ROLES OF INNOVATION IN STRENGTHENING STRATEGIC DELTA PLANNING PROCESSES

The case of the Vietnamese
Mekong Delta

Hoang Thi Minh Vo

PROPOSITIONS

1. Innovations reaching the stage of “hard” implementation have first gone through the stage of “soft” implementation.
(this thesis).
2. By studying the different stages of technology development one can trace the history of social interaction that has shaped it.
(this thesis).
3. The term “delta plan” has caused a lot of semantic confusion in its translation to Vietnamese as the language is only familiar with master plans.
4. The qualitative approach is as critical as quantitative research.
5. Achieving a Ph.D. degree is not a success in terms of gaining, but it is a milestone in terms of training.
6. The motivation for us to pursue our goals is to grow and progress.

Propositions attached to the thesis, entitled:

Roles of innovations in strengthening the strategic delta planning process in the Vietnamese Mekong Delta

Hoang Thi Minh Vo

Wageningen University, 07 June 2021

**Roles of innovation in strengthening strategic delta
planning processes – The case of the Vietnamese Mekong Delta**

Hoang Thi Minh Vo

Thesis committee

Promotor

Prof. Dr Petra Hellegers
Professor of Water Resources Management
Wageningen University & Research

Co-promotors

Dr Gerardo van Halsema
Water Resources Management
Wageningen University & Research

Dr Nhan Kieu Dang
Director of the Mekong Delta Development Research Institute
Can Tho University, Vietnam

Other members

Dr TAP (Tamara) Metze, Wageningen University & Research
Dr Trung Hieu Nguyen, Can Tho University, Vietnam
Prof. Dr Chris Zevenbergen, TU Delft
Dr Arjen Zegwaard, Wageningen University & Research

This thesis was conducted under the auspices of the Graduate School of Wageningen
School of Social Sciences

**Roles of innovation in strengthening strategic delta planning
processes – The case of the Vietnamese Mekong Delta**

Hoang Thi Minh Vo

Thesis

submitted in the fulfilment of the requirements for the degree of doctor

at Wageningen University

by the authority of the Rector Magnificus,

Prof. Dr A.P.J. Mol,

in the presence of the

Thesis Committee appointed by the Academic Board

to be defended in public

on Monday 07 June 2021

at 11 a.m in the Aula.

Hoang Thi Minh Vo

Roles of innovation in strengthening strategic delta planning processes –
The case of the Vietnamese Mekong Delta

Ph.D. thesis, Wageningen University & Research, Wageningen, the
Netherlands (2021)

With references, with summary in English

ISBN: 978-94-6395-773-1

DOI: <https://doi.org/10.18174/544891>

Table of Contents

1 INTRODUCTION	8
1.1 Detailed problem definition.....	8
1.2 Objectives and research questions	16
1.3 Theoretical framework.....	17
1.4 Methodology.....	24
1.5 Structure of the thesis	27
2 POLITICAL AGENDA SETTING FOR THE DELTA PLANNING PROCESS IN THE VIETNAMESE MEKONG DELTA.....	31
2.1 Introduction	33
2.2 Theoretical foundation	35
2.3 Research Methodology	37
2.4 Development of the Mekong Delta from a policy agenda perspective.....	39
2.5 Discussion on processes steering convergence and divergence.....	55
2.6 Conclusion.....	59
3 DO STRATEGIC DELTA PLANS GET IMPLEMENTED? THE CASE OF THE MEKONG DELTA PLAN.....	63
3.1 Introduction	65
3.2 Soft implementation of strategic delta plans.....	67
3.3 Research design	70
3.4 Implementing the Mekong Delta Plan	74
3.5 Discussion	89
3.6 Conclusion.....	92
4 ASSESSING STAKEHOLDER'S PERCEPTIONS OF NO-REGRET MEASURES FOR CLIMATE CHANGE ADAPTATION IN THE MEKONG DELTA.....	97
4.1 Introduction	99
4.2 Theoretical framework.....	102
4.3 Methodology	110
4.4 Results.....	114
4.5 Discussion	120
4.6 Conclusion.....	125

5 THE EMERGENCE OF LOTUS FARMING AS AN INNOVATION FOR ADAPTING TO CLIMATE CHANGE IN THE UPPER VIETNAMESE MEKONG DELTA	129
5.1 Introduction	131
5.2 Methodology and Data Collection	133
5.3 Results	136
5.4 Discussion	152
5.5 Conclusion.....	155
6 SYNTHESIS AND REFLECTIONS	159
6.1 Introduction	159
6.2. The research questions answered	162
6.3 Discussion.....	167
6.4 Implications for policy and practice	176
6.5 Limitations of this research and future scholarly work.....	179
6.6 Conclusion.....	181
SUMMARY	183
References	187
Appendices	207
Acknowledgements	229

Chapter 1

1 INTRODUCTION

"A long-term development strategy for this region will require a sustained effort in adaptive delta management based on sound science and bringing different sectors and provinces together to think, plan, prioritize, and implement resilient investment."

Anjali Acharya World Bank Senior Environmental Specialist

1.1 Detailed problem definition

1.1.1 Background

The global delta planning process

The world's urbanizing deltas have brought many benefits to humanity, but deltas also confront planners with unprecedented challenges. How can deltas worldwide be sustained? This study provides insight into the dynamics of delta planning processes, which significantly influence delta development.

Many definitions exist for river deltas and river estuaries. This thesis adopts the common viewpoint that deltas are formed where rivers and the coast interact and sediment is deposited (Kuenzer and Renaud, 2012). Deltas encompass wetlands, spanning large areas of land with low topography. These are home to many habitats, major agricultural production centers, and population centers. Recent studies on delta management practices confirm that deltas are complex systems with many non-linear elements and mechanisms. These are not limited to the biophysical and ecological environment but also explicitly include artificial networks and human society (Marchand and Ludwig, 2014). Worldwide, delta managers face major challenges due to natural processes and increasing human intervention in delta ecosystems, resulting in unstable water flows. These challenges have produced unanticipated consequences and continually raised new problems for deltas (Marchand and Ludwig, 2014). The very sustainability of deltas, with ever-increasing urbanization and development pressures, is thus at risk. Addressing climate change impacts and developing adaptation strategies and action plans for deltas are challenging tasks. Besides, as multiple stakeholders with multiple and diverse

interests are involved and affected, agreement and alignment between plans and developments are difficult to achieve.

Strategic delta planning (SDP) is one novel approach for sustainable delta development that has been introduced in the delta management domain. SDP has become a particularly salient topic in recent delta management research (Seijger *et al.*, 2016). Strategic delta plans have a long-term time horizon, in which they set out defined goals for development and planning. They are broad in scope (complex, multi-sectoral, multidisciplinary) and in time span. They provide a vision and definition of the problem based on a systematic problem analysis, and propose long-term solutions (e.g., development orientations that can lead to the defined problem being solved). Finally, strategic delta plans define development goals that need to be achieved in subsequent planning, implementation, and development processes (Seijger *et al.*, 2016). The SDP approach, initially developed in the Netherlands, translated and applied in Vietnam, is the main focus of analysis in the present research.

The inspiration for this research came, in the first place, from a headline in the *New York Times*: ‘The Dutch have solutions to the rising sea. The world is watching’. The story told of a cadre of Dutch delta experts traveling around the world and transporting their ‘Dutchness of delta planning expertise’ to other deltas. Vietnam is one of the countries that imported this knowledge. Dutch delta planning has been demonstrated in the Netherlands in a series of delta programs launched starting in 2010. These are documented in annual reports, and national legislation and a dedicated funding mechanisms have been enacted to provide their legal base. The Dutch strategic delta plan provides a common compass in the form of a holistic long-term vision and related policy objectives. System-based, integrated, and adaptive strategies with various degrees of risk were established, including multifunctional, flexible future-oriented measures. Examples are “building with nature”, technological and governance innovations such as “wide green dikes”, and incorporating spatial planning and multifunctional land use into long-term integrated

delta planning. Scholars began suggesting a “regional cooperation” or an “interprovincial cooperation mechanism” for the Mekong Delta, as a delta planning innovation, in the past few years (Huizer, 2019; Soussan, Mcgrath, and Mai, 2019).

Vietnamese delta planning

Like other deltas which provide their country’s agricultural or industrial production base, the Vietnamese Mekong Delta (VMD) – which is located downstream of the transboundary Mekong River – is a zone of strategic importance for Vietnam. In view of the challenges raised by the multiple effects of climate change, including increasingly frequent nature shocks and catastrophes and extreme climatic events, Vietnamese delta managers have called for new (adaptive) delta development plans and strategies. The challenges facing the Vietnamese Mekong Delta have been exacerbated by human interventions for the purpose of economic growth. Over the past 40 years, the Vietnamese government has prioritized agricultural development, with a focus on intensive rice production in the delta. Today, such a focus no longer sufficiently responds to the economic goals of local communities; neither does it address the challenges of climate change and the pressures of human intervention.

In the literature the Dutch delta management approach is characterized as generally more “collaborative”, “adaptive” and “nature-based” (Makaske *et al.*, 2013; Marchand and Ludwig, 2014; Soussan *et al.*, 2019; Van Staveren, 2017). Vietnam’s Mekong Delta Plan (MDP) was formulated in 2013 following the “Dutch approach”. The plan proposes a number of innovative strategies for developing the Mekong Delta. Hasan *et al.* (2019) remarked that the concepts of innovation entailed in the Dutch delta planning knowledge, traveled well to Vietnam under the “making waves” process, a process of trial and error, adopting and adapting. As such, the MDP can be considered a “big shift” for policymakers and governmental entities in this country. The plan has also been used as a guiding framework by the World Bank in the conduct of its development cooperation. However, it is uncertain how effectively the plan has in fact been implemented and to what degree. The MDP

indeed leaves room for Vietnamese political actors to shape and customize innovations based on their interests and the concerns of particular contexts, sectors, and priorities.

In this thesis, special attention is therefore paid to the role of the selected innovations put forward in the MDP. These innovations concern agribusiness, salinity adaptation, alternatives for triple rice, and interprovincial collaboration to foster and maintain consent across various stakeholders at different phases of the planning cycle.

1.1.2 Problem statement

General information about the Mekong Delta

The Mekong Delta is an area with many natural wetland ecosystems. It possesses high biodiversity and is home to the country's largest freshwater resources, accounting for 60% of Vietnam's surface water. The Mekong Delta is also home to 17 million Vietnamese people and is the nation's most important agricultural region. About 52% of Vietnamese rice is produced in the Mekong Delta, and another 18% in the Red River Delta (World Bank, 2016, 2021). Thanks to the productivity of the Mekong Delta, Vietnam has been able to put the food shortages it experienced in the 1970s behind it, and become the second-largest rice exporter in the world. The Mekong Delta is also the third largest industrial area of the country – behind Hanoi and Ho Chi Minh City. It is a place where interactions and tight relations between water, land, and people are clearly evident. The Mekong Delta is important for Vietnam's socioeconomic development, national defense, and as the pillar of the country's food security, while also supporting a unique river civilization.

Challenges the Mekong Delta has faced

Due to its location downstream of the Mekong River, the Mekong Delta is vulnerable to climate change, especially floods. Climate change and hydrological conditions in the delta represent a complex interaction of many factors that have unpredictable and widespread impacts on the area and its development. These

impacts often manifest in changing river flows, over-abstraction of groundwater, sea-level rise, changing patterns of land use, and regional climate fluctuations (Soussan *et al.*, 2019). Such changes affect natural ecosystems as well as agriculture, consequently impacting the resilience and livelihoods of local communities (Mekong River Commission, 2009). The delta economy is highly dependent on agriculture (especially rice and fruit trees) and on aquaculture (mainly fish and shrimp farming). To help sustain these livelihoods, conservation of the delta's ecology, land, and water is crucial. Otherwise, millions of poor farmers face the risk of low or no income. In areas where rice fields are adjacent to shrimp ponds, loss of land due to erosion has already led to intensified social and economic pressures. Moreover, Vietnam is in the midst of a transition from a developing country to a near-developed country. To keep up the economic momentum, it needs to sustain its pace of growth. In this context, the continuous degradation of ecosystems is only one problem among many facing the Vietnam government and its people. Another serious threat, particularly for the Mekong Delta, is extreme weather events. During floods and typhoons, large amounts of water could wash over the dikes at many points, allowing water to penetrate 20-30 km inland without the ability to drain. This would significantly increase salinization and destroy large areas of crops and croplands, putting tens of thousands of farmers' livelihoods at risk. Such challenges point to the need for careful planning and actions, to safeguard the future of the Mekong Delta and its continued economic productivity.

National responses to the challenges and introduction of the strategic delta planning (SDP) approach

To protect and develop the Mekong Delta, many national decisions and policies have been formulated and adaptive practices have exemplified the creativity and resilience of the people here. Valuable lessons have been learned, about living with floods, salt and drought-tolerant crops, and about climate change adaptation. Although there has been a wide variety of national responses to the challenges the Mekong Delta is facing, most cover only part of the region and many have not been

sustained (Soussan *et al.*, 2019). In other words, national agencies have not yet been able to tackle these challenges sufficiently. Central and local authorities have not yet found the right strategic technical solutions, or the financial means, to enable the Mekong Delta region to cope with the challenges it faces in a resilient and adaptive way. To date, to tackle and mitigate the negative effects of climate change, national strategies have focused on minimizing disaster risk, for example, through disaster forecasting and awareness-raising. However, these place the emphasis on emergency responses to short-term, extreme climatic events rather than long-term adaptation to a future with climate change. Nor are they integrated into wider policies for sustainable rural development and poverty reduction (Mekong River Commission, 2009). Moreover, implementing agencies at the central and local levels have not operated in close collaboration to implement solutions that have been proposed by decision-makers as appropriate. Thus, a lack of integration between different sectors and entities, and between national strategies and local actions (Dinh, 2000), remains a main challenge facing the Vietnamese government and delta managers, including researchers. In this context introduction of the strategic delta planning (SDP) process was considered a “paradigm shift” in Vietnam (Vo *et al.*, 2019).

SDP is an open and transparent process that seeks to arrive at consent among stakeholders through rational arguments. SDP is conceived as a long-term planning process aimed at regional development and calling for new institutional governance and a comprehensive and integrated approach (see Friedmann, 2004). In contrast to conventional (delta) plans, the SDP process addresses both socioeconomic and biophysical, ecological aspects, thus producing the broader scope which is needed to plan for urbanizing deltas, in line with Healey (2004). The MDP was formulated in 2013, applying the SDP process imported to Vietnam. The MDP has since been accepted as the strategic development framework for the delta, and key stakeholders have aligned behind it. Nonetheless, connections between strategic planning and policies and timeframes for implementation on the ground have remained loose. Indeed, we know that implementation takes time, and requires many different

actions and the involvement of many different people. There can therefore be no strict one-on-one relationship between strategic plans and implementation on the ground.

In the process of planning, leading into implementation, stakeholders may decide to do things differently. Meanwhile, innovative solutions positioned as key elements of a plan can strengthen consent for plan implementation among relevant stakeholders. Successful innovations, as identified in this research, are characterized as innovations capable of attracting a strong and broad actor network, or support coalition. They are thus able to mobilize many different actors and address multiple concerns, as such becoming instrumental in building consent around a proposed strategy or plan. Successful innovations, as defined here, bring more people into agreement with a problem analysis and with the development goals set out in a strategic plan. So, the likelihood that the strategic plan will be implemented in concrete plans and projects, increases with the success of the innovations proposed. This positions the degree of consent to an innovation as a measure of stakeholders' agreement with the problem analysis and goals defined in a strategic plan. The greater the consent, the higher the likelihood that the defined strategies and plans will be carried out.

1.1.3 Previous research

Earlier international studies provide insights on many innovations – or innovative strategies – for the management of deltas worldwide. Examples are adaptive delta management, multilevel government (both horizontal and vertical), and innovative livelihoods (Albrechts *et al.*, 2016). Seijger *et al.* (2018) examined the uptake of tidal river management (as a strategic innovation to cope with waterlogging, salinity, and congested rivers) in the Bangladeshi delta plan and among stakeholders there. Many other cases around the globe similarly illustrate the roles that innovations can play in strengthening strategic adaptive planning. Examples in specific contexts are, for instance, long-term flood protection, urban offshore development and halting groundwater pumping as innovations in the Jakarta Delta

of Indonesia; and monitoring human use and diversity of ecosystem services in the Po Delta of Italy. This thesis takes an in-depth look at the roles of innovations and how innovative ideas travel through different phases of the strategic delta planning process, in the unique political context of Vietnam.

In the literature on Vietnam, previous studies related to this theme focus mainly on seeking national responses to climate change, including policies, alternative livelihoods, and institutional change in alignment with adaptation strategies. For instance, Tran *et al.* (2018^{b&c}) analyzed alternative livelihoods, including flood-based aquaculture (freshwater prawn, snake-head fish, eel), various rice cropping systems, lotus farming (intensive lotus, as well as combined lotus-rice, lotus-fish and lotus-tourism) and cash crops (chili, squash). Nguyen *et al.* (2019) looked at local people's adaptability in the face of livelihood change. Floating rice was compared with triple rice in Kien (2013), Kien and Duc (2015^{a&b}), Kien and Pittock (2016), and Pittock and Van Nguyen (2017). Institutional issues, including interprovincial coordination mechanisms, were investigated by Seijger *et al.* (2019^a) and Soussan *et al.* (2019). Furthermore, many projects have been conducted and funded by international development partners, such as the World Bank, IUCN, GIZ, JICA, and the Australian-funded "Mekong Delta Futures" project (Smaigl, 2018). All of these have sought adaptive delta management strategies for development of the Mekong Delta in particular.

At the same time, research on the role of innovation in the strategic delta planning process remains limited. There exist very few comprehensive delta planning textbooks or guidelines that consider the (strategic) delta planning process as it is embedded in legislation and formal or informal implementation. The "Motivation and Ability" (MOTA) manual and guidelines is an exception in this regard (Nguyen *et al.*, 2019^b). Some recent contributions have analyzed alternative livelihoods in the VMD (e.g., Bosma *et al.*, 2005; Tran *et al.*, 2018^a; Tran *et al.*, 2018^b; T. Tran *et al.*, 2019; T. Tran and James, 2017), but very few studies investigate "innovation" as the main theme. The term "technological innovation" is mentioned in Bosma *et al.* (2005),

related to a new technical way to see which driving forces influenced farmers' decisions to change farming systems. That study found the most commonly mentioned motive for adopting an on-farm innovation was the desire to improve family well-being. T. Tran *et al.* (2019) analyzed innovation not only as new agricultural technology but also as the application of new learning. A focus of that study was the leadership of farmers in the process of rural innovation to address the mixed impacts of dike policies. However, very little scholarly work mentions "innovation" as one of the crucial components of a SDP process. This study aims to bridge this "innovation gap" in the literature with regard to delta planning processes. It presents an exploratory analysis using a mix of multidisciplinary techniques, including both qualitative and quantitative methods.

1.2 Objectives and research questions

This thesis focuses on the role of innovative solutions in strengthening strategic delta planning processes, specifically in the VMD. It aims to analyze the dynamics of the strategic planning process for the Mekong Delta, referring specifically to the MDP. The research asks how the innovative solutions set out in that plan may play a key role in fostering and maintaining consent across the various stakeholders and different phases of the planning cycle. To achieve this aim, the following main research question and four sub-questions are addressed:

Main research question:

What is the role of innovations in the Mekong Delta Plan in shaping the three phases (agenda-setting, plan formulation, and implementation) of the strategic delta planning process and in fostering and maintaining consent across various stakeholders and different phases of the planning cycle?

Sub-questions:

1. To what degree have innovations in the MDP converged with the agendas of Vietnamese political actors, thus structuring consent among them to adopt

the policy agenda set out in the MDP, and as such, what role has the MDP played in aligning development policy agendas? (Chapter 2)

2. To what extent has the MDP been influential and changed thinking about transformative strategies based on the notions and framings the stakeholders used to move the MDP from the agenda-setting phase to the plan formulation phase, and what was the role of innovations? (Chapter 3)

3. How have stakeholders, especially at the grassroots level, perceived the no-regret measures set out in the MDP, and how have these perceptions influenced acceptance of the plan and thus also embracement of the accompanying adaptation measures? (Chapter 4)

4. How has the innovation of lotus farming (put forward in the MDP as a key innovation for a transformation away from triple rice culture in the floodplains) emerged, been socially constructed, and developed as a grassroots-based technology that preceded the MDP? (Chapter 5)

1.3 Theoretical framework

This study looks at the larger picture to understand the connection between SDP activities and their societal and technological environment. Successful SDP implies that a planning process moves down the “hourglass framework”, probably with many stops and starts (Seijger *et al.*, 2016). The SDP was adopted as the main focus of the joint project of which the present research is a part: “Strengthening Strategic Delta Planning Processes in Bangladesh, the Netherlands, Vietnam, and Beyond” (UDW). So, this thesis is not a stand-alone study but a part of collective undertaking to bring into focus the process of strategic delta planning worldwide (Douven *et al.*, 2013). Across all elements of this joint work, SDP is defined as a public-sector-led process through which a long-term vision and actions and means for implementation are produced that shape and frame what a sustainable delta is and may become (Seijger *et al.*, 2018).

During an SDP process, a visionary strategy is developed. Meanwhile, actions and means are initiated for strategy implementation. Accordingly, the SDP (which is

engaged in a search for innovative solutions) defines a strategic framework for how sustainable development of a delta can be achieved and by what means. The overall focus of the present study is the role of innovative solutions and the interactions between experts, policymakers, and various stakeholders in the planning process. Innovations that entered the delta planning process are critically analyzed to identify characteristics of successful innovations (Royal HaskoningDHV, 2013). Ultimately, since this research examines radical innovations that aim to bring about a transition from a fragmented, conventionally driven planning system to an integrated, strategically driven planning system (Cramer, 2014), the final chapter of this thesis provides a synthesis of findings, reflecting back on how innovations traveled, in the case of Vietnam, across the various phases of the SDP process, for sustainable development in the future. The central idea of the SDP process is that an innovation does not exist as a discrete entity; rather, an innovation develops interdependencies across social, technical, and institutional dimensions (Geels and Schot, 2007).

1.3.1 Strategic delta planning and the hourglass framework

The hourglass framework (Figure 1) is informed by insights from the field of strategic spatial planning (Healey, 2004; Bafarasat, 2015). The aim of such planning is to change people's minds through the development of strategic spatial plans. The scope of SDP is similar, but broader. SDP calls for sets of strategies that are congruent across temporal and spatial scales. There is thus a limited number of frameworks that can be comprehensively adopted for analysis towards such a complex and interdisciplinary planning goal. The hourglass framework applied here, distinguishes three phases of an SDP process: (i) advocacy and agenda-setting, in which (prioritized) issues are put on the agenda; (ii) formulation, in which the strategy is developed with participation of concerned ministries and other stakeholders; and (iii) implementation, in which the strategy is mainstreamed in relevant policies (Royal HaskoningDHV, 2013). The convergence of ideas and plans in the formulation phase is considered critical in elaborating consent across stakeholders and forging decisions for strategic priorities to be implemented (Seijger

et al., 2016). The hourglass framework regards decision-making as a continuous process that occurs throughout the three phases, in which re-negotiation of consent is the linking pin between the planning and implementation stages. The innovations for sustainable development of the delta are initially framed in the first stage of agenda-setting, politically adopted as strategic priorities in the second phase of plan formulation, and (if they survive) elaborated into implementation plans and projects in the third phase of implementation.

Figure 1 The hourglass framework (Seijger *et al.*, 2016).

Note: ① Step forward ② Step out ③ Step in ④ Sidestep. Actors and innovations may follow various trajectories in negotiating consent. The dotted lines illustrate (movable) boundaries of an SDP, among various political contexts or cultures. The bottleneck (narrowest place) represents convergence on delta management strategies, the wider spaces represent more divergence.

1. *Agenda setting* is the initial stage of an SDP process, in which the topic of the SDP is put on the agenda. Actor coalitions are formed, problems are formulated, and innovative solutions are framed in this phase.

2. *The formulation stage* is located at the funnel, and is focused on elaborating the SDP, taking innovations into account that can gain backing from political supporters and serve as a frame for future project plans.
3. *Implementation* of the SDP, including implementation of the innovations set out at the formulation stage, diverges into policies, programs, and projects that actualize the earlier-decided strategic direction.

Though the above phases are distinguished here for analytical clarity, such distinction may be overly rational, as in practice the phases may overlap. Due to this complexity, this thesis does not position the chapters according to their placement within the hourglass structure. Instead, the hourglass is used to visualize the structure of an SDP process, and as such to ground the discussion of each chapter and the thesis as a whole.

1.3.2 Innovations

Innovations are being proposed in many countries to support change towards a more sustainable and secure future (Daniell *et al.*, 2014). Theoretically, an innovation is defined as an idea, practice, or material artifact that is perceived as new by the unit that adopts it (Dewar and Dutton, 1986). In terms of the degree of newness, Dewar and Dutton (1986) classified innovations into radical and incremental types; that is, a revolutionary change or a minor improvement in current technology, respectively. In a broader perspective, the process of innovation is commonly equated with an ongoing pursuit of harnessing new and unique knowledge. Although innovative ideas may belong to an individual activity, inventing and implementing them is a collective achievement (Subramaniam *et al.*, 2005). In this sense, innovation is a co-evolutionary process stemming from the alignment of technical, social, institutional, and organizational dimensions (Kilelu *et al.*, 2013). Innovation is a cross-disciplinary and normative concept, and according to the Oxford Dictionary, it can be either a noun or a verb. Yet, this definition raises unresolved conceptual debates. For instance, ‘how big and how novel does a particular change have to be to count as an innovation’ (Jordan and Huitema, 2014). This study focuses on radical technological

innovations in strategic delta planning, as these may be required to enable change for sustainable development in urbanizing deltas. Innovations within SDP processes are solutions to existing and perceived future problems that inform a strategic change of development orientation. The proposed innovation is the introduction of something new that is altered by something already established (Jordan and Huitema, 2014). This can entail a new idea or way of doing something new; for instance, a new cultivation technique or a new aquaculture model which in a particular region has not yet been practiced, or was practiced a very long time ago and is now the subject of renewed interest. These innovations may engender consent among actors especially if they are multifunctional and thus attractive to a variety of actors (Seijger *et al.*, 2016).

Multifunctional innovations are expected to not only open up the development of broad stakeholder alliances, but also to increase the potential for opposing opinions and obstructions among stakeholders in the consent-making process (Douven *et al.*, 2013). In deltas, in particular, innovations are especially promising if they can serve multiple purposes, since deltas are characterized by competing land use claims, including agriculture, industry, and residential purposes. For instance, “building with nature” and “room for the river” are both multifunctional innovations in that they combine flood control measures and spatial planning. Similarly, “living with floods” is an innovation that combines floods and sustainable livelihoods. Such innovations are considered consent-builders when involved stakeholders can identify themselves or position their own interests within the innovation’s central precepts. These innovations can then help to unite stakeholder coalitions.

In an SDP process, innovation is one of three dimensions, with the other two being the role of actors and participatory planning tools. Participatory processes is another element seen as specifically contributing to negotiating consent for the strategic choices in a delta plan and their implementation. An innovation may become dominant over other solutions or strategies when it is adopted or advocated

by one or more actor coalitions leading to its implementation. Innovations are thus subject to varying degrees of appreciation across actors and are adaptable and can be re-interpreted and re-negotiated up to and during implementation.

1.3.3 Proposed innovations

The hydrological regimes and geographical characteristics of different locations within the Mekong Delta demand tailored innovations. Innovations must be suitable for addressing the challenges that arise in optimal alignment of land and water management and economic development in specific areas. Having said so, for the purpose of multifunctional innovations, the Mekong Delta can be divided into three zones: the upper delta (where innovations are needed to cope with dry season freshwater shortages and droughts and to secure freshwater supply); the middle delta (where the range of local livelihoods requires effective spatial planning that ensures comparative advantages for interregional agro-business zones); and the coastal areas including the estuarial zones and the peninsulas (where the main challenges are coping with brackish water and salinity intrusion and sustainable coastal protection).

The Mekong Delta Plan as a case study of SDP, proposes various innovations (i.e. new ways to develop the Mekong Delta), in the form of strategic scenarios for each specific delta zone. For the present research, four types of innovations from the MDP were selected as case studies: (1) innovations that were adopted in the past but then abandoned, before much later being reintroduced (e.g., floating rice for the upper delta); (2) innovative strategies that had never before been attempted in Vietnam (e.g., the “room for the river” innovation for the middle delta); (3) a promising integration model combining aquaculture and forestry that has received significant attention from international scholars (e.g., the shrimp-mangrove farming system for coastal areas); and (4) an innovation that emerged and developed from farmers’ own experiences (e.g., lotus farming for the flood-prone areas).

