Complex Adaptive System in Transition; the Case of Israel's Mediterranean Marine Space

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"It is a curious situation that the sea, from which life first arose, should now be threatened by the activities of one form of that life. But the sea, though changed in a sinister way, will continue to exist; the threat is rather to life itself"

Rachel Carson

The Sea Around Us (1951)

Acknowledgments

This thesis concludes a double-degree master programme in *'Water and Coastal Management,'* at the University of Oldenburg (Germany), and *'Environmental and Infrastructure Planning,'* at the University of Groningen (the Netherlands). Additionally, it marks the end of an exciting and challenging period in my life.

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Abstract

Marine ecosystems are undergoing dramatic modifications in structure and function. Causal factors are largely attributed to sector-based sea-use planning practice. In this thesis, a new perspective on the marine space as a complex adaptive system is proposed; concepts of the systems theory are employed to analyse the transition towards place-based modes of governance. This holistic perception emphasises issues of uncertainty that may be difficult to address from the perspective of a single sea-use planning programme. Providing an analytic framework for comparative qualitative research, a case study on the sea-use planning framework of Israel was carried out. Several barriers to the transition were identified with regard to both technical and relational qualities of social learning processes. It is demonstrated how such insight could translate into strategic prevention of user-user and user-environment conflicts.

Keywords: *systems perspective; sea-use planning; transitions; multi-level model; multi-phase model; content management; social exchange.*

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List of Abbreviations

CAS:	Complex Adaptive System
CPCE:	Committee for the Protection of the Coastal Environment
DG MARE:	Directorate-General for Maritime Affairs and Fisheries
EBM:	Ecosystem-Based Management
EEZ:	Exclusive Economic Zone
EIA:	Environmental Impact Assessment
ICZM:	Integrated Coastal Zone Management
IMP:	Integrated Maritime Policy
IMP-MED:	Integrated Maritime Policy in the Mediterranean
IPA:	Israel Planning Administration
MEP:	Ministry of Environmental Protection
MLP:	Multi-Level Perspective
MNIEWR:	Ministry of National Infrastructure, Energy and Water Resources
MSP:	Marine Spatial Planning
MVQCA:	Multi-Value Qualitative Comparative Analysis
NGOs:	Nongovernmental Organisations
NOP:	National Outline Plan
QCA:	Qualitative Comparative Analysis
SEA:	Strategic Environmental Assessment
TIIT:	Technion – Israel Institute of Technology

1 Introduction

1.1 The Empirical Puzzle

Global and regional assessments of the marine environment report that biodiversity in the world's oceans is rapidly declining (Crowder and Norse, 2008; Douvère and Ehler, 2009). It is increasingly recognised that threats to the integrity of ecosystems, such as pollution, climate change, and the collapse of food webs, are by-large the result of ad hoc sea-use planning (Crowder and Norse, 2008); governance mechanisms employed for the management of the marine space often adopt a fragmented, sector-based approach. This is understood to reinforce already-occurring environmental degradation, and trigger the emergence of new conflicts between overlaying human uses. Moreover, several complexities with regard to the marine environment itself make this process yet more challenging. These include the spatial and temporal interdependency of biologically-segmented ecosystems, the three-dimensional delineation of the marine space, external effects, and the logistical difficulties of sampling at sea (Day, 2008). These factors call for the development of a more comprehensive planning approach, nested in both natural and social sciences.

Various planning innovations have emerged as alternative solutions for the sector-based system, implying the beginning of a shift towards place-based sea-use planning. This term refers to a comprehensive process whereby biophysical, socioeconomic and jurisdictional objectives for spatially coherent areas are pursued through frameworks of sustainable development; it seeks the limitation of power-relations rooted in the traditional approach, as well as the facilitation of social learning processes (Young *et al.*, 2007). Arguably, this is easier said than done. Place-based planning frameworks often require understanding of highly complex interactions between social and ecological components, and of nonlinear developments across spatial and temporal dimensions. The adaptive capacity of place-based sea-use programmes, i.e. the ability to adjust without sacrificing future opportunities (Folke *et al.*, 2002), is subject to debate; such efforts rely upon regular evaluation but often fail in its practical implementation (Douvère and Ehler, 2011). Understanding processes of social learning and why these may not produce meaningful results should be embedded in the context of the shift itself and its dynamics, rather than the individual programme which is being carried out. Young *et al.* (2007, p. 22) suggest that successful governance ultimately depends upon the observation of the marine environment as a complex adaptive system (CAS): *“What is needed, first and foremost, is a new analytic framework or paradigm that would foster a transition to a systems perspective that focuses on interactions among a wide range of factors operating in spatially demarcated places.”*

This thesis sets out to reconstruct the historical narrative of sea-use planning as a CAS in transition. This perspective is employed to identify risks that are inherent to innovative modes of governance, and establish a standard framework of analysis. Additionally, this work aspires to contribute new insight to the study of other sustainability transitions. Introduced in the following section, a case study was conducted on the Israeli sea-use planning framework.

1.2 The Israeli Case

The state of Israel, on its Mediterranean coast, shares maritime borders with Egypt and the Gaza Strip to south, Lebanon in the north, and Cyprus on the west (Figure 1). Whereas the latter has been definitively delineated, the other two are still subject to political dispute; Israel is yet to have proclaimed the boundaries of its exclusive economic zone (EEZ). The marine space of Israel, spanning over 27,000 km², plays a significant ecological, social and economic role to the country's geopolitical position in the Middle East. Deep-sea biological and geological-processes, normally attributed to open-ocean waters, take place within its boundaries; archaeological heritage assets and cultural remnants of past civilisations are unique to the region, and the communication infrastructure that connects Israel with the rest of the world is settled at its very sea floor. Coastal development and growth within Israel's marine boundaries have dramatically increased in recent decades, jeopardising the integrity of ecosystems and their services. Important examples include: extensive exploration for gas, oil and their derivatives; fishing and mariculture practice; shipping lanes and maritime traffic; water and sediment treatment; military operations; and coastal and marine tourism. Such activities may pose direct risks to fauna or flora and have been giving rise to conflict between stakeholders of the marine space, often resulting in interruption of their individual activities (Portman, 2015). Nevertheless, the state of Israel is yet to have established a national maritime policy, official strategies for sea-use management and planning, or institutional arrangements with regard to the marine space.

In recent years, national awareness about risks and opportunities in Israel's marine space has dramatically increased. Prominent issues on the political agenda, such as the discovery of natural gas within the EEZ, have brought about large-scale investment in sea-use planning programmes, and new modes of governance were introduced from other countries. For example, two parallel efforts were launched in 2013 by the government and academia, establishing a spatial plan and policy for the marine space of Israel. Additionally, other programmes are promoted by specialised advocacy groups, such as environmental nongovernmental organisations (NGOs). In this thesis, these were studied by means of mutual-reinforcement. The systems perspective on the Israeli sea-use planning framework as a CAS in transition calls attention to possible hindrances to the realisation of their sustainability visions.

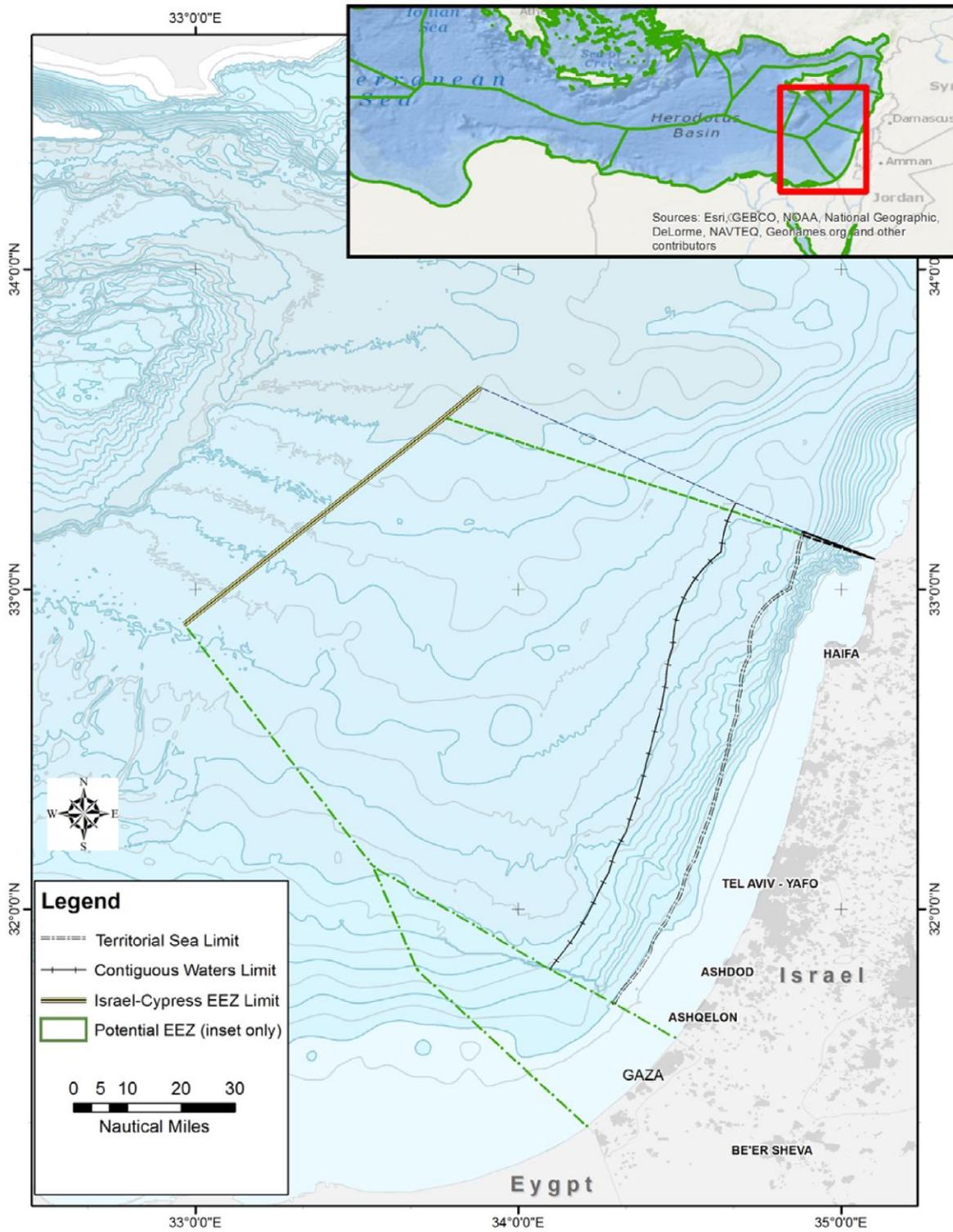


Figure 1: Israel's marine boundaries. Source: Portman (2015).

1.3 Problem Statement and Research Question

As stated in the opening section, innovative modes of governance maintain an ability to deal with different sources of uncertainty through processes of social learning. It is argued in this thesis that a failure to implement content management as well as social exchange, referring to both environmental and human-related complexities, may result in a state of reduced sustainability rather than fruitful integration. In turn, this may reinforce environmental degradation. From a systems perspective, such supposedly paradoxical causalities are understood as transition lock-in situations (Pahl-Wostl *et al.*, 2007).

Despite their many merits, the relatively recent place-based sea-use programmes have not yet been put to the test of practicality and long-term experience (Douvere and Ehler, 2011); real-time identification of potential lock-ins may prove difficult to establish, perhaps more so if the subject programme is already being implemented. Here, an external perspective is employed to point out possible risks in common practice of trendy place-based programmes. A prescriptive framework is proposed for similar endeavours in other sea-use planning frameworks that are also undergoing internal transformation.

In pursuit of the above targets, several questions have served as guidelines for this research. First, in confirmation of the foundational assumption that a transition is indeed occurring, it was examined whether or not international developments in sea-use planning could be explained in terms of the systems approach. Then, it was questioned if the Israeli case could fit within this narrative as well. Finally, the potential outcomes of current integration efforts were analysed in terms of their very own objectives. This process provided answers for the main question of interest:

‘To what extent are current sea-use planning programmes in Israel able address the fundamental uncertainty of the marine space as a socio-ecological system?’

1.4 Theoretical Approach

The concept of transitions was developed in the Netherlands to account for processes of long-term transformations in society. It emerges from complex systems theory and policy sciences, as much as from practical experience (Loorbach, 2010). This notion introduces an external perspective on persistent problems which involve societal interactions, highly uncertain physical processes and complex management dilemmas (van der Brugge *et al.*, 2005). Additionally, it is not restricted to any certain realm; the study of transitions has been employed for a variety of topics in sustainable development, such as energy (e.g., Van den Bergh, Jeroen CJM and Bruinsma, 2008), water management (e.g., Meijerink and Huitema, 2010), and agriculture (e.g., Wiskerke and van der Ploeg, Jan Douwe, 2004). Similarly, new efforts have

recently been made to introduce the concept of transitions to the study of sea-use planning practice (e.g., Crowder and Norse, 2008; Olsson *et al.*, 2008). Nevertheless, such works are mostly descriptive and do not provide analytical frameworks for other sea-use transitions or their management. It is this effort to which this thesis is aspired to contribute.

1.5 Research Design

Two main strategies were employed with respect to the research question and objective: a broad literature review and a single-case study. These were conducted to identify relevant concepts of transitions, and to investigate their suitability for the study of sea-use planning frameworks. Data was gathered through semi-structured expert interviews and triangulated with collected documents. Finally, a computer software was used for qualitative content analysis.

According to Rose and Mackenzie (1991), the development of concepts comes before the construction of theory, as these guide the pursuit and selection of empirical material. Here, inductive cycles of reasoning provided for the adaptation of theoretical concepts, namely the multi-phase and multi-level models, from the complexity sciences to ocean governance and planning. The single-case technique allowed to inductively expand the resulting framework; developments in Israel were reconstructed according to the transitions narrative, in turn facilitating the identification of potential barriers. Finally, this resulted in the derivation a final statement as well as practical recommendations. The conceptual framework is proposed for other single-case studies, as well as *universalising comparisons* (Tilly, 1984; Booth, 2011).

1.6 Scientific and Societal Relevance

The importance of this research lies in its ability to inform marine scientists, managers and policymakers, about opportunities and risks that are embedded in the wider context of sea-use planning practice; isolation of single programmes from the broad perspective of transitions may result in failure to acknowledge significant components of the system and their complex modes of interaction. As mentioned above, other works have been done in response to the literature's call for employment of the systems perspective, but did not provide a comparable analytical framework. Though these studies encourage an important shift in research, the lack of a conceptual framework results in *uniqueness through false particularisation* whereby links to generic interests of other researchers are absent, in turn leading to incomparability (Rose and Mackenzie, 1991). Moreover, such studies often address one aspect of the transition, for instance the shift in policy or general governance approach, and therefore fail to regard tight coupling with other societal transformations (e.g., values and meanings). These shortcomings are addressed in this thesis. The scientific relevance of this research is thus in its enrichment of

the sea-use planning literature, in turn translating into practice. Attention is paid to the dynamic emergence of policy innovations and the role of agency; understanding marine governance systems is a first step in improving their adaptive capacity in the face of fundamental uncertainty and rapid change (Olsson *et al.*, 2008).

Other qualities of this thesis relate to its societal relevance, in Israel and on the whole; lessons from the case of sea-use planning, explicitly the rise and peril of social learning processes, are derived for other sustainability transitions; the identification of potential lock-ins can serve for emulation or as a source of inspiration with regard to various socio-ecological as well as socio-technical systems. It facilitates real-time acknowledgement of problems and a precautionous approach to decision-making processes. Such endeavours to navigate change are generally considered as *transition management*, referring to the steering of drastic transformations without hinging upon crisis (Huiteima and Meijerink, 2010).

1.7 Thesis Outline

Throughout its six content chapters, this thesis delves into complexities of the marine space as a socio-ecological system and different sources of uncertainty in sea-use planning practice. The structure of these chapters is designed to account for not only the research question and the final statement, or the problem at hand and suggested solutions, but the entire process of theoretical and empirical reasoning.

Chapter 2 is divided into three parts. The first introduces concepts of the systems theory as well as specific notions of transitions (e.g., the multi-phase and multi-level models); the second subchapter employs the systems perspective to reconstruct the sea-use planning history. Finally, the third subchapter presents the conceptual framework which is derived from the foregoing review.

Chapter 3 accounts for methodological selections. First, it describes the ontological approach of this thesis. Second, it introduces the single-case study technique and accounts for its suitability for this research. Finally, it provides a full description of the methods and their practical implementation. This includes the selection of the Israeli case, the gathering of data, and the qualitative content analysis.

Chapter 4 presents the empirical results. It reconstructs of the sea-use planning history of Israel according to the conceptual framework. Interim conclusions are inserted in between the four subchapters, providing an analytical interpretation for each phase in the transition. Additionally, sections of the conceptual framework are enclosed, incorporating key findings.

Chapter 5 provides the empirical reflection of this thesis. First, the Israeli sea-use planning framework is described as a CAS in transformation. This provides the foundation for discussion on the transition in Israel and its identified potential of heading towards lock-in. Finally, the research question is addressed and a conclusive statement is made. Based on this reflection, the second subchapter provides practical recommendations.

Finally, chapter 6 reflects on this thesis in terms of weaknesses and strengths. The first two subchapters refer to the theoretical and methodological chapters. Finally, the last subchapter provides suggestions for further research in the future. Attention is paid to sea-use planning as well as other sustainability transitions.

2 Plunging in the Cold Water; Complexity and Sea-Use Planning

This chapter encompasses a multi-disciplinary literature review. The first subchapter employs the systems theory for the understanding of complex adaptive systems in transition. It builds upon insight from the complexity and policy sciences to define transitions in terms of three dimensions, namely time, speed and size, and introduces the multi-phase and multi-level models. These concepts are then employed for the reconstruction of world-trends in sea-use planning frameworks as elements of a sustainability transition; the second subchapter is based upon the literature of ocean-governance as well as natural maritime sciences. Combined insight from the two chapters is incorporated into the conceptual framework of this thesis, introduced in subchapter 3.

2.1 Transitions in Complex Adaptive Systems

Stemming from biology and population dynamics, the concept of transitions describes gradual processes of fundamental change between stable states of equilibrium. A precondition for their inauguration is the concurrence of causalities in different arenas or domains (e.g., technological, institutional, economic, socio-cultural, ecological), that reinforce each-other in a positive feedback mechanism and stimulate a deep-seated societal transformation. Conveniently, this notion is not restricted to a particular aggregation level, such as company, sector, country, or region (Rotmans *et al.*, 2001). Thus, it is applicable for the investigation of a broad spectrum of systems and their evolution over time. Similarly, insights from different disciplines (e.g., energy, infrastructure, environment) may teach about the dimensions, structure and dynamics of transitions as a standalone theoretical concept.

Several authors have emphasised the relevance of systems theory for the understanding of transitions and how they can be steered (e.g., Rotmans *et al.*, 2001; Pahl-Wostl, 2007; Loorbach, 2010). From this perspective, a transition is considered as a dynamic self-organisation process of complex adaptive systems (Waldrop, 1993). As such, it responds to circumstances through the spontaneous rearrangement or emergence of a new pattern, independently of external coordination (Heylighen *et al.*, 2008). Systems theory attributes fundamental uncertainty to the causality transpiring throughout this process; it refers to a universal language in order to unravel complex patterns of interaction between components of the system through the exchange of information or material. With respect to social systems, human foresight and intentionality, as well as communication and technology, add to the degree of overall complexity (Holling, 2001). This implies considerable attention to agency configurations between individuals, organisations and regimes (Geels, 2010).

In the next sections, the underlying mechanisms of transitions are analysed through the conceptual lens of systems theory. Later on in this paper, attention is paid to the dynamics of sustainability transitions and the posited case of sea-use planning.

2.1.1 Transition Dimensions; Time, Speed and Size

Transitions occur in different domains and aggregation levels, and therefore vary in their speed, size and time (Rotmans *et al.*, 2001). These dimensions are the product of long-term evolution in the subject system's *stocks*, and short-term development in their *flows* of interaction. Whereas 'stocks' are identified through quantitative and qualitative indicators of slow change, 'flows' may be distinguished through short-term fluxes facilitating the observed shift. As a simplistic or intuitive example, transitions in ecological systems unfold as the measurable state of biological species slowly adjusts to the interchange of material or energy between them. In social systems, however, indicators of stocks are more difficult to identify; the comprehension of complex transitions requires understanding of their multi-level organisation as well as multi-phase development (Rotmans *et al.*, 2001).

2.1.2 Multi-Level Organisation

In order to standardise terminology with regard to transitions across different domains and aggregation structures, the systems approach distinguishes three functional scales through which these come about, namely the macro, meso, and micro-levels. This classification corresponds with Rip and Kemp's (1998) description of '*landscapes*', '*regimes*' and '*niches*.' The ontologies from which this model stems are discussed in section 3.1.

The macro level, or so-called socio-technological landscape, relates to material as well as immaterial elements (e.g., belief-systems, paradigms, values, world-views, culture, physical environment), which overarch organisational conglomerations. In terms of transition dynamics, this level influences the 'time period' and 'speed' dimensions by responding to generally slow trends and large-scale developments (van der Brugge *et al.*, 2005).

At the meso level, regimes are the patterns, rules and norms within which social activities are framed. These underlie the policies and strategies of institutional organisations, and respond to deviations from the status-quo in a defensive (discrediting other agents), reactive (optimisation and improvement) or innovative manner (active contribution). Thus, regimes influence the 'size' dimension of dynamics (Rotmans *et al.*, 2001; van der Brugge *et al.*, 2005). Though all three mechanisms of response may well occur in parallel, regimes are often geared towards the former two approaches, rather than system innovation (Rotmans *et al.*, 2001).

Finally, at the micro level, niches are configurations of individuals through which innovative ideas or technologies facilitate a learning process, and catalyse deviations from the status-quo at

both the macro and meso-levels (Kemp *et al.*, 1998; van der Brugge *et al.*, 2005). Conversely, the pursuit of new designs can occur in response to change at any of the other levels (Rotmans *et al.*, 2001). Upon sufficient sense of urgency (macro) and ability or willingness to act (micro), the regime (meso) will give in to circumstances. The irreversible transition will have enough impetus to shoot, following a multi-phase pathway towards new equilibrium.

2.1.3 The Evolution and Resilience of the CAS in Transition; a Multi-Phase Pathway

Transitions normally occur over periods of 25 years or more (Rotmans *et al.*, 2001; van der Brugge *et al.*, 2005), during which time the system undergoes continuous change in function and structure. The universal language of the systems theory defines this change in terms of resilience. From an evolutionary perspective, this term is understood as the temporary ability of the social system to evolve in response to internal or external stress, without functional or structural bounce-back-ability (Davoudi *et al.*, 2012). Four phases can be distinguished in this respect (Pendall *et al.*, 2009): *Conservation*; *release*; *reorganisation*; *growth and Exploitation* (Figure 2).

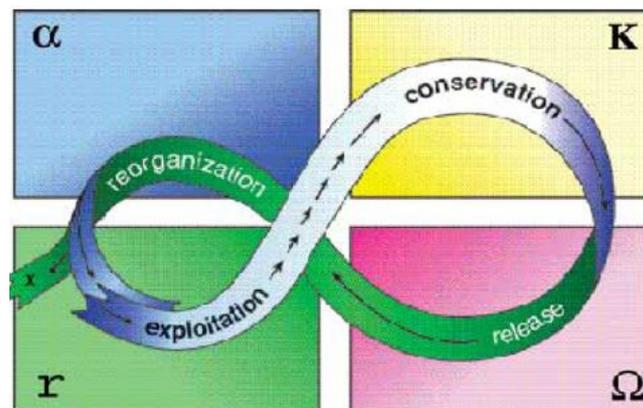


Figure 2: The adaptive cycle in complex system evolution. Source: Geels (2010, p. 501), after (Holling, 2001, p. 394).

Similarly, the multi-phase model of transitions distinguishes four stages of change, corresponding with the above classification: namely *pre-development*, *take-off*, *acceleration* and *stabilisation*. These phases represent different lengths of time and varying degrees of reinforcement between the three organisational levels of the system. The combined understanding of the adaptive cycle and the multi-phase model is depicted in Figure 3 and discussed below as the theoretical foundation of this thesis.

The pre-development stage represents the slow build-up of subtle deviations from the status-quo at the macro and micro-levels. For instance, public reason may begin to question the prevailing policies, common practices or overarching worldviews, while technological ‘answers’ are complementarily developed in small niches. The two levels may potentially reinforce each-other or independently act to perturb the inhibitory regime which is maintaining the existing

landscape or technology (van der Brugge *et al.*, 2005). However, this potential is not yet pursued at this point. The general equilibrium persists and the system sustains a state of *conservation*; resources are used for maintenance and though stability is high, the overall resilience is relatively low (Geels, 2010; Davoudi *et al.*, 2012).

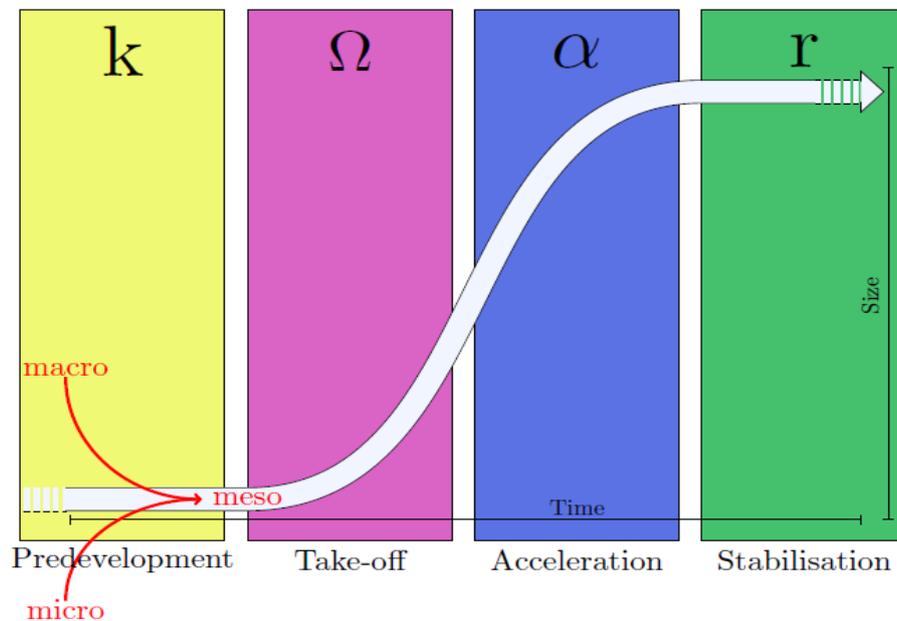


Figure 3: Synthesis of Holling's (2002) adaptive cycle of complex systems with the multi-phase and multi-level models of transitions.

In the take-off stage, top-down and bottom-up-excitation overshoots the threshold for a meso-level shift, from resistance towards active contribution; the regime gradually exercises self-examination before slowly responding to macro or micro-level pressure (van der Brugge *et al.*, 2005). From a systems perspective, reinforcement of the three levels brings about *creative destruction* and chaotic collapse. Uncertainty in this stage is high, giving way to large-scale innovation. In turn, this may increase the system's overall resilience. This stage provides a window-of-opportunity as well as risk for drawback and subsequent lock-in, depending on the impetus and coordination of the driving-forces.

Acceleration is realised as the regime finally subdues through the *release* of accumulated capital and application of resources (van der Brugge *et al.*, 2005; Davoudi *et al.*, 2012). A new design is established by the different components of the system and collective learning processes are finally pursued; the transformation becomes visible in socio-cultural, ecological, economic, and institutional practices. Though uncertainty is high, resilience is at its utmost and the system finally commences reorganisation.

Upon stabilisation, the speed of the social change decreases as a new dynamic equilibrium is reached (Rotmans *et al.*, 2001). However, there is no status-quo as the transformation is only

partially assimilated in the landscape. Ultimately, the macro, meso and micro-levels will fully reorganise in terms of function and structure. As the system matures and undergoes *growth and exploitation*, uncertainty will once again increase in inverse correlation with resilience (Davoudi *et al.*, 2012). In due course, the system may or may not self-destruct as emergent uncertainty unfolds.

To conclude, four inherent phases of function and structure are distinguished with regard to CAS, namely *conservation*; *creative destruction*; *reorganisation*; and *growth and exploitation* (Holling, 2001). The so-called evolutionary understanding of resilience calls for the perception of multiple trajectories through which these occur; the phases are not necessarily sequential, nor do they yield to any particular scale or time frame. Rather, they concurrently transpire through interacting cycles (Holling, 2001; Davoudi *et al.*, 2012). However, it is this order which may propel a so-called transition through the four stages of the multi-phase model – *predevelopment*; *take-off*; *acceleration*; and *stabilisation*. To describe this, Rotmans *et al.* state that “[...] *all social phenomena have an impulse value for transitions, but only some provide a flywheel force*” (2001, p. 17); also drawing from the mechanical realm, van der Brugge *et al.* (2005, p. 166) illustrate transitions as a “*complex set of cogwheels that engage and interact with one another. It could easily lead to an interlock, but once in a while they reinforce each-other and start turning into one and the same direction.*” Understanding the essence of such ‘interlocks’, and how these come about, requires the consideration of fundamental uncertainty as a prevailing characteristic of any CAS in transition. Emerging from the literature of complexity and policy sciences, and elaborated in the next section, *transition management* offers insights to the manipulation of system transformation.

2.1.4 Transition Management in the Face of Uncertainty

Characterised by path-dependent lock-ins and incremental innovation, regimes normally evolve over long periods of time and their perturbation may be difficult to onset (Pahl-Wostl *et al.*, 2007; Geels, 2010). Furthermore, the length of their transition, once facilitated, may exceed the scale of academic research or careers, making the analysis of hindrances to their progression inexpedient. Pahl-Wostl *et al.* (2007) distinguish four sources of uncertainty, of which consideration may help overcome this problem: The first relates to lack of knowledge due to insufficient information, for instance with regard to the pertinence of management approaches in certain situations. The second source is poor understanding of the subject system in terms of stocks and flows. As stated in section 2.1, this applies in particular to systems with a human component (e.g., socio-ecological / socio-technological / socioeconomic) due to a plurality of interpretations to phenomena. An additional source of uncertainty is the unpredictable nature of the CAS, due to non-linearity and dependency of self-organisation on loosely coupled factors

(e.g., anthropogenic climate change and subsequent catastrophes). Finally, multiple opinions and frames of reference may exist among stakeholders with regard to problems and appropriate solutions, giving rise to uncertainty in terms of necessary action. Obliviousness towards the above types of uncertainty may result in an equilibrium of limited sustainability. Transition management aims to prevent such situations through processes of social learning. This implies a change in the role traditionally assumed by planners, from that of experts or mediators, towards transition managers of change. Thus, nonlinearity as well as wicked and persistent problems are brought into consideration. In essence, this constitutes a shift from bounded or communicative-rationality, towards adaptability.

Transition management encompasses four sequential stages which follow a cyclical trajectory (van der Brugge *et al.*, 2005): 1. the establishment of the 'transition arena', understood as the innovative network of relevant actors; 2. formulation of a clear vision and agenda; 3. mobilisation of actors towards learning processes and innovative experiments; 4. monitoring and evaluation. Several frameworks of transition management are suggested in the complexity and policy-sciences. Common to all is the great deal of attention paid to agency at the strategic level. For example, Rotmans *et al.* (2001) discuss the pluralistic role (facilitator-stimulator-controller-director) which is taken up by governments throughout the different phases of transitions. Other authors (e.g., Huitema and Meijerink, 2010; Meijerink and Huitema, 2010) stress the role of policy entrepreneurs (i.e. individuals, collectives, shadow networks, donor organisations) and activities these may pursue in order to steer transitions in favourable directions. Loorbach (2010) clarifies the typical characterisation of transition frontrunners. Accordingly, these are expected to have the ability of considering complex issues in abstraction, as well as the willingness to cooperate and look beyond each of their own interests or disciplines; they should grasp the essence of sustainability and be able to explain it. Additionally, they are required to possess a certain level of authority within specific networks, and the same time must remain open-minded towards innovation and alternative solutions. Frontrunners in the transition arena represent the so-called societal pentagon: governments, companies, NGOs, knowledge institutes and intermediaries (Loorbach, 2010).

2.2 Place-Based Sea-Use Planning; Reconstruction

It is increasingly acknowledged that the loss of marine biodiversity and habitats is attributed to failing forms of fragmented, sector-based governance; spatial and temporal inconsistencies between ecosystem boundaries and their legal delineation call attention to interrelationships between biophysical, socioeconomic, and jurisdictional components (Young *et al.*, 2007). With sustainability at its core, place-based planning acknowledges spatial context through new

management strategies and processes of social learning. Rather than dealing with the system's stocks in isolation, it identifies the complex flows that govern them as well as overlays which may result in conflict. Thus, it may offer tools for dealing with the uncertain and heterogeneous nature of the marine space as a complex, socio-ecological system.

The transition proposed in this thesis, from sector-based to place-based sea-use planning, is not easily managed nor is it intuitively comprehended. Obstacles to both tasks include power-relations that are well established in the sector-based regime, as well as evolution through different modes of planning. In this chapter, the historical narrative of sea-use planning is reconstructed from the complexity perspective, following the multi-phase and multi-level models. Whether or not this transition is indeed headed towards adaptability as it purports will be discussed towards the end of this chapter.

2.2.1 Cultural Regime-Shifts in the Background of Sustainability Transitions

Throughout the history of mankind, environmental degradation has been tightly coupled with global population growth. Similarly, general worldviews and perceptions with regard to natural resources have changed, and may well explain environmental management approaches that were common in the course of time. Three milestones may be distinguished in this respect – the so-called agricultural, industrial, and environmental-revolutions. The posited transition in sea-use planning stems from this background and, in terms of the relationship between man and the environment, may manifest the turn of an era.

Civilisations of the early days were deeply rooted in the environment and had little but sustainable impact on their surroundings. Throughout the Neolithic period, agricultural provisioning of food and nutrients had constituted a window-of-opportunity for permanent settlement and early trade-systems (Davis, 1945). Despite decreasing birth rates due to monoculture practice in this period, global population-size continued to rise (Bideau and Brignoli, 1997), encompassing conspicuous modifications in the physical landscape. A generally anthropocentric vision had been formed; natural resources were perceived manageable and freely cultivatable.

In the past two centuries, ideas of prosperity grew through intensifying urbanisation processes. Pollution was widely overlooked and consciousness towards environmental issues has been generally poor. Population growth, rapid technological improvement and shifting consumer demands have been pushing the loss of biodiversity to an extent that is comparable with ancient geological catastrophes (Hughes, 2005). The now well-established anthropocentric and modernistic approach towards natural resources was essentially utilitarian, failing to acknowledge limits to abundance.

Public awareness of environmental issues started to increase as questions have emerged with regard to humanity's superiority to nature and the latter's carrying capacity. Nonetheless, it was not until the early 1970's that environmental policies were "revolutionarily" put into force. Though these spread fast and finally gained high priority on the political agenda, they were driven by concern towards human health and economic benefit rather than the ecological integrity of natural resources. Aptly, policies were aimed to 'predict-and-control' environmental risks and employed reactive, end-of-pipe techniques to mitigate ecosystem degradation (Pahl-Wostl, 2007). The incremental approach with which environmental issues had been generally addressed was often insufficient to tackle interrelated issues or stimulate collective action beyond minimal conformity to regulations (Geels, 2010). Central state control lacked legitimacy in face of the plurality of social values and division of power between the market and public-sectors. Additionally, it was limited in its ability to address local issues or employ social knowledge at this level.

With regard to the marine environment, population growth has increased alongside the capacity of individual users to utilise resources. New uses continually emerge while existing services, living as well as nonliving, rapidly intensify. Additionally, human activities on land are gradually recognised as drivers of change within marine systems (Young *et al.*, 2007). As a result, two types of conflicts have emerged: 1. Competitive interaction between users, or adverse mutual effects (user-user conflicts); 2. Cumulative impacts of such uncoordinated and unsustainable activities on natural life-support systems (user-environment conflicts). From an anthropocentric perspective, this translates into the impaired ability of the ocean to uphold ecosystem services, such as the production of seafood, resistance to diseases, filtration of pollutants, and recovery from perturbation. Ocean resources are often referred to as a common good, and are managed in piecemeal or sector-based zoning (e.g., shipping lanes, disposal areas, mariculture sites, marine protected areas). Such an approach is based on ad hoc planning and disregard towards natural connectivity or distribution of resources. From a systems perspective, attention is paid to stocks, rather than the flows through which they interact; the emergence of conflicts has called for an alternative approach, employing comprehensive understanding of the economic, aesthetic and intrinsic values of nature, and of the multiple dimensions to environmental problems. Consequently, a shift in ocean governance has been occurring – from sector-based to integrated, place-based planning; from reactive measures to participatory integration of policies.

Global population growth and its impacts on the environment seem to have changed the way humanity perceives its relationship with nature. Whether or not the 'sustainability transitions' narrative can be attributed to this shift in sea-use planning is investigated in this chapter.

2.2.2 Predevelopment; Multi-Level Reinforcement

As stated above (section 2.1.3), the predevelopment phase represents mutual-reinforcement between the macro and micro-levels. Widespread dissatisfaction with existing frameworks for the management of marine resources has increased alongside the escalating crisis in ocean governance (Young *et al.*, 2007; Crowder and Norse, 2008) around the world (i.e., fishery collapse, pollution, warming waters). Complementarily, technological innovation has contributed to our understanding of spatial connectivity between, as well as within, ecological and social spheres.

According to Pahl-Wostl *et al.* (2007), general dismay with the prevailing regime is a prerequisite for the initiation of sustainability transitions. The reason for dismay, however, has been subject to debate. According to Geels (2010), motivation for sustainability transitions may emerge from several sources, including: the contrast between the public's neo-classical image of a clean environment (e.g., clear coasts and pristine reefs) and the negative effects of producers' externalities; public discourse over environmental goals and the essence of 'sustainability'; and a growing sense of urgency for 'green' technologies and behavioural changes in user-practice and demand. However, the sector-based regime in sea-use planning is often anchored in slow bureaucracy and power-relations (e.g., prerogatives of existing management arrangements); defensive mechanisms are maintained even at times of opportunity to improve social welfare without affecting the individual agencies in power (Young *et al.*, 2007).

Also pushing towards place-based sea-use planning are new advances in technologies of two types: innovative tools for place-based frames of reference, and ecological modernisation. The first, development of underwater, airborne and aerospace-instruments, has facilitated the expansion of our ability to analyse the biophysical, socioeconomic, and legal information with regard to the marine environment. Such tools include submersible remotely-operated vehicles, multi-frequency acoustics, remote sensing, global positioning systems, fixed and vessel-monitoring technologies, satellite tags, telemetry, etc (Crowder and Norse, 2008). Improvement of knowledge in biological, chemical and physical-oceanography is attributed to the expansion of ability to break our limits to access, from shallow coastal stretches to deeper and further offshore waters, and from regional scope to the global scale. Human activities can be monitored through the distinguishment of shipping channels, cables and pipelines, point pollution sources, and modifications of seabed bathymetry. Finally, coastal economies (e.g., mariculture, energy production, tourism) and their performance can be tracked and used for the identification of future development. Such advances are imperative for the understanding of the marine space as a complex mosaic of weather phenomena, human uses, and ecosystems, rather than a uniformly blue seascape (Young *et al.*, 2007).