This thesis uses the hourglass framework to trace the proposed innovations as they traveled through the SDP process in Vietnam. The research tells the stories of these four specific cases of innovation. These innovations played important roles in

influencing the policymaking process, but it is as yet impossible to test how effective and how important the innovations will be. The hourglass is used to visualize the process of innovation, to understand the journey an innovation makes from formulation to implementation. The stories of these innovations say something about the potential for further development, or scaling up, of these novel ideas. Tracing these stories provides an especially relevant contribution to the literature, as no previous research offers these.

1.3.4 Consent building

One of the central assumptions of this study is that innovations help to negotiate and build consent between stakeholders. This study regards consent building as part of the decision-making process, which is visualized by the three phases of the hourglass framework. Due to the public nature of a delta planning process and its many related aspects and the range of sectors involved, numerous potential stakeholders have an interest or stake in the outcome of a delta plan. Not all stakeholders have the same stake or level of interest. Some may thus be more or less active than others; entitlements at the various time points of decision-making are also different. Therefore, negotiating and building consent becomes crucial to find ways to accommodate the different interests of actors, as such accommodation prepares these actors to “go along with” the decisions taken (Checkland and Scholes, 1990). The notion of “consent” is used, following Checkland and Scholes (1990), as a refinement of the idea of “consensus”, which is hardly ever truly achieved in negotiated policy settings. Consent becomes then indicative of a willingness to accept a decision or outcome at the time of its establishment – though consent may become re-interpreted or re-negotiated during the execution or implementation of a decision or as time passes.

As applied in this study, stakeholders may be willing to accept and “go along with” the SDP choices and decisions during the agenda-setting and formulation phases, but seek to re-negotiate them towards and during the implementation phase, depending on how well they truly fit their individual objectives and interests. This

study thus regards consent building is as an essential element to connect the SDP to real-life implementation of innovations. It is a simultaneous process of social learning that aims to change the minds of people and to support a seeking process to ensure that enough actors can go along with the plan.

1.4 Methodology

This dissertation used a mix of techniques, including both qualitative and quantitative methods. Among the conceptual approaches and social sciences methods deployed, the following were particularly key (Figure 2):

1.4.1 Literature review

The main sources for the literature review were official documents setting out policies from the past to the present time, the academic literature, articles, and other official documents of the Vietnamese government.

1.4.2 Interviews and discussions with key informants

Among the key informants approached for this study were representatives of provincial government, central government, the Southeast Steering Committee, and donor groups such as GIZ, IUCN, and the World Bank. The numbers of interviews to be conducted were not fixed in advance. Interviewee selection considered first the data that was needed, and then also the institutions and people that could provide that data (e.g., farmers, local authorities, experts, and international development partners). Group discussions were held with people involved in the writing of the MDP and in making decisions in the Mekong Delta planning process.

In addition to these three methods and research techniques, field surveys were carried out throughout the research. These are detailed in the relevant chapters.

1.4.3 Multiple streams analysis (MSA)

Multiple streams analysis (MSA), developed by Kingdon (1984) is a means to understand public policy agenda-setting based on first-hand and secondary examinations of agenda-setting processes. It was applied within the fragmented US political system (Béland and Howlett, 2016). In this dissertation, Chapter 2 in

particular, this technique is used in a slightly modified form, following Liu *et al.* (2010). They proposed an MSA approach that is more flexible and suited to the Asian context. Using that approach, this thesis explores whether the agendas set by political actors in Vietnam converged with the agenda set by the MDP. The approach was adapted to the unique political culture of Vietnam, in that we viewed the politics stream as focused on legislative turnover and political and institutional attention.

1.4.4 Case study

The case study was the main research method used to analyze the influence of the strategic delta plan in changing the mindsets of actors at various levels of the planning system and to better understand strategic delta plan implementation. The case study has high construct validity. It enables the researcher to identify and measure indicators that best represent the theoretical concepts of interest, and allows in-depth analysis of complex and multidimensional phenomena in their context. The case study is an appropriate methodology when a holistic and in-depth investigation is needed, particularly in sociological studies (Van Linh, 2001). Case studies are designed to bring out the viewpoints of the participants by use of multiple data sources.

1.4.5 Millennium Assessment Framework

The Millennium Assessment Framework was used to evaluate the values and functions (or multifunctionality) of innovations according to the combination of services they provide for society (both pros and cons). In this study, the analysis of an innovation's multifunctionality was guided by the Millennium Assessment Framework's classification of the ecosystem services (including provisioning, regulating, cultural, and supporting services), provided by each innovation under study (presented in Chapter 4).

1.4.6 Stated preference

Stated preference, which is a quantitative method using a combined quantitative-qualitative methodological framework, was applied to understand preferences

among local and non-local residents for three selected innovations in the VMD (also in Chapter 4). The data for this analysis were collected using questionnaires administered in the upper, middle and coastal delta zones.

1.4.7 Historical research

Embedded in narrative analysis, historical research was used to trace the development journey of lotus farming, as an innovative technology (Chapter 5). Historical research allows the researcher to capture events as they emerged from the past. In this research, it produced a narrative story of how lotus farming was innovated, designed, accepted, and modified to arrive at its current status.

1.4.8 Social construction of technology

According to the social construction of technology (SCOT) perspective, technology emerges from social interaction among social groups, which is framed as social determinism (Bijker *et al*, 1987). The central claim of SCOT is that understanding social groups can help us to understand technology. For this, it is necessary to identify social groups and actors that are relevant to an innovation over time (Meyer, 2005). In the present research, SCOT justifies the claim that lotus farming as an innovative technology was an “actant” shaped by social actors in the delta. Because successful innovations can be viewed as an instrument for brokering strong and broad consent among stakeholders for an SDP, they can also be regarded as a product of social interaction. Stakeholders thus have an influence on technology design and development, as well as the outcome when used. SCOT also points out that an innovation can have different meanings that for different social groups, which is framed as interpretive flexibility (Meyer, 2005). A closer look at these meanings can help us to understand why conflicts and problems might arise between different social groups; or in terms of the SDP hourglass, to determine the strengths and weaknesses of consent around an innovation as it travels through the different planning phases.

1.5 Structure of the thesis

This thesis is organized into six chapters. After this introductory chapter are four chapters, each of which corresponds to one of the four research sub-questions (Figure 2). The final chapter presents a synthesis and reflections.

Chapter 2 (Convergence of Political Agenda Between Stakeholders and the Strategic Delta Plan) addresses the first research question. It explores the effectiveness of strategic delta planning in influencing the national policy agenda in Vietnam. By presenting the main processes that steer convergence and divergence of the agendas of the various actors involved in the planning process, this chapter sheds light on the function of the MDP as a stepping stone for building consent among stakeholders. This is important to bridge the transition between strategic delta planning and implementation.

Chapter 3 (Soft Implementation of the Strategic Delta Planning Process in the Vietnamese Mekong Delta) addresses the second research question. Being focused on the implementation phase, this chapter links back to the findings from the previous chapter, as it sequentially follows the hourglass framework. It analyzes the implementation-related aspects of the MDP, to see to what extent it has influenced the mindsets of policy actors.

Chapter 4 (Perceptions of the Local Community to No-regret Measures Proposed by SDP) provides an answer to the third research question by digging deeper into the content of the Mekong Delta Plan. Looking at three proposed scenarios, the chapter investigates how residents and non-residents (represented by grassroots stakeholders) perceived the measures proposed, regardless of whether they would directly benefit from them.

Chapter 5 (Emergence of Lotus Farming as an Innovative Technology) tackles the fourth research question. This chapter zooms in on one innovation proposed in the MDP for the floodplains of the Mekong Delta; that is, lotus farming. Specifically, the social development pathway of this technology is analyzed.

Chapter 6 (Synthesis and Reflections) provides a brief recap of the entire dissertation, and then offers summary answers to the research questions, followed by a reflection on the overall research design, the hourglass framework, and the social and policy relevance of the research. A number of limitations to the study are then observed. Finally, the chapter closes with a general discussion and key conclusions on the roles of (technological) innovations in strengthening the strategic delta planning process in the Vietnamese Mekong Delta.

Figure 2 Research design “Roles of Innovation in Strengthening Strategic Delta Planning processes”

Chapter 2

2 POLITICAL AGENDA SETTING FOR THE DELTA PLANNING PROCESS IN THE VIETNAMESE MEKONG DELTA

This chapter is published in 2019 as:

Hoang Thi Minh Vo, Gerardo van Halsema, Chris Seijger, Nhan Kieu Dang, Art Dewulf, Petra Hellegers, 2019, Political agenda setting for strategic delta planning in the Mekong Delta – Converging or diverging agendas of policy actors? *Journal of Environmental Planning and Management*

<https://doi.org/10.1080/09640568.2019.1571328>

Abstract

This article uses the lens of the Multiple Streams Approach, to explore whether the agendas set by political actors in Vietnam converged with the agenda set in the Mekong Delta Plan (MDP). The MDP presents policy choices for development of the Vietnamese Mekong Delta. The plan offers economically attractive, climate adaptive and environmentally sustainable paths forward in the face of climate change and economic uncertainties. We collected our data using qualitative techniques, including a literature review and interviews. We found convergence between the MDP's agenda and political actors' agendas, though divergences were also detected. Between the delivery of the MDP in 2013 and formal endorsement of its ideas in 2017, the problem stream, policy stream and politics stream were brought together by the actions of "policy entrepreneurs" (scientists and experts). Our findings suggest that agenda-setting and convergence were a crucial step towards endorsement of the strategic delta planning process for the Mekong Delta. Further research could explore issues of power mobilization in enabling or constraining decision-making.

2.1 Introduction

Vietnamese delta managers are calling for more responsive policies to cope with the challenges of climate change, upstream hydropower development and economic activities within the Mekong Delta (Smajgl *et al.* 2015; Anthony *et al.* 2015). Examples of such policies are “Living with the Floods” and “Turning Disasters into Opportunity” (Vietnamese Government 2017). Up to now, Vietnam has applied a classic approach in delta planning, characterized by short-term master planning and sectoral planning (5-10 years), though without overall coordination and prioritization (MDP 2013). Strategic delta planning is conceived as a new way to formulate a development agenda for the delta in order to address both socio-economic and physical-ecological aspects over a longer timeframe (Healey 2004). Previous delta planning research (Seijger *et al.* 2016) examined the agenda-setting process that starts the formulation of a strategic delta plan. This entails bringing the topic of strategic planning to the fore in policy and academic circles and determining what are the key issues and problems to be covered by the strategic delta plan. The current study expands on that work, exploring the process of agenda-setting after formulation of a strategic delta plan, in our case the Mekong Delta Plan (MDP). We analyzed how the agenda set by this plan has influenced Vietnamese political actors, particularly their policy agendas and priorities, and how this led to its formal endorsement.

Policy studies focusing on Vietnam are rare, particularly those focused on policy agenda convergence in relation to delta planning. Most research in this area has examined specific policies or offered a historical or contemporary view on government policies influential in the Mekong Delta (Hoanh and Suhardiman 2014; Hoanh *et al.* 2003; Biggs *et al.* 2009). The current study applies the lens of the Multiple Streams Approach to explore the effectiveness of strategic delta planning in influencing the policy agenda. Specifically, it explores the extent to which Vietnam’s strategic delta plan has fostered alignment of different policy agendas for long-term development.

The MDP is a climate change adaptation strategy. It defines no-regret measures for sustainable development of the Mekong Delta in the face of contemporary and future challenges. As such, it defines a new development paradigm that, to have real influence, must influence decision-makers and policy agendas. Agendas are considered across different tiers of governance (national, provincial, local and donor) and across different sectors (e.g., those represented by the different line departments). Indeed, sustainable development of the Mekong Delta is a multifaceted objective involving a diversity of actors and policy domains. Influencing agendas across these actors and domains is key to foster broad endorsement of the delta planning goals.

In the policy sciences, decisions are regarded as policy outputs. The current article assesses the process of the formal decision-making or policymaking, by looking at two such outputs, namely Resolution 120 and Decision 593. Both confirm endorsement of the ideas of the MDP at Vietnam's highest political level, that is, by the Vietnamese Prime Minister. Using these outputs, we studied convergence and divergence between the agenda set by the MDP and those adopted by political actors.

Thus, the aim of our study is to explore whether the actors involved indeed moved towards adoption of the agenda set in the MDP. That is, to what degree did the agendas of the various actors converge with or diverge from the ideas presented in the MDP. We conducted this assessment using the Multiple Streams Approach. This approach employs three separate though interconnected streams: the problem stream, the policy stream and the politics stream. A policy issue receives serious attention and prioritization in agenda-setting and policymaking when these three streams come together through decision makers' efforts (Kingdon 1984). Agenda-setting involves a coupling of the problem and politics streams, while policy implementation involves a coupling of the policy and problem streams. However, implementation can only succeed if the politics stream is consistently favourable (Mu 2018).

2.2 Theoretical foundation

2.2.1 Agenda-setting as a concept

Kingdon (1984) defined an agenda as ‘a list of subjects or problems to which political actors are paying attention’. If an issue is not on an agenda, it cannot be subjected to decision-making processes and will never become a decision (Princen 2009). According to Zahariadis (2016), the term “agenda” first appeared in the policy science literature in 1971. Meanwhile, “agenda-setting” is defined as ‘the process of turning public issues into actionable government policies’ (Zahariadis 2016: 6). Cloete *et al.* (2006) suggested that communities’ perceived problems enter the political system as inputs from interest groups via the political process. Considering agendas analogously as inputs sheds light on how ideas are brought into the policymaking process. This view helps us to understand how political actors and institutions may perceive problems, construct their own agendas and view a strategic delta plan in relation to their traditional ideas or policies (Seijger *et al.* 2016).

2.2.2 The Multiple Streams Approach

The Multiple Streams Approach emerged as an adaptation of the Garbage Can Model by Cohen *et al.* (1972). It was developed by Kingdon (1984) for use in the US political context, further Liu *et al.* (2010) also applied it to the US’s politics at local level. Various international scholars have since adopted it for studies exploring a range of policy contexts, from the EU and Germany to China and Hongkong (Teodorović 2008; Baumgartner *et al.* 2014; Béland and Howlett 2016; Chow 2014; John 2003; Mu 2018; Jones *et al.* 2016; Zahariadis 1999, 2003, 2008; Zahariadis and Herweg 2017; Zahariadis 2016; Zohlnhöfer *et al.* 2016; Baumgartner and Jones 2010; Huitema *et al.* 2009; Cairney and Jones 2016; Rawat and Morris 2016). Recent work on spatial planning and delta development suggests that the strategic planning is becoming the preferred means of setting policy agendas for long-term delta development (Seijger *et al.* 2016; Healey 2004; Friedmann 2004; Olesen 2017). Our study was interested in the influence of strategic planning in delta development. Specifically, we explored the extent that Vietnam’s strategic delta plan has fostered

convergence among different stakeholders' policy agendas for long-term delta development.

Kingdon (1984) used several metaphors to illustrate the Multiple Streams Approach, including “open windows” and “primeval soup”, though without clearly defining the different streams. Derived and developed from this original idea, Zahariadis (1999:32-34) identified three streams as follows: “[T]he problem stream consists of various conditions that policy makers and citizens want addressed;...; the policy stream includes a primeval soup of ideas that compete to win acceptance in policy networks;...; the politics stream consists of three elements: the national mood, pressure group campaigns, and administrative or legislative turnover”. Though these streams developed in part independently from each other, once they are coupled – that is, when a problem is recognized simultaneously with an available solution and there is political support in favour of the change – a window of opportunity or policy window opens (Guldbrandsson and Fossum 2009; Kingdon 1984).

The current research perceives the problem stream as a process of setting agendas and raising concerns from both inside and outside the political system. The policy stream encompasses those actors that can introduce policy ideas to policymakers and policy networks (e.g., experts, researchers and consultants) after which the ideas vie for acceptance. The politics stream is about politicians and the decisions or policy outputs they generate in formal decision-making processes, including legislative turnover and political attention. Because the Multiple Streams Approach was originally developed for the US political context, it might not be completely applicable to the Vietnamese situation. Indeed, Mu (2018) adapted the approach to the Chinese context. This study adopts those modifications. Following Mu (2018), we interpreted the politics stream as referring to political attention in addition to legislative turnover and not including the national mood and pressure group campaigns. Political attention tells us where policymakers turn in their search for solutions, and what public values government pursues (Mu 2018). Furthermore, we label actors from academic institutions as “policy entrepreneurs” (Huitema and

Meijerink 2010) due to their particular roles in the Vietnamese policy process, including consulting and advising the policy makers. They do not take direct part in decision-making but rather push the agenda process and try to merge the three streams (Mu 2018).

2.3 Research Methodology

2.3.1 Data collection

We adopted a qualitative research technique with three parts: a literature review, in-depth interviews and a content analysis. To trace the policy agendas of the past we relied on Biggs (2004, 2009, 2012) and Vormoor (2010) as primary sources on the history of Mekong Delta planning and development. We conducted comprehensive interviews with a diverse pool of 15 actors from 13 organizations (table 1), ranging from the local to the national level. Our interview selection process was designed primarily to identify key policy informants with knowledge and information about agenda-setting in policy on the Mekong Delta. All these informants acted as policymakers to varying extents. Some were practitioners, some worked at academic institutions, and some came from international donor organizations. One interview subject came from the Vietnamese Communist Party.

We used the snowball technique to identify potential interview subjects, as we did not expect any single actor in the delta planning process to be able to express all views on the subject of delta planning. The interview subjects were all men and ranged in age from 30 to about 80.

We hypothesized that, the different policy agendas for the Mekong Delta would converge in the strategic delta plan. The historical record and the interview results helped us determine if that was indeed the case. To facilitate the analysis process, we categorized the 15 interview subjects into four groups based on the functions and duties of institutions they were affiliated with. These groups were labelled as follows: (A) 'national governors', (B) 'local governors and practitioners', (C) 'national experts and advisors' and (D) 'international development partners'.

These roughly represent Kingdon's (1984) policy and politics streams. The policy stream is linked to group C ("policy entrepreneurs") and D (introducing new ideas and proposals), while groups A and B are linked to the politics stream (making decisions). All of the four groups are related to the problem streams. The SWSC (that belongs to group A) is also termed as "policy entrepreneur". The actors did not behave as groups, however, as agenda topics were not always shared between group members. The interviews were digitally recorded, transcribed and analysed.

Table 1: Key-informants and their grouping categorization

A		B	
National Governors		Local Governors and Practitioners	
Based in Hanoi (except SWSC)		Based in Mekong Delta (Tra Vinh province)	
MONRE	Ministry of Natural Resources and Environment (1)	DONRE	Department of Natural Resources and Environment (1)
MARD	Ministry of Agricultural and Rural Development (1)	DARD	Department of Agricultural and Rural Development (1)
SWSC	Southwest Steering Committee (1) (Communist Party)	DPI	Department of Planning and Investment (2)
		DPC	District People's Committee (1)
C		D	
National Experts and Advisors		International Development Partners	
Based in The Mekong Delta (except NACST that was based in Hanoi)		Based in Hanoi	
CTU	Can Tho University (2)	IUCN	International Union for Conservation of Nature (1)
TVU	Tra Vinh University (1)	World Bank	World Bank (1)
NACST	National Assembly's Committee on Science and Technology (1)	GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (1)

Note: In parentheses is the number of interview subjects per institute

2.3.2 Analysis techniques

For our case analysis, to obtain the interview subject's agendas we applied content analysis (Krippendorff 2004). This involved a three-step coding process (Boeije 2009). The first step was to apply initial coding to the themes discovered within the data. For example, an agenda topic noted by the Southwest Steering Committee (SWSC) interviewee was to promote a regional integration mechanism. The second step was pattern coding to uncover major themes, or patterns, underlying the data segments. We then linked the themes coded from the interviews to the agendas presented in the MDP and linked this data to theory. The patterns indicated the extent that certain themes recurred across interview subjects (convergence or alignment), or did not recur and different themes prevailed (divergence). In the third step, we triangulated patterns and themes to seek a new depth of understanding of existing knowledge. For this step, we reviewed the interviews and compared them to the results of our previous two coding steps. Finally, we reviewed emergent themes, findings, and notes in light of the Multiple Streams Approach literature.

It must be noted that while the sample is diverse, it is also limited in the sense that not all actors were involved. For example, national-level ministers and the prime ministers and vice prime ministers were left out, and more local-level officials might have been included. In the donor group, no one was interviewed by the Japan International Cooperation Agency (JICA). However, we did interview international donor representatives, alongside high-ranking government advisors closely associated with national-level ministers. They had good insight into the relevant policy processes.

2.4 Development of the Mekong Delta from a policy agenda perspective

2.4.1 Policy agendas through history

As the starting point of our analysis, we examined past policy agendas to better understand how the Vietnamese Mekong Delta has developed and the historical context of the scenarios presented in the MDP for the delta's future. In order to do that we applied literature review instead of applying MSA, since in this part we focus

mainly on the problem and policy streams without analysing the process of politics that is difficult to assess historically. The earliest policy agenda in Mekong Delta development was exploiting the delta. Under French colonial rule, the government implemented intensive canal digging and initiated a dyke-building strategy to control and manage the delta waters (Biggs *et al.* 2009). This agenda became hugely influential, and extended almost through to the present day.

The second key agenda was food security, which was pursued by closing off the delta with the building of a massive network of dykes, sluice gates, dams and weirs (Vormoor 2010) (figure 3). As acid sulphate soils cover two-thirds of the delta, land reclamation was another important agenda, to reclaim “wastelands” for agriculture. However, as new canals were dredged, civilization penetrated further and deeper into isolated places (Vormoor 2010; Benedikter 2014; Biggs 2012). Thus, another important agenda of the past was rural settlement, by which large populations from northern Vietnam and Cambodia were resettled to rural areas of the Mekong Delta (Sanh *et al.* 1998). This appeared on the policy agenda in other terms, too, that is, as colonization of southern “wastelands” by the northern Vietnamese (Biggs 2004). Prior to the end of the Indochina War, the policy agenda of expansion of agricultural areas gave additional impetus to reclaiming acid sulphate soils. After the nation’s reunification, these agendas were narrowed to the agenda of rice cultivation everywhere to ensure food security. This was a reaction to the severe food shortages experienced following the war, especially in northern Vietnam.

After 1975, the key policy agenda became nation-building, including the Mekong Delta. Agricultural diversification was also pursued. This began with the agenda of restoration and excavation of waterways to facilitate agricultural collectivization (Huynh 2015: 45). After 1986, the agenda of political and economic reform came to the fore, particularly Doi Moi. The Doi Moi reform was associated with political – economic decentralization and liberalization, specifically towards household productivity, and rural – agricultural development. The agenda of transforming the Mekong Delta into the country’s rice bowl led to the intensified

rice strategy, which justified investment in flood-protection dykes, canals and pumping stations (Biggs *et al.* 2009). To accommodate the agenda of expanding rice double cropping, huge areas of land were excavated canals and irrigation and water control infrastructure (Vormoor 2010). This did enable Vietnam to become self-sufficient in rice. The economic reforms released farmers from production quotas. The policy agenda here was agricultural diversification and a switch higher-value crops, such as fruit trees, and aquaculture development. Nonetheless, except in the zones under tidal management, the Mekong Delta's dyke infrastructure was designed for rice irrigation (Biggs 2012). Agendas thereafter focused on control of the delta waters to allow multi-cropping, particularly cultivation independent of the natural, seasonal hydrological regime (Vormoor 2010).

We analysed these past policies to derive the entrenched policy agendas that informed the development of the Mekong Delta. Central in these historic agendas was the building of high dykes and accompanying sluice gates, irrigation infrastructure and canals – though these did not always meet the challenges the Mekong Delta faced. In 2013, the MDP brought a new agenda, offering scenarios for economically attractive development, environmental sustainability and adaptation to climate change. The MDP is analyzed below. It is the only present-day delta development plan included in our study because to date there is no more influential agenda for Mekong Delta development.

Figure 3. Historical agendas set by political actors for development of the Mekong Delta from “opening up” the delta to “closing it off”, with the agenda set out in the Mekong Delta Plan being the latest agenda under nation-building (adapted from Nguyen *et al.* (2016))

2.4.2 Agenda set in the Mekong Delta Plan

The MDP arose from an agenda-setting process concerned with economic development and climate adaptability. The three pillars of this agenda can be summed up as follows: economically attractive development, environmental sustainability and capacity to adapt to climate change. In particular, the MDP's primary agenda is to shift the Mekong Delta away from the longstanding food security and rice bowl emphasis. The MDP recognizes that the focus on rice production will not be economically attractive in the future, as population growth is predicted to significantly slow down. Continuation of the agenda of intensive rice production would, in fact, further damage the adaptive capacity of the delta, according to the plan. In contrast, and this is a key argument of the MDP, it is much more economically advantageous to move towards sustainable aquaculture (e.g., polyculture, sustainable brackish aquaculture, mixed fruit-aquaculture systems and value-added to agricultural products).

The MDP sets out specific agendas for three distinct delta zones. The first zone, the Upper Delta, is favourable for developing farming systems that can cope with seasonal flooding and increased volumes of flood waters. This agenda seeks to grasp windows of opportunity for river expansion. The building of high dykes and sluice gates is discontinued, though this will diminish opportunities for triple rice cropping. The second zone is the Middle Delta. Here the MDP foresees responses to the challenges of the region's declining freshwater supplies in the dry season. The third zone is the Sensitive Coastal Zone. Saline intrusion is the primary focus here. However, salinity is no longer treated as a disaster. Rather, a brackish zone is viewed as an environmental resource.

One of the most striking elements of the MDP is its formulation of four possible development scenarios: agro-business industrialization, corridor industrialization, dual node industrialization and food production. Of these, shifting to an agro-business industrialization development model is considered the preferable

scenario, as it seems most feasible, viable and sustainable. This scenario takes advantage of natural systems and the richness of the Mekong Delta and promotes a form of agriculture that capitalizes on the biological, socio-economic and physical characteristics of the delta. Agro-business is expected to provide an excellent basis for long-term, sustainable economic growth. This scenario has the added advantage of being aligned with a decision taken by the Prime Minister on 17 December 2012 to pursue hi-tech agricultural development up to 2020.

2.4.3 The policy process leading up to the Mekong Delta Plan, 2010 - 2017

All of our key informants were involved in different phases of the organization and proceedings of the 2013 Mekong Delta Economic Cooperation Forum (MDEC) and the subsequent Mekong Delta Forums¹. These are both annual high-level policy events centred on future development of the Mekong Delta. At these meetings, the MDP, and thus its agenda, was a frequent item of discussion. Figure 4 schematizes the roles of the different interview groups and their agendas, which are further detailed in later sections. The early MDP process, from 2010 to 2013, involved consultations with national counterparts and experts, whom we labelled “policy entrepreneurs”. This was followed by intensive discussions with all stakeholders. After delivery of the MDP, at the 2013 MDEC, an international donor group was engaged, which led to a letter of endorsement from them of the MDP. Subsequent to the MDEC, the donor group, together with the national governors began organizing the annual Mekong Delta Forums, which bring in all the involved actors. This political process propelled two outcomes: the Prime Minister’s 2016 endorsement of Decision 593 on Promulgation of the Regulation on Pilot Coordination for Regional Socio-Economic Development in the Mekong Delta (2016-2020) and the 2017 adoption of Resolution 120 on Sustainable and Climate-

¹ The 4th MDF is a special Conference on Sustainable and Climate-Resilient Development of the Mekong Delta of Vietnam (This conference was a special meeting among high-level participants, chaired by the Prime Minister held in Can Tho city on 26-27 September 2017). It can also be considered the 4th Mekong Delta Forum, which has been held every year since 2013 (the 1st was MDEC).

Resilient Development of the Mekong Delta. This legislation inaugurated the ideas of the MDP into national policy.