The second type of technological advancements represents an innovation-oriented approach of environmental regulation that emerged throughout the 1980s; ecological modernisation aims to reduce pollution, relieve pressure on natural resources and create economic advantages (e.g., reduction of costs, creation of markets, stimulation of innovation, creation of competition). Thus, it goes far beyond traditional end-of-pipe solutions to environmental degradation (Jänicke, 2008). Examples that relate and to the marine environment include selective-fishing methods, ballast-water treatment systems, ocean cleaning technologies. Seemingly, this type of innovations aligns with the above changes at the macro level. However, as environmental awareness continues to increase, there is a degree of inconsistency between formal and informal institutions; though ecological modernisation leads to their adjustments, it alone may prove insufficient to bring about a shift in the regime (Warner, 2010). Moreover, despite the suitable performance and price of sustainable innovations to user-requirements, these are often not at all available on the market. Kemp *et al.* (1998) identifies several potential barriers to their 'breakthrough': an established technological regime and defensive mechanisms of response; cultural factors, such as unsustainable icons of modernity; a sense of economic security in existing technologies; uncertainty concerning market demand; and background-potential for the rise of new problems.

Throughout the predevelopment phase of the transition, processes at the macro and the micro-levels undergo mutual-reinforcement through positive feedback mechanisms (Geels, 2010). Different sources of motivation for change, including the demand for 'green' solutions, create widespread willingness and ability to act upon complex and uncertain issues. However, place-based knowledge is required for improved understanding of the system in terms of stocks and flows. Technological innovation facilitates the identification of biophysical, socioeconomic, and jurisdictional-overlays, and provides opportunities for more social networks to emerge. In turn, these encourage a sense of legitimacy and responsibility at the individual level, reinforcing ecological modernisation and deviation from the status-quo. Nevertheless, the system's ability to evolve remains low as defensive mechanisms at the meso level act to discredit other agents and maintain a stable state of conservation.

2.2.3 Take-Off; Alternative Resources

Place-based identification of overlays in the marine space provides a powerful tool for the consideration of different sources of uncertainty and may compensate for essential deficiencies of the sector-based approach. However, the latter is deeply rooted in institutional and technological landscapes, and is therefore highly imperturbable. In order to realise the potential of macro and micro-level pressure, the introduction of a wide variety of actors into the process may prove useful; public-private partnerships offer the provisioning of funding as well as

scientific and administrative expertise, and facilitate consensus-building practices through processes of social learning (Young et al, 2007).

The emergence of public-private partnerships from the application of place-based planning tools presents alternative resources to those conserved by the regime. Young *et al.* (2007) call attention to the effectiveness of NGOs in the identification of key sea-use planning issues. Accordingly, these invest funding, knowledge and administrative capacity and enable the private-sector, advocacy crowds, academia, local governments, and federal agencies to develop consensus and adjust competing uses in order to alleviate conflicts. Such coalitions distinguish the cores of areas that are suitable for place-based planning, even if their geographical boundaries are harder to establish. Moreover, they clarify the meaning of rules as applied to specific places and reduce incentives to cheat. Operating in parallel to the sector-based regime, public-private partnerships do not necessarily proclaim its replacement, nor are they suppressed by its conservation of resources. However, they may well encourage its self-examination and reactive optimisation or improvement. Finally, it may collapse due to the loss of exclusive ownership over critical resources. A considerably high degree of uncertainty is attributed to this stage; alongside the creative destruction of the regime, opportunities for large-scale innovation as well as lock-in situations rapidly increase. Place-based planning relies upon information technology and access to involved actors.

Reinforcements of the macro and micro-levels manifests through the formation of public-private partnerships. By focusing on the distinctive features of individual places, the evolving regime adapts management approaches to regional circumstances, offering tools for dealing with heterogeneity of the marine environment and the associated forms of uncertainty. To increase in comprehensiveness and dodge potential lock-ins, experiments with place-based approaches and tools are carried out through reorganisation. The evolution through different modes of governance is described hereafter as the acceleration phase of the transition.

2.2.4 Acceleration; Experimental Governance

Upon release of accumulated capital, the regime engages in active contribution to innovation of governance systems. Though large-scale experimentation with new modes of governance is highly attractive in this phase, caution should be exercised to avoid an overly flexible response towards merits of distinct approaches. Several motifs in the shift include maintenance of the ability to prioritise upon inevitable or irreconcilable conflict, involvement of stakeholders, and promotion of social learning processes (Young *et al.*, 2007). Central to the comprehension of the self-organisation process is the evolving understanding of sustainability as a core principle, and the different approaches towards environmental and social issues. In the next paragraphs, key concepts in the assumed transition are distinguished, namely integrated coastal zone

management (ICZM), ecosystem-based management (EBM), marine spatial planning (MSP), and comprehensive ocean zoning.

A significant departure towards a place-based regime in sea-use planning dates back to the introduction of the ICZM approach in the 1990s. Spreading like wildfire, this new concept was adopted by myriad organisations throughout the world. ICZM is defined as a dynamic process that thrives towards sustainable use, development, and protection of coastal and marine areas (Cicin-Sain *et al.*, 1998; Cicin-Sain and Belfiore, 2005); it operates within demarcated geographical borders through analysis of implications, conflicts, and interrelationships between social and physical components. Overarching principles of ICZM include sustainable development as well as integration on several dimensions: inter-sectoral; intergovernmental; spatial (e.g., sea and land-use issues); scientific-managerial; and international (Cicin-Sain and Belfiore, 2005). Societal principles include an approach to the marine space as a public good of which management should be guided by equity, fairness, and a stewardship ethic. Thus, it prioritises coastal developments that are dependent on marine resources over those that are not, and recognises the historical claims of indigenous communities. A key aspect is the design of institutional arrangement whereby bottom-up and top-down processes take place, aiming to overcome the fragmentation inherent to the sector-based approach. With regard to the special character of oceans and coasts, ICZM acknowledges the need for special sea-use planning as well as the sensitivity of the marine space to human activities on land. It emphasises soft engineering as an important means of maintaining biodiversity and buffering functions of coastal-geomorphologic processes. Arguably, this focus does not stem from concern to the environment itself but from motivation to improve liveability in coastal areas. ICZM principles are often formulated in an ambiguous and non-prescriptive format of guidelines, and their scope seldom suits the scale on which practices are carried out. For example, in their analysis of the European Recommendation on ICZM, McKenna *et al.* (2008) identify a degree of incompatibility between principles addressing national and local-level interests. According to those authors, inconsistency as such may give rise to selective interpretation and ad hoc use, ironically resulting in disintegration. Though ICZM principles elevate awareness of the need for integrated ocean management, urgency remains valid with regard to processes and implications.

Perhaps complementary to ICZM, an additional step away from the sector-based approach is EBM. Here, sustainable development is achieved through the maintenance of several ecological principles (Crowder and Norse, 2008): the spatial and temporal heterogeneity of the marine environment; population dynamics (source-sink recruitment); inter-species webs-of-interaction; biogeochemical complexity (“ocean metabolism”); and equilibristic resilience (i.e., the ability of the system to bounce back between different states of equilibrium). These

elements of connectivity are used as a frame of reference for the assessment of ecosystem services and their continuous availability in the future. Moreover, EBM recognises the relationship between physical and social components of the system; an emphasis is put on the place-based development of uses, conflicts, and their impacts, with regard to the temporal and spatial distribution of resources. Nevertheless, the EBM concept lacks operational guidance with regard to the dilemma between conservation and exploitation (Douvere and Ehler, 2009). Though it has been established as a key approach to attain sustainability, in the marine as well as the terrestrial environment, it requires measures that regulate human activity in a comprehensive manner and rely upon information-providing mechanisms such as monitoring programmes (Stelzenmüller *et al.*, 2013); an emerging and considerably popular tool for this purpose is MSP.

MSP is a public process of analysis and allocation of sea-use areas to human activities in the coastal and marine environment (Young *et al.*, 2007). The output of this process is typically a 10-20 year plan that reflects political priorities; it provides a place-based frame of reference for policymakers from different sectors to work in a participatory, collaborative manner (Gilliland and Laffoley, 2008; Stelzenmüller *et al.*, 2013). MSP decisions are made and modified upon evaluation of management measures that have previously been pursued, and in correspondence with expanding knowledge about the system's evolution (Day, 2008). In this respect, MSP is an adaptive approach which responds to results from new data, experience, and external circumstances; it assumes fundamental uncertainty and prevailing knowledge insufficiency (Douvere and Ehler, 2011). MSP aims at the resolution and prevention of both user-user and user-environment-conflicts. It uses the development of maps to clarify cumulative impacts, identify inconsistencies of mandates, and aid in the implementation of EBM, by minimising externalities that are associated with the system's boundaries. In order to assure this is carried out in a sustainable manner, MSP employs comprehensive ocean zoning. As opposed to (non-comprehensive) sector-based delineation, this concept refers to zoning by objective rather than activity. The marine space is divided into areas wherein several uses are permitted as a function of, for instance, the ecosystem's carrying capacity. Though MSP has been politically and scientifically endorsed in relatively very short time, only few countries have already launched their second-generation programmes (Douvere and Ehler, 2011; Carneiro, 2013). Hence, it is perhaps too early to determine whether or not it may reach stabilisation.

From a systems perspective, the acceleration phase of the transition towards place-based sea-use planning is still underway. Collective learning processes facilitate experimentation with different modes of governance and innovative tools (e.g., planning permits, public education, codes of conduct). The concepts discussed in this section indicate the system's self-organisation

in terms of institutional arrangements (i.e. bottom-up involvement and decentralised decision making), as well as the perception of coastal and marine resources as a common, rather than a private good. Most importantly, ongoing progress towards the ecosystems approach in policymaking is evident. As implied in section 2.2.1, this shift may bring about the reinvention of environmental planning through innovative concepts such as 'integration', 'adaptability', and 'evaluation.' Such so-called experiments are often deemed inoperative (e.g., ICZM) or merely too recent to have proven otherwise (e.g., MSP). Whether or not these effort represent processes of social learning, as often claimed, is discussed in the following section.

2.2.5 Social Learning – Towards, or just Two Words?

Efforts to overcome shortcomings of the sector-based approach imply consideration of multiple perspectives and their transformation over time. The so-called experiments discussed heretofore emphasise 'process' as a goal in itself, pursued through practices of social learning. Pahl-Wostl (2007) explains this term as a means of increasing actors' capacity to collaboratively deal with different sources of uncertainty. In turn, this facilitates reflective change of the management approach which is employed, in response to incoming knowledge about physical and social processes. To bring about the generation of such knowledge, sea-use planning efforts rely upon monitoring and evaluation programmes. However, innovative modes of governance often fail to implement such tasks despite successful integration. Paradoxically, this may lead to a lock-in situation in which new conflict has emerged from the effort to achieve consensus.

Social learning takes place through processes of content management and social exchange (Figure 4); whereas the former indicates analysis of factual information, the latter stands for social involvement concerning subject-oriented issues (Pahl-Wostl, 2007). This process informs about technical and relational qualities of the system; it provides data with regard to the state of the environment, and teaches about the adaptive capacity of participating actors. In order to collect necessary information, monitoring programmes are designed to inform about the causal relationship between objectives, measures, and their outcomes. Thus, they generate evidence-based feedback which helps decision-makers to assert place-based planning directions with regard to the marine space (Day, 2008). For example, knowledge gaps identified throughout the process may imply a need to reconsider systemic expenditures or resource-allocation.

Monitoring programmes are often perceived significant in theory yet dispensable in light of other management or planning urgencies (Day, 2008); these are frequently dismissed altogether due to high costs, institutional barriers, political difficulties, or a lack of clear and measurable objectives. A considerable degree of disregard towards monitoring and evaluation is evident not only in practice, but also in the scientific literature; though extensive research has

proliferated in the past decades with regard to ongoing programmes, only few studies have addressed the extent to which evaluation can generate meaningful results, and whether or not current projects have the means to support it (Douvere and Ehler, 2011). Arguably, a stronger emphasis is put on the importance of monitoring programmes than, for instance, how these can be developed. Consequentially, even efforts that do reflect desire to carry out monitoring and evaluation may lack the knowledge to put in place a framework of pertinent indicators.

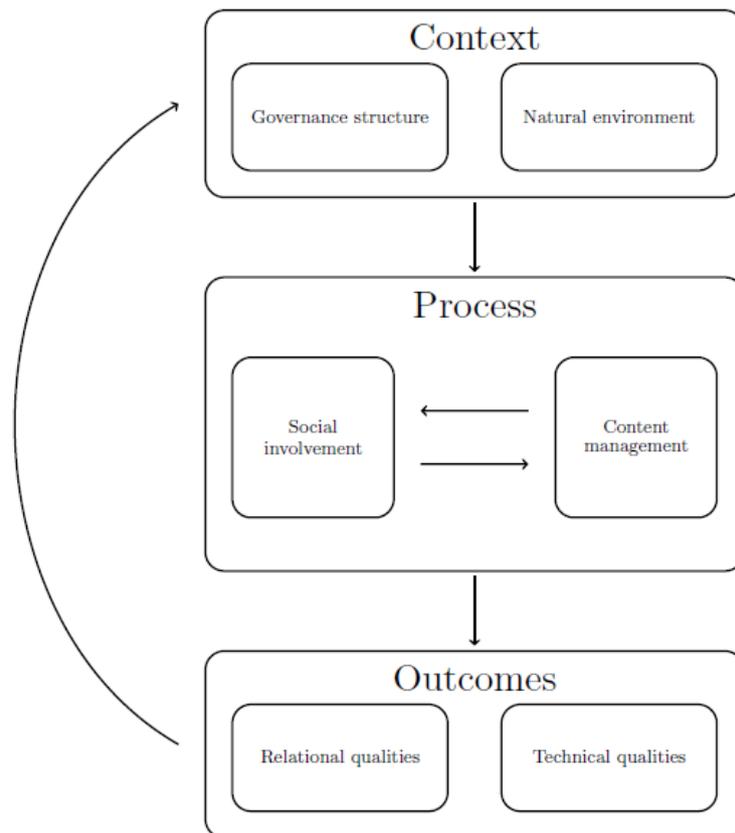


Figure 4: Context, process and outcome of social learning. After Pahl-Wostl (2007).

Failure to carry out social learning practices may hinder timely adjustment of the management approach, in turn affecting the entire planning process (Pahl-Wostl, 2007). For example, lack of knowledge regarding the efficiency of measures and fulfilment of objectives may prevent recognition of multiple interpretations to shared principles or values (e.g., sustainability, good environmental status). As a result, accountability for inappropriate resource allocation is reduced, giving rise to user-environment as well as user-user conflict. From a systems perspective, this may indicate lock-in potential (Pahl-Wostl, 2007); division between actors becomes inherent to the process, suppressing the strengths of place-based sea-use planning. This calls for a view of monitoring and evaluation in the wider context of transitions rather than the scope of individual sea-use planning efforts.

2.3 The Conceptual Framework

The first part of this chapter introduced key principles of the systems theory, as well as generic concepts from the study of transitions. In the second, the very same notions were used to reconstruct the historical narrative of the sea-use planning as a transition in itself. The concepts derived from these sections employ the multi-phase and multi-level models as the basis of analysis in the chapters to follow. Rose and Mackenzie (1991, p. 448) state: *“To amass materials without regard to concepts is to produce empirical data that will sink under its own weight, lacking ideas that give it meaning.”* The multi-phase and multi-level models are here perceived sufficiently abstract to connect empirical material – horizontally and vertically, as well as across national boundaries and different scientific schools. The conceptual framework captures the essence of these variables, with regard to the transition in sea-use planning; the table and description are enclosed in the following section.

2.3.1 Guide to the Conceptual Framework

The emerging framework (Table 1) is essentially a fusion of Holling’s (2001) adaptive cycle and the multi-phase model of transitions, specifically regarding the case of sea-use planning. Colours in the leftmost column represent the four internal states of complex adaptive systems, namely *conservation*, *creative destruction*, *reorganisation*, and *growth and exploitation*. These correspond with the four dynamic phases of transitions – *predevelopment*, *take-off*, *acceleration*, and *stabilisation*. As discussed in previous sections, the system’s transformation is marked by a change in the regime’s mode (i.e., defensive; reactive; innovative) at each of the above phases. Therefore, further division into the different levels of the system is included in the second column. Notably, distinction of the macro and the micro levels is made to identify enabling conditions for the onset of the transition. These are therefore only distinguished with reference to the period of predevelopment. The next column, namely ‘Dimension’, presents essential notions for each level or, if not specified, for the corresponding phase in the first column.

Referring to the macro level, the dimension *‘Willingness to Change’* stems from the statement made by Pahl-Wostl *et al.* (2007), that general dismay with the existing regime is a prerequisite for sustainability transitions (section 2.2.2). Referring to the micro level, the dimension *‘Ability to Act’*, includes two types associated innovations: 1. Operational technologies, facilitating the establishment of place-based frames of reference (e.g., offshore and deep-sea research tools); 2. Technological developments which reinforce the urgency to plan (e.g., ecological modernisation), complementarily to macro-level predevelopments. The meso-level dimension, namely *‘Defensive’*, refers to the regime’s discrediting of other agents by means of institutional barriers.

Table 1: The conceptual framework for analysis of sea-use planning as a CAS in transition.

Transition Phase / CAS State	System Level	Dimension	Definition
Predevelopment (Conservation)	Macro (landscape)	Willingness to Change	General dismay regarding the management and planning of marine resources, creating a sense of urgency to act
	Micro (technological niches)	Ability to Change	Operational technology and innovative tools, indirectly improving place-based frames of reference, in turn creating a sense of control
			Complementary technology, reinforcing macro-level sense of urgency
Meso (regime mode)	Defensive	Reluctance of the sector-based regime to change, despite existing opportunities	
Take-Off (Creative-Destruction)		External provisioning of bottleneck resources	Facilitation of change through private public partnerships
	Meso (regime mode)	Reactive	Self-examination alongside maintained conservation Collapse due to loss of exclusive ownership and, finally, release of accumulated capital
Acceleration (Reorgansiation)		Experimental Modes of Governance	Emergent initiatives to improve the sea-use planning framework, such as planning permits, public education, and codes of conduct, facilitating a visible shift to the ecosystems approach in the public and the private sectors
	Meso (regime mode)	Innovative	Active contribution
Stabilisation (Growth and Exploitation)		New Geographical Scope	Spatial sovereignty in previously unregulated areas
		Integration	Implementation of social learning processes, accounting for factual / relational sources of uncertainty
	Ecosystems Approach		
Meso (regime mode)	Defensive	Unwillingness of the place-based regime to change, despite existing opportunities	

In the take-off phase, no distinction is made with regard to the macro and the micro levels. The dimension ‘*External Provisioning of Bottleneck Resources*’ emerges from the call for attention to the role of public-private partnerships in the promotion of consensus-building forums (section 2.2.3). The regime’s state in this phase is defined by the dimension ‘*Reactive.*’ This notion refers to self-examination and attempts to address uncertainties of the marine environment. Additionally, it implies the regimes collapse due to loss of exclusivity over resource ownership, and release of accumulated capital through pursuit of new directions.

In the acceleration phase, the dimension *'Experimental Modes of Governance'* refers to emergence of new sea-use planning programmes, facilitating social-learning processes as well as a shift towards the ecosystems approach, thus enabling prevention or resolution of user-user or user-environment conflicts. With respect to the regime's mode in this phase, the dimension *'Innovative'* implies active contribution of the government to trends of the macro and the micro levels, through reorganisation of the sea-use planning framework.

As suggested at the end of section 2.2.4, the transition towards place-based sea-use planning is still underway. Nevertheless, three dimensions may already be distinguished, namely *'New Geographical Scope,' 'Integration,'* and *'Ecosystems Approach.'* Whereas the latter two emerge from the literature, the first was derived from the collected data and incorporated into the framework. This refers to the realisation of the regime's own sovereign rights in previously unmanaged seascapes. In other such cases, this dimension may capture the essence of the shift from ad hoc usage of the marine space, to place-based sea-use planning. Further elaboration on inductive development of the conceptual framework is provided in the following chapter. According to Flick (2009), schematic elaboration of categories facilitates comparison between different cases. This corresponds with the stated objective of this thesis, to develop an analytic frame of reference for the study of sea-use planning as a CAS in transition.

3 Methodology

This chapter describes the selection and implementation of the methods employed in this research. First, the ontological foundation is defined according to the literature of sustainability transitions. The established ontology provided reasoning with regard to the selected methods, as belaboured in the epistemology subchapter. Finally, the methods themselves are described in the last subchapter, as well as the data collection and analysis.

3.1 Ontology

The analysis of the shift in sea-use planning as a private case of sustainability transitions requires consideration of social, technical and ecological dimensions. It may thus employ multiple foundational assumptions with regard to agents and mechanisms of causality. Geels (2010) explores different ontologies and their broad conceptualisation of socio-technical transitions (Table 2); it is argued that social-science theories that provide insight into the study of this phenomena, for instance rational choice, structuralism and functionalism, may still be limited in their ability to encompass complexity – owing to their default inclination towards stability, equilibrium and incremental change. Four meta-theories are proposed by this author to include different ontological combinations: 1. *Complete integration*, referring to an encompassing synthesis of multiple theories; 2. *Incommensurability*, assuming impossibility to combine ontologies due to their different points of departure; 3. *Eclecticism*, suggesting selective and partial combination of ontologies on the basis of general disregard towards the differences between them; 4. *Inter-ontology crossovers*, implying the interplay of ontologies as distinct components of an overarching theory. Considering the close connection of this thesis to both natural and social sciences, both factual and constructed understandings of reality are employed. Thus, complete integration and incommensurability are both concluded irrelevant perspectives. Similarly, the third meta-theoretical proposal is dismissed in order to avoid inconsistency and fuzzy consideration of the system's interacting elements; considering the stated objective of this thesis, to generate insight into the study of transition management, differentiation between components of, for instance, the policy and complexity-perspectives remains a key condition; Finally, inter-ontology crossovers offer an emphasis on both stability and change, as well as agency and structure. According to Geels it is therefore fruitful for the study of transitions. For example, he states that *"The crossover allows the MLP to combine an evolutionary interest in long-term patterns (trajectories, speciation, invasion, extinction) with an interpretive interest in social enactment, sense making, and cognitive learning"* (Geels, 2010, p. 505).

Considering the conceptual focus of this thesis on the multi-phase and multi-level models, it is by definition derived from functionalism as well as evolution and interpretivism /

constructivism. Moreover, it builds on notions of rational choice and relationism (interactionsim), such as neo-classical or socio-technical drivers of change, correspondingly. Thus, it does not see itself divorced from any ontology presented in Table 2. Instead, it stems from all of those, as an inter-ontological crossover. It is from this constellation that the epistemology of this thesis emerges.

Table 2: Characteristics of transitions in different ontologies. Source: Geels (2010).

	Default orientation: change or stability	Explanation of transitions
Rational choice	Stability (equilibrium) or incremental change	Difficult. Requires exogenous impulse (price changes) followed by gradual adjustment (of resource allocation)
Evolution	Dynamic stability (incremental change along lineages) and radical change (speciation, niches, competition)	Endogenous change (radical innovations) and/or exogenous changes in selection pressures
Structuralism	Stability	Difficult. Changing ideologies and belief systems often remain exogenous
Interpretivism/constructivism	Ongoing change and sense-making	Radical change through endogenous second-order learning processes (change in cognitive frames)
Functionalism (systems theory)	Stability (system equilibrium)	Difficult. Requires exogenous shocks, followed by gradual adjustments ^a
Conflict and power struggle	Stability (powerful actors suppress change), incremental change ('reform' to accommodate protests) and radical change ('overthrow' by challengers)	Endogenous struggles between incumbents and challengers
Relationism	Continuous process (change or reproduction)	Unclear. No distinction between radical or incremental change. Focus on micro-processes and local projects

^a Complex systems theory does acknowledge that endogenous processes may create 'conditions for change' in which external shocks can have big effects.

3.2 Epistemology

DiMaggio (1995) associates between ontology and epistemology on the basis of three general views, with regard to 'what theory should be': 1. 'Theory as covering laws', implying measurements are perceived plausible for the explanation of reality. This corresponds with object-oriented ontologies through tools of statistical generalisation; 2. 'Theory as enlightenment', whereby new insight is pursued through deviation from familiarity. This relates to subject-oriented ontologies, through non-generalising methods that clear away conventionality; 3. 'Theory as narrative', referring to dynamic processes through empirical tests of causality and its enabling conditions. Here, the methodological emphasis is on analytical generalisation of dynamic patterns (DiMaggio, 1995; Geels, 2010). The latter view corresponds with the comprehensive focus of inter-ontology crossovers, and therefore with the focus of this thesis.

According to Rihoux (2006), an adequate epistemological approach for the gathering of insight into complexity of cases while also producing some level of generalisation, is qualitative comparative analysis (QCA). Here, the focus is on small numbers of cases and variables, with an emphasis on rich data (O'leary, 2004; Rihoux, 2006). Whereas the necessity to preserve richness in large-*N* situations entails a shift from mainstream statistical data treatment towards strategies of fuzzy sets (i.e., generalisation of quantitative variables, whereby comprehension of different cases is of lesser emphasis), in qualitative research, this need is addressed through reduction of the number of cases. An additional strategy which integrates these two approaches is multi-variable QCA (MVQCA), considered most suitable for medium-*N* situations of 50-80

cases (Figure 5). In this thesis, the view of theory as narrative is aspired to not only strengthen existing knowledge on transitions, but also bring new understandings to the fore. The emphasis, therefore, is on high richness of information. Hence, the resulting selection is of a single-case technique, introduced in the following section.

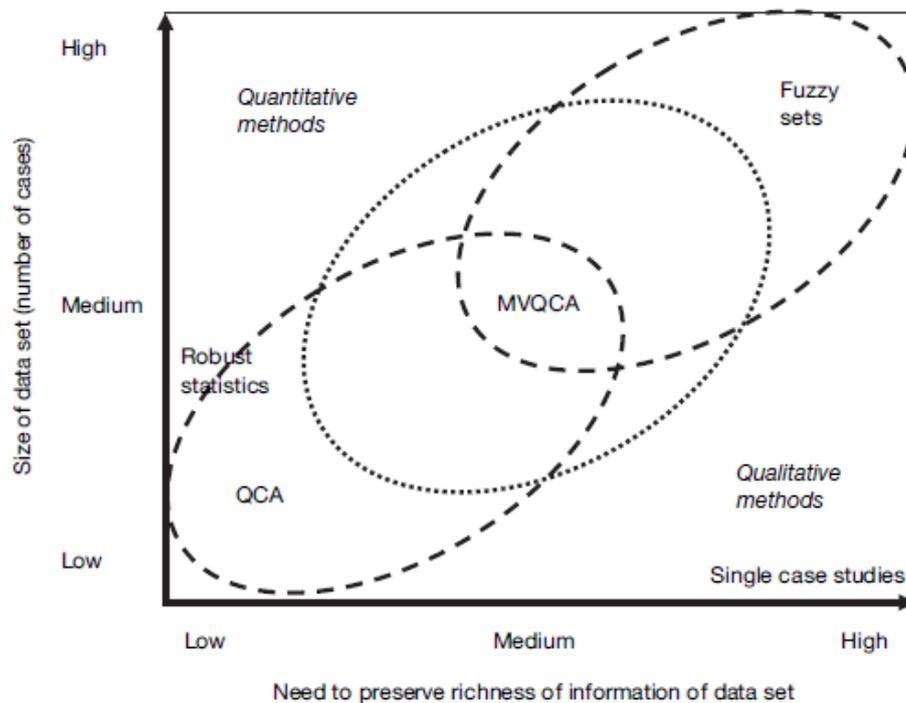


Figure 5: Best use of qualitative comparative analysis (QCA), multi-value QCA (MVQCA), and fuzzy sets. Source: Rihoux (2006).

3.2.1 Case-Oriented Research

The case study methodology allows for comprehensive exploration of social elements in 'bounded systems' (i.e., instances or entities of identifiable boundaries) through in-depth examination of particular individuals, institutions, instances or occurrences; it serves to illuminate a body of knowledge through numerous methods, such as surveys, interviews, observations and document analysis (O'leary, 2004). As implied above with regard to QCA as a research strategy, such studies may vary in their number of cases as a function of need to preserve richness; the single-case study constitutes the most demanding form of empirical qualitative methods in this respect (Rihoux, 2006). According to Flyvbjerg (2006), several misunderstandings are common in the conventional wisdom about case study research, suggesting that theory, reliability and validity are sacrificed in this approach. In his defence for the importance of this methodology, Flyvbjerg states that context dependent knowledge, facilitated through case study research, is more valuable than the search for predictive theories which are advocated by proponents of epistemic construction. It allows the researcher to position himself within the context being studied and understand the viewpoints and the

behaviours characterising social actors. With regard to single-case studies, a common criticism which is tackled by this author states that these cannot be generalised and therefore do not contribute to scientific development. Based on his example of Galileo's rejection of Aristotle's law of gravity – involving an individual case - as well as Popper's famous example “all swans are white”, Flyvbjerg argues that practical experiments through single-case studies are self-evident hindsight, providing the basis for falsification of dominating scientific inquiries. In dismissal of the above statement, he concludes (2006, p. 228):

‘One can often generalise on the basis of a single-case, and the case study may be central to scientific development via generalisation as supplement or alternative to other methods. But formal generalisation is overvalued as a source of scientific development, whereas “the force of example” is underestimated.’

In comparison to other available techniques of QCA, such as statistical analysis of large samples, the single-case study is an exploratory tool that brings insight on new variables to light, and supports or debunks theory through anecdotal evidence as well as triangulation of methods (O'leary, 2004). In this thesis, the case study technique is employed as a form of QCA, in order to produce generalisation of theory as narrative. As such, it does not only provide a tool for the analysis of past experiences, but a forward glance as well – facilitating the envisioning of alternative futures (Flyvbjerg, 2006). According to Rihoux (2006), by using QCA, the researcher is urged to determine different causal models that exists among comparable cases. Here, the multi-phase and multi-level models provide the analytical foundation for a case study on the Israeli sea-use planning framework; in turn, this is aspired to produce generalised concepts for future comparative research, and an empirical framework for the identification of lock-ins in other single-case studies. Selected methods of data collection and analysis are discussed in the following subchapter.

3.3 Methods

Despite irrelevance of tests of statistical significance in thematically analysed qualitative data, there is still a need to achieve credibility through rigour and confirmation (O'leary, 2004). In order to insure thoroughness, a broad representation of involved institutions was sought through expert interviews. To pursue confirmation, collected data of this source was triangulated with a selected documents. Moreover, member-checking was carried out to verify that the author's interpretation of the narrative gelled with that of the professionals. Finally, a full account of the analysis is provided to enable confirmation through reproduction in future research of similar cases.

3.3.1 Case Selection

The above misunderstanding about the generalisation on the basis of a single-case study produces an additional misconception that is addressed by Flyvbjerg (2006) – that case studies are most useful for generating hypotheses, rather than testing those or building theory. On this Flyvbjerg argues that the testing of hypotheses relates to question of case selection, and proposes various forms of sampling which are suitable for different research situations. These are listed in Table 3.

Table 3: Strategies for the selection of samples and cases. Source: Flyvbjerg (2006).

Type of Selection	Purpose
A. Random selection	To avoid systematic biases in the sample. The sample's size is decisive for generalization.
1. Random sample	To achieve a representative sample that allows for generalization for the entire population.
2. Stratified sample	To generalize for specially selected subgroups within the population.
B. Information-oriented selection	To maximize the utility of information from small samples and single cases. Cases are selected on the basis of expectations about their information content.
1. Extreme/deviant cases	To obtain information on unusual cases, which can be especially problematic or especially good in a more closely defined sense.
2. Maximum variation cases	To obtain information about the significance of various circumstances for case process and outcome (e.g., three to four cases that are very different on one dimension: size, form of organization, location, budget).
3. Critical cases	To achieve information that permits logical deductions of the type, "If this is (not) valid for this case, then it applies to all (no) cases."
4. Paradigmatic cases	To develop a metaphor or establish a school for the domain that the case concerns.

As stressed in the previous subchapter, an emphasis was put in this thesis on richness of information of the data set, providing the basis for employment of the single-case technique. As shown in the table, this can be described as an information-oriented selection. The four alternatives that are presented for this type of selection differ in the research purposes that they address, two of which correspond with the stated objectives of this thesis: On the one hand, it seeks to obtain information that is suitable for the study of sustainability transitions. On the other, it thrives to introduce concepts of transitions to sea-use planning research. Thus, the purpose of this thesis corresponds with two of the above types, namely the *extreme / deviant case* and the *paradigmatic case*.

According to the author, the extreme case clarifies the deep causes behind a given problem and is therefore well suited for getting a point across. For this purpose, the selection of the Israeli case seems appropriate; as mentioned in the introduction (section 1.2), environmental awareness has increased dramatically over the past two decades and several parallel programmes for the planning of the marine space have concurrently emerged. These developments may imply features of a rapid shift, corresponding with the multi-phase and multi-level models of transitions. Moreover, the identification of potential lock-ins to the shift in sea-use planning as a sustainability transition is, so to speak, a 'point to get across.' Whether or not the Israeli case is a selection of an 'unusual' or 'especially good' example, as extreme cases are typified in the table, is arguable; authors such as O'leary (2004) referred to selection on the basis of generalisability to result in 'typical cases,' while extreme cases are considered to be suitable for debunking theory or highlighting deviations from the norm. However, such distinction is not made by Flyvbjerg in his more detailed elaboration of the various strategies, while elements of his definition of extreme cases do match the aim of this thesis.

With respect to the second objective of this thesis, to propose the study of transitions for the sea-use planning 'domain', the Israeli framework is a paradigmatic case. As such, it operates as a frame of reference and may function as a focus for future research (Flyvbjerg, 2006). The selection of the Israeli case stems from the author's familiarity with the study of transitions and its association with developments in sea-use planning in this country. Booth (2011) warns against loss of cultural context due to language barriers and (limited) usage of formal sources. The selection of the Israeli case, was based upon the author's nationality and native proficiency in Hebrew. This facilitated familiarity with the involved actors as well as basic mechanisms of the sea-use planning framework. For example, it enabled the interviews to be held in the expert's language of choice, providing for a common frame of reference. Additionally, it broadened the scope of the analysis by facilitating access to a greater variety of formal as well as informal sources. In his interview with Flyvbjerg, in 1988, Hubert Dreyfus referred to the identification of paradigmatic cases as a hunch: "*[...] you recognise a paradigm case because it shines, but I'm afraid that is not much help. You just have to be intuitive*" (Flyvbjerg, 2006, p. 232).

The interpretation of a case of which selection is based upon multiple strategies provides a unique wealth of information, involving various perspectives and conclusions, while its value depends on the validity of the researcher's claims (Flyvbjerg, 2006). In this thesis, such validity is pursued through triangulation of different methods, namely semi-structured expert interviews and document analysis. The collection and treatment of this data is elaborated in the following sections.

3.3.2 Semi-Structured Expert Interviews

In order to acquire a rich and diverse understanding of enabling conditions to the proposed transition, ten interviews were conducted in Israel in May and June, 2016. Taking into account that the interviewees would have a complex stock of knowledge on the topic under study, the 'semi-structured' approach was selected to avoid bias towards verification of the assumed narrative.

Semi-structured interviews follow a flexible and conversational style, and readily pursue spontaneous tangents (O'leary, 2004). The experts are integrated into the study as representatives of groups rather than isolated cases, and are directed by the guide to exclude irrelevant topics. Here, this was carried out by three types of questions (Flick, 2009): 1. *Open questions*, answered on the basis of immediately available knowledge; 2. *Theory-driven, hypotheses-directed questions*, referring to the conceptual framework of this thesis (section 2.3), and; 3. *Confrontational questions*, critically responding to the notions presented by the interviewee. Documentation of this data included acoustic recording followed by transcription. According to Flick (2009), the use of machines for the documentation of data provides for freedom from interpretation, enabling a "natural" flow to the conversation; though interviewed experts were aware of the device, this was visually restricted to avoid mental distraction. Nevertheless, possible influence on the participants was considered and addressed. For example, interviewees were reserved the right to speak "off the record".

The selection of interviewees was based on two criteria (Table 4). The first was equal representation of all categories of the societal pentagon, i.e. governments, companies, NGOs, knowledge institutes and intermediaries. This criterion is based on Loorbach's (2010) conceptualisation of key frontrunners to the transition management arena. Based on this source, it was presumed their insight would be key for the unfolding of the Israeli case; 2. Direct involvement in at least one of the current programmes in Israel, towards place-based sea-use planning. In order to identify relevant participants, key representatives of the programmes were contacted. Additionally, some participants were inductively added based on other interviewees' recommendation. Notably, selected experts often fit in more than one category within a selfsame criterion. In this case they were asked to notify the guide upon extra information.

Overall, more than 600 minutes were recorded. Eight of the ten interviews were conducted in the Hebrew language; two interviews were held in English. MP3 files are available upon request; a separate appendix comprising the interview guide and transcript is limitedly available to the formal reviewers of this thesis.

Table 4: Categorisation of interviewed experts by selection criteria (societal group and associated programme).

Criterion 1	Place, Date	Institution	Position	Criterion 2
Government	Jerusalem 30.05.2016	Ministry of National Infrastructures, Energy and Water Resources	Head of Environment Department, Natural Resource Division	Israel Maritime Policy (IPA)
	Haifa 06.06.2016	Ministry of Environmental Protection	Head of Marine Environment Protection Division	Israel Maritime Policy (IPA)
Companies	Jerusalem 30.05.2016	Coastal and Marine Processes Ltd.	CEO	Israel Maritime Policy (IPA); Israel Marine Plan (TIIT)
	Tel-Aviv 31.05.2016	Israel Electric Corporation	Former Marine Laboratory Manager	Israel Maritime Policy (IPA); Israel Marine Plan (TIIT)
NGOs	Tel-Aviv 25.05.2016	Adam Teva V'Din	Marine Management Division Scientist	Complementary Initiatives
	Sdot-Yam 02.06.2016	Ecocean	Executive Director	Israel Maritime Policy (IPA); Israel Marine Plan (TIIT)
Academia	Tel-Aviv 24.05.2016	University of Haifa	Top Predator Monitoring Coordinator, Mediterranean Monitoring Centre	Complementary Initiatives
	Haifa 01.06.2016	Technion Israel Institute of Technology	Coastal and Ocean Social Scientist	Israel Marine Plan (TIIT)
Intermediaries	Mikhmoret 22.05.2016	Israel Nature and Park Authority	Coordinator of Marine Department	Complementary Initiatives
	Tel-Aviv 01.06.2016	The Israel Marine Plan	Integrating Team	Israel Marine Plan (TIIT)

3.3.3 Document Analysis

According to Flick (2009), document analysis is an instructive tool for understanding social realities in institutional contexts, opening a new perspective on the topic of study. However, as a standalone method, it may offer limited approach to experiences and processes. Here, this tool was employed for the purpose of triangulation with expert interviews as a means of achieving credibility. The term 'document analysis' refers to both a data collection method and a mode of analysis, discussed here and in the following section, correspondingly.

As a method, document analysis refers to the collection, review, and interrogation of various forms of text as a primary source of research data. Notably, such documents are pre-produced and are not generated by the researcher. According to O'leary (2004), this may result in two common biases: 1. Failure to identify the author's purpose behind the writing of the subject document and accepting published text as absolute truth; 2. False interpretation as a result of one's own perception of reality. These sources of bias were considered particularly relevant for this thesis, as the identification of potential lock-ins was based on the assumption that authors of planning-related documents would be oblivious of their existence or lack the capacity to address them. In this thesis, the gathering of documents was based on references made by the interviewed experts. Additionally, internet sources such as institutional home pages, documents, and files, were collected in case no printed publication was available for a certain programme or organisation. Described in the following paragraph, the application of the document analysis method was based on four quality control criteria (Scott, 2014): 1. *Authenticity*, addressing the question of whether the document is essentially a primary, secondary or tertiary source (e.g., original report, summary, or reference catalogues, respectively); 2. *Credibility*, referring to the reliability of the text and freedom of error or distortion; 3. *Representativeness*, regarding the typicality of the document to its kind, and the extent of deviation from this type if relevant; 4. *Meaning*, distinguishing between the comprehension of the document's intentions by its author, readers, and individuals that it addresses.