Figure 4. The political process in Vietnam since 2013-2017 related to the formulation of the MDP

Notes: ICRESL (Integrated Coastal Resilience and Sustainable Livelihoods) is a project that is still ongoing; the MDEC (Mekong Delta Economic Cooperation Forum) is the first event that gave rise to the Mekong Delta Forum series. It was held in 2013, when the Mekong Delta Plan was delivered to the Vietnamese Government

2.4.4 Agendas set by political actors and their convergence or divergence with the Mekong Delta Plan

Having categorized the relevant stakeholders into the four groups, this section examines the core agendas of each group in turn (table 1). Group A represents central policymakers, most of whom were based in Hanoi, except the representative of SWSC, who was regionally based in the Mekong Delta. Group A is made up of political actors with direct influence on the policymaking process. Though currently inactive, SWSC was a powerful entity on Vietnam's political scene at the time of the interviews, being the government Communist Party for the Mekong Delta provinces. Group B represents local government, including departments functioning as practitioners on the ground. Those in this group worked directly with farmers. Their views are thus closest to those of local communities. Group C is the group with the most technical expertise. It is made up of national experts from universities, line ministries' research institutes and policy think tanks, alongside retired high-ranking government officials. All were active in the Mekong Delta planning process. Group C is also labelled "policy entrepreneurs", as its members operated as mediators of agenda-setting, primarily due to their unique position in the stakeholder arena and their wider and longer-term access to policy discussions and actors. Group D represents international donors. They provided financial assistance and conducted research and projects for the direct benefit of the local communities. In the analyses using the Multiple Streams Approach, groups A, B and D are linked to the politics stream, as they supported and initiated the coupling of the problem stream with the policy stream. Group C is linked to the policy stream, as its members consulted, advocated and gave advice to facilitate achievement of the policy output.

Group A: National governors

Within group A, a retired official from the Ministry of Agriculture and Rural Development (MARD) noted improving coordination between entities (ministries and provinces) and creating a regional coordination mechanism as prominent policy agendas. Another interviewee, who was working as an advisor to MARD at the time of the interview, prioritized addressing problems with upstream countries caused by competition over water resources, though this topic was not included in the MDP. This interviewee also pursued an agenda of solving salinity intrusion problems, as salinity intrusion has become increasingly problematic in recent years.

An interviewee from SWSC mentioned the agenda of supporting and cooperating with the regional coordination mechanism (nowadays, this term has been referred more popular as interprovincial collaboration mechanism) to adapt the Mekong Delta to climate change. This reflected the subject's former formal role, as SWSC was part of a national committee to respond to climate change. It was mandated to organize at least two annual meetings on the topic, involving all ministries, sectors and the 13 provinces of the Mekong Delta. It thus played a bridging role between the local and central government levels.

Our interviewee from the Ministry of Natural Resources and Environment (MONRE) expressed two major agendas: achieving further cooperation with international agencies and experts to come up with concrete activities and plans and raising awareness among the public and local communities. Coordination with local communities was considered important because the agendas typically set by MONRE for addressing climate change and other problems took the perspective of the entire Mekong Delta, whereas local inhabitants tended to focus on impacts or problems at the scale of their own community or region.

In conclusion, within group A, the policy agendas of the institutes based in Hanoi, being located at a greater distance from the Mekong Delta, were inclined towards institutional development and furthering macro-level priorities, such as

solving upstream development problems and fostering cooperation between stakeholders. Meanwhile, institutions located in the Mekong Delta, here represented by SWSC, had a stronger link to the situation on the ground within the Mekong Delta and thus cared more about improving local livelihoods and regional cooperation.

Group B: Local governors and practitioners

One group B interviewee, an official from a local branch of the District People's Committee (DPC) of Tra Vinh province, indicated concern with improving local livelihoods. This interviewee prioritized sustainability and agreed with the need to switch coastal areas to brackish water aquaculture and support polyculture instead of the intensive rice monoculture. Another agenda mentioned was creating reservoirs to supply freshwater to local people, as the already limited groundwater was becoming increasingly depleted.

Most of the action plans proposed by the Department of Agriculture and Rural Development (DARD) (Tra Vinh Province) were inspired by ideas in the MDP. Our DARD respondent noted the boost that the MDP had given to some of the projects already being implemented in the province. It was thus positively impacting the local level, the interviewee said, for example, by supporting sustainability, including the switch to a brackish environment and storing freshwater.

The interviewee from the Department of Natural Resources and Environment (DONRE) said the biggest concern was obtaining financial support to implement new policy and strategy. This interviewee strongly supported the MDP, but disagreed with the goal of increasing the share of integrated shrimp-mangrove farming systems and protected forests. The alternative agenda offered was tailored models towards diversification using a zoning approach.

We spoke with two people from the Department of Planning and Investment (DPI), though both were vague in expressing their agendas, which seemed geared

mainly towards developing their own institutional plans and projects. DPI's agendas focused primarily on industrial development, including enhancing added value in agriculture and development of infrastructure, such as roads, waterways and industrial corridors.

In sum, this group of practitioners, being civil servants working directly with local communities, seemingly understood the real needs and demands of the region. Their agendas were mostly in accordance with the ideas presented in the MDP, and they understood the practical reasons underlying them. An exception was DPI (of Tra Vinh Province), which was not directly involved in the planning process or in farmers' livelihoods. Its interests lay more in its own plans and projects, particularly industrial development. Aside from this exception, a relatively convergent trend was found across this group's agendas in relation to the agenda of the MDP.

Group C: National experts and advisors

The national experts and advisors were involved from the early stages in creating a platform for discussion of the Mekong Delta's present and future. They pursued the agenda of determining responses and solutions that are preferably "no-regret". Such responses, thus, should mitigate any potential for devastating impacts on local communities and natural resources. Alternatively, some in this group suggested that the problems facing the Mekong Delta could be viewed as opportunities. For instance, a professor from Can Tho University (CTU) suggested considering salinity in the coastal zone as an advantage for developing a brackish-water based economy. This informant indicated support for a dual zone approach to coastal management combining brackish aquaculture with agriculture. The agenda pursued was improving local livelihoods and alleviating poverty at the local level, as well as improving human resources and agriculture to help local communities. This expert, who had been involved in formulating the MDP, expressed as priorities addressing saline intrusion and the lack of freshwater in dry years, climate change and developing agro-business.

Our second interviewee from CTU had contributed to scenario-building for the MDP. This expert strongly disagreed with the food security agenda of the past, as this was said to have brought huge costs and few benefits to the Mekong Delta. This interviewee prioritized agribusiness and aquaculture development and enhancing the functions of nature, for example, via restoration of the mangrove forests.

The interviewee from Tra Vinh University (TVU) was concerned mainly with how saline intrusion might motivate local people to shift to aquaculture. A related concern was the entrenched tradition of rice production, as this expert considered it would be hard to change. Resolving conflicts from competing interests in water management was another policy agenda mentioned, especially the potential for benefit-sharing between upstream and downstream communities and provinces (e.g., between An Giang and Tra Vinh or Ben Tre).

Our fourth expert was a retired official from the National Assembly's Committee on Science and Technology (NACST) and was still active in the planning process. This person was strongly supportive of sticking to traditional agendas, supporting a food security approach and building more high dykes and sluice gates. The informant thus opposed the new agenda, citing the huge changes it would bring. However, this person did support the idea of restoring the freshwater of the Mekong Delta, especially for provision in the dry season.

Hence, most of the experts' agendas were in harmony with the MDP – the exception being the informant from NACST, who favoured adhering to the agendas of the past and keeping the Mekong Delta as the nation's rice bowl. This relative harmony among agendas is remarkable, as theory suggests that people perceive things differently, then pursue agendas based on these different perceived interests. That is why in policymaking processes, it is never easy to reach absolute agreement on final choices, as different agendas exist from the start, rooted in the different

perceptions. In this group we see a convergence, or alignment, of agendas with the MDP, though it is not absolute.

Group D: International development partners

In our international development partner group, the World Bank recognized the advantages of the agenda set by the MDP, as the plan is largely aligned with the World Bank's own project in the delta. The World Bank in general pursues a holistic, integrated planning approach instead of the traditional sectoral method of planning. Adaptive delta management is considered a valuable means towards sustainable exploitation of water resources, development of agriculture and protection of the environment while adapting to climate change. The World Bank prioritizes no-regret measures that take into account climate change and development uncertainties. For example, rice is preferred for regions for which it is perfectly suited. In other regions where more profitable livelihood options exist, such as polyculture and organic shrimp production, those should be pursued. Most World Bank projects reflect strategic choices for controlled flooding in the upper delta and sustainable aquaculture in the estuary zones. The World Bank also focuses on livelihood models. The organization is innovating in integrated mangrove-shrimp and rice-shrimp models for coastal zones, and looking at different kinds of flood-based agriculture for the upper delta. For example, floating rice or lotus-based systems might be considered appropriate in some places, while two rice crops with a differing third crop could be favoured elsewhere. The World Bank observed that a lot of data and information on the Mekong Delta is split between different research agencies and ministries without protocols for data sharing or collaboration. One of its agendas is improving that situation.

The interviewee from the International Union for Conservation of Nature (IUCN) expressed his key agenda as addressing problems of rice intensification and flood risk. However, IUCN cannot accomplish this alone. That is why, according to our interviewee, there was a need for cooperation between various development

partners, such as the Dutch government, the World Bank and GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH). This interviewee expressed deep concern about losses in capture fisheries and the loss of absorptive capacity upstream, linked to increased salinity intrusion in the dry season.

The GIZ representative expressed the organization's priority agenda as integrated coastal management, saying this was a major focus of their projects. In collaborating on the MDP, GIZ's main agenda was zoning. In particular, this related to what the MDP proposed where regarding adaptive rice production in the upper delta and brackish aquaculture in coastal zones. Inclusion of these specifics was necessary for them to lend collaborative support to the plan. GIZ's second priority was formulation of an overarching plan or strategy for the Mekong Delta that was officially adopted by the government. GIZ is also working hard to improve regional coordination.

Ultimately, we found an absolute alignment of the strategies and interests across this donor group and with the MDP. Nevertheless, coordination was still considered necessary, not only with respect to agenda-setting, but also in practical actions, as these actors usually focus on their own projects. One interviewee in this group suggested that the development partners had to realize that an integration process would be required to take the next step.

Table 2: Convergence and divergence of agendas between interviewees and the MDP

A National Governors		B Local Governors and Practitioners	
Agendas	Institution	Agendas	Institution
Improving coordination between Vietnam Government entities (ministries and provinces) and creating a regional coordination mechanism	MARD SW/SC	Improving local livelihoods even without transformation, yet supporting the Mekong Delta Plan	DPC
Salinity intrusion	MARD MONRE	Supporting sustainability, including switching to a brackish environment where applicable and storing freshwater	DARD
Solving problems caused by competition over water resources with upstream countries	MARD	Promulgating tailored models towards diversification under a zoning approach	DONRE
Cooperation with other entities, mainly focused on coping with climate change at the delta-wide scale and raising awareness within the public and local communities	MONRE SW/SC	Developing own institutional plans and projects	DPI
C National Experts and Advisors		D International Development Partners	
Agendas	Institution	Agendas	Institution
No-regret solutions	all	Integrated and holistic planning and governance in the Mekong Delta	World Bank
Exploiting problems in the Mekong Delta as resources aimed at improving local livelihoods and alleviating poverty at the local scale	CTU	Prioritising no-regret measures to cope with climate change and development uncertainties	World Bank
Developing a brackish-water based economy	CTU	Promoting innovative livelihood models	World Bank
Addressing saline intrusion and freshwater shortage	CTU TVU	Collaboration in data provision	World Bank
Agribusiness and aquaculture development agenda	CTU	Addressing rice intensification, flood risks, and need for cooperation between entities	IUCN
Sticking to traditional agendas that require few changes of the status quo	NACST	Integrated coastal management and promoting regional coordination and zoning	GIZ

Note: Shades correspond to the classes presented in table 3. MARD= Ministry of Agricultural and Rural Development; MONRE= Ministry of Natural Resources and Environment; SWSC= Southwest Steering Committee; DONRE= Department of Natural Resources and Environment; DARD= Department of Agricultural and Rural Development; DPI= Department of Planning and Investment; DPC= District People’s Committee; CTU= Can Tho University; TVU= Tra Vinh University; NACST=National Assembly’s Committee on Science and Technology; IUCN= International Union for Conservation of Nature; GIZ= Deutsche Gesellschaft für Internationale Zusammenarbeit.

Table 3: Degree of convergence and divergence (author’s interpretation)

Note: DARD= Department of Agricultural and Rural Development; DONRE= Department of Natural Resources and Environment; SWSC= Southwest Steering Committee; CTU= Can Tho University; TVU= Tra Vinh University; IUCN= International Union for Conservation of Nature; GIZ= Deutsche Gesellschaft für Internationale Zusammenarbeit; DPC= District People’s Committee; MARD= Ministry of Agricultural and Rural Development; MONRE= Ministry of Natural Resources and Environment; DPI= Department of Planning and Investment; NACST=National Assembly’s Committee on Science and Technology.

2.5 Discussion on processes steering convergence and divergence

2.5.1 Evidence on convergence and divergence

The interview data provided strong evidence of convergence between the agendas of political actors and the agenda set in the MDP. Further evidence of this convergence is provided by the Prime Minister's formal endorsement of Decision 593 in 2016 and Resolution 120 in 2017. That legislation contains many of the ideas of the MDP. Indeed, Decision 593 echoes the MDP's call for a sub-regional planning approach. Another link to the MDP agenda is Decision 593's call to strengthen regional planning and collaboration between provinces. In the past people did not talk about such mechanisms. In Resolution 120, the main directive points are turning challenges into opportunities; adapting to climate change and sea level rise and pursuing nature-based development; switching from intensive rice cultivation to diversified agriculture and agro-business; considering salinity as a resource for development of a brackish zone economy; and promoting interprovincial collaboration. Those ideas are perfectly aligned with the MDP agenda. What processes explain this convergence? We explored this question by studying the interconnections between the problem, policy and politics streams, and the roles of policy entrepreneurs in bringing these streams together. The formal endorsement of Decision 593 and Resolution 120 is considered proof of convergence of the agendas of political actors and the MDP.

As noted, groups A, B and D are linked to the politics stream, and group C to the policy stream. An analysis using the Multiple Streams Approach lens suggests that these streams operated both independently, each setting their own agendas and priorities, and in an integrated fashion, via the consultations and group discussions culminating in the consecutive Mekong Delta Forums. We identified the problem stream by way of monitorable indicators, such as salinity concentration, drought frequency, flood intensity and crop failure; focusing events, such as salinity peaks, that draw attention to problematic conditions; and feedback from previous programmes, which can highlight what works and what may not. As such, a disaster

in the form of an extreme drought with salinity intrusion that irregularly occurs could become a focusing event to draw politicians' attention and create a sense of urgency for steps towards the MDP agenda.

The policy stream includes a variety of policy agendas that vie to win acceptance within policy networks in Vietnam. The number of agendas is large, so only a few can receive serious consideration. We observed a diversity of agendas that competed to win acceptance and become policy in the Mekong Delta. Since policymaking in Vietnam is mostly sector-driven or project-driven, clear boundaries between sectors remained, as well as overlaps in project proposals between sectors and ministries (Conway 2004).

We applied the politics stream to the Vietnamese political context only in regard to legislative turnover and political attention, as ideas must be formalized in official documents (e.g., a resolution, decision or decree) before they become policy. The MDP provided a vision to guide political actors in composing their proposals; but its ideas were not formalized in national policy until the adoption of Decision 593 and Resolution 120, respectively, in 2016 and 2017.

2.5.2 Policy windows revealed by the Multiple Streams Approach lens

Resolution 120 was endorsed at a critical point when the three streams came together. Occurrence of a focusing event, in our case a 20-year peak of saline intrusion measured in 2016, engaged all the relevant political actors. Endorsement of Resolution 120 was also facilitated by the consecutive Mekong Delta Forums, especially the 2017 event, which was chaired by the Prime Minister.

Throughout the development history of the Mekong Delta, the agendas of the stakeholders in the political process have changed. For instance, the agendas of the past were more conscious of the need to ensure food security and enable intensive rice production. Meanwhile, since the arrival of the MDP, each of the stakeholders has composed and presented newer agendas to the central government, in the form of action plans and project proposals that sometimes overlap or conflict,

both with each other and with the MDP. According to the Multiple Streams Approach, this process forms part of the problem stream. Agenda-setting for the MDP climaxed at the 2013 MDEC and at the Mekong Delta Forums that were organized annually since 2013. These propelled a process of intensive consultations involving MARD, MONRE, the Prime Minister and focus groups (see figure 4). All these actors represent the politics stream.

There were also protracted engagements with the entrenched political agendas of the past. Here SWSC emerged as a key policy entrepreneur, as this organization responded positively to the MDP agenda. The sudden rise of SWSC in support of the MDP agenda thus significantly contributed to the further endorsement of the plan. The MDEC and the later Mekong Development Forums also engineered important political breakthroughs that opened windows of opportunity for considering alternative development agendas. Due to the presence and involvement of all the various actors at these events, a political process got underway that greatly facilitated convergence between the agendas of stakeholders and that of the MDP.

The group of national experts (C) acted as indispensable policy entrepreneurs. They played crucial roles in promoting the MDP's agenda: consulting, advising, giving feedback on formulating the MDP's agendas; delivering training courses; taking action for the MDEC; and taking action with donors and with the national governors. They engaged with many actors. Once national experts supported the MDP agenda, they became important in influencing the agendas of other.

At each step, from the MDEC and delivery of the initial MDP, to the first Mekong Delta Forum in 2013 and endorsement of Resolution 120 and the latest Mekong Delta Forum in 2017, the agenda of the MDP increasingly converged with the agendas of stakeholders and became more 'Vietnamese' (see figure 1 on convergence over time and tables 2 and 3 for convergence across actors). The stakeholders operated at different steps of this political process. The efforts and actions of policy entrepreneurs led to consolidation in agenda-setting across all

stakeholders along the way. This eventually culminated in endorsement of Resolution 120 by the Prime Minister at the point in time when the three streams came together. Consolidation of agenda-setting thus took time and effort. Rawat and Morris (2016) argued that, though agenda-setting may be perceived as non-incremental, specification of alternative policy can be both non-incremental and incremental. This was indeed found to be true in our case. The agenda set by strategic delta planning underwent a long process of soft implementation, as the many minds and agendas involved did not automatically converge with the new strategic agenda set in the MDP (Seijger *et al.* 2017).

However, looking back, though a clear convergence of goals and agendas can be observed between the stakeholders and the MDP, this was certainly not uniform across all stakeholders. Nuances and divergences were also found in all groups. Group A, for example, set agendas mainly at the macro level, such as cooperation between national and international entities and solving problems caused by upstream developments. Group B focused more on improving local livelihoods, while group C was most interested in no-regret solutions for the entire Mekong Delta and embracing a brackish-water based economy. Group D displayed elements of all these agendas. The divergences can be traced to institutional political affiliation, differences in age and self-interest, and more importantly, to geographical location – that is, whether the actor was based inside or outside the delta. The agendas of the “insiders” (SWSC, DARD, DONRE and DPC) were more in line with the MDP agenda concerning the practical needs of local communities, for example, creating better livelihoods, improving the water supply situation and willingness to embrace a brackish environment. The “outsiders” (MONRE, MARD) were concerned with institutional agendas (e.g., cooperation at the national level, solving upstream conflicts and raising awareness).

Divergences were also identified between local and national groups. The former, practitioners, were more problem-oriented and set agendas that reflected the real needs of farmers. They were situated closer to the emerging problems of

sustainability, economic development and the need to adapt to the changing environment. Their agendas and concerns were thus more closely affiliated with the problem analysis and solution strategy embedded in the MDP agenda. Meanwhile, the latter were more concerned with the institutional and governance aspects of the agenda than with the details of the problems and solutions. For example, they sought enhanced cooperation between entities and pursued ways to cope with climate change at the delta scale. Another type of divergence was found in the mindset of one national expert. The interviewee from NACST objected to significant changes in the development model for the Mekong Delta, and thus could not fully support the MDP.

The conclusion we draw from this analysis is that agenda-setting is a long-term incremental process that requires sustained stakeholder engagement across a wide spectrum of the policy and politics arena. In the case of the MDP, engagement and cooperation of policy entrepreneurs who were strategically positioned within this arena proved pivotal. We hypothesized that the different policy agendas for the Mekong Delta would converge in the strategic delta plan. Our evidence confirms this hypothesis. Though it took time, the various actors' different policy agendas for Mekong Delta development did converge with the agenda put forward in the strategic delta plan.

2.6 Conclusion

The MDP arrived on the Vietnamese political scene as a paradigm shift. It introduced a whole new development agenda for the Mekong Delta. The MDP agenda brought emergent issues to the fore, thus representing a break from the agendas of the past, particularly the longstanding key agenda of food security through intensive rice production. The MDP proposed a better way to achieve food security and sustainable rice production; that is, through flood-adapted farming systems and a switch to brackish-water based economic development, while viewing the saline zone as an environmental resource. This was proposed to replace the past strategy of building high dykes and sluice gates, irrigation infrastructure and canal

projects. Many interviewees considered the agendas of the past to be ineffective today, and saw the Mekong Delta as in need of new development directions. Many of them, especially those from SWSC, CTU, TVU, donors and local practitioners, saw their own concerns and agendas reflected in the MDP.

After delivery of the MDP, in 2013, formal recognition of the ideas presented in the plan by the Vietnamese Prime Minister followed in 2016 and 2017. Divergence of agendas was narrowed over time by the actions of policy entrepreneurs, particularly, through SWSC's organizing of the annual Mekong Delta Forums and the intensive discussions and consultations held among national experts and academics and their active cooperation in these events. This finding is important as it demonstrates that the strategic agenda set by the MDP eventually did influence the agendas of a wider pool of actors, ranging from the local to the national and international levels. The MDP strategic agenda can also be seen as a success in terms of decision-making. Insofar as strategic delta planning and agenda-setting are concerned, the MDP has certainly made inroads in aligning development policy agendas, though this result was not uniform or across the board. As such, it is not yet a finished process.

This convergence of agendas, however, was not achieved overnight. Having a sound problem analysis and a good story, or strategy, is not the only thing that matters. A dedicated political process is also required in which different actors, operating in different arenas of decision-making and acting at different stages of the process, are engaged in pursuit of the agenda, trying to merge the three streams.

While this analysis provides a deeper understanding of political agenda-setting following from strategic delta planning, it also presents some limitations. First, the sample size was limited and did not cover all actors involved in the Mekong Delta planning. Second, the interviewees did not represent all the involved institutions. However, the interview subjects were highly placed in the political system of Vietnam. They, moreover, played important roles in the MDP formulation process

and in its uptake in policy processes, such as Decision 593, Resolution 120 and the annual Mekong Delta Forums. They can therefore be considered knowledgeable informants.

Our analysis confirmed the usefulness of applying the Multiple Streams Approach in the Vietnamese context, though with several modifications. In particular, we viewed the politics stream as focused on legislative turnover and political and institutional attention, taking into account the newness of the strategic delta planning approach in Vietnam. Additionally, the Multiple Streams Approach revealed the crucial role of agenda-setting as a step towards achieving consensus among actors. Given the importance of such consensus, especially regarding support for the strategic plan, the political process of agenda-setting merits further attention in future studies on strategic delta planning or strategic spatial planning. Further research is also recommended on the role of mobilizing power and resources, and the links between these and the sorts of agendas being prioritized for delta development. They could prove particularly influential in delta decision-making processes.

Chapter 3

3 DO STRATEGIC DELTA PLANS GET IMPLEMENTED? THE CASE OF THE MEKONG DELTA PLAN

This chapter is published in 2017 as:

Chris Seijger, Vo Thi Minh Hoang, Gerardo van Halsema, Wim Douven, Andrew Wyatt, 2017, Do strategic delta plans get implemented? The case of the Mekong Delta Plan, *Journal of Regional Environmental Change*

<https://doi.org/10.1007/s10113-019-01464-0>

Abstract

A strategic delta plan can alter the course of delta management. Implementation of such a plan essentially involves a change of minds about delta management priorities and strategies for sustainable livelihoods. Such a change of minds, or “soft implementation”, must come before material, or “hard”, implementation can take off. To explore the influence of strategic delta plans in bringing about a change of minds among the actors involved, we examined four features of soft implementation: prospects for change, new mental models, consent and decision-making. We then applied these features to analyze implementation of the Mekong Delta Plan (MDP). The MDP envisions agro-industrialization in the Mekong Delta, with dynamic land use, high-value commodities and enhanced interprovincial collaboration. We found that three years after its completion, the MDP has indeed been influential in introducing new ways of thinking about both delta problems and transformative strategies for agribusiness development. Minds have changed at all levels of the planning system, though change at the local level remains most limited. Implementation is fragile, however, as a small though influential group actively promotes and subscribes to the MDP’s precepts. The plan has influenced national policies, provincial project proposals and donor loans. We found the four features to provide a valuable entry point for assessing the influence and effectiveness of the strategic delta plan. They might prove useful to planners, investors and researchers too in designing and evaluating strategic planning processes for more sustainable land and water resources management.

3.1 Introduction

This paper examines the role of strategic delta plans in changes of mind about priorities and strategies for delta management. A strategic delta plan introduces new ways of thinking, new approaches and new collaborations (Albrechts, 2015). These may relate to, for example, flood control, agricultural diversification and nature restoration. Strategic delta planning is regarded as a particular form of strategic planning (Albrechts, 2004). It is defined as a public-sector led process through which a long-term vision (the strategic delta plan) and actions and means for implementation are produced that shape and frame what a sustainable delta is and may become (Seijger *et al.*, 2017). Strategic delta plans can produce strategic priorities which go beyond mainstream planning processes. For instance, in the Netherlands the Dutch Delta Committee framed the issue of flood protection as too urgent to be left to the regular political process (Vink *et al.*, 2013). Its strategic delta plan tabled drastic recommendations for increasing flood protection and freshwater storage. Likewise, between 2009 and 2013, California devised its Delta Reform Act, Delta Council and Delta Plan to improve planning and management surrounding the coequal goals of water supply and ecosystem restoration in the Sacramento-San Joaquin river delta (Laćan and Resh, 2016). Other strategic delta planning processes have taken place in Bangladesh, England, Louisiana, Myanmar and Vietnam (CPRA, 2012; Environment Agency, 2012; GED, 2018; Royal HaskoningDHV *et al.*, 2013; 2014).

In terms of implementation, a main role of strategic delta plans is to influence people's thinking about the priorities and strategies to be pursued in delta management. Those involved must understand that continuation of current priorities, policies and the related human interventions – usually framed as a business-as-usual scenario – would threaten the sustainability of delta areas (Renaud *et al.*, 2016; Tessler *et al.*, 2015). For instance, in many deltas rapid urbanisation, industrialisation and agricultural intensification have resulted in competing claims for land and water use, increased flooding, salinity intrusion, environmental

degradation and compromised livelihoods (Szabo *et al.*, 2016; Renaud *et al.*, 2013; Syvitski *et al.*, 2009). Although strategic planning happens on top of regular planning, implementation of transformative ideas relies on the same people who produce and implement regular plans. They must learn about and buy into the strategic delta plan, and then find ways to embed the strategic delta plan's priorities and alternative approaches into regular projects and planning (Albrechts and Balducci, 2013; Faludi, 2000).

This influencing of minds is challenging, as people in conventional planning systems address problems in a particular way, and many actors are content with the status quo (Albrechts and Balducci, 2013; Mäntysalo, 2013). Given this challenge, alongside the recent wave of strategic delta plans and the power these plans have to muster substantial investment funds over a period of decades,² it is relevant to explore how effective strategic delta plans have been in changing the minds of actors at various levels in planning systems.

To this end, we introduce four features of “soft” delta plan implementation. We then apply these to analyse implementation of the Mekong Delta Plan (MDP) in Vietnam. In doing so, we address two gaps in the scientific literature. The first gap is theoretical, as few studies offer methodologies for investigating strategic delta plan implementation. Seijger *et al.* (2017) presented a strategic delta planning framework that includes implementation, but their account was highly conceptual due to the probing nature of the underlying case studies. Kwakkel *et al.* (2016) proposed methods for decision-making under conditions of deep uncertainty in deltas (i.e., robust decision-making and adaptation pathways), but did not explore plan implementation. The field of strategic planning offers several studies of plan implementation (e.g. Mastop and Faludi 1997), insights from this field will therefore be connected to strategic delta plan implementation. The second gap is the general absence of strategic delta plan implementation studies. The studies that are available

² The Mekong Delta Plan attracted an initial US\$310 million loan from the World Bank. Second and third instalments of similar amounts are expected towards 2030. The Dutch Delta Programme commands a budget of some €15 billion up to 2028. The Bangladesh Delta Plan seeks to earmark \$70 billion up to 2050.

address one particular strategy for delta management, such as flood-based agriculture (Tran *et al.* 2018a) or long-term adaptive flood risk management (Zevenbergen *et al.* 2013), rather than overall strategic delta plan implementation.