Authenticity was pursued through usage of primary sources only (Table 5). Notably, formal publications available in both English and Hebrew were searched for inconsistencies; English versions were generally preferred for reasons of terminological coherence. In terms of credibility, a conscious decision was made to include authoritative sources, such as policy documents or scientific reports which, by authorship or authority, claim to be objective (O'leary, 2004). Additionally, documents such as promotional material were recognised for their agenda and considered for potential bias. Discussed in the chapter of conclusions, this proved essential for the triangulation with expert interviews and interpretation of results. In addition to concern

Table 5: Collected documents for the analysis.

Name of Document	Publisher	Author	Type	Language	Last Access	Reference in text	Available on
Protection of the Coastal Environment Law 5764-2004	Israel Ministry of Environmental Protection (MEP)		Policy Document	English	20/08/2016	MEP, 2016	http://www.sviva.gov.il/English/Legislation/Pages/MarineAndCoast.aspx
The Marine Environment Protection Bill; Overview	Adam Teva V'Din - Israel Union for Environmental Defence		Policy Document	English		ADV, 2015	Internal document - not for distribution
Israel Marine Plan	Israel Marine Plan, Technion - Israel Institute of Technology		Plan	English	20/08/2016	IMP, 2015	http://msp-israel.net.technion.ac.il/en/stage-a-report/israel-marine-plan-final-plan/
Long-Term Acoustic Monitoring of Common Bottle-Nose Dolphins in the Haifa Bay Area; Final Environmental Survey Report on the Effect of Underwater Port Construction Noise on Marine Mammals (name translated)	Israel Marine Mammal Research & Assistance Centre (IMMRAC)	Kerem, D; Scheinin, A; Zuriel, Y E	Report	Hebrew		IMMRAC, 2016	
Strategic Environmental Assessment for Exploration and Exploitation of Oil and Natural Gas in the Sea; Draft for Public Comment (name translated)	Israel Ministry of National Infrastructure, Energy and Water Resources (MNIIEWR)	Geoprospect Ltd. and Israel Oceanographic & Limnological Research	Report	Hebrew	20/08/2016	MNIIEWR, 2016	http://energy.gov.il/subjects/oilsearch/pages/gxmsmnoilsearchsea.aspx
State of the Sea Report 2014 - Who Will Manage the Sea? A Recommendation by Zalul NGO for Best Management of the Mediterranean Sea	Zalul	Tal, D	Report	Hebrew	20/08/2016	Zalul, 2014	http://www.zalul.org.il/?page_id=1641
Adam Teva V'Din - Israel Union for Environmental Defence	Adam Teva V'Din - Israel Union for Environmental Defence		Internet Website	English	20/08/2016	ADV, 2016	http://www.adamteva.org.il/english
Ecoocean - Marine Research and Education	Ecoocean - Marine Research and Education		Internet Website	English	20/08/2016	Ecoocean, 2016	http://www.ecoocean.org/Default.asp?sType=0&PageId=651
IMP-MED; Project on Integrated Maritime Policy in the Mediterranean	IMP-MED; Project on Integrated Maritime Policy in the Mediterranean		Internet Website	English	20/08/2016	IMP-MED, 2016	http://51.255.195.60/En/page.php?code=26

for low credibility, other types of collected documents, such as multimedia records and personal communication (e.g., new reports and email correspondence, respectively) were excluded from the analysis due to the limited scope. The third criterion, namely representativeness, was maintained through selection of the same types of documents from parallel organisations. For example, competitive programmes were compared by their final plans or documents. Similarly, environmental bills were examined for the understanding of the role of NGOs. Finally, with regard to 'meaning' as a criterion of quality control, this was attached to collected texts on the basis of their authors' own description. As explained in the previous section, interviewed experts were selected on the basis of their involvement in one of the current programmes in Israel; in all cases, these individuals had direct contribution to the final formulation of the text. Inconsistencies between attached meanings were sought through the conceptual framework.

3.3.4 Data Analysis

As discussed earlier in this chapter, a strong emphasis in this thesis was put on richness of information rather than statistical significance. In the analysis, this meant bringing the categories that were developed in the conceptual framework to the empirical data itself, rather than deriving them from it. According to Flick (2009), qualitative content analysis is a suitable procedure. Textual data was reduced into three analytic categories: 1. *Coding units*, referring to the most minimal part of the text that may be categorised; 2. *Contextual units*, defining the largest elements in the text, and; 3. *Analytic units*, which organise the structure of the passages to be analysed. The reduction of text into such categories included both deductive and inductive processes, as themes emerged from prior engagement with the literature as well as from the gathering of data. According to O'leary (2004), deductive coding procedures are normally regarded as a core principle of positivistic, quantitative research, whereas inductive processes are seen as central to the post-positivistic, qualitative approach. However, analysis is often dependent on both lines of reasoning. For example, inductive theory that is derived from empirical data may require confirmation through verification with the literature. In turn, the credibility of such tests may depend upon the ability of the researcher to generate alternative explanations (Figure 6).

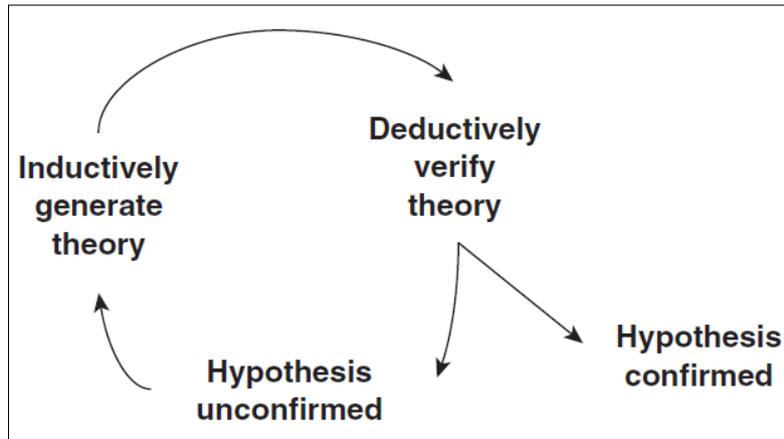


Figure 6: Cycles of inductive and deductive reasoning. Source: O'leary (2004).

In this thesis, the conceptual framework was derived from the literature yet assessed and modified on the basis of collected data. Salient features were identified in the material to define criteria as coding units (Table 6). These were later organised according to the different dimensions of the multi-level model which served as the contextual units. Finally, the multi-phase model provided for analytic units. For example, one of the questions asked in the interview related to the general dismay with the sector-based management of sea-use activities in the marine space of Israel. Two criteria were derived from the literature of ocean governance, namely 'public awareness of the environment' and 'advocacy crowds,' referring to concern at the individual and collective levels, correspondingly. However, gathered data showed that macro-level pressure on the system had also resulted from world trends in sea-use planning as well as global developments in economic, social, and ecological landscapes; the scientific literature was employed for the understanding of different reasons to engage in international policy transfer, such as coercion, emulation, inspiration, etc (Dolowitz and Marsh, 1996; Stone, 2012). Eventually, an additional criterion, which had not been previously considered, was incorporated into the framework (framed in red), referring to world trends. Notably, similar reasoning was used for the development of contextual units of analysis, that is, the dimensions of the conceptual framework. For example, the dimension 'geographical scope' was derived directly from the Israeli case, but is nevertheless proposed as a comparable variable in future research.

Table 6: Analytic units (transition phases), contextual units (dimensions), and coding units (criteria).

Transition Phase / CAS State	System Level	Dimension	Criterion
Predevelopment (Conservation)	Macro (landscape)	Willingness to Change	Public awareness of the environment (individual level)
			Advocacy crowds (NGOs, scientific community)
			World trends in political, economic, social, and ecological landscapes
	Micro (technological niches)	Ability to Change	Accessibility to remote environments
			Navigation tools
			Marine construction technology
			Research and environmental monitoring
			Planning technology
			Technology-facilitated media
			Coastal desalination / power-plants
	Ecological modernisation		
	Meso (regime mode)	Defensive	Lack of resources
			Slow bureaucracy
Power relations / ego			
Take-Off (Creative-Destruction)		External provisioning of bottleneck resources	Funding
			Expertise
	Meso (regime mode)	Reactive	Introduction of tools for dealing with heterogeneity of the marine environment and associated uncertainties
			Introduction of innovative modes of governance
Acceleration (Reorgansiation)		Experimental Modes of Governance	Integrated Coastal Zone Management
			Marine Spatial Planning
			Integrated Maritime Policy
			Private Bills
	Meso (regime mode)	Innovative	Governmental initiative
Stabilisation (Growth and Exploitation)		New Geographical Scope	Zoning framework in place
		Integration	Social exchange
		Ecosystems Approach	Content management
	Meso (regime mode)	Defensive	Statutory place-based planning frameworks

The next step of the analysis involved the use of a qualitative-research software, namely ATLAS.ti (version 7.5.12). This enabled the attachment of the coding units to segments of text which addressed related questions; the program displays the primary text with the attached codes and comments. Different quotes (i.e., segments of coded data) were then sorted by criterion, forming conceptual networks of information relating to the various dimensions. The program's feature of displaying links between criteria has allowed for understanding the interaction between the different networks. This was particularly useful in the interpretation as well as presentation of multi-level reinforcement in the first phase of the transition (Figure 7). Finally, coherent explanations were identified to link between all different phases and internal states of the CAS. These analytic units enabled the confirmation of a transition's occurrence according to the conceptual framework.

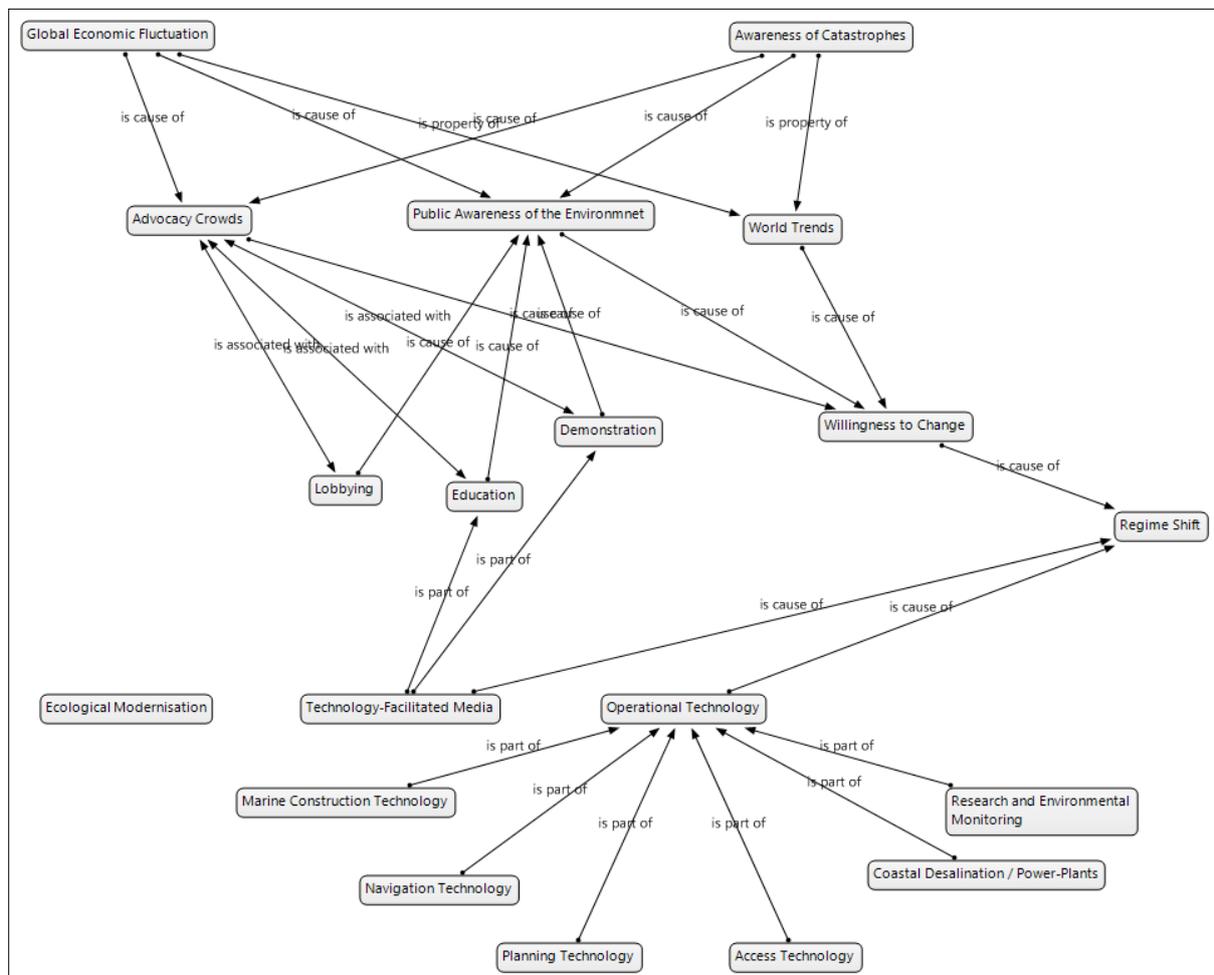


Figure 7: A conceptual network, produced on ATLAS.ti to map multi-level reinforcement at the predevelopment phase of the transition in the Israeli sea-use planning framework.

4 The Transition in Israel; a Look Beneath the Surface

This chapter presents the results of the qualitative content analysis. Following the structure of the conceptual framework, it demonstrates the application of the systems perspective on the Israeli case of sea-use planning. The first subchapter employs the multi-level model to describe bottom-up and top-down pressure on the regime as well as the latter's mechanisms of defence. This is followed by elaboration on external provisioning of resources that have facilitated the transition's take-off. Here, the regime is described in terms of its reactive response following self-examination. Then, it is suggested that the transition in Israel is currently in its acceleration phase. Current initiatives towards a place-based sea-use planning framework are presented in the third subchapter, including the governmental programme. The latter is examined as active contribution to the transition at the meso level. Finally, building on the statement that the transition is still underway, the fourth subchapter examines the implementation of social learning processes to identify potential lock-ins. Each of the four subchapters includes an interim conclusion, presenting the application of the systems perspective in the interpretation of results.

4.1 Conservation

Results of the qualitative content analysis reveal that mutual-reinforcement has occurred not only between, but also within the different levels of the system. In order to illustrate causal interactions, the predevelopment phase is divided into two stages. Stage 1 refers to the growing motivation for change, between 2000 and 2009. This period was characterised by a growing sense of urgency among the scientific community and advocacy crowds in Israel, as well as by the introduction of new modes of governance. Stage 2 describes the very need to plan and the ability to do so, referring to the years between 2010 and 2012. Here, distinction is made between technological innovations which that facilitated change at the operational level, and complementary developments, referring to indirect reinforcement of the sense of urgency to act.

4.1.1 Stage 1: Willingness to Change

According to a private consultant on coastal geomorphology, three historical episodes of coastal development stand in the background to the transformation of the Israeli sea-use planning framework: 1. Extensive mining of beach-sand as a basic building material, before and after the country's declaration of independence in 1948; 2. Wide-scale construction of detached breakwaters for the purpose of beach expansion, throughout the 1960s and 1970s; 3. Development of three marinas along the Israeli coast, in the 1980s and 1990s, as part of the number 13 National Outline Plan (NOP). These coastal developments created barriers to the

eastern Mediterranean long-shore transport of sand, resulting in conspicuous modifications in the physical landscape. In turn, it brought about the rise of advocacy crowds and establishment of environmental movements. According to this expert, *“This brought the marine construction in Israel to a halt, followed by twenty years of silence. Every piece of concrete that was put on the beach would be met with demonstration.”*

In the late 1990s, two parallel bills for the protection of the coastal environment were simultaneously prepared – one by a private NGO, the other by the Israel Ministry of Environmental Protection (MEP). The passing of the private bill first enabled enhanced reviewing of the government’s proposal. This process resulted in their combined entry into force as the Israeli Protection of the Coastal Environment Law (5764-2004). According to the Head of the Marine Environment Protection Division at the MEP, the formulation of this law was “boosted” by the ICZM protocol of the Barcelona convention, of which Israel had been a signatory since 1976. Additionally, it was first sign of change in the sector-based regime:

“There was a certain evolution to our perception of the marine and coastal environment at the MEP [...] Until 2004, the geographical delineation of the sea and coast was not even clear [...] this law was a first step in understanding the spatial scope of what we had to address.”

Three features of the law were mentioned by this expert and confirmed in the analysis to have enabled this initial step. In summary, it set the geographical delineation of the Israeli seacoast area, providing a place-based frame of reference for environmental regulation. Additionally, it introduced the legal establishment of the coastal space as a public good. This entailed recognition of a variety of uses, and the ability to prioritise between conflicting interests. Finally, the law introduced the Committee for the Protection of the Coastal Environment (CPCE), composed of seventeen members from government ministries as well as public agencies (MEP, 2016).

Stage 1 of the predevelopment phase is concluded to have been driven by two macro-level factors: 1. Top-down pressure of advocacy crowds, regarding the bills these have promoted for environmental legislation; 2. Indirect coercive policy transfer, referring to introduction of new policies in compliance with the ICZM protocol. Though both were initially met by the regime with self-optimisation, it by large maintained a state of conservation; the new law did not apply beyond the seacoast area, sea-users were not directly involved in the committee, discussions were not open to the wider public, and near-shore development was addressed in a multi-sectoral perspective. As stated by the Head of the Marine Environment Protection Division at the MEP, *“This was not quite MSP, not even ICZM. But the mere existence of the committee with its seventeen members, was already integration by definition.”* Hence, it is considered as the first sign of a transition. Bottom-up reinforcement is discussed in the following section.

4.1.2 Stage 2: Ability to Change

The early 2000s introduced important technological advancements that facilitated the discovery of natural gas reservoirs in Israel's marine space. The possibility of exporting gas to neighbouring states as well as overseas presented Israel with an opportunity for economic and geopolitical security. Additionally, it provided a potential alternative for carbon-based resources and therefore a considerable environmental advantage (IMP, 2015). Though exploitation of reservoirs had been taking place in Israel's territorial waters since 2002, it was not until 2009 that the "move" further away from the coast was finally established. Multiple expert reported that advancements in offshore research tools, such as remotely-operated vehicles and multi-beam eco-sounders, were coupled with computational improvements in seismic imaging as well as deep-sea drilling. Stated by the Head of the Marine Environment Protection Division at the MEP, "[...] *ten years earlier no one would have thought it possible to drill for gas in ultra-deep water [...] this was a technological jump, to go this far offshore.*" Considering the abovementioned opportunities that this encompassed, the subject matter soon gained national attention. A recurrent theme in all expert interviews was the association of the so-called awakening with two world-trends in the background: 1. Global economic fluctuation, referring to the rise in the price of carbon-based fuels; 2. Awareness of potential catastrophes, in light of the 2010 oil spill in the Gulf of Mexico. Marine scientists discovered new fields of research, and specialised advocacy crowds arose once again. For example, a scientist at the University of Haifa has said:

"Take the academia as an indicator – researchers working on the sea, then and now. Look at how many of them focused on the 15 km long reef in Eilat versus those on the Mediterranean environment; everyone was working only there for sixty years. Now it's no longer like that."

In line with this statement, a coastal and ocean social scientist at the TIIT has added: *"The marine advocacy crowd in Israel – organisations like Ecoocean, Tsalul, even the Society of Nature Conservation and Ministry of the Environment – were all of a sudden up in arms because we have no environmental regulation past the territorial sea."*

The software analysis of contextual networks reveals processes of interaction within and between the different levels of the system. At the macro level, these include interrelations between various advocacy crowds. Interviews with representatives of NGOs reveal that while environmental advocacy crowds are often competitive by means of the bills, plans or causes they promote, they also reinforce each-other through the sharing of data or employment of complementary strategies, such as lobbying, demonstration or public education. For example, a marine scientist at a key NGO in Israel, namely 'Adam Teva V'Din' (Hebrew: man nature and law), has mentioned:

“In some cases we try to assist one another and support as much as possible, whereas in other instances we avoid interrupting. There are also reversed situations of not just separate work, but also competition[...] After all, it is the same Knesset members whose support we are pursuing.”

Additionally, advocacy crowds were further reinforced by other macro-level entities. According to the expert quoted in the previous section, with regard to the emergence of concern for the coastal environment, there was a degree of mutual-reinforcement between scientists and concerned individuals: *“The very same people previously dealing with the coasts were now fighting over gas. NGOs were already existing, but there were now also specialised experts; until then, they had never dealt with biology. Only physical aspects.”* Notably, the increase in awareness following the discovery of natural gas was attributed by all interviewed experts to the scientific community and the different NGOs, rather than the wider public on the whole; approximately forty organisations were established in Israel throughout the past twenty years, five of which working exclusively on the marine areas of Israel. To involve the public, create a critical mass, and instigate systemic change, such groups often push an agenda other than their very own. For example, the representative of ‘Adam Teva V’din’ has said:

“Concerning the gas and oil issue, people worry about being gulled. As of the deep-sea ecosystem, the public doesn’t know and doesn’t understand it. You lose them five seconds into the debate. We try to generate public support through issues such as accessibility to beaches. This does not directly link to our cause, but nevertheless helps us to promote it.”

As mentioned above, such interactions between environmental crowds were further reinforced by world-trends in the background. Combined, international and local developments applied top-down pressure on the planning regime. Important means of influencing government officials and elected representatives were found to include strong public pressure, media exposure and fear of prosecution. Here, linkages are made with micro level processes. For example, relevant technologies include mobile apps and social platforms for the launching of campaigns. Similarly, dependencies between these two levels occur in the opposite direction, through introduction of technological developments by macro-level entities. For example, a research vessel equipped with innovative tools is provided to the marine scientific community in Israel by a private NGO. Finally, technological improvements reinforce each-other. As stated above, the discovery of natural gas is attributed to innovations in multiple fields. These include advancements in global navigation systems, hydrographic tools, subsea construction, etc. Other technological trajectories applied direct pressure on the planning framework. For example, seawater desalination systems and coastal power plants create user-environment as well as user-user pressures; together with the rise of offshore platforms, these facilities increased the urgency to plan the marine space in its entirety. A third type of micro-level technological innovation relates to newly available place-based frames of reference; development within the

coastal and marine environment rests upon improved numeric models and decision-making tools. For example, MARXAN, VIZLAB, and ARCGIS SERVER facilitate the visualisation of spatial overlays and conflicts, thus enabling their resolution or prevention (IMP, 2015). Similarly, ecological research in Israel now includes monitoring of pelagic organisms in the sea; satellite tags are used for the shark and sea-turtle surveys, and passive acoustic monitoring is used to identify the effects of noise pollution on the distribution of marine mammals (IMMRAC, 2016). Such tools call for the association of management measures with the temporal and spatial variability of the sea.

4.1.3 Regime Defence

Despite some degree of internal optimisation at the meso level, referring to new legislation and environmental policies, a state of conservation is concluded to have been maintained throughout the phase of predevelopment. Several mechanisms were identified in this respect, and are discussed in the following paragraphs. These include various forms of power relations and administrative difficulties.

A recurrent theme detected in the analysis of contextual networks was *'territorialism'*, metaphorically and literally referring to power-related institutional barriers. The metaphorical usage illustrates professional conflicts between 'areas' of responsibility in different government ministries. According to a member of the integrating team of one Israel Marine Plan, *"Part of the problem was indeed conflict and **territorialism** of the different ministries [...] these represent the various users of the marine space in Israel and, classically for the sector-based approach, are often disputing the use of shared resources"* (emphasis added). Similarly, this form of power-relations is attributed to inter-departmental interactions – within rather than exclusively between the different sectors. For example, this expert has added that the allocation of space for the disposal of coal combustion residuals has habitually triggered heated discussions between different departments at the MEP. Such conflicts may pose barriers to efforts of internal change despite macro / micro-level pressure. A second form of territorialism refers to the spatial sense of the word. In this respect, power-relations between different organisations refers to ownership of planning data. For example, an additional member of the Israel Marine Plan's integrating team, the above-quoted coastal and ocean planner, has regarded this notion on through reference to international experience in the field:

*"The sectoral issue, or horizontal look at integration, this was a much bigger challenge because it was a lot of **territorialism**. A big piece of MSP is the gathering of the data – the baseline. That was a huge challenge in Israel because if I compare the data that is publically available in Israel to the data that is publically available in the state of Massachusetts... it's night and day. A totally different situation. Here it's pulling teeth to get GIS information, whereas in Massachusetts there is a system where I can go online and download data that the state has, that the state is generating, and that*

the state has funds and office of people to generate for the public to download, and it includes marine data on state waters” (emphasis added).

Hence, the lack of a publicly open platform is concluded as a barrier not only to the achievement of a place-based frame of reference but to integration altogether. In similarity to the figurative understanding of territorialism, here too power-relations can be distinguished on an intra-institutional scale (i.e., within organisations). For example, in his explanation of the establishment of a marine department at the Nature and Parks Authority of Israel, the coordinator of this unit has referred to the interaction between district offices: *“There was antagonism that is more related to ego issues than professional issues. Starting a marine district entailed the loss of **territory** for other districts. At the professional level there was no doubt about this being the right thing” (emphasis added).*

Notably, identified defensive mechanisms at the meso level did not only include the above forms of power, or so-called territorialism; other institutional barriers to predevelopment refer to the administrative capacity of the regime. Distinguished issues include a common lack of resources, and degree of bureaucratic sluggishness. The prior notion suggests operational difficulty which, as opposed to the different types of territorialism, does not relate to power or ego. Here, the shortage of expertise, manpower, or equipment, manifests logistical obstacles to system innovation. The Israeli planning framework is essentially land-use-oriented and the ‘shift to the sea’ often calls for flexibility at a technical level. For example, according to the coordinator of the marine department at the Israel Nature and Parks Authority, such difficulties include the initial introduction of new positions or equipment, as well as the long-term establishment of new networks: *“Taking new steps is often complicated and hard. Creating regular communication with the navy, with the maritime police, with the fishery department – it has all been attempted, but not at this level of intensity.”* As mentioned above, an additional form of administrative difficulties includes bureaucratic sluggishness. Whereas exploitation of natural gas reservoirs in the territorial waters of Israel has been practiced since 2004, it was not until later on in that decade that natural gas was discovered in the EEZ (IMP, 2015), giving rise to large-scale planning efforts. Several experts referred to this delay as “the government’s neglect.” According to the Head of the Marine Environment Protection Division at the MEP, it is attributed to the slow pace in which legislation processes often take place. In this case, the government did not realise its very own authority to plan the EEZ until large reservoirs of natural gas had been discovered, and pressure of the macro and the micro levels finally became sufficient. As concluded by this expert: *‘One thing reinforced another [...] You can always ask “why now”, or “how come it was never thought of sooner,” but this is how the evolution started.’*

In summary, meso-level mechanisms of response included figurative and literal territorialism, whereby power-relations in inter / intra-organisational constellations has brought about personal resistance to change. Other institutional barriers included limited administrative capacity as well as sluggish bureaucracy. Hence, the system is concluded to have maintained a defensive state of conservation despite a certain degree of willingness to change, as discussed in section 4.1.1. Presented in the following section are enabling conditions to the transition’s take-off phase.

4.1.4 Interim Conclusion

The first phase of the transition marks the possibility of a three-dimensional shift towards place-based sea-use planning; innovations of the existing framework included the statutory definition of the seacoast area, improvement of the system’s integration capacity, and early recognition of the environment as a key element in policymaking. Though first stimulation is attributed to top-down pressure of advocacy crowds as well as international trends in sea-use planning, a most significant trigger for change was the introduction of imported technologies. These reinforced each-other and facilitated amplification of societal processes. Notably, not all macro level components distinguished in this thesis seem to have prompted the so called sense of urgency; public awareness of the marine environment is concluded to have been the result, rather than driver of the predevelopment. Nevertheless, it has translated the above causality into substantive pressure on the sector-based regime. This is reflected in issue of power and ego between and within government and intermediary organisations, as well as slow bureaucracy and lack of resources. Presented in Table 7 is the incorporation of these conclusions into the conceptual framework.

Table 7: Reconstruction of the predevelopment phase according to the conceptual framework.

Transition Phase / CAS State	System Level	Dimension	The Israeli Case
Predevelopment (Conservation)	Macro (landscape)	Willingness to Change	Growing awareness of NGOs and the scientific community to changes in the coastal environment, as well as world trends in sea-use planning (indirect coercive policy transfer). Public awareness at the individual level was not a driver but an outcome of macro-level predevelopment. World trends relating to the gas / oil industries, namely economic fluctuation and awareness to catastrophes, applied additional pressure.
	Micro (technological niches)	Ability to Change	Imported technological improvements in marine navigation and deep-sea offshore research, seismic imaging, and drilling. Additionally, innovation in planning tools such as numeric models and spatial visualisation programmes. Finally, place-based environmental monitoring instruments (e.g., marine mammal monitoring devices). Technology-based media such as communication apps and the internet were used to establish critical mass in the generation of public support. Desalination technologies and other coastal facilities increased the urgency to plan. No forms of ecological modernisation were identified as complementary.
	Meso (regime mode)	Defensive	Though initially reactive to a certain degree, defensive mechanisms were overall upheld through: 1. <i>Territorialism</i> - power-related inter/intra-sector conflicts over shared resources, and ownership over spatial information; 2. Administrative capacity - lack of resources and bureaucratic sluggishness.

4.2 Creative Destruction

The regime's submission to the different predevelopments was not a smooth process. Instead, the abovementioned institutional barriers seemed to have maintained prevalence throughout its so-called evolution. This section illustrates the take-off phase of the transition as an entire episode, rather than a single point in time; a private fund's allocation of bottleneck resources, such as financial funding and professional expertise, has enabled the regime's self-examination. In turn, this triggered a shift from a state of conservation, to self-examination and, finally, to internal optimisation. Building upon reference to the theory chapters of this thesis, the logic behind this interpretation is carefully elaborated.

4.2.1 External Provisioning of Bottleneck Resources

Before the 2009-2010 discovery of natural gas within Israel's EEZ, exploration and exploitation rights were readily granted. According to the Head of Environment Department, at the Israel Ministry of National Infrastructure, Energy, and Water Resources (MNIWR), *'licences were given almost for free [...] because no one believed that anything would be discovered; all they wanted was to encourage investment.'* Upon the government's realisation of the magnitude of this resource, however, precautionary measures were finally taken; in 2012 the MNIWR stopped licensing-administration altogether, and launched a strategic environmental assessment (SEA) programme, in cooperation with other governmental entities (MNIWR, 2016). The SEA included dense measurements of physical, chemical, and biological parameters in the water-column and deep seabed, generating a powerful environmental baseline. According to the above-quoted ministerial official, this was envisioned to serve as a decision-making tool in the future, offering three distinct advantages: *"minimised impact to the environment; reduced exploration focus where natural gas is already known to exist, and; flexibility in planning."* Additionally, other monitoring programmes were initiated by private NGOs to 'fill in the gaps' and expand existing knowledge. For example, the SEA provided a frame of reference for a new governmental programme, namely the Israel Maritime Policy', launched by the Israel Planning Administration (IPA). However, due to the same mechanisms of defence which were discussed in the previous section, this programme was progressing slowly, and NGO initiatives were often terminated prematurely. For example, in his description of the rise and fall of one such 'complementary' project, namely 'HaMaarag' (Hebrew: the fabric), a scientist at the University of Haifa has said:

"I guess each part of this puzzle was meant to serve a different purpose [...] the activity of HaMaarag at sea was purposed to provide an estimation of the suitability and value of existing knowledge for other processes [...] an idea that was later met with political difficulties."

In 2013, shortly after the launching of the governmental effort, an additional programme, namely the Israel Marine Plan, was established as a public-private partnership; through the allocation of financial resources, a philanthropic foundation enabled freedom from political constraints, employing a team of academic researchers from the Technion – Israel Institute of Technology (TIIT). Regarding the background to the launching of this effort, a member of the programme’s integrating team has said: “[...] *it is commonly assumed that the Israel Marine Plan has stemmed from the government’s very own inaction and “tardiness” in advancing this process,*” generally referring to marine management and planning. According to a private consultant, a member of the governmental programme’s integrating team, this motivated the IPA to gear up its own effort once again, assuming that *“in the end, only governments can govern.”*

4.2.2 Regime Release

The MNIEWR’s SEA may be seen as key contribution to the transition’s development in terms of the three dimensions discussed in the previous subchapter. First, it was the government’s official step across the contiguous zone borderline. Second, it marked a shift in terms of nature’s role in policymaking; as opposed to other internationally common tools, such as environmental impact assessment (EIA), SEA programmes are employed as a preliminary step in policymaking (MNIEWR) and thus arguably contradict ad hoc spatial planning. Third, it soon served as a place-based frame of reference for integrative modes of governance, such as the IPA’s initiative as well as the TIIT’s programme. In support of the last two statements, the Head of Environment Department at the MNIEWR has said:

“We have acknowledged the potential of what we had been doing and its relevance for other processes, and have broadened our perspective from a sectoral to a comprehensive prism; eventually, what we have done has served as the basis for the TIIT’s as well as the IPA’s.”

Hence, the SEA is concluded as a possible departure from the system’s state of conservation. Yet, the question rises whether or not it indeed indicates the transition’s so-called take-off. The arguments discussed in the following paragraph eliminate this proposition and provide the foundation for further analysis.

The SEA programme of the MNIEWR was initially launched as a sectoral effort, focusing on natural gas infrastructure and disregarding some significant components of the marine environment; in addition to the above-quoted statement, the Head of Environment Department of the MNIEWR has added that *“launching other SEAs in addition to that of gas and oil would have been the right thing to do... to look at different things and see how they came together.”* Moreover, though the SEA has provided significant support for innovative processes of policymaking, it did not result in a statutory place-based sea-use plan. A second factor which is considered in the rejection of the above hypothesis is the very theoretical foundation of this

thesis. As described in section 2.2.3, deviation from the existing status-quo may require external provisioning of bottleneck resources. This calls attention to the role played by the philanthropic foundation, rather than the MNIEWR or IPA. As mentioned above, this has enabled the introduction of academic knowledge and administrative expertise. In reply to the question ‘what has enabled the transformation of the planning framework?’ a coastal and ocean social planner from the TIIT has said: *“I think that the fact that the Faculty of Architecture and Town Planning took it on. A big percent of what a planner does is bringing different sectors together.”* Thus, the SEA may have served in as an important factor in the system’s transition from a state of conservation to creative destruction, but the take-off itself is attributed to the TIIT’s programme and the composition of its integrating team. This conclusion is in line with the analysis of contextual networks; excluding ministerial officials, all experts have reported that the Israel Marine Plan was “the straw that broke the camel’s back”.

4.2.3 Interim Conclusion

In summary, the SEA programme marked the beginning of a meso-level shift from a state of conservation towards internal optimisation. The introduction of resources by an external foundation is understood to have pushed the regime towards self-examination, indicated by the “gearing up” of the governmental effort, implying the replacement of defensive mechanisms with reactive measures of improvement (Table 8). From a system’s perspective, this implies creative destruction and chaotic collapse; the regime itself has passed the point of irreversibility and was utterly engaged in large-scale innovation. Seemingly, new directions of integration in policymaking were currently pursued. These are not limited to the government or academia, Rather, collective efforts are being made through continuing reinforcement between advocacy crowds. The next subchapter provides additional information on each of these efforts.

Table 8: Reconstruction of the take-off phase according to the conceptual framework.

Transition Phase / CAS State	System Level	Dimension	The Israeli Case
Take-Off (Creative-Destruction)		External provisioning of bottleneck resources	A philanthropic foundation has enabled funding for the launching of a place-based sea-use planning programme, employing an international team of academic planners and researchers.
	Meso (regime mode)	Reactive	Strategic Environmental Assessment (SEA), reflecting the regime's self-examination. Enhanced governmental efforts to optimise sea-use policies marked the regime's collapse due to loss of exclusive ownership over resources.

4.3 Reorganisation

The acceleration phase of the transition is characterised by the broadening variety of innovative programmes, the formal move towards an ecosystems approach, and the introduction of public participation into decision-making processes. These developments correspond with the three dimensions of the transition's evolution, and mark the system's new state of reorganisation. This subchapter introduces the different programmes facilitated by external allocation of resources. The academic programmes and NGO initiatives are discussed as well as the governmental effort, representing the regime's engagement in active contribution. An analysis from a systems perspective is provided in the last section.

4.3.1 The Academia

The Israel Marine Plan is a MSP for the territorial and exclusive economic zones in the Mediterranean Sea. As mentioned in the previous subchapter, it was developed by a team of planners and researchers at the Faculty of Architecture and Town Planning – Centre for Regional Studies, at the TIIT. The plan's board is comprised of an integrating team, individual research-assistants and professional consultants from various fields, supported by a professional scientific advisory committee as well as an international professional committee. Finally, a large group of stakeholders was involved in the process. This includes representatives of government organisations, local authorities, and business-sector representatives with an interest in the marine space. These have had considerable impact on the plan's formulation as well as its end product, published in December 2015 (IMP, 2015). Additionally, horizontal integration is pursued through the development of a GIS-based online platform as a central aid for planning, participation and management. Through open access to experts and professional stakeholders, it allows to *"[...] cross reference, analyse data, respond and participate interactively, hold dialogue, and exchange spatial and textual ideas and opinions relating to planning of the marine space and the Israel Marine Plan products in a flexible and visual manner"* (IMP, 2015, p. 20) The plan aspires to develop knowledge with regard to the marine environment, improve public awareness, and shape the spatial depiction of the sea as an integral part of the country. It outlines a series of twelve goals for the realisation of this vision, and an array of policy measures with spatially distinct guidelines for implementation by the government and stakeholders. Through its vision and its goals, the plan promotes informed and responsible management of the marine space, adhering to the ecosystems approach. It proposes to divide the marine area into five spatially distinct, functional ('exploration') sea-use areas (Figure 8): Marine Protected; Marine Shared; Marine Shared-Protected; Deep Sea; Marine Horizon. These are distinguished from each-other by means of policy, primary and secondary 'exploration goals', and their environmental compensation multiplier. Additionally, the plan dictates general, long-term

guidelines for its implementation on the whole (i.e., as opposed to goal / area-specific), for instance “*monitoring the state of the marine environment,*” “*monitoring uses and actions within the marine space and relevant developments,*” etc (IMP, 2015, p. 56).

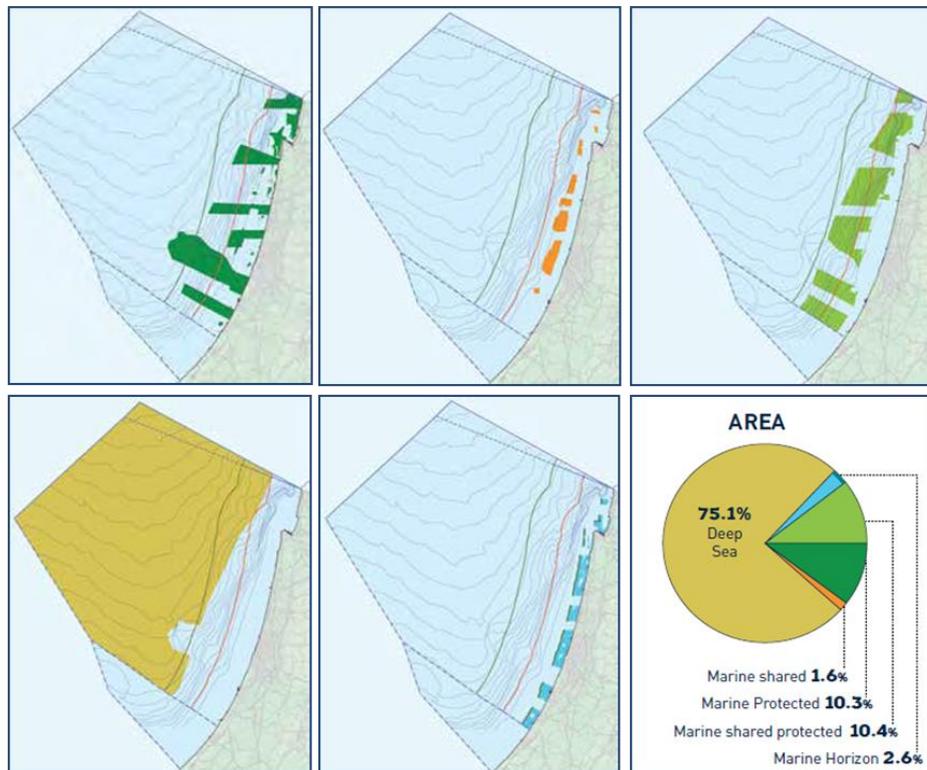


Figure 8: Spatial scope of sea-use areas of the Israel Marine Plan. Source: IMP 2015.