The MDP (2013) is a recently developed strategic delta plan that envisions an agro-industrialisation path for the Mekong Delta, with economic diversification and specialisation across agricultural products and regions (Royal HaskoningDHV *et al.*, 2013). It proposes major management and strategic reorientations. However, we know little about what influence the plan has had in practice. How effective has the MDP been in changing minds and influencing on-the-ground delta management? A long-standing challenge in the delta is declining freshwater availability due to reduced river flows, groundwater exploitation, salinity intrusion and climate change (Erban *et al.*, 2014; Wagner *et al.*, 2012). Shrimp and rice farming, the two most prevalent forms of intensive agriculture in the Mekong Delta, are increasingly questioned as well, due to their diminishing returns and high environmental costs, particularly soil and water pollution and loss of mangroves (Guong and Hoa, 2012; Joffre and Bosma, 2009; Tuan *et al.*, 2007; Tran *et al.*, 2018b). Meanwhile, management of land and water resources has been characterised as top-down with little coordination between Mekong Delta provinces and between the delta and Hanoi (Benedikter, 2013; Kien *et al.*, 2016).

3.2 Soft implementation of strategic delta plans

Various literatures discuss the connects and disconnects between planning and implementation. In the policy sciences, authors refute the top-down assumption of policy formulation followed by implementation, as policies change during implementation in a process of communicative interaction between policy actors and target groups (Grin and Van de Graaf, 1996; Hupe and Hill, 2015). In the field of planning, conformance with plans, or “hard implementation”, is assessed by the extent a plan can be directly linked to outcomes predetermined by it (Pressman and Wildavsky, 1984; Talen, 1996). Yet, plan conformance studies tend to focus on operational plans and policies, as these are detailed and specific regarding, for

example, what should happen, where, how and when (Brody and Highfield, 2005; Phi *et al.*, 2015). In contrast, strategic delta plans are indicative and abstract. They sketch alternative futures for a delta and envision appropriate strategies to those ends. As a result, there is little value in assessing the implementation of a strategic delta plan based on hard implementation criteria. Instead, similar to strategic plans, their influence and performance can best be assessed using soft features related to learning, persuasion and changing minds (Mastop and Faludi, 1997; Faludi, 2000). Though such soft features are by definition rather intangible, they are required before hard implementation can take off in the form of detailed project plans and policies.

The extent that a strategic delta plan is influential can be assessed using four interrelated “soft” features of implementation:

3.2.1 Prospects for change

A strategic delta plan conveys a long-term vision of prospects for change (Mäntysalo, 2013), including priorities and strategies for developing the delta more sustainably. The strategies represent steps that can be taken towards the envisioned future. Strategic delta planning widens the group of people involved in planning, involving those whose knowledge and interests were previously less represented in the planning system. This produces a creative and innovative process that can make the strategic delta plan an innovative force introducing new possibilities and potentials (Healey, 2009). Strategic delta plans thus have the potential to open a range of new possibilities in delta management and livelihoods and to change the course of delta management (Seijger *et al.*, 2017).

3.2.2. New mental models

To implement the long-term vision of what a sustainable delta could be, the mental models that people carry in their heads have to change (De Geus, 1988). For instance, in relation to sustainable water supply in the Mekong Delta, people need to start thinking about the limits of groundwater resources and the near unavoidable

increase in salinity intrusion. This is essentially a learning process (De Geus, 1988; Faludi, 2000) in which people become aware of why strategic choices have to be made and what alternative strategies could be practised to achieve a more sustainable delta. The people involved may range from powerful decision-makers and politicians to planners, bureaucrats, academics and societal movements. People will probably have to be coaxed out of their comfort zone, as many actors may be content with the status quo (Albrechts and Balducci, 2013). They will also need to figure out how new strategic orientations and alternative strategies can be included in the regular planning system. New mental models in various organisations and at different levels of planning lead to new understandings of what a sustainable delta is and may become. Such understandings make it more likely that innovative ideas and strategic orientations will travel across the institutions that constitute and are affected by the planning system (Healey, 2009; Albrechts and Balducci, 2013).

3.2.3 Consent

Once mental models begin to change, consent to strategic priorities and transformative ideas has to be obtained to foster support from powerful and influential actors (Seijger *et al.*, 2017). Negotiating consent is an informal process of accommodating different interests, such as actors' socio-political agendas and spatial claims. Due to the multiplicity of actors involved in delta decision-making and planning (e.g., politicians, planning bureaucrats, societal movements and scientists), consent negotiations take place at multiple locations, levels and points in time. The negotiations prepare different actors to "go along with" changes in priorities (Checkland and Scholes, 1990), for instance, on what to sustain in the delta when it comes to the environment, agriculture and industry. Strengthening and expanding consent enlarges the coalition of supporting actors, thereby enhancing the likelihood that the strategic delta plan's ideas and strategies will become embedded in on-the-ground plans, policies and livelihoods. Consent is renegotiated in each round of decision-making. For instance, to come to regional-local consent, limited divergence from strategies in the strategic delta plan is expected due to differences between

national and regional perspectives, motivations and abilities (Seijger *et al.*, 2017; Phi *et al.*, 2015).

3.2.4 Decision-making

Only after learning has taken place, and consent established, can the step be taken to decisions and actions influenced and coordinated by the plan (Faludi, 2000). Indeed, a strategic delta plan must influence decisions, actions, programmes and projects if it is to contribute to the envisioned long-term development of the delta. For instance, land use plans need to be modified to reflect strategic zoning for floodplains, urban areas and industry. Many policies, programmes and projects will predate the strategic delta plan and have to be reoriented and reshaped to reflect the strategic orientations of the plan (Seijger *et al.*, 2017). As a result, the new priorities and alternative strategies in the strategic delta plan become increasingly reflected in decisions and actions for delta management over time.

These four features together provide a means to assess the extent that a strategic delta plan has changed minds about how problems in urbanising deltas can and should be addressed. They are thus indicative of how influential a strategic plan has been in terms of soft implementation. Obviously, a strategic delta plan does not have to be followed exactly and at all costs. Ideas and strategies may be reconsidered for various reasons, not least, new knowledge, technologies and policy priorities.

3.3 Research design

3.3.1 Analytical framework

To study implementation of the MDP, we embedded the four soft implementation features into the “Hourglass” analytical framework for strategic delta planning. As this framework has been published and tested elsewhere (Seijger *et al.*, 2017), we suffice here to summarise the main elements. The framework conceives of strategic delta planning as a political process in which actor coalitions, innovative strategies and participatory planning tools play a role in negotiating consent for plans and strategies. These negotiations are also affected by the political

and institutional context, by formal and informal rules of decision-making, and by the prevailing cultures of participation, planning and negotiation (Briassoulis, 1989; Innes, 1996; Ostrom, 2007; Sabbatier and Weible, 2007). The Hourglass framework represents a long-term perspective. That is, it covers actor coalitions and strategies that existed prior to the strategic plan, and recognises that implementation of strategic choices and related activities may continue for 20-40 years until a new strategic plan is developed.

The Hourglass framework distinguishes three phases of decision-making:

- **Agenda setting.** The agenda-setting phase determines the main agenda and key issues to be addressed in strategic delta planning. It also raises awareness of the potential of the strategic delta plan to yield a more desirable future for the delta.
- **Plan formulation.** In the formulation phase, a strategic delta plan is developed that has political support and can serve as a frame of reference for future project plans. A strategic delta plan is usually developed within a few years, culminating in political endorsement of the plan.
- **Implementation.** Different policies, programmes and projects will contribute to the envisioned long-term development of the delta. Some divergence from the plan is expected, as the mainly national perspective of plan formulation must be adapted to local and regional realities.

The features of soft implementation coincide with the plan formulation and implementation phases of the Hourglass framework. Strategic delta plan formulation yields prospects for change (feature 1). In drafting the plan and gathering support for political endorsement of the plan, new mental models emerge about delta management, strategies and livelihoods (feature 2). The shaping of new mental models and consent negotiations extend into the implementation phase, as actors

discuss the content of the strategic delta plan (feature 3) and try to align it with policies, programmes, projects and plans on the ground (feature 4). Material, or “hard”, implementation then occurs through the execution of policies, plans and projects that, despite some expected divergences, are overall aligned with the strategic goals and priorities.

3.3.2 Method

Our goal was to better understand implementation of strategic delta plans. For this, we selected the case study as our research method. The case study has a high construct validity; that is, it enables the researcher to identify and measure indicators that best represent the theoretical concepts of interest (George and Bennett, 2005). Furthermore, the case study allows in-depth analysis of complex and multidimensional phenomena in their context (Flyvbjerg, 2006). The phenomenon that we were interested in was the influence of a strategic delta plan in changing minds at various levels in a planning system.

We selected for our case study the MDP. The Mekong Delta is one of many deltas impacted by rapid urbanisation, industrialisation, agricultural intensification and climate change. Others are the deltas of the rivers Elbe, Ganges-Brahmaputra, Irrawaddy, Mississippi, Nile, Po, Rhine and Zambezi (Künzer and Renaud, 2012; Syvitski *et al.*, 2009). Inhabitants of these deltas are being forced to adapt to salinity intrusion and diminishing freshwater availability. We deemed the Mekong Delta as a representative case to explore the influence of a strategic delta plan on thinking and decision-making about delta management in such new circumstances. Moreover, as the MDP was completed in 2013, sufficient time has passed to study the extent the plan has influenced the minds and decisions of those in or related to the Vietnamese planning system. Our case study focused on multiple levels, from ministries and international agencies operating in Hanoi, to the interprovincial delta level and provincial level, particularly implementation efforts in the coastal province of Tra Vinh. The case study sought to determine how minds have changed and how ideas from the MDP travelled into sectoral policies, new research and project

proposals in the 2013-2016 period. We also reflected on the changes that have not been achieved as yet.

For our case study, we used four data sources. Primary data was provided by interviews undertaken in May 2016. Interviewees met three criteria: (1) they worked in the Vietnamese planning system at the national, delta or Tra Vinh Province level, (2) they were familiar with the MDP or could directly relate content of the MDP to their work, (3) they were Vietnamese nationals or worked directly for Vietnamese governmental institutions. Fifteen interviews were held. Two interviewees operated at the national level, five at the delta level, four in Tra Vinh Province and four at the international level. They worked in government (7), in universities and research institutes (4) and in international development (4). Most were Vietnamese (10). The interviews were semi-structured and covered the phases in the Hourglass framework: agenda-setting, plan formulation and implementation. Supplement S1 presents the interview guide. Interviews lasted 45 to 75 minutes. Secondary data was obtained from documents on Mekong Delta policies and planning. In addition, informants were asked follow-up questions on the development and uptake of the MDP. Lastly, researchers took four field trips to learn first-hand about livelihoods and possible shifts in MDP strategies. These field trips were in the provinces of An Giang (1) and Tra Vinh (3).

We analysed the data qualitatively in consecutive rounds. First, we transcribed and analysed the interviews according to a list of codes derived from the Hourglass framework (see supplement S2). This template coding (Crabtree and Miller, 1999; Miles and Huberman, 1994) yielded tables associating what interviewees said with the various codes. Next, we drew up an Hourglass case analysis focused on interviewees' perceptions related to agenda setting, plan formulation and implementation of the MDP. We then realised that regarding MDP implementation, interviewees had spoken directly or indirectly about the need for changes of mind within and beyond the planning system. Hence, a second, revised case analysis (section 4) was drawn up that also included perceptions related to changes of mind

associated with the MDP, including comments on where minds were already changing at the various levels in the planning system. Interviewees were not quoted in the analysis, for reasons of narrative coherence and confidentiality. To come to an internally valid case study (Gibbert *et al.*, 2008), we selected elements from the interviews that either were repeated by other subjects or could be triangulated with secondary data sources (e.g., plans, policies, decrees, media items and scientific research). Due to the multicausality issues (Faludi, 2000; Talen, 1996), we must acknowledge that in changing minds and influencing decisions on Mekong Delta management, the MDP is not necessarily the only or even the decisive factor, as there are other influences, such as ideas and policies predating the MDP, political opportunism, economic motives and other parallel initiatives. Yet, many interviewees made frequent explicit reference to the MDP. This suggests that they perceived a link between the ideas in the MDP and changing minds and decisions. Our case analysis includes examples of MDP implementation only when interviewees or informants explicitly referred to the MDP as having been influential.

3.4 Implementing the Mekong Delta Plan

The Mekong Delta is the last station of the Mekong River before it reaches the South China Sea. Some 17 million people live in the delta, which has a total surface area of 40,000 sq. km (12% of Vietnam). The delta is mostly flat, with a vast network of waterways, river channels and intensive farming systems, interspersed with villages and medium-sized provincial cities like Long Xuyen, Can Tho and Tra Vinh. The boundaries of the delta are usually defined by the administrative territories of Vietnam's 13 Mekong Delta provinces (Figure 5). Most of the delta has an elevation within 2 m of current sea levels, making it vulnerable to impacts of sea level rise and salinity intrusion (Long, 2017). Intensified agriculture, particularly mono-shrimp and triple rice culture, is another threat, as it impacts natural water flows and the quality of soils and water (Chapman *et al.*, 2016; Tran *et al.*, 2017). Figure 5 shows that rice was the dominant land use in in 2015 (43%), followed by

cash crops and fruit trees (18%), shrimp (16%), forest (8%). The remaining 15% of land use consists of roads, rivers, and urban areas.

Figure 5. Land use map showing the dominance of rice in the Mekong Delta in 2015. Source: Land Resources Department, Can Tho University (CTU)

The MDP was undertaken to develop policy responses to climate change and socio-economic developments in the Mekong Delta. Modelled after the Netherlands' Delta Plan (2008), which in that country effectively buttressed policy responses to coping with climate change and sustainability issues, the Vietnamese government pursued an analogous process of strategic delta planning. Its goal was to ensure a safe, prosperous and economically and environmentally sustainable delta into the future. Between 2010 and 2013, Dutch and Vietnamese experts worked together on the MDP, under the auspices of the Deputy Prime Minister and authorised by the Ministry of Natural Resources and Environment (MONRE) and Ministry of Agriculture and Rural Development (MARD).

Our MDP case analysis is presented below. It starts by looking back at previous strategic master plans and their implementation. It then looks at the

development directions proposed in the MDP and the changes needed to implement them. We then examine the extent that minds have changed to become more aligned with the ideas in the MDP, based on our data sources. Finally, the soft influence of the MDP is assessed in regard to the four features of soft implementation introduced earlier.

3.4.1 Master planning in the Mekong Delta

From the 17th century onwards, the Mekong Delta has been developed through large-scale human interventions, particularly land reclamation, construction of a vast network of water channels and relocation of people to exploit the region's resources (Huu Nguyen *et al.*, 2016). These interventions continued during French colonial rule and nation-building from the 1930s to early 1950s (Biggs, 2012; Huu Nguyen *et al.*, 2016; Wesselink *et al.*, 2015). Development efforts stagnated during the Vietnam War of 1950-1975, as large parts of the delta were abandoned and neglected. The delta returned to a more natural state, with wild plant and animal populations thought to have rebounded to colonial-era numbers (Biggs, 2012). However, chemical defoliants and napalm bombing damaged almost 5 million hectares of forest during the war years (Huu Nguyen *et al.*, 2016).

Around Vietnam's unification in 1975, a Mekong Delta master plan was completed (NDDT, 1974) to spur agricultural production, mainly through water control and rice production, to feed the hunger-stricken country (Van Staveren *et al.*, 2018). Interventions to increase rice output focused on reclaiming fertile areas in the upper delta's Long Xuyen Quadrangle and Plain of Reeds (Benedikter, 2013). By 1979 paddy output had begun to rise, and the delta became a key granary for the entire country (Huu Nguyen *et al.*, 2016). By 1990, the food insecurity issue had largely been resolved. From a strategic point of view, the planning system, which operated based on development targets and five-year plans, was thus highly successful (Table 4).

Table 4 Vietnam's rapid rise to become one of the world's five largest rice-exporting countries by 2013. Source: Food and Agriculture Organization of the United Nations, FAOSTAT Database

	Rice exports (1000 tons)					Global rank in 2013
	1973	1983	1993	2003	2013	
India	170	230	767	3401	11,300	1
Thailand	846	3471	4980	8383	6787	2
Vietnam	2	89	1722	3813	3939	3
Pakistan	788	904	1032	1819	3822	4
USA	1588	2334	2635	3735	3183	5

With the Doi Moi economic reforms of 1986, Vietnam began to pursue integration into the global economy, and the international donor community engaged, resuming its financial support (Benedikter, 2013). The next delta-wide master plan (1990-1993) aimed to boost economic development. It identified more than 100 projects, with a shortlist of 60 priority activities totalling more than US \$1 billion (NEDECO, 1993). The projects covered agricultural production, fisheries, forestry, navigation and flood protection. Based on the plan, the World Bank and Australian government, among others, pledged funding for large-scale water control schemes. Implementation of this plan could be regarded as a success. Rice areas expanded in the upper and middle parts of the delta, as sulphide acid soils were reclaimed (Nhan *et al.*, 2007). This spurred rice exports to ever higher levels (see Table 4). However, along the coast implementation largely failed, as the ambitious rice targets proved incompatible with local realities. Dyke rings and irrigation systems were built to boost rice production, for example, in South Mang Thit (>250,000 ha) and Quan Lo-Phung Hiep (~450,000 ha) (Cosslett and Cosslett, 2014). However, rice farmers switched to the lucrative shrimp business, bypassing tidal gates and dyke rings to allow brackish water to flow in (Can *et al.*, 2010).

Implementation of the master plans brought to light weaknesses of the planning system. Our interviewees spoke of “fragmentation”, “wish-list planning” and “a preference for large infrastructure”. First, coordination was seen as highly fragmented – between ministries, between provinces, and between the ministries and the provinces. This resulted in a tangle of plans and policies handed down from Hanoi to the delta.²³ At the national level, some 270 planning processes were in place, with more than 19,000 plans in effect just for the 2010-2020 period. The provinces and ministries set unfeasible development targets for the delta, namely, ever-more rice, fish and industry. Achieving them would have required an area four times larger than the whole Mekong Delta (Royal HaskoningDHV *et al.*, 2013).

Second, the master plans were seen essentially as wish lists. Each province and ministry pursued its own interests, and interviewees noted that short-term interests prevailed, often at the expense of the environment and local livelihoods. For instance, permanent dyke-protected agricultural areas served the rice production targets of the Ministry of Agriculture, yet undermined natural resources such as fish stocks (Huu Nguyen *et al.*, 2016). In addition, permanently dyked areas exacerbated downstream flooding (ICEM, 2015), reduced inflows of fertile sediment (Chapman *et al.*, 2016), undermined incomes from fisheries (Tong, 2015) and contributed to accumulation of pesticides in delta floodplains and wetlands (Triet *et al.*, 2013).

Third, as Benedikter (2013) pointed out, politicians, planners and engineers formed non-transparent, well-connected networks in Hanoi and the delta. This bureaucracy demonstrated a strong preference for capital-intensive infrastructure, like dyke rings, sluice gates, canal systems and pumping stations (Benedikter, 2013). Referring to these preferences, interviewees questioned particularly projects to install intensified rice production systems in the coastal zone, as these were often incompatible with local livelihoods and the environment (Hoanh *et al.*, 2006).

²³ Master planning in Vietnam is done by line ministries, which set targets for development towards 2030. Recently, approved master plans cover agriculture (Decision 124/QĐ-TT), aquaculture (Decision 1445/QĐ-TT) and industrial development (Decision 879/QĐ-TTg)

3.4.2 MDP and changes needed for implementation

The MDP was developed between 2011 and 2013. From the start it was clear that the MDP would not be a programme of capital projects, as at the time there was no budget for such investment.⁴ Instead it would be a visionary document on the future development of the Mekong Delta, with congruent delta-level strategies. The document aimed to inform policy discussion, strategy formulation and projects, all of which would be aligned with the vision. In the MDP the delta is subdivided into three hydrological zones: the upper delta, which copes with increased fluvial flooding; the middle delta, which faces freshwater shortages in the dry season; and the coastal delta, which deals with issues of coastal protection and salinity intrusion.

The MDP problem analysis is critical of the development directions advocated in previous master plans. For instance, though those plans set out to accommodate the needs of a growing population, nowadays there is net out-migration. Industrialisation in the delta has also remained substantially below master plan targets, with industries scattered across the delta, operating well below capacity and unnecessarily occupying fertile agricultural lands. Though Vietnam has prioritised and maximised triple rice production, the high dyke systems that enable triple rice cultivation have had detrimental environmental impacts and exacerbated flooding downstream. Thus, the profits of the extra (third) rice crop have to be weighed against the extra cost of flood protection downstream and lost revenues from fishing in the flood season. The main conclusion of the MDP problem analysis is that the agricultural sector in the delta should modernise, as past policies to maximise production have placed too heavy a burden on the region's water resources, on which agriculture depends. Permanent dykes have reduced water retention area, exacerbated downstream flooding and aggravated droughts. In addition, farmers' frequent recourse to groundwater reserves has led to subsidence

⁴ Initially, this led to semantic confusions around the English and Vietnamese meanings for delta *plan*. For some policy and bureaucratic stakeholders, the very word plan brought expectations of an investment programme in the traditional master plan style. Establishing the MDP as a visionary document integrating, the myriad of sector plans was thus a change of minds process itself.

and resource depletion. Lastly, salinity intrusion is moving inland, impacting more and more agricultural land. Fundamental strategic decisions are thus needed to shift away from intensified agriculture and overreliance on fresh-water resources.

To achieve sustainable growth, the MDP envisions agro-industrialisation in the delta. This development path is presented as consistent with the delta's agriculture-based economic structure and environment. The delta would thus develop into a regional agribusiness hub with specialised food-processing industries. Production models for fruits, aquaculture and other commodities would be transformed into modern, commercially oriented systems yielding superior quality to meet international consumer standards and demands.

The agro-industrialisation vision follows from three related strategic choices. First, to adapt resource use to the delta's changing, dynamic and diverse setting, the region will shift to a policy of living with the floods and brackish aquaculture, instead of insisting on full flood control and salinity prevention. In other words, it will see flooding and saline conditions as an opportunity. Second, economic diversification and specialisation will be pursued across agricultural products and regions to increase the economic value per hectare. Instead of trying to grow rice everywhere regardless of the cost, production will be attuned to regional conditions. Thus, the upper delta will focus on a combination of double rice and flood-based agriculture. The middle delta will focus on high-value rice and fruit-based food products, and the coastal area will specialise in high-value brackish aquaculture. Third, diversification and specialisation into highly commercial products will be pursued through collaboration and coordinated efforts involving ministries, provinces, researchers, farmers' cooperatives and actors such as banks, feed companies and processing industries in (to be developed) supply chains.

These strategic reorientations necessitate major changes in thinking throughout the entire planning system. Our interviewees said that the central government and ministries in Hanoi needed to realign their policies and business models to the strategic directions in the MDP. The success of post-war nation-

building and the Communist Party were rooted in maximisation of rice production, with the Ministry of Agriculture essentially concentrating on the building of ever more dykes and sluice gates for water control to grow more rice. Interviewees said it will be important for ministry officials and lower level staff within MARD and MONRE to support the new MDP way of thinking, though it is a stark departure from former practices. Moreover, the focus of planning was previously on the provincial level and agricultural output targets (e.g., tons of rice per year), while the MDP emphasises the interprovincial delta scale and economic measures that include externalities (e.g., the impacts of agriculture on the environment and increased flood risk downstream). In short, changes of mind are needed to rally these officers behind strategies like flood-based agriculture and brackish aquaculture. Interviewees also spoke of the need for a change of mind within the international community. While international agencies have financed large-scale infrastructure to enable triple rice expansion, the MDP prioritises more dynamic and diverse land use across the delta.

Interviewees further said that stronger collaboration will be needed among the delta provinces to support implementation of the agro-industrialisation vision. For instance, collaboration will be needed to decide where to develop what kinds of industrial zones to support diversification of agricultural products and specialisation in agribusiness. Similarly, an interviewee suggested that more collaboration will be needed among universities and research institutes, to better understand the delta system and further investigate the trends and strategies set out in the MDP. Finally, interviewees mentioned the need for farmers to shift, when possible, to double rice and flood-based agriculture in the upper delta, and to sustainable alternatives to intensive shrimp farming in the coastal zone, alongside management for increased coastal protection (e.g., poly-aquaculture and mangrove-shrimp mixed cultivation). However, for farmers to make these shifts, supply chains need to be developed to support the production and processing of high-value agricultural outputs.

3.4.3 Changes of mind at multiple levels

The perceptions expressed by our interviewees confirmed the need for changes of mind at all levels of the planning system in order to implement the agro-industrialisation vision of the MDP. We therefore explored how the MDP has been received and its influence thus far at the different *levels* of the Vietnamese planning system.

At the *national* level, interviewees said that minds were changing within the central government and ministries of agriculture (MARD) and natural resources (MONRE). Officers were beginning to acknowledge that the delta should be developed differently, departing from previous growth strategies. There was also growing awareness of the need to reduce triple rice in the upper delta, and to halt rice intensification in the coastal areas in favour of farming systems better adapted to rising salinity. Interviewees characterised the change of mind process as slow, as increasing rice production has been a key priority for decades. They attributed changes of mind in part to policy advocacy by MDP proponents. Particularly active has been a group of some 20 Vietnamese experts who were involved in the three rounds of review for the MDP, along with World Bank representatives. Recent policies were cited as reflecting key MDP ideas. For example, in its agricultural restructuring policy (Decision 899/QĐ-TTĐ) MARD is moving away from fixed targets for rice and land use, towards more flexibility and adaptation to salinity. Furthermore, the Prime Minister's Decision 593 on interprovincial collaboration in the Mekong Delta conveys the notion from the MDP that more collaboration between the provinces is essential for sustained economic growth. Yet, though key individuals at the national level have changed their thinking to some extent (particularly Deputy Prime Minister Hoang Trung Hai and MARD Vice Minister Hoang Van Thang), several interviewees stressed that the general workforce in the ministries still adhered to rice production targets and large-scale construction of high dyke and sluice gate infrastructure.

Vietnam remains largely dependent on *international* donors to implement land and water management projects. A group of nine development partners, including the World Bank, the Asian Development Bank (ADB), the International Union for Conservation of Nature (IUCN) and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), formally endorsed the MDP on 18 December 2013. Interviewees said that these partners see the MDP as a vehicle to align their efforts towards a more sustainable delta, whereas before they operated more in isolation, supporting separate loan requests for agriculture, infrastructure and flood control projects. The nine partners have undertaken to use the MDP as a basis for their policy and project choices. The World Bank initiated, together with the Vietnamese government, a US \$310 million loan for activities corresponding to the transitions proposed in the MDP. According to interviewees, an off-the-shelf plan was initially submitted to increase rice production in the coastal province of Tra Vinh. Funds were requested for dyke maintenance and three large sluice gates. After MDP authors reviewed the proposal, the World Bank declined it, observing that it did not contribute to the envisioned shift towards brackish sustainable aquaculture. After the review, the province adapted the proposal to bring it more into line with the MDP principles, and the project was subsequently approved. GIZ and IUCN, for their part, are funding research to further investigate the coastal protection strategy and alternative farming systems discussed in the MDP.

Despite the coordinated efforts of the group of development partners, interviewees said that opportunities remained to fund “old-style” policy and planning projects, such as those promoted in previous master plans. Such funding could be found both within national budgets and from the donor community. An example of the latter is the Saline Intrusion Prevention Sluice Gate Construction Programme, under which 68 new sluice gates were to be constructed in the delta and another 69 rehabilitated (JICA *et al.*, 2013). In the coastal area of Ben Tre Province, that programme unfolded into a US \$286 million Japan-funded project to counter

salinity and adapt to sea level rise, endorsed by the Prime Minister in December 2016.

At the *interprovincial* level, the vast majority of provinces in the Mekong Delta endorsed the MDP at the first Mekong Delta Forum in February 2015. Interviewees considered other main MDP advocates within the provinces to be the regional committee of the Communist Party (the “Southwest Steering Committee”) and scientists at universities across the delta, such as Can Tho University, An Giang University and Tra Vinh University. These proponents endorsed the ideas of the MDP and opined that more measures were needed to successfully shift from rice production to high-value crops and supply chains. Provincial authorities, too, seem to have recognised the need to collaborate beyond their own administrative boundaries. Such an interprovincial approach represents a break from the past, as each province previously pursued ambitious but fragmented socio-economic growth targets. Steps have already been taken to practise the interregional approach. Following discussions between development partners and the government at the first Mekong Delta Forum, GIZ took the lead in assisting the Ministry of Planning and Investment in drafting a pilot regional coordination regulation. The Prime Minister endorsed the regulation as Decision 593 on 6 April 2016. An interprovincial collaboration pilot is now under way in the upper delta’s Plain of Reeds and Long Xuyen Quadrangle.

Scientists across the delta are involved in research projects related to the strategies in the MDP. These are producing more insight on feasibility and the prerequisites for agricultural modernisation to take off. The Vietnam Academy of Social Sciences is coordinating a large, US \$1-2 million research programme for 2016-2019, called the Science and Technology Programme for South-Western Vietnam. One interviewee saw this programme as an opportunity to equip researchers and policymakers with new knowledge and data on future strategies and livelihoods, to critically reflect on approaches and ultimately to support change and innovation. Other interviewees pointed out smaller research efforts formulated in

line with the MDP. For instance, Can Tho University had a project on agricultural value chains, and the University of An Giang was conducting research on the reintroduction of floating rice and adaptation to flooding. Lastly, interviewees noted growing media attention for MDP ideas, particularly after an IUCN-organised tour in June 2016. The tour introduced journalists to the links between migration and unsustainable development, the impacts of sediment loss and salinity intrusion, alternative livelihoods and reassessment of rice policies. Afterwards, a series of articles appeared online and in print on deterioration of the delta, failing freshwater systems and alternative livelihoods such as rice-lotus farming.

Despite these examples, MDP implementation at the delta level has not been without obstacles. Collaboration between the provinces has remained challenging, as rich upstream provinces like An Giang have more influence than the poorer downstream provinces like Tra Vinh and Ben Tre. However, these latter have largest transformations ahead, as they are most affected by droughts, exacerbated flooding and salinity intrusion. Though university scientists are among the main advocates of the MDP, researchers in governmental research institutes – such as the Vietnam Academy of Water Resources, the Southern Institute of Water Resources Research and the Institute for Water and Environment – are less proactive, doing little to push for change in governmental plans. MARD's policy for An Giang Province, for example, still targets a nearly 10% increase in triple rice area between 2015 and 2020 (Decision 101/QD-BNN-TT). Within society, too, the MDP has had little impact as yet. Vietnamese and international NGOs were obligated to support the current provincial plans, which have not been revised in line with the MDP. Farming communities and the farmers' union had little involvement with the plan from 2013 to 2016, and it is difficult to determine what effect the media coverage and other developments might have had on their thoughts and opinions.

Zooming in on *Tra Vinh Province*, interviewees from the provincial departments of line ministries generally agreed with the MDP's problem analysis and the need for agricultural modernisation. Those familiar with the MDP considered it

to be a good plan. They found it helpful in the development of action plans and land use planning. Multiple project proposals had been developed in line with the MDP. One interviewee said that following discussions with Dutch and Vietnamese experts, officials realised the importance of reducing groundwater use. This led officials at the Department of Natural Resources and Environment (DONRE) to write at least six proposals for projects to harvest and store rain and floodwater during the wet season. These proposals were sent to the national government requesting budget from the Climate Adaptation Fund. However, these DONRE proposals were not shaped exclusively by the MDP, as one interviewee said. The plans were also influenced by national guidelines and targets set by ministries, the provincial socio-economic development strategy and specificities of the local context. Various interviewees pointed out that though the need for agricultural modernisation was acknowledged and supported by the provincial departments, lower level officials did not know how to link agricultural output with access to markets and improved value chains for high-value products.

Finally, at the *field level* in Tra Vinh Province, an interviewee from the Agriculture and Rural Development Office indicated not being familiar with the MDP. However, the official did agree with large parts of the problem analysis, particularly on the net out-migration of (failed) shrimp farmers and the need for agricultural modernisation in the district. Practical, field-level concerns were also raised. For example, a transformation to activities capitalising on brackish conditions was already under way with the shift from rice production to aquaculture. However, the current shrimp mono-farming system is not sustainable, as it is vulnerable to high summer temperatures, diseases and soil pollution. Likewise, for decades groundwater has been widely used in the district, and the official saw no easy alternative for freshwater supplies. Though shrimp-mangrove and fish-shrimp systems were understood to be more sustainable, there was no experience with shrimp-mangrove systems in the district. Previous fish-shrimp pilots had failed, as the fish ate the shrimp and farmers lacked access to fish seed.

3.4.4 Soft impact of the MDP

Our interviewees gave many examples of the influence of the MDP in changing minds at the national, international, interprovincial and provincial levels. This section assesses the influence of the MDP in terms of the four features of soft implementation.

Prospects for change. The MDP provides a new problem analysis and congruent delta-level strategies setting out what a sustainable delta is and may become. Moreover, the MDP offers an alternative development path, focused on high-value agriculture, agro-industry and value chains and introducing farming systems that are well-adapted to the natural setting in the delta, with water storage upstream and salinity intrusion in the coastal area. The MDP problem analysis has been instrumental in convincing people of the need to consider alternate futures. The plan demonstrates that the socio-economic expectations in the fragmented master plans have largely failed to materialise. Particularly, population, industry and agricultural output have remained substantially below master plan forecasts. In addition, the MDP process gave a voice to groups that were less represented in the planning system in the past. Particularly, senior scientists throughout the delta and the Southwest Steering Committee benefited from the inclusiveness of the process. They collaborated on problem analyses and in exploring strategies at the delta level, for instance, devising alternatives for triple rice policies.

New mental models. Proponents of the MDP have been active at various levels, and new mental models are gradually emerging that reflect the strategies advocated in the MDP (agricultural modernisation, crop diversification and specialisation, capitalising on brackish conditions). Main proponents of MDP ideas and strategies are the authors of the MDP, delta scientists, regional politicians, high-level advisors to ministries and the group of development partners. These actors have worked proactively to convince others in the planning system of MDP ideas, such as the need for alternatives to triple rice; the importance of zoning the delta into upper, middle and coastal regions; the value of interregional collaboration; and

opportunities to thrive on salinity intrusion. They have actively sought to change the mental models of others through outreach, presentations and discussions on key features of the MDP and how these can be incorporated into policies, projects and research. Furthermore, the media tour influenced journalists. They learned and wrote not only about the critical problems discussed in the MDP, such as migration and the detrimental effects of rice intensification policy, but also about transformative ideas such as flood-based agriculture and brackish farming systems.

Emergence of new mental models takes time. Many in the planning system remained fixated on raising agricultural output. Frequently mentioned examples of people who had not yet changed were Communist Party members in Hanoi and provincial politicians who preferred triple rice and classic industrialisation; the general workforce in the provincial departments of line ministries, which continued to work towards unchanged master plans and policies; researchers employed by governmental agencies; development agencies working apart from the group of development partners; and farmers not actively engaged (as of 2016) and thus continuing to practice their erstwhile farming systems.

Nonetheless, minds were changing at the local, regional, national and international levels. A new consensus was emerging on transformative ideas for a sustainable Mekong Delta. We can thus conclude that MDP ideas and strategic orientations have travelled well across the institutions that constitute and relate to the planning system at various levels.

Consent. Support for the MDP is steadily growing. Our case analysis found local, regional, national and international support for the MDP problem analysis and proposed strategies for agricultural modernisation. Between 2013 and 2016, consent steadily expanded from the core group of senior scientists and Southwest Steering Committee, to the group of development partners, provincial authorities submitting proposals (which eventually withstood the review by the World Bank and MDP authors) and officials at the Prime Minister's Office and MARD. Elaboration of this consent, and related changes of mind, was linked to policy advocacy, outreach by

frontrunners, support of the Prime Minister's Office and the fact that several ideas, such as mangrove restoration and interregional collaboration, were already practised or advocated prior to the MDP.

Despite rising consent surrounding the MDP, many actors in the planning system did not subscribe to MDP ideas. Those whose minds had not changed thus far, had not yet consented to MDP ideas and strategies like more commercially-oriented production and farming systems that capitalise on brackish conditions. In addition, the Ministry of Planning and Investment had as yet hardly been involved. It was, however, slowly being drawn into MDP strategies through the World Bank loan. We can thus conclude that consent is still fragile and directly linked to a small group of early adopters.

Decision-making. Interviewees discussed a diverse set of actions and decisions that were influenced by the MDP, often as a result of policy advocacy by individuals. The group of development partners, for example, decided to align their efforts to the key principles of the MDP. This donor alignment and policy advocacy resulted not only in a major World Bank loan reflecting the MDP goal of agro-industrialisation, but also in central government policies reflecting changes in rice production ambitions (Decision 899/QD-TTG) and boosting interregional collaboration (Decision 593). In addition, research projects got under way to further analyse the strategies proposed in the MDP. Most of these influences remained preliminary and very soft. They had not evolved into hard, material changes, such as altered supply chains for high-end commodities or farmers adjusting their production systems.

3.5 Discussion

The title of this paper asked the question of whether strategic delta plans get implemented. Our case study of the MDP points to a positive answer, though it very much depends on how implementation is interpreted and assessed. Our analysis contributes in three main ways to understanding what strategic delta plan implementation entails for societies grappling with the need to manage the combined

impacts of agricultural intensification, salinity intrusion, environmental degradation and climate change.

First, our analysis showed that implementation of a strategic delta plan cannot be assessed by studying plan conformance with policies, projects and management on the ground (Pressman and Wildavsky, 1984; Brody and Highfield, 2005). Instead, a strategic delta plan should be regarded as a vision, geared towards influencing minds and leading to decisions to develop and redevelop policies, plans, projects and research programmes. We introduced four features of such “soft implementation”. These features cover both content and process outcomes of planning (Talen, 1996), thus providing a useful basis for assessing the influence and effectiveness of a strategic delta plan. Content outcomes relate to the generation of prospects for change (feature 1) and influences on decision-making from the national to the local and international level (feature 4). Process outcomes relate to new mental models (feature 2) and consent (feature 3). For planners, researchers, investors and government officials involved in preparation or implementation of strategic plans in coastal or delta areas – for example, in Bangladesh, Myanmar, Louisiana and Jakarta – the four features constitute valuable entry points for designing or assessing implementation processes beyond the usual “hard” criteria of plan conformance. Further research could explore these features in implementation of other strategic delta plans, or comparable strategic plans for marine and coastal zones (Arkema *et al.*, 2006), river basins (Varis *et al.*, 2008) and water resources (Giordano and Shah, 2014).

Second, the case of the Mekong Delta demonstrates that a strategic delta plan and novel strategies can indeed change minds. They can thus rally actors behind innovative approaches to cope with profound management challenges. The MDP concludes that major changes are needed to effectively address the challenges of intensive agriculture, limited freshwater supplies and lack of collaboration across governmental institutions (Tuan *et al.*, 2007; Kien *et al.*, 2016). Minds began to change at the national and regional levels within the Vietnamese planning system, as

awareness sunk in that alternatives were needed for triple rice production in the upper and middle delta, alongside sustainable aquaculture in the coastal zone. Interviewees indicated further an influence of the MDP in central government's decisions to introduce flexible rice production targets and experiment with collaboration among the delta provinces. In Tra Vinh Province, proposals were developed for rain and floodwater harvesting and storage projects to reduce groundwater exploitation. These positive examples of MDP implementation were attributed in part to the clear problem analysis presented in the MDP, which connected the dots from policy to economy and environment and sounded the alarm on the deteriorating socio-economic prospects for the delta. A reorientation was needed. This was provided by the plan in the form of strategies for agro-industrialisation and capitalising on opportunities offered by brackish conditions. The plan benefited from input from critical thinkers outside the planning system, such as senior scientists. This constituted a break with the past, ensuring that the plan did not merely echo the earlier master plan priorities.

Third, the MDP case illustrates that implementing a strategic delta plan is likely to be an incremental and piecemeal process. MDP ideas spread in small steps such as new research programmes, modified policies and new slants in project proposals, pilots and donor loans. All such efforts must be widely shared, coalesce together and form a front against vested interests until new ways of thinking about managing the delta become mainstream. Implementation is thus not smooth or instantaneous. This is due not only to the complexity of managing a delta (Renaud *et al.*, 2016) and the long-lasting influence of the preceding master plans (Benedikter, 2013; Molle *et al.*, 2009), but also because strategic plans are by definition abstract and cannot be linearly translated into local plans and project proposals. During our study period, 2013-2016, local stakeholders like the farmers' union were hardly involved in the plan, though their knowledge and support will be essential to bring transformative strategic delta plan ideas into local practice.

These implementation lessons based on our single case study merit further empirical investigation in other deltas. Those findings could supplement and update these lessons, contributing further to a better understanding of the influence and effectiveness of strategic delta plans. Further research could be done in the Mekong Delta too, exploring to what extent MDP strategic choices and key ideas are included in the provincial master plans due in 2020.

Though this study sheds new light on the implementation of strategic delta plans, it faced limitations as well. First multicausality issues are always in play when investigating the influence of strategic plans (Faludi, 2000; Talen, 1996). In our case analysis we used only examples explicitly attributed by interviewees to the MDP. However, this does not guarantee that the MDP was always the decisive factor. Our interviews with experts from various levels of the Vietnamese planning system provided an overview of the extent that minds have changed and are changing at the various levels of the planning system. However, this overview was limited by our group of interviewees and could have overlooked important differences of perspectives within or between organisations. Furthermore, at the provincial level, we only examined the influence of the MDP on decisions and actions in Tra Vinh Province. Our case study revealed that in a piecemeal way decisions and policies in the Mekong Delta were influenced over the 2013-2016 period. However, more time is obviously needed to explore the ongoing implementation of MDP ideas and strategies, and the extent that new strategic priorities for the Mekong Delta boil down into new policies, plans, proposals, activities on the ground and changes in farming systems. Lastly, we did not cover the full scope of the MDP. We focused on agricultural modernisation and the interregional approach, and thus paid less attention to MDP proposals to adapt to sea level rise and for coastal flood protection and water diversion.

3.6 Conclusion

The goal of this study was to explore how strategic delta plans get implemented. To this end, “hard” plan implementation criteria were found to be of

limited use, as strategic delta plans aim to facilitate “soft” changes in thinking about priorities and related strategies at the livelihood level. Changes of mind are needed, for example, about agricultural production and flood control, before material implementation can take off in the form of detailed plans and policies. Based on our analysis of soft implementation of the MDP from 2013 to 2016 we can draw the following conclusions for implementation of strategic delta plans in other urbanising deltas:

A strategic delta plan generates prospects for change in delta management. It can offer new ways of thinking about what a sustainable delta is, what kinds of choices have to be made to achieve it and what sorts of strategies are required. The MDP offers new insights on how to cope with the long-standing challenges of agricultural intensification, limited freshwater supplies and lack of intra-governmental collaboration. To this end, it promotes an agribusiness vision founded on three strategic choices: adaptation of agriculture to the delta environment, economic diversification and specialisation across agricultural products and regions, and enhanced interregional collaboration. The plan proposes innovative strategies, such as flood-based agriculture and capitalising on brackish conditions, to implement this agribusiness vision.

Strategic delta plans do not change delta management overnight. It takes at least three to five years before the prospects for change embodied in a strategic delta plan influence national policies and project proposals. People tend to be committed to business-as-usual strategies and policies. They are therefore unlikely to immediately embrace strategic reorientations of delta management. The MDP case demonstrates that minds have changed at various levels of the planning system in Vietnam, particularly the provincial, delta, national and international levels. Moreover, plans and policies on rice production, interregional collaboration and groundwater exploitation have already been influenced. However, the case study also revealed implementation to be piecemeal and fragile. More time is needed for MDP ideas and strategies to solidify.

The prospects and potential benefits of a strategic delta plan are tremendous, but such a plan should not be entered into lightly. As the MDP shows, a strategic delta plan can set an entirely new course for delta management, and muster significant investment funds from government and international development partners over a period of decades. The features of soft implementation examined here provide a clear framework for assessing whether a strategic delta plan is living up to its promise. They can also be used to explore the capabilities of societies in delta regions to shape and implement policies, local plans and projects that are effectively aligned with the strategic vision and thus effectuate the change of direction envisioned in delta management.

Chapter 4

4 ASSESSING STAKEHOLDER'S PERCEPTIONS OF NO-REGRET MEASURES FOR CLIMATE CHANGE ADAPTATION IN THE MEKONG DELTA

This chapter is corresponding with the article:

Hoang Thi Minh Vo, Gerardo van Halsema, Petra Hellegers, Bakker Evert-Jan, 2021, Assessing stakeholder's perceptions of no-regret measures for climate change adaptation in the Mekong Delta (*Submitted*) *Journal of Environmental Management*

Abstract

The recently adopted Mekong Delta Plan recommends the implementation of no-regret measures to adapt to the impacts of climate change. Proposed measures include floating rice cultivation, allowing room for river dynamics, and the integrated shrimp-mangrove farming system. These could enable the region to better cope with future flood risks while enhancing water management and protecting the coast. This study investigates grassroots stakeholders' perceptions of these innovations and their appreciation of them as multifunctional "green" adaptations to the impacts of climate change. The data were analyzed qualitatively using the Millennium Assessment conceptual framework and quantitatively using statistical techniques. We found large differences in stakeholders' views on the three measures. The qualitative analysis found wide appreciation among stakeholders for the ecosystem services they provided. Floating rice was particularly favored, thanks to its outstanding multifunctionality, including its adaptive "green" functions. However, it was not necessarily viewed as the ideal farming model. Farmers associated floating rice with a return to a grassroots "building with nature" livelihood model, representing little voice and power in policymaking. This qualitative result was confirmed by the quantitative results, as floating rice received the highest preference, followed by "room for the river". Surprisingly, the shrimp-mangrove farming system was not favored by respondents. Despite some limitations in sampling and population selection, our results suggest a willingness among farmers to adapt their livelihoods, in close association with changes in water use and management regimes.

4.1 Introduction

Vietnam is in the top five countries most seriously affected by global climate change (Smaijl, *et al.*, 2015, 2018). Within Vietnam, the Mekong Delta is especially vulnerable, as it is simultaneously impacted by changes in weather patterns, sea-level rise, and unsustainable water use in the upstream reaches of the Mekong River (Anthony *et al.*, 2015). Urbanization and human activities are causing many problems here, including water quality degradation, reduced water and sediment flows, coastal erosion, soil subsidence, and saline intrusion (Evers and Pathirana, 2018). The fertile soils of the Mekong Delta are intensively cultivated, making the delta a major source of rice on the world market. With a population of 18 million, living on approximately 40,000 square kilometers, the Mekong Delta is a hotspot not only for rice production but also for aquaculture and horticulture. The delta greatly contributes to Vietnam's food exports and national economy. However, in the face of climate change, the Mekong Delta is being subjected to increasing environmental pressures. These have affected freshwater supplies, water quality, salinity intrusion, coastal erosion, and delta flooding (Smaijl *et al.*, 2015; Anthony *et al.*, 2015), threatening agriculture and aquaculture and, indeed, the livelihoods of local populations.

After North and South Vietnam's unification in 1975, in an effort to combat famine Vietnam invested heavily in irrigation infrastructure, especially in the Mekong Delta (Biggs *et al.*, 2009; Biggs, 2004, 2012). By the turn of the 21st century, the sustained focus on rice intensification had made Vietnam the world's second-largest rice exporting nation. Intensification and expansion of agricultural production also gradually transformed the upper Mekong Delta floodplains. Whereas before, riverine floods had inundated agricultural fields annually, now high dikes prevented sediment-rich floodwaters from reaching rice fields and homesteads. This allowed farmers to harvest three rice crops per year. However, rapidly expanding construction of high dikes brought negative consequences as well. Recent studies confirm that presence of the high dikes has increased flood hazards downstream (Tran *et al.*, 2018; Triet *et al.*, 2017), while also bringing increased economic costs and

environmental degradation among farmers within the dike-protected areas (Tran *et al.*, 2018). The enclosed dike construction strategy, thus, appears to have reached its limits. In the heavy flood years of 2011 and 2013, many watersheds of the Mekong Delta had to reinforce the dikes to protect thousands of hectares of winter crops. An Giang Province, nonetheless, lost more than 7,000 ha of rice (Kien, 2013). This added momentum to a search for effective alternatives to the expansion of dike-enclosed rice fields on the floodplains, leading to the development in 2013 of the Mekong Delta Plan (MDP).

The MDP advocates “green” measures to facilitate a safe, prosperous, economically, and environmentally sustainable, and climate-proof future for the delta region, taking into account a 100-year timeframe (Vo *et al.*, 2019). In particular, three lines of “no-regret” measures are proposed: (i) restoring the delta’s natural floodplains with controlled flooding to accommodate future higher river peak flows; (ii) enhancing freshwater retention capacity in response to the dwindling dry season river flows and the lengthening drought spells; and (iii) accommodating a wider band of salinity intrusion in the coastal zone. These measures are characterized as “no-regret”, as they do not require huge up-front infrastructure investments in the short term, and they allow scope for flexible adaptation to unforeseen developments in the mid-term to long term (Haskoningdhv and Deltares, 2013). Nonetheless, these proposed measures are a marked shift from previous practices in the delta. To succeed, livelihoods in the region will have to change in conformity with the multifunctional services envisioned by the proposed measures. In other words, the success of the measures relies largely on their uptake by the farmers who are the main grassroots stakeholders.

The present study examines stakeholders’ perceptions of these three key measures, as proposed in the MDP. Particularly, it zooms in on stakeholders’ views of the desirability and feasibility of the measures. Multifunctionality is a central concept in the MDP in two regards. First, the measures promoted in the plan seek to combine benefits to local livelihoods with long-term climate change adaptation

and sustainable regional development. Second, the plan recognizes that the more functions a measure serves, the greater the likelihood that stakeholders will embrace it. We thus assessed stakeholders' perceptions of three no-regret measures for water management in the Mekong Delta: cultivation of floating rice (aimed to assure local livelihoods under a "living with floods" water management regime), "room for the river" (to increase the freshwater retention capacity of the delta, thus protecting natural values, while enabling agriculture and other human activities), and expanding the integrated shrimp-mangrove farming system (to enable coastal farmers to earn a livelihood while allowing a larger band of salinity intrusion in the coastal zone). This study further refers to these no-regret measures as "innovations". If these innovations are to be successfully transitioned from the plan to the field, stakeholders need to embrace them. This raises two crucial questions, which this study explores: (i) Do farmers see promise in the livelihood opportunities on offer, thus making it likely that farmers will adopt them, and thus also embrace the accompanying adaptation measures? (ii) How successful have the innovations been in fostering consent, or support, among grassroots stakeholders? These green innovations and their associated livelihood opportunities were designed to deliver benefits both at the local level – not least, a steady income for residents – and at the regional level – such as a sustainable water management regime for the delta at large. We, therefore, assessed stakeholders' views both locally (i.e., on the livelihood opportunities offered in their area of residence) and at the delta level (e.g., their views on the innovations foreseen for other regions of the delta). Our aim was to understand how residents and non-residents alike perceived these measures, regardless of whether they would benefit directly from the livelihood opportunities and environmental services envisioned. Ultimately, our aim was to understand how grassroots stakeholders perceived and valued the combined functionalities of the innovations, as green multifunctional strategies for climate change adaptation.

4.2 Theoretical framework

4.2.1 Innovations

Many countries are proposing innovations to support transitions to a more sustainable and secure future (Daniell *et al.*, 2014). The present study focuses on radical technological innovations proposed in a strategic delta plan, as these may well be required to enable sustainable development in urbanizing deltas. The innovations proposed within a strategic delta planning process offer solutions to existing and perceived future problems and are meant to inform a strategic shift in development path (Seijger *et al.*, 2016). An innovation may be a reintroduction of something already established elsewhere; or it might be a technique that has never been practiced or was practiced a very long time ago and is now being revived as the subject of renewed interest (Jordan and Huitema, 2014). For example, in this study, cultivation of floating rice is an innovation that was practiced in the past, but it was largely supplanted by intensive rice cultivation before being reintroduced. Innovations can also represent an entirely new idea or way of doing something. An example in our context is “room for the river”, which is a strategy to allow more space for rivers’ natural dynamics. Or, an innovation can be a new take on an existing practice, such as a new cultivation technique or a new farming system, such as the integrated shrimp-mangrove farming system in the Mekong Delta.

Seijger *et al.* (2016) argued that when innovations are multifunctional in the services they provide, and thus meet the needs of a variety of actors, they can play a critical role in strategic delta planning as a moderator of consent among stakeholders. Multifunctional innovations are thus expected not only to open a path to broad stakeholder alliances, but also to bring increased likelihood of opposing opinions and obstructions in the consent-making process among stakeholders (Douven and UDW, 2013). Innovations that can serve multiple purposes are particularly promising for deltas, as deltas are characterized by competing for land use claims that span ecological, agricultural, industrial, and residential services. Examples of multipurpose innovations are “building with nature” and “room for the river”; both

these concepts combine flood control measures and spatial planning with multifunctional livelihood opportunities. These types of innovation are considered “consent builders”, as they provide a platform for involved stakeholders to make themselves known and position their interests within the concepts’ central precepts. Such innovations are therefore expected to garner varying levels of support across the different actors, while also being adaptable and amenable to reinterpretation and renegotiation up to their implementation (Seijger *et al.*, 2016).

Grassroots actors such as farmers, local officials, and sometimes local experts, typically have little voice and involvement in planning processes. However, their perceptions do matter. They are first-line users of innovations, and are directly affected by them. The preferences of grassroots actors are usually heterogeneous, but their ability to coalesce around an issue and speak with one voice crucially influences the efficacy of their advocacy. Stakeholder engagement can evolve over the course of a negotiation process. Grassroots engagement can be uncontested, with stakeholders unified on one side of an issue. Or it can be contested to varying degrees, with different stakeholders pressing authorities for different actions (Foster and Arnold, 2019). In other words, interrogation of grassroots stakeholders’ perceptions can help facilitate consensus-seeking by bringing out common interests on certain solutions or strategies.

In our delta planning process, an innovation was depicted as one of three dimensions, with the other two being “actor coalitions” and “participatory planning tools”. Innovations were understood as specifically contributing to the negotiation of consent for the strategic choices made in the delta planning process. One innovation may become preferred over other innovations or strategies if it is adopted or advocated by one or more actor coalitions, particularly if its implementation becomes assured (Korbee *et al.*, 2019^a; Seijger *et al.*, 2016). Thus, knowing grassroots actors’ perceptions of innovations can help us to foresee whether they will be embraced, in our case, by local farmers and more widely among delta residents.

4.2.2 Three no-regret adaptation measures

Enclosure of fields by high dikes has enabled intensive cultivation of rice on the floodplains of the Mekong Delta. However, this strategy has become problematic. The high dikes require regular maintenance in order to maintain their flood protection and safety function. Moreover, they have been found to increase flood hazards downstream, alter the geomorphological dynamics of rivers and floodplains, and cause soil degradation (Tran *et al.*, 2018^a). These drawbacks were little understood during the decades of rapid construction of dense networks of high dikes in the Mekong Delta (Figure 6). The need for more sustainable alternatives is now widely acknowledged.

Figure 6 Example situations in the Mekong Delta with high dikes and low dikes (Duong *et al.* 2016)

In seeking strategies for a safer, more sustainable and prosperous future, delta managers initiated a planning process to capitalize on the Mekong Delta's unique geographical situation and hydrological and ecological conditions. Development activities upstream also had to be considered, as these recently changed the hydrograph of the Mekong River area, significantly altering the frequency and intensity of annual floods. In exploring potential development strategies, the planning process divided the Mekong Delta into three zones according to

hydrological regime and geographical characteristics⁵ (Royal HaskoningDHV *et al.*, 2013). The location, climate, soil, and ecology of each zone was understood to be sufficiently distinct as to require its own development strategy. Further, the planning process sought to identify innovations that offered multifunctionality geared specifically for each of the zones. Finally, the strategies proposed had to be suitable to address the challenges facing the delta, particularly in aligning land and water management, adaptation to climate change, economic development, and water management measures. For example, to deal with the increased seasonal riverine floods in the upper delta (region 1), innovations in land and water use were needed to enhance water retention capacity. The middle delta (region 2) was experiencing problems related to spatial planning and a lack of freshwater; hence, multifunctional innovations were needed here, combining adequate freshwater supply with opportunities for sustainable livelihoods. In the coastal delta (region 3), innovations needed to be geared towards coping with brackish water and salinity intrusion, while providing sustainable coastal protection and minimizing groundwater withdrawals. All three regions faced severe consequences of climatic change. It was therefore imperative for innovations proposed for the regions to provide climate adaptation services. The multipurpose innovations proposed for the three regions, and addressed in our research, are as follows: floating rice (region 1), room for the river (region 2), and the integrated shrimp-mangrove farming system (region 3).