The Israel Marine Plan is essentially a place-based innovation for the Israeli sea-use planning framework. However, it does not hold a legally binding status, nor is it under statutory planning procedures. It is purposed for the guidance and support of all entities with an interest in the marine space, including government bodies and management or regulatory systems (MNIEWR, 2016).

4.3.2 Nongovernmental Organisations

The role of private and public organisations was found key to all phases of the transition thus far. Specialised advocacy crowds were identified as a significant component of top-down pressure on the meso level, and the take-off tipping point was attributed to a philanthropic foundation’s allocation of resources. Similarly, NGOs were identified as an important factor in the transition’s acceleration phase. A scientist at the marine division of ‘Adam Teva V’Din’ (Hebrew: Man Nature and Law), a key NGO in Israel, has stated:

“[...] everyone has a plan today, in one way or another. Also NGOs and other environmental entities – like the Society of Nature Conservation – started getting into this much more seriously over the past three years. Be in independently or in response to the government, no matter how, everyone has gotten pulled in.”

As mentioned in section 4.2.1, complementary initiatives have previously failed to overcome institutional barriers. However, owing to the increased interest in the sea and external provisioning of funding, these are now re-emerging and promoting multiple interests, including the removal of power-related obstacles that have previously hindered their very own proliferation. Examples include the alleged motivation of the philanthropic foundation to expose sources of territorialism and rigidity, as well as other NGOs that advocate the sharing of, and accessibility to 'safeguarded' scientific information.

As mentioned with regard to the phase of predevelopment, advocacy crowds have contributed to the expansion of the system's geographical scope and the emphasis on the environment as a core principle in policymaking. Nowadays, NGOs also advocate the third element of place-based sea-use planning that is distinguished in this thesis – the system's integration capacity. For example, these too work towards the identification and mapping of interests in the marine space, to provide for conflict resolution (ADV, 2016). Additionally, several such entities in Israel promote the establishment of a specialised authority to be in charge of policy procedures regarding the marine space (ADV, 2015; Zalul, 2014). According to the above-quoted expert, a marine authority would facilitate integration as a managerial plenum, comprised of representatives from different ministries and sectors. Moreover, it will employ a scientific committee which, on the basis of existing knowledge, examines its decisions and identifies remaining gaps of information. Thus, the activity of NGOs in the acceleration phase is concluded to have promoted the shift towards an ecosystems approach, by means of environmentally responsible policymaking as well integration.

4.3.3 Regime Innovation

The Israel Maritime Policy is a governmental partnership with the European Commission's EuropAid Cooperation Office, and the Directorate-General for Maritime Affairs and Fisheries (DG MARE). It is a part of the Integrated Maritime Policy in the Mediterranean (IMP-MED) project which seeks to organise sector-based sea-uses through systemic integration within and between nine member-countries: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria and Tunisia (IMP-MED, 2016). The rationale of the integrated maritime policy (IMP) approach is that increased development can only coexist with environmental protection as long as supportive governance mechanisms are employed (IMP-MED, 2016).

The Israel Maritime Policy initiative was launched in 2013 by the Ministry of Interior's IPA – now an auxiliary unit at the Ministry of Finance. This programme is coordinated by a multi-disciplinary team, led by a private firm for architectural design; the programme's editorial committee includes representatives of other government ministries, as well as the Nature and Parks Authority. It is aimed at the development of a sea-use planning policy for the country's

Mediterranean marine space. Additionally, it seeks to establish a national database for jurisdictional, environmental, and technological issues, in order to provide for integrative management as well as cooperation between all organisations dealing with the sea (MNIEWR, 2016). Two stages are proposed for the policy-document's preparation process: 1. Comparative multidisciplinary and multi-country analysis; 2. Formulation of the regulation and management design. Ultimately, this document will serve as the foundation for a statutory plan. According to the Head of the Marine Environment Protection Division at the MEP, it may include thematic and not necessarily geographical recommendations: *"The document will define the marine space, as well as the relevant stakeholders and their interrelations. It will provide the government with recommendations for policy with regard to different polygons or sectors."* Thus, it is yet uncertain whether the resulting strategy will ultimately lead to a chiefly sector -based or place-based framework.

4.3.4 Interim Conclusion

As stated with regard to the transition's take-off phase, the engagement of a philanthropic foundation has triggered the regime's shift from self-examination towards active contribution. This is indicated by the promotion of the IPA's Israel Maritime Policy in response to the launching of the TIIT's Israel Marine Plan. Similarly, NGO initiatives were facilitated by the external allocation of resources, rather than innovation at the meso level. This finding is in line with the theoretical foundation of this thesis, according to which the regime continues to be geared towards its previous internal states throughout periods of system innovation (section 2.1.2). These conclusions are organised according to the conceptual framework in Table 9. Notably, the plurality of efforts has facilitated new forms of interactions between the different levels of the system. For example, the IPA's Israel Maritime Policy and TIIT's Israel Marine Plan have both used the habitat map developed for the SEA of the MNIEWR. Similarly, representatives of both programmes have taken part in its preparation process. Hence, these indirectly reinforced each-other in the geographical planning of the marine space; such programmes provide an opportunity to develop joint recommendations for the decision-makers in due time (MNIEWR, 2016). Additionally, advocacy crowds can act to inhibit or promote governmental efforts (section 4.1.2). Further research on mutual-reinforcement in the acceleration phase could prove insightful for the study of transitions.

The developments in this phase correspond with the three-dimensional evolution of this transition. New zoning solutions were proposed, encouraging experimentation with the system's geographical scope, and its integration capacity was improved. Finally, monitoring and assessment of the marine environment has become an integral part marine planning and

management procedures. However, none of the above initiatives has gained validity through statutory law. In this sense, uncertainty is at its utmost and the transition is still underway.

Table 9: Reconstruction of the acceleration phase according to the conceptual framework.

Transition Phase / CAS State	System Level	Dimension	The Israeli Case
Acceleration (Reorgansiation)		Experimental Modes of Governance	Academia - Israel Marine Plan; Complementary efforts - NGO bills, promoting the establishment of a statutory marine authority.
	Meso (regime mode)	Innovative	International cooperation with the EU through engagement in the IMP-MED project.

4.4 Growth and Exploitation / Transition Lock-In

It is presently unknown whether current efforts for a statutory framework will result in a new maritime law, a NOP, a set of guidelines for the regulation of human activities at sea, or a new authority indeed. According to multiple experts, the next step in this respect might be the passing of current bill, namely the Marine Areas Law (5775-2014), which will combine the different efforts. For example, the coastal and ocean planner from the Israel Marine Plan has stated:

‘The planning framework – the way it stands now – is kind of like protective, and even though it’s getting an “undercut” as we speak, it’s still not permissive enough. It’s not total chaos either [...] I’m wondering if that point will actually be when this law passes, if it passes [...] I hope that a reasonable, rational and a very environmentally sensitive plan that is statutory eventually gets passed and approved by the government.’

This above bill was originally submitted by a private NGO and is presently being forwarded by the Ministry of Justice (Zalul, 2014; Zalul, 2016). The passing of this legislation may indicate the transition’s stabilisation phase as an equivalent to the terrestrial Planning and Building Law (5725-1965), through which the IPA administrates land-use regulations. As mentioned above, the Marine Areas Law will draw from different planning programmes that are currently in progress. For example, the bill promotes the establishment of marine authority as the basis of EBM implementation (Zalul, 2014) As explained in the previous subchapter, it is aspired to promote both stakeholder integration as well as understanding of environmental processes, and therefore may mark the completion of a structural and functional transformation of the sea-use planning framework.

In light of the above statement, that the transition in Israel is still in its acceleration phase, this subchapter examines the application of the systems perspective in the identification of potential lock-ins. Building upon the theory chapter of this thesis, an emphasis is put on social learning practices as the basis for dealing with the different sources of uncertainty. Based on

section 2.2.5, distinction is made between social exchange and content management, referring to relational (e.g., social involvement) and technical (e.g., state of the environment) qualities of social learning.

4.4.1 Social Exchange

The concept of social exchange refers to essential elements of integration processes, such as consensus-building around the framing of problems and the attachment of meanings to shared goals (e.g., sustainability, ecosystem health, etc). Since place-based sea-use planning programmes in Israel emphasise integration as a means to pursue EBM (IMP, 2015; IMNEWR, 2016; IMP-MED, 2016), social exchange may serve as an indicator for the transition's potential to bring about success.

Integration in Israel is generally perceived as a difficult yet worthwhile effort. In their visions and stated objectives, the different programmes for place-based sea-use planning emphasise improved governance as the basis for development alongside conservation (e.g., IMP, 2015). According to a member of the integrating team at the TIIT's Israel Marine Plan, *"The mere existence of dialogue indicates that the different sectors acknowledge that they will not get everything they thrive for, and that gains at the national level may ultimately loom larger than individual losses."* This holds true not only for essentially anthropocentric efforts, such as the TIIT's or IPA's programmes, but also for environmental advocacy crowds. For example, the CEO of 'Ecoocean' NGO, has stated:

"The sea is not something that's decided behind closed doors. It's something that's discussed, reviewed and shared; there should be a win-win between commerce and ecology. We're not saying that the advancements in the economic areas should not take place, but it should take place in a dialogue."

In addition to the recognition of integration as a key instrument, certain risks are associated with this practice by experts from all groups. As an example, the statutory authority discussed in the context of NGO's adaptation to the planning framework's evolution, is essentially an integrative entity which is promoted by different programmes to push a common environmental agenda (Zalul, 2014; ADV, 2015; IMP, 2015); the interviewed expert from 'Adam Teva V'din' has mentioned three reasons for concern that advocacy groups may have to consider. First, it is feared that once such an entity is finally established, it may have more legitimacy to promote other issues that have to do with the marine space, depending on the personal priorities of the people in power. Thus, environmental conservation may gain lower priority than it would have in the first place. Second, integration processes may constitute a slowing bureaucratic barrier as an interim mechanism, standing in the way of economic entrepreneurs who offer potentially environmental and social contributions through

development of the marine space. With general regard to integration, this expert has concluded: *“On the one hand this is a good process, but on the other it is driven by financial interest and the question is what it might lead to.”* Similarly, awareness of potential disadvantages to integration practices were acknowledged by frontrunners from other groups of the pentagon. For example, a scientist at the University of Haifa has said: *“Typically for Israel, it can also be negative [...] they come up with regulations that eventually are not enforced. This is even worse than the “wild-wild west” we had in the beginning.’*

Despite general awareness of the above potential ‘threats’ – power imbalances, bureaucratic barriers and lack of follow-up enforcement – preventive measures were not found to be actively exercised. With regard to the IPA’s Israel Maritime Policy, the Head of the Marine Environment Protection Division at the MEP referred to the State Comptroller’s supervision over the government’s compliance with policies and rules as a mechanism of process evaluation, and confirmed that procedures to assess the quality of social involvement are not currently considered. This expert has concluded that *“Indicators are necessary and though these can be qualitative, it is preferable they be quantitative; to start a new system, you have to establish measurable parameters not only for success, but for the sustainability of interest-matrices as well.”* Similarly, the TIIT’s Israel Marine Plan states twelve goals with respect to the overarching vision of sustainability as economic, environmental, social and cultural wellbeing; each goal is supported by a set of policy measures. However, these do not address potential barriers to future implementation such as those discussed above. For example, the first stated goal, namely *“Improve governance at the marine space,”* is presented with five policy measures, including *“Establish a governmental entity to be responsible for the development, efficacy and coordination.”* However, it is not explained how this might overcome difficulties such as those discussed above, with respect to the marine authority. According to the interviewed planner, a member of the integrating team of this programme, the user-user and user-environment conflicts are not equally addressed through processes of integration:

“It could bring about a compromise of environmental standards. But I don’t think there is a choice [...] I don’t think we’ll be able to use our measures in this, which are kind of like actions, and be able to measure whether or not they have contributed to sustainability. And frankly, I mean, as much as this looks really good I don’t think it’s particularly environmental; a MSP is not necessarily an environmental tool, I mean a conservation or sustainability tool, and unfortunately is often presented as such. And it’s not, I mean it’s planning!”

Finally, interviewed experts from other groups of the societal pentagon, such as private companies and intermediary organisations, referred to integration in the Israeli sea-use planning practice as a futile concept which is only applied on paper. For example, a private consultant on coastal geomorphology has commented: *“[...] it is clear to every economist and*

decision-maker in Israel that, whatever you do, the environment will always lose.” With regard to integration on the whole, this expert has added: *“It isn’t real! Supposedly it’s a democracy but there are very few people who are actually pushing it. You bring in stakeholders because you’re interested in their opinion but, ultimately, you won’t accept anything that doesn’t suit you.”*

The above findings indicate a purported shift towards integrative modes of governance as a means to reduce conflict in the marine space. However, general distrust in the ability of this strategy to prevent user-user or user-environment conflicts, was implied by representatives of all groups. Several institutional barriers were identified in this respect, and are argued to potentially impede the transition towards place-based sea-use planning.

4.4.2 Content Management

The previous subchapters indicate considerably high consistency between the case of Israel and world-trends in sea-use planning. For example, in line with subchapter 2.2, general dismay with the prevailing regime was an important driver of change, and private-public partnerships were found to have facilitated the transition’s take-off and acceleration phases. However, this does not seem to be the case with respect to content management; whereas the importance of environmental monitoring and evaluation programmes is often dismissed or overlooked, a great deal of attention is paid to the generation of factual data in Israel; monitoring was described by all interviewed experts as an essential tool that enables spatial and temporal identification of pressure on the environment, and to pursue EBM. For example, the Head of Environment Department at the MNIEWR has said: *“the purpose of monitoring is to verify that the mechanisms and systems you have built are operating according to plan, where any sign of change may indicate a problem that needs to be addressed.”* Similarly, the Head of the Marine Environment Protection Division at the MEP has stated: *Monitoring is the main tool for making sure that the ecosystem is in a good state. If it isn’t, something is bound to happen at some point in time.”* According to this expert, a monitoring programme will be established as an extension of the MNIEWR’s SEA programme and integrated into the IPA’s Israel Maritime Policy. A managerial council will be established as part of the monitoring programme, comprising of all relevant entities (e.g., Israeli Navy, MEP, Ministry of Health). Similarly, a scientific committee of six marine researchers will coordinate the management of the collected data. Finally, representatives of the academic team report that they are currently in the process of establishing pertinent indicators for future evaluation of the programme’s success.

At first site, the adaptive capacity of the Israeli sea-use planning framework may seem promising in terms of content management; monitoring and evaluation processes are included in the different programmes of place-based sea-use planning as an imperative tool for keeping long-term policy up to date. However, a closer look from an external point of view reveals

several shortcomings to the effort on the whole. The analysis of contextual networks indicates a degree of frustration with availability and accessibility to monitoring data. Experts from the academia and NGOs alike relate such issues to power. For example, according to a scientist at the University of Haifa, *“researchers that are rewarded on the basis of scientific publications may lack the incentive to give up exclusive ownership of information.”* As a result, other monitoring efforts compare collected data to irrelevant frames of reference. These build upon irregular reports that provide general conclusions rather than analytical parameters. Representing private companies in the societal pentagon, a retired marine biologist has said that *“standard values for the quality of coastal seawater are sometimes determined on the basis of data from the offshore environment, as well as up to several years in retrospect.”* Explained by this expert, such practice may hinder profound understanding of spatial and temporal connectivity of the marine environment which, as mentioned in the introduction of this thesis, is a complexity that has to do with user-environment as well as user-user conflicts (section 1.3). An additional limitation of practices of content management that was identified in the analysis relates to a lack of incentive for private companies to engage in joint monitoring efforts. Coastal facilities such as power and desalination plants carry out such programmes to comply with conditions of their wastewater discharge permits. Due to high costs of such procedures, these often measure end-of-pipe concentrations, rather than direct impact on the environment. Thus, they are not held accountable for interaction of pollutants with external effects. Several experts have mentioned that attempts to overcome such deficiencies have failed due power relations, as well as lack of human resources and slow bureaucracy. For example, an interviewed expert from ‘Adam Teva V’din’ has said:

“Three of the five desalination plants along the coast are situated close to streams, pumping water from nearby the outlet [...] these streams are polluted with industrial discharge, you see the absurd? Now those that manage desalination in Israel is the water authority. Those permitting discharge, is also the water authority. Those who fine the desalination facilities, in case there is pollution in the desalinated water, is also the water authority [...] In the meantime, if I ask for monitoring data, I need to submit a freedom of information act request, to the MEP for some reason that I cannot understand, which then holds me back for two or three more months.”

Despite general recognition of the importance of monitoring for sea-use planning practice, the above findings indicate institutional barriers to the success of current and future monitoring programmes. Seemingly, such efforts are deeply rooted power-relations as well as slow bureaucracy. Together with the findings in the previous section, these are concluded to indicate potential for a lock-in situation. This analysis is discussed in the interim conclusion of this subchapter.

4.4.3 Interim Conclusion

As mentioned in the previous subchapters, three dimensions to the subject transition were identified: 1. Expansion of the Israeli sea-use planning framework’s geographical scope; 2. Engagement in integrative modes of governance, and; 3. A shift towards the ecosystems approach. Arguably, these dimensions provide confirmation that the transition is still underway. The lack of a statutory place-based sea-use plan or policy for the EEZ shows that first dimension has not yet reached stabilisation. Regarding the second dimension, integrative forums that are expected to mark the planning framework’s new design are still being promoted. Finally, proposals for an environmentally sensitive zoning are still being developed, suggesting that the ecosystems approach has not yet been embraced.

The results indicate deficiencies in monitoring practice with regard to the state of the environment as well as integration processes. Several institutional barriers are concluded to account for these supposed inadequacies. In the case of content management, these included limited sharing of data and lack of incentives to engage in joint monitoring efforts. As an outcome, the planning framework is argued to maintain a sectoral approach and knowledge gaps continue to exist. It is here concluded that, as observed in previous subchapters, such forms of so-called territorialism may in turn stimulate further user-user conflict. In the case of social exchange, it was shown that power imbalances, bureaucratic barriers, and lack of follow-up enforcement are feared to result in compromise of marine ecosystem integrity, i.e., user-environment conflict.

From a systems perspective, the above findings show that though innovations of the place-based approach are, to a certain degree, already assimilated in the sea-use planning framework, the transition is still in progress and uncertainty remains high. Additionally, the potential for a lock-in situation is identified in the reliance upon limited content management as the foundation for sustainability, whereas social exchange is dismissed altogether.

Table 10: Reconstruction of the stabilisation phase according to the conceptual framework.

Transition Phase / CAS State	System Level	Dimension	The Israeli Case
Stabilisation (Growth and Exploitation)		New Geographical Scope	No national maritime governance structure or zoning framework has far thus been established. Though content management is implemented, it is essentially sectoral and hindered by institutional barriers. Social exchange is purportedly practiced but not monitored; environmental assessment remains the home turf for policy-makers in addressing sources of uncertainty, indicating a potential lock-in to the transition.
		Integration	
		Ecosystems Approach	
	Meso (regime mode)	Defensive	It is assumed by frontrunners in the transition arena that the Marine Areas Law (5775-2014) will mark the next equilibrium and the stabilisation phase.