Floating rice is a priority measure in the upper delta, which is characterized by freshwater flood zones. In reality, floating rice is a traditional production method with high cultural and crop-genetic heritage value. Floating rice also offers the potential to access high-value specialty international rice markets that can provide high economic returns for farmers (Royal HaskoningDHV *et al.*, 2013). In the VMD, floating rice is a traditional crop with a long history and a proven track record as an environmentally sustainable farming system (Kien *et al.*, 2015; Kien and Duc, 2015;

⁵ There have been many approaches in existing literature or in national documents regarding ways of zoning the MD, mainly based on different viewpoints of the researchers/scientists about how to look at the MD's problems and about the aims of zoning. For instance, (Marchand, Dam, & Buck, 2011) has zoned the MD into 9 ecological areas based on soil texture, salinity and micro-topography. Another classification from an economic viewpoints has zoned the MD into 5 areas (Yamazaki, 2000) and so on.

Van Kien). Floating rice is ecologically adapted to the hydrological conditions of the floodplains, as this rice variety thrives in deeply flooded areas, and the plant can grow its elongated stems (up to 3-4 m) at the same rate as the rising floodwaters (up to 10-15 cm per day). For this reason, floating rice was widely grown in flood-prone areas of the VMD, such as the Long Xuyen Quadrangle and Plain of Reeds (Figure 7).

Figure 7 Example of floating rice field in the study region

Our second innovation, room for the river is a strategy borrowed from the Netherlands. Described in the Dutch “Room for the River Directive”, it requires that water be considered a structuring principle for spatial development (Rijke *et al.*, 2012). Furthermore, the innovation recognizes the need for a multi-level governance approach involving multiple disciplines and actively incorporating water safety, planning, agriculture, and nature values, from the local to the national level (Rijke *et al.*, 2012; Zevenbergen *et al.*, 2015). With room for the river, extra space is created for river water dynamics, hence mitigating or eliminating damages due to floods. When floods do come, space is available for overflow water. “Room for the river” innovations require appropriate zoning laws to ensure minimal human intervention and vulnerable infrastructures. Room for the river can also serve to reduce drought damage and enhance groundwater recharge, as natural water storage and flood retention areas are created (Figure 8).

Figure 8 “Room for the river” pilot region in the study area

Our final innovation is the integrated shrimp-mangrove farming system, which the MDP proposes as a no-regret innovation suitable for the coastal zone of the VMD (Vo *et al.*, 2019). In this zone, farmers have long practiced a brackish water shrimp monoculture, which however, has led to environmental problems, disease, and yield failures (Royal HaskoningDHV *et al.*, 2013). The shrimp-mangrove farming system, also known as “silvoaquaculture” or “silvofisheries”, has been demonstrated as environmentally-friendly and sustainable elsewhere (Bosma *et al.*, 2016; Minh *et al.*, 2001). There are three main types of mixed shrimp-mangrove farming systems. The model analyzed in the current research is the integrated shrimp-mangrove system; that is, mangrove-planted platforms are separated by canals used for shrimp farming (Figure 9). This is a low input, sustainable, organic aquaculture system (Ahmed *et al.*, 2018). Decades ago, mangroves were viewed by farmers as an enemy, but their value as part of a sustainable farming system is now understood and widely recognized (Le and Ann, 2017). The intensive shrimp monoculture model requires that mangrove forests be destroyed. Shrimp-mangrove farming models, in contrast, conserve mangrove, which protect the coast.

Figure 9 Shrimp-mangrove farming system in the study region

4.2.3 Millennium Ecosystem Assessment conceptual framework

This study adopts the Millennium Ecosystem Assessment conceptual framework, which uses the concept of “multifunctionality” to evaluate innovations according to the combination of “services” they provide for the environment and society. The notion of multifunctionality was initially used in forestry and agriculture. Fruitful debates have since also emerged on multifunctionality in relation to urban planning and urban land use (Priemus and Hall, 2004; Priemus *et al.*, 2004). Most studies on multifunctionality in agriculture refer to the benefits that multifunctional agricultural policies can bring for a country or region (Knickel *et al.*, 2004). Further, the concept is presented as a pragmatic approach, defined either in political terms or in theoretical terms, for example, in relation to rural spaces, functions, and interrelations. Historically, the idea of multifunctionality gained prominence in regard to the EU’s reform agenda for the Common Agricultural Policy (CAP). In that context, it provided a means to steer EU subsidies to landscape and nature functions of agriculture, in addition to agriculture’s traditional production functions.

Since the emergence of the “ecosystem services” concept, multifunctionality has also been phrased in terms of “multi-ecosystem services”. From here, the concept can easily be merged with the water management requirements of climate adaptation – such as flood retention, water regulation, water purification, and

nutrient cycling. By bringing together climate adaptation – particularly, enhancement of flood protection and water retention (e.g., freshwater storage and regulation, sediment and nutrient cycling, and brackish water retention) – and food production (crops, fish, wood and fiber), multifunctional systems can be designed that provide both primary production functions (and livelihoods) and climate adaptation and water regulation functions.

In our analysis of the “multifunctionality” of innovations for the VMD, we were guided by the classifications from the Millennium Ecosystem Assessment (Costanza *et al.*, 1997; Wood and Van Halsema, 2008). Specifically, we applied the Millennium Assessment conceptual framework by Wood and Van Halsema (2008: 20) “for identifying, documenting, and disseminating good agriculture-related practice, including site-specific and crop-specific information, and policies that demonstrate sustainable use of wetlands and agriculture”. The use of site-specific or region-specific factors (i.e., factors that reflect nature or characteristics of good agricultural practice locally, including multi-level institutional support, policies, and resources) enables particular responses to be identified as feasible for implementation.

The conceptual framework considers the process by which alternatives can generate income while applying good agricultural practices to maximize production sustainability. Despite the wealth of literature available on this approach, there is little consistency in the terminology used for classification of such multifunctional services, including their functions and benefits. Following Wood and Van Halsema (2008: 9), the current study categorizes ecosystem services in four classes:

- “provisioning services”, goods produced or provided
- “regulating services”, benefits from processes of regulation, such as water and climate regulation
- “cultural services”, non-material benefits such as those embodied in spiritual, recreational, and aesthetic values

- “supporting services”, factors necessary to produce ecosystem services, such as the hydrological cycle, soil formation, and nutrient cycling

We analyzed the multifunctionality of water management innovations in terms of these services. Particularly, we investigated grassroots stakeholders’ awareness and appreciation of the three innovations presented above as no-regret measures for flood and water-use management which would ultimately contribute to sustainable livelihoods in the VMD. Familiarity and knowledge of the innovations was considered an additional factor to help explain respondents’ perceptions of the innovations.

4.3 Methodology

We assessed stakeholders’ perceptions of the three innovations using a mix of qualitative and quantitative methods blending information from semi-structured interviews, the literature, and field surveys.

4.3.1 Qualitative analysis using the Millennium Assessment conceptual framework

Our qualitative analysis focused on local perceptions, adopting the Millennium Assessment conceptual framework. Using case studies, we examined stakeholders’ views on the multiple functions offered by floating rice, room for the river, and the integrated shrimp-mangrove farming system, both locally and in the delta as a whole. Each of the three innovations analyzed has particular relevance for one of the three agro-hydrological zones of the VMD, responding to the particular water-related multifunctional service requirements of the zones as identified by the MDP (Royal HaskoningDHV *et al.*, 2013).

We conducted two rounds of data collection. First, in March 2016 we interviewed 27 subjects, including local officials, farmers, and local experts at three locations. Second, in April and May 2016, we administered 180 questionnaires for the quantitative analysis. Interviewees for the first data-collection round were selected based on their familiarity with the region-specific innovations; that is, they

needed to have knowledge of the three innovations. This meant that most of the interviewees had worked in related fields in the region in the past or currently. The interviews explored stakeholders' views and appreciation of the multiple functions served by the three no-regret measures. Both pros and cons of the innovations were interrogated. Prior to the interviews, a guide was developed with open-ended questions giving participants ample opportunities to express views and experiences. The researcher avoided prompting or in any way influencing the participants' answers. The range of ages and professions of the interviewees was diverse to ensure a wide view of perceptions at the grassroots level. The interview transcripts were digitalized and analyzed, with content analysis methods used to identify common perceptions among the interviewees.⁶

For the second data-collection round, 180 questionnaires were distributed to farmer respondents, who were approached randomly across the three study regions. Some 60 questionnaires were administered in each region. While administering the questionnaires, we explained in detail the multifunctionality of each innovation; i.e., the combinations of functions they provided in relation, for example, to the control of floodwaters, water management, climate change adaptation, and improved livelihoods. This enabled each respondent to provide as full an opinion as possible.

4.3.2 Quantitative analysis based on questionnaires

To better understand perceptions of the three innovations, we designed a questionnaire exploring respondents' views on (1) implementing floating rice in flood-prone areas (FR), (2) implementing room for the river in the pilot area (RR), and (3) implementing the integrated shrimp-mangrove farming system in coastal areas (SM). Further, we introduced three sums of money: 20,000, 50,000, and 100,000 VND/year. These represented the household contribution the farmer would have to pay for the innovation option to be implemented (donation). This was to test whether farmers' preferences depended on implementation cost. Our

⁶ Content analysis is a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use (Krippendorff, 2004):18)

overall aim was to assess farmers' interest in having the measures implemented and determine whether interests differed between regions.

We began with a descriptive analysis of the data per region, with a graph of the 95% confidence intervals for the mean ratings per option, as well as a complete table of the number of times each rating was chosen per option. Second, per region, we analyzed the ratings using two analysis of variance (ANOVA) models. In the first model, FR, RR, and SM (each factor with 2 levels, i.e., “yes” and “no”) were taken as fixed factors (with interactions) and respondents as a random factor. In the second model we included only the main effects FR, RR, and SM as fixed factors, with respondents as a random factor and donation as a covariate.

The questionnaire was designed using the “stated preference” method (Sanko, 2001). In SPSS, we ran the experimental design module, which produces the attribute (or factor) levels on the cards for the questionnaire. In our design, eight options were presented to each respondent, scored on a 1-5 scale: (1) “strongly disagree”, (2) “slightly disagree”, (3) “neither agree or disagree”, (4) “slightly agree”, and (5) “strongly agree”. This number of options was chosen to keep the number of choices the respondents had to make manageably low. Each alternative (or option) consisted of a combination of levels of four attributes (FR, RR, SM, and donation). We thus had three attributes (hereafter referred to as factors), with two levels each (“yes” or “no”) and donation with three levels. We chose to use all combinations of the levels for FR, RR, and SM, which yielded eight options (2³). To each option, one of three levels of donation (20,000, 50,000, and 100,000 VND/year) was randomly added by the SPSS software.

Note that donation does not signify a donation to the farmer, but a contribution of the farmer. The lower donation levels were set sufficiently low so as not to impede any farmer from favoring the option, while the highest level might do so. This procedure ensured that the order in which the options were presented to respondents was randomized (Sanko, 2001). We re-numbered the options so that

“no-no-no” was the first option and “yes-yes-yes” was the last option. Table 5 presents the eight options.

Table 5. Possible combinations of FR, RR, and SM, and a random *donation*

Option	Floating Rice (FR)	Room for the River (RR)	Shrimp-Mangrove (SM)	Donation (VND/year)
1	No	No	No	100,000
2	No	No	Yes	50,000
3	No	Yes	No	20,000
4	No	Yes	Yes	100,000
5	Yes	No	No	100,000
6	Yes	No	Yes	20,000
7	Yes	Yes	No	50,000
8	Yes	Yes	Yes	100,000

4.3.3 Research areas and sample distribution

Figure 10 Research areas (created by the authors in 2016, using Arcmap)

From each of the three regions, one site was selected to carry out the research (Figure 10). To consider room for the river implementation, the Binh Thien reservoir in An Phu District, An Giang Province was chosen, as this was a pilot area for implementation of this innovation. The Binh Thien reservoir typically functions as water storage and is considered an ideal example of room for the river, due to its multifunctionality. Residents of Khanh Binh and Quoc Thai communes, in An Phu District, were highly dependent on the Binh Thien reservoir for their livelihoods. Hence, the reservoir was locally known as “Heaven Lake” due to its abundant supply of freshwater, which fostered aquaculture and attracted tourism. In fact, this reservoir is the largest lake in the VMD.

To analyze the integrated shrimp-mangrove farming innovation, we selected Duyen Hai District, Tra Vinh Province. In this coastal area, freshwater was in short supply, especially in the dry season, leading in some places to over-exploitation of groundwater. The currently popular intensive shrimp monoculture, in particular, had brought multiple challenges related to local water use and governance (Ahmed *et al.*, 2018; Bosma *et al.*, 2016; Le and Ann, 2017). There is therefore a need to transition away from the shrimp monoculture to another type of aquaculture that is more sustainable, adaptive, and environmentally friendly. Such a transition is expected to reduce the solid waste loads of aquaculture on the water system and aid adaptation of local livelihoods to a wider band of salinity intrusion.

4.4 Results

4.4.1 Qualitative analysis: Application of the Millennium Assessment conceptual framework

This section explores the multifunctionality of the three alternatives using the earlier-presented terminology from the Millennium Assessment conceptual framework (Wood and Van Halsema 2008; Costanza *et al.*, 1997; Leemans and De Groot, 2003). Thus, our analysis zoomed in on the extent that provisioning services, regulating services, cultural services, and supporting services were associated with each innovation. For this qualitative part of the study, content analysis was used to analyze

data from the literature and from the interviews both together and separately (Table 6; see also Annex 1).

Table 6. Ecosystem services provided by the three innovations: Floating rice (*FR*), room for the river (*RR*), and the integrated shrimp-mangrove farming system (*SM*) applying the Millennium Ecosystem Assessment conceptual framework

Ecosystem Services (Multifunctional Aspects)		Innovations		
		FR	RR	SM
P	Environmentally-sustainable farming system	✓	✓	✓
P	High tolerance for drought, salinity, or flood	✓		
S	"Building with nature" (nature-based measure)	✓	✓	✓
R	Water restoration ability	✓	✓	
P	Opportunities for side-production models (include agriculture and aquaculture)	✓	✓	✓
P	Fetching good prices as ecological products	✓		✓
P	Offering additional livelihoods	✓	✓	✓
R	Resilience to climate change (floods, water restoration, water supply, etc.)	✓	✓	✓
S	Minimizing damages caused by floods, soil erosion, dike breakage and pollution	✓	✓	
S	Transportation function		✓	
P	Providing wildlife habitats	✓	✓	
R	Climatic regulation	✓	✓	
R	Water self-purification	✓		✓
C	Traditional values	✓		
C	Recreational values and potential for ecotourism	✓	✓	✓
C	Cultural values	✓	✓	

Note: P: provisioning services, R: regulating services, C: cultural services, S: supporting services.

4.4.2 Quantitative analysis

We began with a sample size of 60 respondents per region. However, in region 1 this number was reduced to 56 due to missing data for 4 respondents (to be specific, we did not know why the respondents skipped the items, but we respected their decision to do so). Furthermore, we found that 4 farmers in region 2 had rated all options equally. We therefore eliminated these responses, as it seemed unlikely that they understood the options, and nonetheless had no preference or dislike for any.

In the end, our sample for analysis thus contained 56, 56, and 60 answers for regions 1, 2, and 3, respectively.

Figure 11 presents the preferences per region. We also ran two models as follows:

Model 1: $Y = FR + RR + SM + \text{interactions} + \text{respondent}$

Model 2: $Y = FR + RR + SM + \text{respondent} + \text{donation}$

Figure 11. Preferences of options among respondents (per region)

Figure 11 shows the average ratings per option per region with a 95% confidence interval, based on the 56 or 60 values per confidence interval. The length of the confidence interval is indicative of the spread in the answers, as the sample sizes varied little. It is logical that cases where the mean is close to 1 or 5 (the extremes) have a larger spread. The more extreme the average, the more the values on which the average is based must be similar. For respondents in region 1, we found large variation in preferences between the options, meaning that the choice among the proposed measures was more clear for them than for respondents in regions 2 and 3.

The most striking aspect of the graph in Figure 11, given our research questions, is in region 1 the strong effect of whether or not floating rice (FR) was included in a particular option. This result is interesting as it indicates that respondents' opinions were driven more by the measures themselves, than by the amount they were willing to pay for implementation. For the options with no FR (1-4), we found slightly different mean ratings for room for the river (RR), but it is not clear whether this is meaningful. For the options with FR (5-8), the mean ratings for RR varied from positive to negative, depending on inclusion of the integrated shrimp-mangrove farming system (SM). If SM was not included, then including RR resulted in a higher average rating. If SM was in the option, then including RR yielded a lower average rating. This means that, within the "FR=yes" frame, there seemed to be an SM-RR interaction. Perhaps respondents did not favor the idea of inclusion of SM in a region that was projected for RR implementation. This is logical, as they might foresee difficulties in implementing SM, even though they were not the ones directly involved in SM implementation. Overall, SM appeared to be an unfavorable option, even among respondents outside the projected implementation areas.

Respondents in region 2 demonstrated a general preference for RR and FR, except for the option of implementing only FR at the highest donation level (100,000 VND). This also means that people living in the pilot area of RR implementation might prefer RR to FR. In region 2, we found no effect of FR, but the effect of RR was significant. Thus, our results for RR (yes) differed from those for RR (no) in terms of mean ratings.

In region 3, SM and RR were not significant, though FR was (slightly) significant, and we found a very clear FR effect. Residents in region 3, especially, were unsure of what they should choose. Thus, the variation (the width of the confidence interval) here was quite large.

From the ANOVA model 1 we see for region 1 indeed a very large effect of FR being in the option or not (sum of squares (SS)=608, see Appendix 2). There were RR*SM interactions as well, and FR*RR*SM interactions (Table 7). These

interaction effects, though, were relatively small ($SS=11.5$ and 12.2 , respectively). This finding, again, confirms respondents' clear preference for FR implementation, in every region surveyed.

Table 7. *P*-values of F-tests of the factors for model 1 and 2 applied to the preferences on the eight *FR-RR-SM-donation* options of the respondents in each of the 3 regions

Region Factors	1	2	3
<i>FR</i>	0.000	0.07	0.000
<i>RR</i>	---	0.000	---
<i>SM</i>	---	---	---
<i>FR*RR</i>	---	---	---
<i>FR*SM</i>	---	0.001	---
<i>RR*SM</i>	0.000	0.001	---
<i>FR*RR*SM</i>	0.000	---	---
Respondent	---	0.000	---
<i>FR</i>	0.000	0.07	0.000
<i>RR</i>	0.000	0.000	---
<i>SM</i>	---	---	---
Respondent	---	0.000	---
<i>Donation</i>	0.000	0.001	---

For region 2, the average ratings were much closer, indicating that preferences were less strong here, compared to region 1. We do see, though, a clear RR effect. In option 3 versus 1 (RR=yes vs. RR=no), option 4 versus 2, option 7 versus 5, and option 8 versus 6, all options with RR had a higher average rating. This again makes sense because RR was the piloted model in region 2. As it was designed specifically for this region, it was expected to directly benefit the locality. Our ANOVA analysis confirmed the visual observation: the RR effect was very significant (see Table 3). FR has a *p*-value of 0.07, almost significant, but seemingly not relevant (as the effects were very small, $SS=3.0$, compared to 63 for RR, Appendix 2). Two significant interactions warrant mention: *FR*SM* and *RR*SM*, but both effects were small (both with $SS=10$, Appendix 2). Only in region 2 was a significant respondent effect found, both in model 1 and model 2, indicating that some farmers rated systematically higher than others. This finding also illustrates a particular concern regarding the

respondents in region 2: they somewhat favored FR, but had a stronger preference for RR.

Donation had a significant negative effect. The slope coefficient of -4.7×10^{-6} indicates a difference in mean rating of 0.38, calculated as $(100,000 - 20,000) \times 4.7 \times 10^{-6}$ between options with a donation of 100,000 versus one of 20,000. In the other two regions, no such effect was found (see Table 3). In region 1 and region 2, donation was significant, while in region 3, donation was not significant at all. Overall, the “100,000” donation level was rated lowest, with higher donation levels overall associated with lower ratings.

In region 3, there was a small but consistent FR effect, surprisingly, as farmers in region 3 could not apply this option. RR and/or SM effects were completely absent. In fact, in the ANOVA analysis, in both models 1 and 2, none of the other factors reached significance (see Table 3). This is logical and consistent with the qualitative analysis results indicating that SM implementation would yield very little in terms of ecosystem services. Furthermore, the respondents in region 3 were not likely to appreciate SM, as they were primarily involved in intensive shrimp monoculture.

Table 4 presents the same data in a different format. Per option, per region, it indicates how many times each rating was chosen. Per region, each row has a maximum total count of 180.

Table 8. Ratings of and counts of options per region

Options	Ratings and Counts (Region 1)					Ratings and Counts (Region 2)					Ratings and Counts (Region 3)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
0-0-0	28	24	4			6	12	15	18	5	17	15	6	17	5
0-0-1	26	27	3			3	18	16	15	4	15	12	15	12	6
0-1-0	39	13	4			1	5	14	16	20	15	13	17	10	5
0-1-1	36	17	3			1	12	20	8	15	14	15	13	7	11
1-0-0			32	22	2	7	18	17	14		10	8	16	14	12
1-0-1			9	27	20	2	10	15	19	10	8	12	13	15	12
1-1-0			13	25	18	2	2	13	17	22	5	11	22	12	10
1-1-1		4	19	33		2	4	12	17	21	8	11	20	9	12

In Table 8, we see that in region 1, the options with FR (no) were rated only 1, 2, and 3. Options with FR (yes) were rated only 3, 4, and 5. And in regions 2 and 3, all options had ratings in all five categories (from 1-5). In essence, there was fairly large agreement among the respondents in region 1, while there was less agreement about how preferable the various options were in regions 2 and 3. In these latter regions, the average ratings were all closer to 3, but with much disagreement between respondents (see Appendix 2 for results of the statistical analysis).

4.5 Discussion

This study examined grassroots stakeholders' views of the ecosystem services expected to result from three no-regret innovations proposed for the VMD. Specifically, we were interested in the capacity of these innovations to facilitate consensus-seeking among stakeholders, both locally and regionally. The ecosystem services examined offer multiple functions, defined here as "provisioning services", "regulating services", "cultural services", and "supporting services", in line with the Millennium Ecosystem Assessment conceptual framework. As this is a new approach to delta management, its application and terminology may cause some initial ambiguity in both interpretation and understanding across stakeholders. While such innovative approaches can provide opportunities for broad-scale decision-making (i.e., at the delta scale), stakeholder engagement at this scale can become complex and difficult to control. Understanding stakeholders' views is an important first step to finding ways to coordinate the various levels of stakeholders in regional sustainability planning.

Our findings suggest that to develop the VMD along the proposed strategic lines, planning objectives need to be embedded in exchanges, discussions, and negotiations among stakeholders about their concerns and interests. Furthermore, reaching consensus among stakeholders is key. In this process, higher decision-making levels must listen to the thoughts and aspirations of those at the grassroots level, typically farmers. They are the ones who use the ecological resources of the

delta to earn their livelihood. Indeed, the livelihoods of many farmers are completely dependent on exploitation of the delta's ecological resources.

In our study, we found that farmers (grassroots stakeholders) highly appreciated the livelihood opportunities on offer. Because their lives were already so difficult, they were willing to consider whatever opportunities came to hand to improve their lives. Since the scope of this research included only three innovations, other promising livelihood opportunities may have been overlooked. However, our analysis of the multifunctionality of the three innovations based on the ecosystem services they were expected to provide points to four main findings.

First, the surveyed farmers paid primary attention to income benefits, termed here as “provisioning services”. For example, floating rice could fetch competitive prices in organic product markets. Similarly, products from the integrated shrimp-mangrove farming system can be labeled organic and fetch premium market prices. However, integrated shrimp-mangrove farming requires a long time to harvest, which farmers considered a major disadvantage. They viewed the floating rice model as a strong contributor to “supporting services” as well, though room for the river was viewed slightly more favorably in terms of “supporting services”. Particularly, room for the river was appreciated as providing a wide range of alternative livelihood opportunities, including on-site fisheries and the opportunity to plant floating vegetables, alongside immediate benefits such as freshwater supply and beautiful landscapes (important for tourism).

Second, farmers were inclined to support and appreciate the extra livelihood opportunities arising from the three analyzed innovations. For example, floating rice cultivation could bring additional livelihood opportunities – and these could even bring in greater income than the cultivation of the floating rice itself. Such additional livelihood opportunities include cultivation of upland crops, tubers and cassava. Floating rice was also considered promising in terms of potential development of ecotourism, as floating cultivation has been practiced in Vietnam for centuries. Room for the river, too, was considered a “many-in-one” innovation, offering a

range of new livelihood opportunities. However, fewer opportunities for additional livelihoods were perceived in relation to the integrated shrimp-mangrove farming system, outside the few other species that can be grown with shrimp in the same pond. This is a key disadvantage of integrated shrimp-mangrove farming, according to our analysis.

Third, farmers may not explicitly and specifically acknowledge all of the “intangible” ecosystem services provided by the three analyzed innovations, though these are recognized with the Millennium Assessment conceptual framework analysis and in the literature (Table 2). This is probably a matter of awareness-raising and capacity building at the grassroots level.

Finally, during the interview process, some respondents initially struggled to understand the concept of “innovations” as used in this research. To overcome the difficulty, where possible, the author replaced the term “innovation” with language that was more familiar from farmers' daily lives. Thus, farmers expressed almost unanimous support for “innovation”, which they understood as a "reform" of their livelihood and water use strategies. The idea of creativity in farming strategies was also explored with the respondents during the interviews. When the author mentioned the word "adaptive", farmers understood it to mean "innovations", to which their answer was simply, "why not, as long as it will bring me better income".

Furthermore, our analysis found no direct or explicit support among farmers for the phrases "innovations" or “innovative solutions”. However, as in more than 50% of the interviews, respondents understood “innovation” to mean “changing”, the conclusion could be drawn that farmers appreciated and realized the importance of "change". For them, adhering to their old ways of agricultural production, on the same land, had caused many “immediate and visible” consequences, such as soil degradation, water pollution, environmental devastation, and diminishing yields and productivity. Climate change was recognized as one of the factors underlying these trends. Farmers were very interested in "adaptation", such as adaptive farming techniques for extreme climatic and natural conditions. They were also increasingly

aware of the potential of “disasters” – such as encroaching salinity and flooding – as opportunities rather than barriers. Development of the three no-regret innovations analyzed here similarly considered extremes in natural conditions as a potential resource for production.

In our qualitative analysis of ecosystem services using the Millennium Assessment framework, we found general consensus among grassroots farmers across the three study regions. Likewise, in our quantitative analysis, respondents in all three regions indicated a preference for floating rice, no matter where they lived. The preference for this innovation was highest among respondents living in the floating rice zone, as indicated by the largest FR main effect for this region. Yet, even those living in the other regions indicated a preference for floating rice, meaning that this innovation enjoyed broad support, even among those who would not directly benefit from it. In our quantitative analysis, we found respondents living in the room for the river pilot area to be highly supportive of RR, but they still appreciated FR, even though it was not “their own” innovation. These findings are indicative of a general consensus on the value of no-regret measures that deviate from intensive rice production. Surprisingly, we found little support for implementation of the integrated shrimp-mangrove farming system, in either our qualitative or our quantitative analysis. This innovation is probably suitable only for very specific geographical regions of the delta (for example, Ca Mau Peninsula).

Finally, our donation parameter gauged respondents’ willingness to pay. Here, we found that respondents in region 1 did not care how much they had to pay for the no-regret measures, especially FR, which was their favorite choice. For respondents in regions 2 and 3, a high donation amount was associated with a reduced preference for that innovation. Like the main effect of SM, which was found to be insignificant in all three regions, donation was found to be insignificant in region 3. This makes sense, as farmers here perceived the drawbacks of SM to be substantial and difficult to solve, including the need for a vast land area for implementation of the integrated shrimp-mangrove farming system. Moreover,

shrimp-mangrove farmers needed to be well-equipped and rather skilled to design and run such a system successfully.

Note, however, that this finding was likely influenced by our selection of Duyen Hai District, Tra Vinh, as our survey location. In this estuary district, farmers mainly practiced intensive shrimp culture or a mixed rice-shrimp culture. This could perhaps be considered a limitation of our study in regard to sample selection. One of the farmers interviewed indicated that their intensive shrimp operation had failed, suggesting that perceptions of the integrated shrimp-mangrove system may be very context-specific. Indeed, the benefits of the integrated system are well recognized by shrimp-mangrove farmers in areas such as Ca Mau Peninsula, where intensive shrimp operations had previously been decimated due to diseases and other issues. In peninsula areas, such as Ca Mau, SM could provide a viable alternative, without bringing the huge economic risks attached to an intensive shrimp monoculture. In the case study region, the negative impacts of intensive shrimp had not yet manifested on a large scale. Integrated shrimp-mangrove here tended to be perceived as a “poor man’s” option.

Although our findings reveal a preference among respondents for floating rice and room for the river, and not for the integrated shrimp-mangrove farming system, it must be remarked that this finding is rather at odds with reality. Areas implementing both floating rice and room for the river have in fact diminished. Both measures seem to have failed in the VMD, particularly since 2018. A drastic reduction in the area cultivated to floating rice has been recorded in recent years, mainly due to the changing hydrograph of the Mekong River area as a whole. Newly built upstream dams and development activities of upstream countries (i.e., China, Laos) have dramatically altered the flow pattern of the annual floods. This resulted in very low flood levels in 2016, 2018, and 2019. In those years, floating rice could not be cultivated. These incidents resulted in a switch from floating rice cultivation to other flood-based farming systems (such as floating gardens or a diverse pool of cash crops considered to offer more stable markets). This switch gained momentum

especially following the severe drought of 2016, when farmers could not cultivate floating rice at all due to the lack of floods. This has undermined uptake, but can only be addressed by infrastructure (hard) measures (Dang *et al.*, 2018). As for room for the river, the failure of this innovation stems from shortcomings in the cost-benefit analysis. According to the Millennium Assessment conceptual framework, some functions of room for the river are impossible to value in monetary terms. It is interesting to observe differences such as these, between theory and practice, though these have long been a fixture of scientific research.

4.6 Conclusion

This study investigated the outcomes of a future-oriented strategic delta planning and management process which included the goal of balancing ecosystem services with sustainable socioeconomic development and the maintenance of livelihoods at the local, delta, and national levels. Stakeholders at all levels played a role of importance and influence on the output of that planning process, represented by the Mekong Delta Plan (MDP) published in 2013. Indeed, the grassroots level may ultimately have the largest influence, because it is farmers at the local level who depend on delta resources for their livelihoods. The greatest concern of farmers in the three study regions of the VMD was the livelihood they could earn tied to the ecosystem services provided by each innovation analyzed. It is not surprising that in both our qualitative and quantitative analyses farmers considered the ecological benefits of floating rice to be superior to the other two innovations. This does not mean that floating rice was considered an ideal farming system, but it does reflect the tendency of farmers towards “building with nature” practices. The surveyed farmers were genuinely motivated to change, alter, and replace the intensive rice monoculture system, which by now has been practiced in the study area for decades. This desire hinges on the perceived need to give the environment some rest, the ecology some breath, and escape from the sole ambition of ensuring food security for the nation. Livelihood concerns in the delta have gradually shifted towards more sustainable and environmentally-friendly practices, though these must still ensure a

steady source of income. Farmer consensus on this was evident from our Millennium Assessment analysis, as well as our statistical results, which demonstrated that farmers viewed floating rice and room for the river as the most promising innovations, particularly as they offered additional livelihood opportunities for the locality. All three innovations were expected to bring improved incomes and opportunities, as well as benefits for the entire delta, derived from a more sustainable overall water management regime. Although some differences in farmer preferences were found, there was overall most support for floating rice, followed by room for the river, indicating a trend towards “nature-based” and “no-regret strategies”. The integrated shrimp-mangrove farming system did not enjoy general support, though perhaps this innovation would be more appreciated in specific areas, with more appropriate geographies and conditions.

We can conclude that more time is needed for uptake and expansion of the innovations analyzed and further development effort will be needed for them to meet farmers' expectations. One obstacle is dissemination and implementation capacity in regard to national plans and policies. In reality, while grassroots stakeholders may exhibit interest, incentives from higher up will be needed to stimulate livelihood changes. The design of such incentives requires methodologies to clearly delineate among stakeholders and determine their roles and power in policymaking and policy implementation in Vietnam.

In summary, our analysis suggests that innovations can foster consensus among stakeholders, most notably at the grassroots level. The role of innovations in delivering ecosystem services at the delta scale, and more widely, was confirmed in many respects, but not all. We found support particularly for “building with nature” strategies among both practitioners (grassroots stakeholders) and policymakers (higher-level stakeholders).

Chapter 5

5 THE EMERGENCE OF LOTUS FARMING AS AN INNOVATION FOR ADAPTING TO CLIMATE CHANGE IN THE UPPER VIETNAMESE MEKONG DELTA

This chapter is corresponding with the article:

Hoang Thi Minh Vo, Gerardo van Halsema, Petra Hellegers, Andrew Wyatt, Quan Hong Nguyen, 2021, The emergence of lotus farming as an innovation for adapting to climate change in the upper Vietnamese Mekong Delta – *Land*

<https://doi.org/10.3390/land10040350>

Abstract

Climate change poses an acute threat to the Vietnamese Mekong Delta (VMD). To respond to this threat, the structure of the delta's agriculture-based economy must transform, becoming more adaptive to changing conditions. One adaptive livelihood option is use of flood-based farming systems for the upper VMD. The present study examines local perceptions of such a system in Dong Thap Province, a lowland, flood-affected area of the upper VMD. Specifically, we explored rotational lotus farming as a potential flood-based adaptive livelihood model for the region. The study advances the current literature by using historical research, embedded in narrative analysis applying the social construction of technology (SCOT) lens. We collected data through in-depth interviews and field surveys, to qualitatively analyze the emergence and status of lotus cultivation in the study area, zooming in on how local society evolved with expansion of this farming model. The findings suggest that as an innovative idea, lotus farming initially emerged due to unfavorable natural conditions, and then was developed, accepted, and modified, finally achieving a low degree of stabilization. Our findings indicate that though lotus farming has been a success at the local level, it is not yet ripe for replication on a larger scale as a climate-resilient and sustainable livelihood models in the upper VMD.

5.1 Introduction

Climate change poses an acute threat to the Vietnamese Mekong Delta (VMD). As the region's economy is predominantly agriculture-based (Smith, 2013), the Vietnamese government today faces a dilemma of whether to continue pursuing the traditional model of farming or to explore farming systems better adapted to the changing climate. Many scholars have studied innovative ideas in flood management (including flood-adapted livelihoods), but the uptake of novel approaches has been slow, partly due to the nature of Vietnam's existing planning system, which is top-down and still fragmented (Benedikter, 2014, 2016; Benedikter & Nguyen, 2018). Several new strategic plans have been developed and introduced, including the 2013 Mekong Delta Plan (MDP), which proposes major changes in the development pathway of the VMD. One of the main models explored in the MDP is flood-based farming (FBF), as an alternative to the intensive rice monoculture covering much of the upper VMD (Tran *et al.*, 2018). Further, the MDP calls for planning processes to involve a broad spectrum of stakeholders, with grassroots actors playing a pivotal role in agricultural innovation. Grassroots actors, particularly farmers, are key due to their role not only as "receivers" of innovations but also as producers and holders of knowledge related to innovations and innovation creation (Tran *et al.*, 2019). Other relevant social groups (RSG) in Vietnam are government, academia, and donors. All of these stakeholders have played a role, whether active or passive, in shaping innovations in the country. Their varied interests and agendas, depending on how consensus was reached, have thus influenced the outcomes of planning processes. Recent studies by our project team (UDW – Urbanizing deltas of the world (Douven *et al.*, 2013)) point to a shift in mindset among Vietnamese political actors (an important stakeholder) towards recognition of the need for adaption pathways to ensure a more sustainable future (Seijger *et al.*, 2019; Vo *et al.*, 2019).

FBF has been proposed as a particularly promising "innovation" for sustainable agriculture in the upper VMD, as it could help farmers harness the changing climatic conditions for the goals of food security and sustainable

livelihoods (Vo *et al.*, 2021). Among others, lotus cultivation has emerged as a technology that fits in the FBF frame. Lotus cultivation can be combined with additional services, such as aquaculture, water retention, and tourism, bringing enhanced livelihood options. Lotus has certain advantages comparing to rice cultivation. First, it requires less investment in fertilizers and pesticides. Second, it suits very well to the land and water condition of FBF in the upper VMD. Whereas intensive rice production requires floodwaters to be minimized, lotus can adapt to either high or low water levels. As floodwaters can be allowed to enter lotus fields, thus enriching soils and creating habitats for wild fish and other aquatic species, lotus cultivation can be part of a system of floodwater storage for dry season usage (Tran *et al.* 2018b).

The MDP calls for innovations appropriate to the changing natural conditions of the delta, and lotus farming may fit the bill as a suitable adaptation for floodplain areas. The current study investigates the lotus cultivation model (including intensive lotus, lotus-rice, lotus-fish, and lotus-ecotourism) as an appropriate innovation for the VMD floodplains. Though lotus is a long-existing farming practice pre-dating the MDP, the planning strategy frames lotus cultivation as a suitable, climate adaptive technology that provides good multifunctionality. These are considered basic requirements for a livelihood option to thrive on the natural floodplains of the Plain of Reeds. Lotus also provides opportunities for diverse associated products. Indeed, every part of the lotus plant can be harvested, processed, and marketed for different uses.

The current study opens a discourse on how lotus farming as a technology has been designed, implemented, adopted, and spread. We therefore adopted historical research as our main method, using the social construction of technology (SCOT) lens. SCOT views technologies as a result of stakeholder interaction, with human actions understood as shaping technology, rather than technology driving human action (Bijker *et al.*, 1984). SCOT has most commonly been used to study state-of-the-art technologies and governance innovations (Al Lily, 2013; Damman *et*

al., 2017; Meyer, 2005; Mollinga and Veldwisch, 2016; Prell, 2009; Shah, 2003, 2008, 2012). This paper applies the historical research method embedded in narrative analysis using the SCOT lens to trace the emergence of lotus farming as an alternative to rice in the upper VMD. In addition to providing a historical overview of the developments and changes affecting lotus farming in the VMD, we address three research questions: (a) Why is there so much flux in the lotus farming model as an innovation? (b) What features of lotus farming are working well? (c) Has lotus farming reached some degree of closure or stabilization that could confirm its suitability as a climate-adaptive innovation for the VMD; or is the search for an appropriate lotus technology still underway?

5.2 Methodology and Data Collection

5.2.1 Historical Research Method

Historical research in the social sciences is a method for discovering, from records and narrative accounts, what happened in some past period (Berg, 2001). This method enables the researcher to describe important and interesting past events by listing or drawing them in chronological sequence. Historical research is at once descriptive, factual, and fluid, not merely nostalgia. The method “attempts to systematically recapture the complex nuances, the people, meanings, events and even ideas of the past that have influenced and shaped the present” (Berg, 2001: 115). Data for this method can be gained from primary sources that provide descriptions and witnesses to the focus events and time. For instance, one such primary source is individuals who are still alive and can bear witness to some aspects of the research focus. The current study employed this means of data collection (Berg, 2001), embedded in narrative analysis (Allen, 2017).

Our approach was grounded in and reflects the SCOT lens. The central premise of the SCOT perspective is that technology is not an isolated artifact developed by engineers in the laboratory and then implemented in the field. Rather, it is an outcome of social interactions between scientists, developers, and users (Latour, 2005); a product of human choices and social processes (Pfaffenberger,

1988). Technological innovation is a continuum from inception to development, testing, application, and ongoing modifications and iterations (Bijker *et al.*, 1984). Intended users and effects may not materialize, while other uses or effects may become apparent, and users may alter the technology for unforeseen purposes and uses. In analyzing lotus farming as an innovation, we viewed it not just as a technology transferred to the delta, but as an “actant” (terminology from Latour, 2005) or “artifact”, shaped by social actors in the delta.

5.2.2 Research Design, Case Study, and Data Collection

To investigate the development of rotational floating lotus and how this innovation has been changed and adopted by society, we used a qualitative, explorative research design. We started with a literature review, which fed into open-ended interviews conducted in line with a pre-developed interview guide.

We selected Dong Thap Province as our case study area for several reasons. First, it is located in the upper VMD, which is one of Vietnam’s most vulnerable regions (Smajgl *et al.*, 2015; Anthony *et al.*, 2015). Second, the region has attracted the attention of development partners such as the International Union for Conservation of Nature (IUCN) because of local farmers’ knowledge of flood-based livelihoods, such as lotus farming. Additionally, the World Wildlife Fund (WWF), seeking to promote sustainable flood-based livelihoods, entered the scene with funding from the Hongkong and Shanghai Banking Corporation (HSBC) to develop lotus-ecotourism in farming areas around Tram Chim, a township in Dong Thap Province. For decades, local farmers have practiced flood-based lotus farming here, with apparently satisfactory results (Tran *et al.* 2018a).

Applying snowball sampling (Goodman, 1961), we selected interview subjects in the research area. The first subject (a farmer) was fixed a priori. We began by interviewing farmers who had been involved in the development of lotus farming. We asked them to identify relevant social actors, which led to our identification of five relevant social groups (RSGs): (i) farmers who had a direct link to the technology and played a part in its development; (ii) scientists, who played a key role in

technology design and development; (iii) local officials, including government authorities and farmer representatives, who were indirectly linked to the technology and involved as advocates in policymaking, lobbying, and the process of technology design and development; (iv) development partners, who also acted as advocates and had close links to local officials, while playing the role of both implementer and financial supporter; and (v) traders, including individuals and businesses, who were indirectly linked to the technology and made choices about, bought, and used the technology, while also supplying needed inputs to farmers.

Respondents were selected using stratified purposive sampling (Suri, 2011). Particularly, we sought out farmers who had been involved in or planned to implement lotus farming. We were interested in both the common and not so common experiences of farmers. We also reached out to local officials to gain a more comprehensive picture. To make the sample empirically meaningful and accommodate nuances and variations, we sought heterogeneity in terms of social characteristics and experiences (Boström *et al.*, 2018). In total, we conducted 31 in-depth interviews. One interview subject was from IUCN, four were local officials, and three were traders. The remaining 23 were farmers. Most of these farmers had been involved in a lotus farming project conducted by IUCN Vietnam, which provided some financial support for the lotus farming operation. Most interviewees were men and the main breadwinner of their household. Ages ranged from 21 to 65 years.

During our open-ended, guided interviews, respondents were encouraged to freely share their experiences and recount stories to illustrate their perceptions. Interviewees could elaborate on what was important to them, while the interview guide kept the discussions on track and ensured that each interview covered specific themes. There was also probing and cross-checking based on earlier answers, and interrogation of information provided by other respondents (without disclosing their identities). The appendix presents the interview guide (Boström *et al.*, 2018). The interviews were recorded, transcribed verbatim, and thematically coded.

5.3 Results

5.3.1 The Story of Lotus Farming and Its Development Stages with Related Technical Issues

Every technology has a legal dimension, it has a history, it entails a set of social relationships, and it has a meaning (Pfaffenberger 1988). Framed by this description, we picked out different pieces of historical stories, told by our 31 interviewees, to bring together the story of floating lotus as an emergent innovation in the upper VMD (figure 12). Including the historical aspect in the narrative brought out key dynamics that shaped rural change processes in the region (see Ontita, 2007). The narrative presented below was constructed from the recollections of our interview respondents. Though largely consistent, our reliance on respondents' recollections does present some intrinsic limitations (e.g., one-side observations with lack of a fuller view on facts and events). It would be preferable to confirm the story constructed through rigorous scholarly analysis.

Land Reclamation (1975). The story of lotus farming began following the war in Vietnam when the Plain of Reeds was still covered by forest and the soils were classified as mainly acid sulfate. Local people call this period “Exploring the New Economic Zones”. Each household received 10 ha of uncultivated land, which led to the clearing of forests for agriculture, mostly rice cultivation. However, rice yields were very low, due to the unsuitability of the region's agroecology for this crop. This period of land reclamation was important in setting the stage for the emergence of lotus, as farmers found that they could hardly generate an income with rice cultivation. At that time, lotus was chosen to be cultivated in the region. Initially, farmers planted lotus mostly by using seedlings. The seeds were brought in from other places, then propagated for continued use over many years. For harvesting, farmers collected lotus seeds and sold these spontaneously to individual traders. Lotus yields were reported to be very low.

Taiwanese Export Attempt and Intensive Lotus (1980). The Taiwanese pioneered commercial lotus farming in the VMD. Cultivation of lotus was believed to flush out

acid sulfate and “clean” and enrich the soil. In 1980, the Cao Tung Company arrived from Taiwan and leased huge areas of acid sulfate lands for lotus farming, starting with intensive lotus cultivation to produce lotus seed for export. This seed was in high demand in the Taiwanese market. The Cao Tung Company invited local farmers to join the lotus campaign, initially providing seeds, fertilizers, cultivation techniques, and knowledge. The Taiwanese helped the farmers and offered a guaranteed output market for lotus products ranging from flowers to the rhizome, leaves, leaf stalk, stems, and seed. However, they set high standards for these products. This was the first difficulty confronted by lotus development in the region. Local farmers could not conform to the high standards, so the Cao Tung Company departed after two lotus crops. Nonetheless, still subscribing to the idea brought by the Taiwanese firm, local farmers continued to grow lotus, though for an internally-oriented market rather than the international (particularly Taiwanese) market the Cao Tung Company had targeted. As farmers at that time could no longer produce for export to Taiwan, some form of local trade must have emerged (i.e., retailers, supermarkets or open markets).

Lotus-Ecotourism. A group of Vietnamese students visiting the area by chance was amazed at the beauty of lotus and came up with the idea of lotus-ecotourism. This would combine intensive lotus cultivation with fish farming and tourism activities. The idea immediately took off and was developed into a tourism business by Sachi, a Vietnamese company based in Ho Chi Minh City. Sachi’s involvement brought opportunities for good jobs and better incomes for local farmers. At first, Sachi’s model worked well, bringing positive change to the region. Many tourists visited the area, attracted by the beauty of lotus, the surrounding landscape, and the local cuisine. Unfortunately, the productive cooperation quickly came to an end, due to a conflict that arose between the investor and the farmers. The problem was that local farmers, who owned the lands, wanted a larger share of the profits from both the lotus crop and ecotourism than the investors were willing to provide. As a result, Sachi left the area. Again, local farmers continued lotus farming, expanding its scale.

One by one, many established their own lotus-ecotourism businesses. A weakness, however, was the lack of coordination among the farmers. The lotus-ecotourism initiatives were fragmented, resulting in replacement of the larger lotus expanses with small-scale cultivation, which detracted from its previous beauty.

This was, however, a first transition in the region from agriculture-based livelihoods to business-based livelihoods. Those who shifted to lotus-ecotourism were able to change their life significantly. They moved up a rung in society. Thanks to lotus-ecotourism, owners began to earn substantial incomes and continued to do so up to the time of our research. They seemed to face very little risk of failure as well, enjoying relatively steady earnings. This reflected a shift in lotus farming, as its function and operators became more diverse. The meaning of lotus farming for grassroots stakeholders changed accordingly, as lotus was now no longer just an agricultural product, but also a landscape element that attracted tourism. This change had far-reaching positive effects on local society. However, the fragmentation of individual landholdings remained a major technical issue hindering the development of lotus-ecotourism in the period. Few farmers could meet a key requirement of the lotus-ecotourism model: maintenance of a beautiful landscape. Some of the farmers interviewed expressed a desire to buy lands from their neighbors, in order to make the larger connected landscapes that tourists paid to see. The fragmentation of landholdings also presented water management issues.

Diversification of lotus farming types (1994). Some local farmers were unable to join the tourism model, for example, because they did not own big enough areas of land or did not have land near main roads. They explored livelihoods involving intensive lotus or combinations of lotus with rice, fish, and ecotourism. Each of the lotus models required certain water management techniques. For example, rice-lotus had to be practiced outside dike compartments and needed to adhere to a particular seasonal calendar to achieve high yields. Lotus-fish required a strong high dike, so farmers had to switch from a natural flood regime to controlled flooding. As noted, lotus-ecotourism required availability of a large land area with adjacency to roads.

All types of lotus farming required a suitable flood-control infrastructure and water management capability. For intensive lotus, availability of high-quality seeds was important.

In parallel, the lotus market expanded, and demand became more diversified. Product innovations also got underway, with items such as lotus wine, tea, medicine, food, and (organic) wrapping materials produced. In the extremely competitive market that opened up, the largest share of profit accrued to traders. The number of lotus traders thus increased, though most operated as individual tradespeople. Interviewees further mentioned “lotus collectors, retailers, wholesalers, supermarkets and open markets” as trade outlets. The biggest market, according to our interviewees, was supermarkets, most of which were located in a few big cities, such as Ho Chi Minh City. Many lotus processing factories were established there and in the neighboring industrial province of Binh Duong. Lotus raw products were typically transported and processed in these urban centers to prepare them for their final markets. Though markets emerged for all parts of the lotus plant, farmers needed specialized knowledge and technical skills to properly harvest the various components. Some farmers did limited “on-site” processing, for instance, peeling off lotus seed skin. This job could be done by hand, without the need for machines. Peeled lotus seed fetched a higher market price than unpeeled seed. This activity reflects a skill that farmers’ picked up from their experience with lotus; those who applied it were able to improve their income. Yet, labor shortages undermined the success of lotus farming, as lotus farming is heavy work. Lotus cultivation had always been laborious and became particularly so when farmers discovered a new lotus disease. It had not yet been resolved at the time of this writing. The quotes below from our interviews illustrate the situation:

We don’t know what happened to our lotus trees. They were all sick ... the lotus rhizome was suddenly rotten.

Scientists and professors from CTU [Can Tho University] already came and took samples, they are investigating. We may know the results soon.

We tried many traditional ways to solve it, but the disease is still there.

Official Support (2014). Local authorities supported the emergence of the lotus economy. They sought to facilitate links between lotus farmers and other channels and even gave lotus farming households seed and start-up funding to encourage them to plant lotus. This was in accordance with a national policy to promote a restructuring of the agricultural sector towards high-value crops. In Dong Thap Province, lotus farming remained an established practice, though the lotus farming model continued to be modified for improved efficiency and economy. Multiple RSGs entered the scene, promoting lotus farming and searching for better ways to develop lotus. Nonetheless, due to the various constraints and problems that arose, the success of the farming model remained uncertain.

Figure 12. Lotus Cultivation: Timeline of Technology Emergence and Involvement of Relevant Stakeholders

5.3.2 Types of lotus farming and the technological development involved

Intensive Lotus. Intensive lotus can be farmed either inside or outside dike compartments. Among our surveyed farmers, 19 households practiced intensive lotus outside dike compartments and one inside. Among the 19 farms, 79% applied the tilling method (using existing lotus roots), 16% used the method of transplanting lotus rhizomes, and 5% planted new seedlings. The first method was preferred, as farmers believed it helped remove residual matter left from previous crops, thus reducing the risk of plant disease. The second method involved a single transplant operation, in which farmers planted the lotus rhizome at the proper depth, after tilling or cutting down the stalks left from the previous crop. In choosing seeds for intensive lotus, farmers tended to pick Taiwanese varieties, as these produced plants meeting this market's high standards (including for lotus buds, seed, and the rhizome). All of the households that used Taiwanese varieties agreed that these were well suited to the local alkaline soils and flood conditions, while also being resistant to pests and diseases and well-adapted to the local climate. Harvesting times depended on the planting method used. Seedling plantings required 100-120 days to harvest, while rhizome plantings needed 75-90 days.

Lotus-Fish. Only one household in the research area practiced combined lotus-fish. In that regard, this farmer was a pioneer in the region. The lotus-fish model required investment in a high and solid dike, and the area available for lotus cultivation was reduced so as to increase the water surface area available for fish farming. For this, the ditches around the banks of the lotus field were used. Fish were fed on the food naturally provided by the lotus plants. The farmer, therefore, did not need to purchase supplementary feed for the fish. Caring for the fish was also not technically difficult. Compared to the intensive lotus model outside the dike ring, combined lotus-fish required a higher initial investment to dig ponds and reinforce the ring dike. Therefore, the lotus-fish combination needed to return greater earnings to be an attractive alternative.

Lotus-Rice. The integrated lotus-rice model could be practiced outside the dike areas on lands used for double rice. Because the soils in the study area were more suitable for lotus cultivation than for rice, farmers adopted lotus as an alternative to rice, and were rewarded with higher incomes. Lotus and rice were cultivated in turns. Rice was planted in the winter-spring season, when the profit from rice was normally high. In the autumn-winter or summer-autumn seasons, lotus was cultivated. The lotus-rice model did require the purchase of pesticides and fertilizers for the rice crop; and some fertilizers were needed for lotus as well, to prevent disease and enrich the soil.

Lotus-Ecotourism. The lotus-ecotourism model was implemented on lands with accessibility to roads. In addition to a lotus field, lotus-ecotourism required ponds in between for wild fish and other aquatic species. Farmers practicing lotus-ecotourism also had to reserve areas of land for recreational purposes and restaurants. Materials for these services were mostly “green” such as Melaleuca wood, bamboo, and Nipa palm. Lotus products were served as food in restaurants; particularly, lotus seed was used in various dishes. Leaves were used for wrapping, and lotus wine, milk and tea were on offer. Profits from this model arose from intensive lotus cultivation in the lotus fields and the wild aquatic products, alongside supplemental income from tourism businesses and restaurants.

5.3.3 Stakeholder Perceptions of Lotus Farming During Technology Emergence

Local Farmers in the Land Reclamation Period. As seen from the story presented above, local farmers early on recognized the value of the lotus plant. They identified the lotus plant as a workable natural crop that could grow under the extremely poor natural conditions, and could even actively help to clean and reclaim the soils for agriculture. Lotus thus provided both a means and a purpose for reclamation in extremely poor growing conditions.

The Taiwanese Company. The Taiwanese company’s idea to commercially develop lotus production in the study area represents a point of stabilization of the

lotus farming idea. As farmers came into contact with the high-quality, high-value export-oriented niche market for lotus products, they saw an opportunity to expand their lotus production area. The company provided agronomic and technical support to expand its production base. However, farmers had difficulty meeting the quality and product standards of the Taiwanese side. This led to a scenario in which the market developer and innovator abandoned the scene. Yet, lotus cultivation remained. Products and processing continued, though redirected to the domestic market.

Actors in the Emerging Value Chain. Both domestic and international lotus markets became established, though farmers' links with these markets remained lacking. The emerging value chain was evidenced by the high prices paid for lotus products in 2014-2015 (spring season), which peaked at a level seven times higher than necessary to earn a profit. Interviewees benefitted from this development. Whereas they could clear a profit if lotus seed was sold for an average price of US \$0.43 per kilo, peak prices ranged from US \$2.17 to US \$3.13 per kilo. Thus, the market for lotus and lotus products appeared to be large, though farmers in the study area were largely unaware of where the lotus products went.

Expansion of the lotus market was also reported in other Mekong Delta provinces, including An Giang, Long An, Soc Trang, Can Tho, and Vinh Long. Dong Thap Province had more than 850 ha of lotus, while the biggest market was in Ho Chi Minh City, where many large supermarkets were located. In terms of the marketing of lotus at the research site, all lotus trade was conducted between the farmers (lotus growers) and individual traders. These traders then sold the products on to bigger companies, retailers (such as supermarkets), wholesalers, or at open markets. In doing so they availed of their own personal connections to these partners. Some companies did attempt to collect lotus products directly from farmers in Dong Thap Province. One of these companies, Nam Huy Trading, Ltd., located in Dong Thap, offered a guaranteed market for some lotus products. In spring of 2016, it exported 8 tons of lotus products to Korea and Singapore from

Dong Thap. Ramsa Corp, in collaboration with Can Tho University (CTU), was developing a lotus milk, to be sold under the “zen milk” label for the health food market. The Plain of Reeds Investment and Trade Joint Stock company developed a lotus wine, labeled “pink lotus wine”, which many tourists bought as a gift. However, these locally-active companies were still very few. While most did have factories in the research area to process raw lotus products, some were still transporting raw products elsewhere for processing before being traded. Some interviewees suggested that establishment of a robust local-level lotus processing chain could provide better income potential for local lotus farmers.