5 Conclusion

The shift from the sector-based approach towards place-based sea-use planning seems a necessary step for dealing with the social and ecological complexities that relate to the marine space. Though innovative planning programmes are being promoted by governments, academic institutes and advocacy crowds, they have not yet proven capable of addressing different sources of uncertainty, through long term practical experience. The systems theory provides an external perspective on potential barriers to the success of such programmes. Though this approach has been pursued in previous studies of sea-use planning throughout the world, a conceptual framework for international comparative research has not yet been developed. Stemming from this problem, the following question was addresses in this thesis:

'To what extent are current sea-use planning programmes in Israel able address the fundamental uncertainty of the marine space as a socio-ecological system?'

This chapter provides an empirical reflection on this thesis, resulting in an answer to the above question and implications for the Israeli case. Additionally, lessons are drawn for the application of the conceptual framework in other single-case studies, as well as in comparative research.

5.1 Empirical Reflection

This subchapter deals with the interpretation of results and derivation of a final statement. First, conclusions are made with regard to the reconstruction of the Israeli sea-use planning framework as a CAS in transition. Key features of the different phases are explained from the systems perspective, providing an analytical foundation for the following section. The second subchapter reviews the identified dimensions to the now confirmed transition. These are discussed in terms of their potential to result in conflict, leading to the final statement of this thesis.

5.1.1 A Systems Perspective on the Israeli Case

The interim conclusions throughout the previous chapter make up the connective link between the systems theory and sea-use planning practice. The Israeli framework is described as a CAS, undergoing transformation in both function and structure. The different phases of transitions, namely predevelopment, take-off, acceleration, and stabilisation, are described in terms of a meso-level shift through four internal states: conservation, creative destruction, reorganisation, and growth and exploitation. These are characterised by different levels of evolutionary resilience, understood as the ability of the CAS to shift between different equilibriums without bouncing back to the former status-quo (see section 2.1.3).

The predevelopment phase of the transition, attributed to the period between 2000 and 2010, was characterised by high stability of the regime's internal state. Though bottom-up and top-

down pressure on the meso level were initially met with self-optimisation, a state of conservation was generally upheld. Defensive mechanisms included different forms of 'territorialism' and institutional barriers. The persistence in this state despite applied pressure indicated low resilience of the sea-use planning framework, and thus limited capacity to address emerging conflict. Upon increase of pressure, however, the need of a comprehensive plan for the entire EEZ has brought about a period of self-examination. This was attributed to the launching of the MNIEWR's SEA and IPA's 'Israel Maritime Policy.' Nevertheless, as argued in the subchapter 4.2, these did not mark the departure from the traditional ad hoc planning approach; the former was essentially a sector-based initiative and the latter was not yet making headway the time. Rather, the so-called creative collapse of the system was triggered by the external intervention of a philanthropic foundation. Through provisioning of funds and expertise, this agent has increased the overall level of resilience, marking the transition's take-off phase. The rise of new initiatives, such as the TIIT's 'Israel Marine Plan' and those of NGOs has facilitated competition and diversity. In turn, the regime itself engaged in innovation through acceleration of the governmental programme. In this respect, the sea-use planning framework was now in reorganisation. Though the system's resilience was high and uncertainty was at its utmost, these would soon start to decrease as the new system stabilises in terms of function and structure. Discussed in section 4.4, it is assumed that the shift from the accumulation of resources (i.e., the gathering of data on the nature of user-user and user-environment conflicts) to growth and exploitation, will finally transpire with the passing of the Marine Areas Law (5775-2014). In consistency with the theoretical review, this will mark the completion of the 25-year transition from a sector-based to a place-based sea-use planning framework.

The Israeli sea-use planning framework presents a complex, non-linear character, permeated by uncertainty as well as discontinuity. It is concluded that, in terms of resilience, the history of sea-use planning framework in Israel can be reconstructed according to the transitions narrative, and that the conceptual framework developed in this thesis was suitable for this analysis. The next section examines the ability of current programmes to address the different sources of uncertainty which are associated with the socio-ecological CAS.

5.1.2 The Three Dimensions of the Transition in Israel

In order to understand whether or not the transition in the Israeli sea-use planning framework is headed towards a lock-in situation, three dimensions were identified and analysed: 1. Geographical expansion of the planning framework's scope; 2. Promotion of integration forums as a means of reducing conflict in the marine space; 3. Acknowledgement of the environment as a core component of policymaking, indicating inclination towards the ecosystems approach. The

evolution of these three dimensions through the transition's different phases is summarised below as the foundation for the final statement.

The expansion of the planning framework's geographical scope refers to the delineation of different zones comprising the marine space, and the institutionalisation of sovereignty within them. A first sign of this dimension was the legal establishment of the seacoast area in the predevelopment phase, providing a place-based frame of reference for coastal management and planning. The second sign, attributed to the take-off phase, was the government's acquisition of sovereignty in the EEZ. This is indicated by the launching of the SEA which served the government as a tool for familiarisation with the area beyond the territorial waters. The next step was the IPA's effort to establish a maritime policy for the EEZ in its entirety, which only gained impetus upon acceleration. Considering no legal entity has been approved just yet, the transition has not yet reached stabilisation by means of this dimension. Nevertheless, no lock-ins are identified with regard to the geographical scope. It seems rather promising, that that the Israeli sea-use planning framework is headed towards comprehensive coverage of the marine space.

As mentioned above, the second dimension of the transition was engagement in integration practices. The establishment of the CPCE, in the predevelopment phase, was a first step in this respect. Comprised of 17 members from different government ministries, it established new consensus-building forums based on ICZM principles. However, this committee did not include direct sea-users and discussions were not open to the wider public. In this respect, integration was promoted but not quite carried out. Marking the transition's take-off phase, the emergence of the TIIT's Israel Marine Plan has provided alternative means for vertical and horizontal integration, involving sea-users in the plan's formulation. Additionally, the GIS-based online platform developed as part of this programme, facilitated the removal of power-related barriers to integration, such as territorialism through ownership of spatial data (section 4.1.3). In the third phase of the transition, the emergence of new efforts has promoted integration through promotion of new modes of governance, such as the specialised marine authority. Based on the conclusion that this phase is still in progress, the quality of integration was assessed in terms of social exchange. Identified risks included not only potential failure of such practices due to power imbalances, bureaucratic barriers, and lack of follow-up enforcement, but also the emergence of new conflict as a result of this effort. For example, integration may essentially constitute a slowing bureaucratic barrier as an interim mechanism. In turn, this may result in reduced ability to evolve in the face of innovation. Additionally, it was shown that frontrunners of the transition arena lack trust in integration as a tool to overcome environmental

degradation. It is therefore concluded to limitedly address user-user conflicts that are high on the political agenda.

The third dimension of the transition refers to the shift towards the ecosystems approach. Multiple steps can be distinguished in the planning framework's evolution in this regard. The first stage of the predevelopment phase was characterised by growing concern for biological components of the coastal environment, in turn translating into first protection-oriented legislation. Additionally, macro-level pressure in the second stage of this phase included awareness of catastrophes as a result of large-scale oil-spills, as well as other factors that have reinforced this process. Next, relating to the take-off phase of the transition, the stopping of licensing-administration for the exploration and exploitation of natural gas reflected government concern for the environment, and reprioritisation of ecological integrity as a main factor in policymaking. This effort was further reinforced by the complementary initiative of the academia and NGOs. As discussed with regard to the acceleration and stabilisation phases, different sea-users have contributed to the monitoring effort of the state of the environment. Though now perceived a primary tool in policymaking, content management was found subject to a compromise. Disincentives to share data or engage in joint monitoring programmes is concluded to potentially result in unreliable baselines. In turn, this may well hinder efforts for profound understanding of ecological complexity.

Discussed in the theoretical chapter (section 2.1.4), four sources of uncertainty are distinguished with regard to socio-ecological systems: 1. Lack of knowledge due to data limitation; 2. Insufficient understanding of the subject CAS in terms of stocks and flows; 3. Unpredictability of self-organisation, and; 4. Diversity of rules and mental models among participating actors, leading to a plurality of perceptions. The above barriers to social learning may bring about failure to address these sources of uncertainty. For example, inadequate social exchange is directly linked to the second and the fourth sources, whereas barriers to content management relate to the first and third uncertainties. In turn, these impediments may well result in a place-based yet unsustainable equilibrium; considering the low resilience of the planning framework as a CAS, the new equilibrium may persist for long periods of time. In this sense, the hypothesis that the transition is headed towards lock-ins confirmed. Based on these conclusions, the following statement can be made as an answer to the research question:

Despite the place-based character of current planning efforts in Israel, and the merits of each programme in and of itself, processes of social learning are deeply rooted in institutional barriers that have initially impeded the transition altogether. Hence, the ability of the evolving sea-use planning framework to deal with fundamental uncertainty is limited to the short-term future.

Based on this statement, recommendations for the Israeli case and generalisation for other frameworks in transition are provided in the following section.

5.2 Recommendations

The above conclusions show that despite the tree-dimensional shift towards place-based modes of governance, the sea-use planning framework in Israel is deeply rooted in the very same barriers that have preciously blocked the transition altogether. Meso-level mechanisms of defence that prevailed the sector-based approach but were somewhat overcome, namely territorialism (i.e., issues of power and ego) and inadequate administrative capacity (i.e., lack of resources and bureaucratic sluggishness), reappeared in the context of social learning processes. Discussed in the following paragraphs, several recommendations can be derived from the above conclusions. These refer to marine researchers, planners, managers, and policymakers alike.

With regard to the second dimension of the transition and the corresponding lock-in, it is advised that future integration forums that are currently in process or are being developed (e.g., the IPA's initiative and the specialised marine authority, respectively) emphasise elements of social exchange. These include the establishment of qualitative indicators for the monitoring and evaluation of the long-term management process. Rather than assessing success by the realisation of stated goals, process monitoring should refer to shared conceptions and the framing of the problem. For example, in addition to thriving towards "improved governance" or "good environmental state," it is important to explicitly define those terms and continually inform new participants on their consensually constructed meaning. Examples for relevant questions include "are standards for such concepts to be decided by the stakeholders, scientists, or government officials?" and "how is meaning attached to notions such as conflict or success?" Finally, lessons can also be drawn for specific integration processes. For example, government programmes should emphasise the involvement of the societal pentagon in its entirety, and particularly NGOs; if the marine environment is indeed aspired to serve as a core component in the process, the representation of environmental-interests should be secured through the participation of advocacy crowds. This would address power imbalances and help understanding and prioritising environmental considerations. Similarly, consensus building forums that are developed by NGOs should encourage representation of the wider public in the panel. This was shown to be an important means of dealing with different mechanisms of meso-level defence.

With regard to the third dimensions and the associated lock-in, it is recommended that incentives are created for the sharing of data and engagement in joint efforts for monitoring of

the state of the environment. For example, external provisioning of funding may enable coastal facilities such as seawater desalination plants to expand their monitoring programmes beyond conformity with regulations. A second recommendation is based on the finding that the SEA is still sectoral in essence. In order to really move towards a place-based planning framework, complementary efforts should refer to other industries (e.g., fishery, tourism, coastal development) and their impacts on the environment. Additionally, an identified weakness of the MNIEWR's SEA was its disregard towards pelagic species and marine mega-fauna (e.g., sea-turtles, sharks and marine mammals) in spite of the fact that these may well be affected by the gas and oil industry. Rather than merely increasing this monitoring effort, it is important to establish a place-based frame of reference which is of management and planning value. For example, in addition to species-specific monitoring of pelagic animals, site-specific research may help identify biodiversity hotspots in terms of seasonal patterns. In turn, such data may translate into frames of reference for planning.

The above recommendations demonstrate the value of a systems perspective on sea-use planning practice. Innovative modes of governance that are purportedly environmental are understood for their potential to result in new conflict. In turn, insight is derived on the management of the transition for the different groups of the societal pentagon. In order to encourage similar research in other sea-use planning contexts, the generalisation of the conceptual framework is discussed in the following chapter.

5.3 Generalisation

Elaborated in methodological chapter, analytical generalisation was a main objective of this thesis, embedded in its epistemological approach of “theory as narrative” (section 3.2) as well the selected techniques. The development of the conceptual framework was aimed to not only provide the basis for comparative research, through establishment of common variables, but also translate into actual practice based on single-case studies.

The conceptual framework developed in this thesis is concluded suitable for generalisation in research due to two reasons. First, it is based upon the systems theory which refers to a universal language and sufficiently abstract concepts for universalising comparisons; the selection of the multi-phase and multi-level models stemmed from their suitability for the connection of data across national boundaries as well as different scientific schools. Second, it builds on the international literature of ocean governance through, mainly, deductive cycles of reasoning. Thus, the problems that are addressed in this thesis are not restricted to specific planning frameworks. Rather, they characterise a global process in which the interconnectedness between politically-segmented ecosystems are the issue at hand.

As stated above, an additional application of the framework is in management and planning practice. For example, the strategic analysis of the manoeuvrability of this transition can be carried out in a collective effort (e.g., thinking groups, conferences) involving representatives of the societal pentagon and various professions (e.g., engineers, ecologists, planners, etc). Such experts should be familiar with the sea-use planning history as well as current programmes, and provide access to documents and information. Reference to the conceptual framework should be made through the coding, contextual and analytical units (see section 3.3.4); fields that remain blank may indicate the transition's current phase or lock in potential (in the multi-phase or dimension column, respectively). Additionally, room for modification should be made in case of context-specific circumstances or deviations from the framework. In turn, such inconsistencies may illuminate unique features of the transition under study. Finally, discussion should be made regarding plausible solutions.

Despite the generalisability of the conceptual framework, several considerations should be taken into account in its application for both single and multi-case studies. Reflection and advice is discussed in the last chapter of this thesis.

6 Reflection

This chapter accounts for of this thesis, in terms of its theoretical scope as well as methodological selections. Attention is paid to both In its third and last subchapter, suggestions are made with regard to new trajectories of research on the topic.

6.1 Theoretical reflection

The conceptual framework developed in this thesis emerged from the fusion of the adaptive cycle of complex systems and the multi-phase as well as multi-level models of transitions. In hindsight, this theoretical approach is acknowledged for its benefits as well as disadvantages.

The systems perspective facilitated thorough understanding of the shift between internal states of the studied planning framework as an evolutionary process. Each of the transition's phases was defined in terms of the overall level of uncertainty, stability and resilience, which not only provided for a model that is applicable for universalising comparisons, but for real-time identification of transition lock-in situations. Additionally, this synthesis has facilitated a dual frame of reference; gathered data could address features of the multi-phase or multi-level models, as well as general regime characteristics. This helped overcome information deficiencies and served as a useful tool in the interviews and document analysis.

Notable shortcomings of the developed framework include the limited applicability of the multi-level model. As demonstrated in this thesis, dwelling into the complexity of socio-ecological systems may necessitate understanding of reinforcement not only between, but also within the different levels of the system. For example, the various modes of interaction between NGOs provided insight into forms of top-down pressure on meso-level mechanisms of defence. Additionally, the application of the multi-level model was limited to the predevelopment phase of the transition, yet further reinforcement was identified in later stages. For example, it was found that environmental advocacy crowds, such as the scientific community and NGOs, hinge upon technological developments (e.g., research tools and technology-facilitated media) in the acceleration phase. However, due to the limited scope of the conceptual frameworks, such findings were mentioned but only limitedly elaborated in the results.

This above reflection may provide for similar studies on sea-use planning or other sustainability transitions. In order to derive recommendations for future research, a methodological reflection is provided in the next subchapter.

6.2 Methodological reflection

This subchapter lays out points of strength and weakness in the methodological selections of this thesis. First, the single-case study on Israel is discussed in retrospect. This is followed by a short account on the pros and cons of the two selected methods, namely semi-structured expert

interviews and document analysis. Finally, a short remark is made with regard to the coding process and the use of a computer software.

Stemming from the definition of this thesis as an 'inter-ontological crossover' (section 3.1), as well as the epistemological selection of the view of 'theory as narrative' (section 3.2), an emphasis was made in this thesis on richness of information. In turn, this translated into employment of the single-case approach. The selection of the Israeli case was based on two objectives of this research, to warn against potential barriers to the success of sea-use planning programmes, and to propose the concepts of transitions to the ocean governance domain (section 3.3.1). In this respect, the Israeli case is concluded a relevant choice as the above goals were accomplished while the transition was already well developed. Notable disadvantages of this selection was the geographical distance of the author, based in the Netherlands throughout the study period. This posed logistical constraints related to the gathering of data which was limited to two short visits in Israel. Elaborated below are other issues with regard to each method.

The two criteria for the semi-structured interviews helped to avoid a situation in which the interviewee would prove not to be insightful. However, this resulted in the reversed situation where experts were able to provide multiple perspectives on the subject of study. For instance, representatives of private companies were often discussing their experience from previous or parallel jobs as government officials. Similarly, one of the NGO representatives was also a researcher from the academia. Though this contributed to the results by means of content, no analysis could be made to address the contribution of each group of the societal pentagon to the management of the transition on the whole. An additional point with regard to the criteria is that all experts were senior employees at the institution that they represented. Therefore, they were able to address current as well as past developments in the history of the sea-use planning framework. This was distinct in high consistency between their reports alongside each of their unique contributions. Nevertheless, due to time limitation, only ten experts were interviewed. Considering the aim of this thesis, to achieve richness of information, this was considered a disadvantage of the study. Similarly, the second method was attributed both costs and benefits.

Document analysis served as an instructive tool for the understanding of institutional contexts and completing the picture that was portrayed through the interviews. As mentioned in the methodology chapter, the selection of documents was based on reference made by the interviewed experts. In multiple cases, these were also able to provide direct access to data that was not publically available. However, the dependency on non-transparent sources is concluded a notable disadvantage of document analysis as a method in and of itself. An additional difficulty

was to conceptualise the relations between explicit content and implicit meaning while trying to avoid bias (e.g., accepting published text as absolute truth, or of personal interpretation). Finally, this method was considerably time-consuming; whereas it did provide for validity through triangulation, most data was not generated from the documents but from the transcript. In conclusion, this method can supplement but not replace the semi-structured expert interviews.

A final comment should also be made with regard to the qualitative content analysis and the use of ATLAS.ti. In essence, this served as the connective link between the gathering of data and its follow-up interpretation. The representation of codes and categories in conceptual networks enabled in-depth understanding of multi-level interactions, and the identification of underlying contexts. Notably, this tool was highly prone to personal interpretation bias. It is therefore suggested that the coding process should take place as late as possible in the process, once the analytic categories (i.e., coding, contextual, and analytic-units) have already been established.

In summary, the selected methods in this thesis are concluded adequate with regard to its various objectives. However, future research should consider the above limitations, not only from this subchapter but the previous one as well. The last subchapter of this thesis provides recommendations and ideas for further research on the topic.

6.3 Suggestions for Future Research

This thesis has demonstrated the suitability of the systems theory for the study of transitions in sea-use planning frameworks. In due time, current efforts towards place-based approaches may well result in lock-ins and further user-user and user-environment conflicts. This calls for continued research which fosters the systems perspective not only with regard to Israel, but every country of which sea-use planning framework is advancing towards the place-based approach. For example, new insight could emerge from separated exploration of the three identified dimensions, as well as other features that may have not been distinguished in this thesis. Similarly, more analytic units could be developed to enrich the coding procedure or the general literature.

A relevant question that remains unanswered is ‘to what extent does the transition in sea-use planning represent a societal change?’ As suggested in chapter 2.2.1, advancement towards the ecosystems approach may mark the beginning of a new era, in which policymaking maintains an anthropocentric approach yet nature is finally acknowledged as the key to sustainability and to dealing with not only technical, but also relational sources of uncertainty. In this sense, the sea-use planning transition may provide a new field of research.

7 References

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