The Vietnamese Company. Sachi, located in Ho Chi Minh City, entered the scene attracted by the great beauty of lotus. Lotus was at that time perceived and promoted as a characteristic natural landscape, in stark contrast to the monoculture rice fields. Sachi’s involvement coincided with the economic rise and greater prosperity of Vietnam, especially in the capital city, where a new middle class was emerging, alongside a domestic and foreign tourism and leisure industry. Lotus-ecotourism was well marketed, and brought a profitable diversification opportunity for lotus farmers. However, this scenario quickly came to an end when a conflict developed over profit sharing, prompting the key innovator to leave the scene. Lotus combined with tourism remained, but in a fragmented landscape. This fragmentation threatened to undermine the beautiful scenery, which was what brought tourists to the area.

Regional Authorities. Advocacy of lotus farming was observed in the involvement of local government authorities, which began to support lotus cultivation and even provided limited financial assistance to lotus farmers. Their intervention was also stimulated by a national policy to restructure agriculture towards high-value crops. Authorities’ support for lotus stemmed too from the symbolic value lotus acquired, from the mid-1990s up to the present day, as an embodiment of the region’s cultural and landscape identity. This appreciation extended from local residents to government authorities and entered the national conscience. For example, references to lotus abound in Vietnamese literature. Dong

Thap Province was promoted as “the lotus region of the delta”, with traditional, nature-based landscapes that embraced the natural conditions of the Plain of Reeds and provided rich opportunities for biodiversity preservation and livelihoods for its farmers and residents. Lotus products were thus firmly linked with nature values and a landscape worthy of domestic and foreign appreciation. Here, again, however, some missing links can be identified, such as how to maintain the beauty of the landscape in the context of fragmented farm operations, and how to attract local processing and industry around lotus-based products.

Scientists and Development Partners. At the later stages of technology emergence, Can Tho University (CTU) and IUCN (funded by the Coca-Cola Foundation) became involved. In recognition of the need for climate change adaptation, and acknowledging the delta’s vulnerability, these actors framed lotus farming and the lotus landscape as a nature-based alternative to rice intensification with lotus also recognized as providing valuable ecosystem services and benefits—in Dong Thap Province and beyond, at the delta level. Within that frame, this group recognized the potential of lotus in the MDP strategy.

Traders. Yet, lotus farming could not succeed without the emergence of a bigger market, with traders, both individuals and firms, serving key functions. For example, some traders guaranteed that outputs would be bought at fair prices, then consumed or processed in a timely way. Our interviewees recognized traders and other lotus buyers and related businesses as a particularly vital actor in creating lotus markets. Tradespeople were also said to significantly influence farmers’ decisions on lotus cultivation. However, interviewees also reported that the lotus market had become unstable of late, with fluctuating demand, being too high or too low. Apparently, when output prices rose, farmers grew more lotus, leading to excess supply, accompanied by the inevitable drop in prices. The large fluctuations in prices for lotus products were a cause of extreme worry among the lotus farmers interviewed. They considered this a problem requiring immediate attention from all RSGs. A solution proposed by some, was for traders to make use of their strong links to

manufacturing firms to establish local capability for processing lotus raw products. Such a development, they said, could create jobs for the community while fueling local value chain development. For example, development of new products, like lotus milk, could both expand the market and increase demand.

Table 9 summarizes the different stakeholder perspectives on lotus farming as an innovation.

Table 9. Stakeholder Perspectives on Lotus Farming as an Emerging Innovation

Stakeholders (Relevant Social Groups)	Perceived Function of Lotus Farming as an Innovation	Claims
<i>Farmers:</i> lotus growers and laborers	Lotus farming is a valuable opportunity to improve incomes and deal with disadvantageous soil conditions	<ul style="list-style-type: none"> - Higher market price than rice (ten times higher in 2015) - Income earned periodically, giving farmers more regular income than with rice
<i>Scientists:</i> academics, researchers, and students	Lotus farming is a means to adapt to climate change and cope with floods and unfavorable natural conditions	<ul style="list-style-type: none"> - An alternative to intensive rice cultivation, which has been shown to undermine resilience to climate change - Resolves soil problems - A good opportunity for further collaboration between stakeholders towards future sustainability
<i>Development partners:</i> international organizations and NGOs	Lotus farming is a way to cope with the concurrent challenges of climate change, erratic flood seasons, and unfavorable natural conditions	<ul style="list-style-type: none"> - Provides potentially environmentally-friendly livelihoods and a pathway to climate change adaptation - Resolves soil problems - One of the best ways to achieve Sustainable Development Goals
<i>Local officials:</i> local authorities and farmer representatives	Lotus farming evolved from being a profitable activity for the community to being a symbol of the region's cultural identity and heritage; it is also a means of implementing the national policy of agricultural restructuring	<ul style="list-style-type: none"> - Creates jobs - Provides a symbol of the region's great beauty and cultural heritage
<i>Traders:</i> individual traders and companies	For individual traders, lotus farming was foremost a source of monetary profit. Companies, however, viewed it as a way to achieve greater sustainability, as well as profit.	<ul style="list-style-type: none"> - Excellent market potential, as lotus is an agricultural product of which all parts are used - Higher market price than rice

Our discussion thus far underlines that, as an emerging technology, lotus farming underwent a continuous process of social construction and development, influenced by a wide range of key stakeholders, though some linkages were missing. Eventually, lotus farming did reach a point of stabilization, albeit to a low degree; that is, no reliable lotus farming model had been achieved. In terms of the SCOT lens, lotus farming had not yet reached closure. Crucial concerns at the time of our research were the unstable market prices and the serious disease affecting the lotus rhizome. Thus, the technology design still seemed to be underdeveloped.

5.3.4 Stakeholders' Influence on Technology Development

All of our interviewees considered the most influential stakeholder group to be the *development partners*. This group, they said, was instrumental in maintaining, expanding, and promoting the lotus farming model. The *farmer* group framed lotus as a valued opportunity for improved incomes and for coping with unfavorable soil conditions. *Scientists* initially framed lotus farming as a means to adapt to climate change and cope with flood extremes. Later, with the engagement of the *development partners* and *local officials*, the multifunctional opportunities presented by lotus farming became more widely recognized. *Local officials* played a role in connecting *farmers* to the other groups. *Development partners*, like the *scientists*, were interested in lotus as an innovation to adapt to climate change, resolve soil problems, and deliver sustainable livelihood opportunities on the regional scale. Meanwhile, *local officials* supported the development partner in initiating program activities. *Local officials* also cast the innovation in terms of national policy and development targets. Indeed, lotus farming progressed from being viewed as a profitable activity for the community to being upheld up as a symbol of the region's cultural identity and heritage. This frame facilitated the innovation's continued development. A synchronized effort emerged between *scientists* and *local officials* to promote lotus farming as an innovation. Meanwhile, *traders*, acting solely in response to the commercial opportunity brought by lotus, regardless of the climate adaptation aspect, found support in the frames of the other groups. However, within the trader group, differences were found.

Companies expressed more concern about sustainability and understood better how useful the technology could be, especially in the context of climate change, while *individual traders* defined lotus farming foremost in terms of monetary benefit.

5.3.5 Influence of Available Resources on Technology Development

Interview subjects mentioned six resources as key to the development of lotus farming: technologies/knowledge, infrastructure, natural conditions, institutional mechanisms, human labor, money, and the market. Concerning *technologies/knowledge*, farmers said that they mainly “learned by doing”, gaining valuable experience over time, crop by crop. That experience, they said, was vital in enabling them to improve their lotus production and yield.

Infrastructure was needed as well, specifically, dikes of varying heights to control the level of water entering the lotus fields. Such dikes could be constructed as road footings, with sluice gates installed so that farmers could control the water entering and leaving their fields. However, the need for such infrastructure somewhat contradicts the recent strategy of the Vietnamese government to pursue sustainable development by preserving “natural conditions” on the delta. *Natural conditions* have in fact proven to be an obstacle to the expansion of lotus farming. Lotus cannot be grown on high terrain, but only in lowlands that are flooded annually. Yet, if floodwaters are too high or too low, lotus can be negatively affected. Moreover, in recent years lotus farmers have grappled with a fungal disease which they attribute to “natural conditions”—though it must be said that the disease could originate from some other source, such as seed or cultivation techniques. Although the disease has been identified and studied, and some remedies proposed by CTU scientists, the issue remained unresolved for some farmers at the time of this writing.

Institutional mechanisms, in the form of official interventions such as the financial support provided by local government, played an important role in the development process, though this was largely unrecognized by the lotus farmers we interviewed. Officials confirmed that further plans were in place to develop lotus farming. This

points to a gap and disconnect in information sharing between farmers and officials. If this gap were filled, lotus farming development could likely be accelerated.

Human labor remained a crucial resource because lotus cultivation cannot proceed without a sufficient supply of labor. Nowadays, fewer workers are willing to do the heavy work that lotus cultivation entails, as the pay is low and “easier” jobs are often available. This problem, according to some interviewees, could be solved with an institutional mechanism to assemble dedicated labor teams with access to mechanization, such as husking machines for peeling the seeds, alongside worthwhile compensation.

Money is a resource that cannot be overlooked. Lotus farmers would like to see budgets made available to financially support their operations, to guarantee output markets and prices, and to support the labor teams mentioned above.

Finally, *the market* has proven to be a key factor that significantly influences lotus cultivation. The three interviewees representing the *traders* group said that they had started out as general traders, buying and selling various products to earn an income. One of these traders had previously been a lotus farmer. Upon starting trade in lotus products, they recognized the strong potential of the lotus market and sought to develop it. Their first lotus product was lotus milk. After that, they expanded into salted lotus seeds, followed much later by lotus tea and lotus milk powder. Farmers came to the traders for sales and marketing. Deals were decided by both sides’ agreement on the price. Traders also bought lotus products to sell on to “bigger” traders if this could be done profitably. When asked about the stability of the lotus market, traders mentioned price fluctuations, which they said were out of their control. The market decides the price of lotus, they said. Prices were said to be dependent on the supply and demand principle; if supply was high, the price dropped. All of the traders expressed general satisfaction with their business, thanks to the high potential for profit. As one trader said, “*I found no failure in doing lotus, either planting it or trading it.*”

Table 10. Profit from Crops in Study Area, i.e., Rice, Lotus and Other Products, surveyed on December 2018 (US\$/ha)

Crop/Product	An Giang	Dong Thap	Average
Profit from first rice crop (winter-spring)	794.24	553.59	709.30
Lotus farming profit	911.16	62.08	495.83
Fish farming profit	168.71	354.16	175.01
Profit from second rice crop (summer-autumn)	356.34	260.80	357.05
Profits from other livelihoods (duck/frog/wild fish) in flood season	282.54	224.25	264.60

Table 10 shows that the first rice crop brought greater profit than the second rice crop. Lotus farming brought higher profit than a second rice crop. Lotus prices fluctuated depending on both demand and environmental factors such as the timing of floods and incidence of plant disease. In 2018, farmers in An Giang Province earned a good profit from their lotus crop—higher even than the first rice crop—while Dong Thap farmers lost much of their lotus crop due to serious disease.

5.3.6 Closure or Stabilization of the Technology

Since the first farmers in this region started lotus farming, in about 1980, the farming model has been recognized as a valued innovation. Commercial lotus farming was initially pursued via the interventions of the Cao Tung Company and Sachi. Financial support, though meager, provided by the government, served to clarify the semiotic structure emerging around this farming model. It also brought stabilization of the technology's meaning. The support gave farmers confidence in lotus farming and motivated them to continue the model. Lotus farming was initially viewed as a way to earn a living in a region with unfavorable soil conditions. Soon, however, it was also valued for its adaptability to changing flood levels. Furthermore,

it was found to bring higher incomes and thought to be environmentally friendly as well. At the early stage of lotus farming development, the idea of “adapting to climate change” had not yet taken off. Lotus farming merely met the needs of the community better than rice cultivation. Yet, the multifunctionality of lotus farming went on to attract an array of other RSGs, especially those concerned about the environment, sustainability, and climate adaptation. The semiotic structure of lotus farming gained stability from the financial support and verbal encouragement of local officials—themselves stimulated by the mandates of the central government via national policies and plans. The fact that lotus farming was more profitable than rice farming attracted the attention of scientists and development partners. The meaning of the technology thus coalesced and stabilized, with this stabilization also narrowing the range of RSGs that could influence the further design of the innovation.

Eventually, a project sponsored by IUCN created more opportunities for the development of lotus farming as an innovation. The project invited more farmers to join in and introduced state-of-the-art tools such as a monitoring system to test soil and water quality. These helped to make the innovation even more successful. Many activities were undertaken, including training, conferences, workshops, group discussions, and field trips with the IUCN team and experts from CTU. The RSGs joined together in a search for ways to equip farmers with better knowledge and techniques for sustainable development of the lotus farming model. This culminated in a design of lotus farming that propelled its development on a particular path. The next steps in the process would involve bringing in new actors and groups, and initiation of the process of building a “reified”, or concrete, form of the emergent innovation. Yet, Pinch and Bijker (1984) cautioned that “the stabilization of an artifact will always be a matter of degree” and “complete closure does not happen” (Bjerregaard and Georg 2011: 18). We see this in the lotus case. Though actors still differed somewhat on the innovation’s meaning, all RSGs agreed that lotus farming

worked for them. Closure was not achieved, however, as further design modifications were still needed, which could result in new RSGs entering the scene.

Our analysis does indicate that lotus farming had reached stabilization, albeit at a low level, as all RSGs pointed to lotus farming as offering the best potential for the future. At the same time, we found that alternatives, particularly a second rice crop, had become less important. In summary, though our RSGs framed lotus farming differently, the innovation's development brought a diminishment of interpretive flexibility, and the meaning of the innovation coalesced. Among lotus farming stakeholders, all came to accept the innovation's value. This was in no small part due to the multifunctionality the innovation served.

5.4 Discussion

5.4.1 An Emerging Technology with Development Potential

Lotus farming as an innovation was locally initiated, with the starting point for development being “to resolve soil problems”. Stakeholders’ perceptions of the technology became more diverse with the involvement and interventions of more stakeholder groups. Unexpected “difficulties” arose, however, including the departure of the Taiwanese company, the lotus disease, erratic market prices, and dwindling labor availability. These set the development process on a new path from time to time.

Farmers welcomed lotus farming as a valuable innovation for the local community. Eventually, farmers realized that lotus not only could bring improved livelihoods and better incomes, but also offered a means to adapt to climate change, to cope with floods, and to resolve unfavorable natural conditions. Lotus farming became most highly stabilized for this RSG. Nonetheless, the unexpected difficulties that occurred caused farmers to look at lotus farming differently and prompted some to switch back to rice. Farmers were particularly concerned about their ability to sustain lotus cultivation. Eventually, other groups—namely, local authorities, scientists, and development partners—invested serious effort and concern. Their

interventions brought renewed impetus for the continued development of lotus. As the technology was further developed, farmers branched out into a diversity of lotus farming types, including lotus-ecotourism, which nowadays is considered the preferred model due to the steady profit it offers. Lotus-fish was also viewed as advantageous, as the combination with fish delivers a better income than lotus alone. However, these two models were not considered “sustainable” in terms of coping with climate change. In fact, lotus farming can be viewed as a relative failure in the research area, compared with other provinces, particularly An Giang, Can Tho, Vinh Long, and Long An. Most of our interviewees mentioned the success of An Giang Province in implementing lotus, as this province was key in providing good lotus seeds for other provinces. Local people in Dong Thap Province were very positive about lotus and expressed a strong willingness to work with it. However, conditions outside their control, particularly the lotus disease and the erratic market, had left them deflated. This underlines the underdeveloped state of the technology’s design. Before the intervention by the scientist group (CTU in particular), little R&D funding had been available to investigate the lotus rhizome disease and other risks and to find solutions. Much more funding is still needed. Investment in lotus pales in comparison to rice, which has received hundreds of millions of dollars in R&D funding and assistance, with dedicated research facilities such as Cuu Long Rice Research Institute, active over many decades. Both *development partners* and government are active in rice R&D, seeking to anticipate and reduce risks posed by diseases, pests, environmental conditions, and other threats. With greater investment at the predevelopment stage, lotus farming could turn a corner, and take off as a profitable, innovative alternative.

Lotus farming was ultimately framed as a good income-earning farming model for the local community in the research area. While the innovation proved sustainable, it remained underdeveloped at the time of our survey. Indeed, farmers were less attracted to lotus in the later study years, as other crops, such as rice, were considered better options. This was due to the fluctuating market prices and labor

shortages, which remained hurdles blocking the development process. With effective support from development partners, especially international organizations, the development of lotus farming could be advanced. To facilitate the process, local authorities should take decisive action to initiate engagement and collaboration among relevant stakeholders. Especially important will be to establish a platform to foster interaction between *farmers* and *traders* with fair access and a benefit-sharing scheme. Our findings also suggest potential for lotus value chain development on the local scale, in view of lotus' multiple advantages, particularly in relation to climate change adaptation. Further technology development can be facilitated through stakeholder dialogue geared towards advancement and maintenance of lotus farming. Our findings furthermore support the argument that it is important to look beyond what we see in the field and explore how stakeholders interpret and negotiate various aspects of an emerging technology. Lotus farming as a technological artifact, in this study, was not found to be a fixed entity yet, despite a degree of acceptance among all stakeholders. All RSGs expressed appreciation for the outcomes of the lotus farming development process, at every phase of the development trajectory. The technology has undergone modifications and alterations, and has been shaped by continuous interventions. This finding points to the potential value of providing more room and more opportunity for additional relevant stakeholders to step in, to shape and reshape lotus farming in a way that fits their interests. This finding substantiates the SCOT perspective. Indeed, lotus farming as an artifact cannot be perceived as a single technology that was developed on its own. Rather, it was shaped by many social factors and the interactions that took place within the social network.

5.4.2 Policy Messages

Since the Vietnamese government announced its intention to promote more diversified, sustainable, and adaptive livelihood models, in accordance with the MDP, lotus farming has received significant attention and investment. Our research demonstrates that lotus farming originated in a context of poor farming and livelihood conditions, and was improved through local experience and knowledge.

A key finding is that the innovation's development stabilized when other relevant social groups—in addition to local farmers—became involved. Among the main stakeholder groups, our interviewees identified the most important actors as supporters of the technology, particularly international partners, local officials, and scientists. All of these had a significant influence on farmers' decisions to take up or continue lotus farming. One important actor remained largely missing from the support network, that is, the private sector (enterprises). Their involvement could bring about a more stable lotus market. This stakeholder group could be attracted through incentive programs, involving for example, government financial stimulus and support.

In practice, lotus farming has undergone considerable development, but this development is nowadays suspended due to the many hurdles that the present stakeholders have been unable to overcome. The design, or way in which lotus farming is practiced, changed over time, evolving with circumstances and societal demands. Alongside these changes, the interests of the relevant actors changed as well. Therefore, lotus farming today is very different from lotus cultivation 30 years ago. A major recommendation for policymakers is to invest in sustainable maintenance of this farming model, while also seeking to expand involvement to more actors, for example, by providing attractive modes and incentives for cooperation. Furthermore, government policies, such as tax reductions, should be considered to fuel creation of a local value chain, thus attracting more enterprises to the market for lotus products.

5.5 Conclusion

Within our project we conducted other studies exploring the roles of innovations in the strategic delta planning framework (Seijger *et al.* 2018; Vo *et al.* 2021). The present study examined whether one specific innovation, lotus farming, could be viewed as successful in terms of its acceptance by relevant stakeholders. Lotus farming emerged as an attractive nature-based alternative to rice for the research area, and has since received increased attention from both international and domestic actors.

The MDP and climate change adaptation discourse provided a new frame and impetus for initiatives sponsored by IUCN and the Coca-Cola Foundation, as well as local government, to support and advance lotus cultivation. Yet, the success of this farming model is not a done deal, due largely to the failure to manage externalities, such as erratic prices (which could be stabilized with appropriate market development); labor shortages (which could be solved by establishing government-sponsored dedicated labor teams); inappropriate water management schemes (which could be solved with suitable dike infrastructure); and lack of horizontal and vertical integration.

Although lotus development had not reached closure, the model has high potential, particularly in relation to the diversity of the lotus market, as all parts of the plant can be used, and lotus fields offer high aesthetic and symbolic value. Moreover, lotus products can be labelled as “green”. The meaning of lotus cultivation has coalesced over time, as the innovation was recognized as a means to cope with the floods, to adapt to climate change, to bring in better incomes, to create jobs, to improve water quality (by washing out acid sulfate), to diversify livelihoods, to restructure agriculture, and to symbolize local cultural identity and heritage (lotus is Vietnam’s national flower). Despite the difficulties faced by lotus farmers, the lotus farming model has served an important community need. Yet, throughout the research period the technology remained in a constant state of flux, with continued development and adaptation, resulting in the technology taking different forms, each emphasizing and adapted to different circumstances and services. The technology had not reached closure but was continuously subjected to modifications and change to enable it to work better in the context of the VMD.

With increased investment, the quality of local lotus products could be brought up to the requirements of the international market. For example, a training or lotus farming manual might provide some help. Other aspects that should be considered are effective linkages between farmers and traders, particularly the companies that process raw lotus products (now mostly located in Ho Chi Minh

City and Binh Duong Province). Farmers would benefit from direct connections to these large buyers to market their products. Furthermore, the idea of a government-sponsored labor team was raised, to help solve the problem of labor shortages.

The current study found a range of social actors that supported lotus farming's development. We can conclude that lotus farming has experienced continuities and discontinuities in technology development, but nonetheless has great development potential. This finding is of wider importance because, as delta researchers, we propose innovative ideas not only to be written in policy plans but, more importantly, for implementation to achieve sustainable deltas worldwide. Our findings in this study echo the social construction of technology perspective, as we found lotus farming to be a technological artifact that did not develop on its own. Rather, its development was driven by stakeholders' interpretations and the meanings they assigned to it. In this sense, it has been socially shaped and continues to be reshaped. This conclusion is an important one for a strategic delta planning process, as it confirms that an innovation takes time to travel from formulation to the field. Moreover, no innovation can be implemented without acceptance by the relevant stakeholders. As of this writing, many aspects of the lotus farming model remained unclear or underdeveloped as its design still allowed many windows for actors to insert their ideas for further development. This points to the important role of stakeholders' perceptions (especially farmers) in creating satisfying outcomes for an innovation and enabling multiple co-evolution of a technology. The regional planning process recognizes lotus as a highly adaptive, innovative technology. To achieve this potential, greater government support is needed, to attract more actors to the development of this innovation. Increased research attention is also needed to identify the right models to make this technology work.

Chapter 6

6 SYNTHESIS AND REFLECTIONS

This chapter concludes the dissertation. Section 6.1 provides a brief recap of the research purpose and approach. Section 6.2 reintroduces the main research questions posed in Chapter 1. Section 6.3 reflects on the key findings presented in the analytical chapters. The implications of the findings for policy and practice are discussed in section 6.4. Section 6.5 presents limitations of the research and avenues for further work, while section 6.6 offers general conclusions.

Throughout this final chapter, both opportunities and challenges are touched upon for the wider applicability of the SDP approach, especially within the unique political context of Vietnam.

6.1 Introduction

Strategic delta planning (SDP) is a new approach proposed as a deliberate effort to influence delta development. Herein, wishful thinking on how a delta could develop is repeatedly confronted with vested interests and practices. These confrontations produce expected changes (institutional embedment, changing people's minds) as well as unexpected changes (actors suddenly consenting or stepping out). In fact, these outcomes apply to any change or innovation process. A key element of SDP is its explicit, very long timeframe, informed by climate change adaptation. This forces consideration of change processes far into the future (50-100 years). SDP is innovative in acknowledging the long-term uncertainty of change and innovations. Although it cannot fundamentally alter the future, it can push development in a particular orientation (towards a particular change). Explicit acknowledgment of this motive is needed to build consent among stakeholders to initiate the shift and propel developments and change in the new direction. What the future will look like in 50-100 years cannot be ascertained, but changes initiated today may shift development towards a different strategic orientation. SDP, therefore, is not only an ambitious planning process with influence in altering decision-making, but it is also highly uncertain, as consent on strategic priorities is needed. While the SDP approach has the potential to alter decision-making on

strategic priorities for deltas, to be influential, consent to these priorities must be negotiated and renegotiated across phases and arenas (Korbee *et al.*, 2019^a).

Throughout this research, the hourglass framework was assigned a central role in understanding the negotiation of consent among actors during the agenda-setting, plan formulation, and implementation phases. Core elements contributing to such consent, as visualized by the hourglass framework, are innovations, actor coalitions and participatory planning tools. Various trajectories are possible in steering towards convergence or divergence in the process of negotiating consent in planning and plan implementation; such as the step forward, step in, step out, or sidestep (Chapter 2 and 3). In strategic planning, innovations play a role in changing the mindsets of traditional practitioners, understanding their conventional thoughts and agendas. When they are multifunctional and address multiple concerns, innovations can also play the role of mobilizing actors. If a proposed innovation is given continuous support, it might end up being a success. In a long-term strategic planning process, innovations can be viewed on a continuum; they get shaped during agenda-setting, they structure plan formulation, and they become projects upon implementation.

The Vietnamese Mekong Delta (VMD) is unique in its biophysical dynamics. Large-scale seasonal flooding affects the upper delta (Wesselink *et al.*, 2015), while the coastal areas are highly salinized (Smaijl, 2018; Tran *et al.*, 2018^a). Over time, these dynamics have engendered a strong adaptability and resilience among local people to tackle the extreme conditions they face. Their efforts are reflected in mottos such as “living with floods” and “turning to a brackish economy”. These local characteristics were not truly recognized in the national sectoral and master plans of the past, which were characterized by an interplay of rigid top-down decision-making and extensive bottom-up reporting. Traditional planning in Vietnam was assessed quantitatively, in relation to quantified targets (Benedikter and Nguyen, 2018; Smaijl, 2018). Little consideration was given to qualitative assessments of social or institutional outcomes.

Regarding adoption of a strategic planning approach in national plans, Vietnamese decision-makers at first perceived this as a stepping stone to new development impetus, without institutional integration down to lower levels and with insufficient focus on action plans. However, this research found that the SDP approach, in which innovation is a crucial pillar, gradually changed the thinking of these actors. Examples of new mindsets within the national political establishment are identified in recently released national (legal) documents.

This thesis has focused on the role of innovations, or innovative solutions, in strengthening the SDP process for the VMD. It has analyzed the dynamics of the SDP process in the MDP, employing a multidisciplinary approach and qualitatively exploring how innovative strategies may play a role in fostering and maintaining consent across various stakeholders and through different stages of the planning cycle. In particular, the thesis attempted to answer one main research question: “What is the role of innovations in the Mekong Delta Plan in shaping the three phases (agenda-setting, plan formulation, and implementation) of the strategic delta planning process and fostering consent among stakeholders on the strategic developments?”

As shown in the previous chapters, the SDP process evolved and traveled well from the agenda-setting phase to the implementation phase once the strategic plan was shared, appreciated, and promoted by the involved stakeholders. Before the SDP process, Vietnamese planners, experts, and decision-makers saw the VMD mainly in terms of its biophysical characteristics, and as an external object, relatively independent of the planner. Moreover, past planning processes had led to extensive division and fragmentation of the delta (Umans, 2021). Therefore, planning actors perceived and acknowledged the need for a new approach to delta planning, that deviated from the past conventional planning approach. The first step in SDP is to convince stakeholders of the need. In the VMD, this was done by a problem analysis, and by showing alternative development options. Realizing the need is thus part of the consent-building process. Yet, the policy exploration and planning phase leaves

room for political actors to later shape proposed innovations according to their own perspectives, taking into account contextual opportunities and constraints.

6.2. The research questions answered

This section summarizes the key findings of the research, though not yet discussing their implications. Specifically, it returns to the main research question and four sub-questions corresponding to the four analytical chapters (2, 3, 4, and 5). An overall key finding of this study is that the progress of a strategic innovation can provide a good indication of how a delta or coastal area is performing in adoption of the alternatives for livelihoods, institutions, or societal developments proposed in an strategic delta plan. The sections below look at the four sub-questions.

6.2.1 Convergence of agendas

The first sub-question referred to the convergence of the agenda set out in the MDP and the agendas of stakeholders and the political establishment (Chapter 2). Specifically, it asked, “To what degree have innovations in the MDP converged with the agendas of Vietnamese political actors, thus structuring consent among them to adopt the policy agenda set out in the MDP, and as such, what role has the MDP played in aligning development policy agendas?”

Chapter 2 focused mainly on the problem orientation and priorities for innovative solutions proposed by the MDP and politicians, to determine the degree to which these were aligned. The MDP, which is an instance of SDP, proved able to bind different political actors, via a convergence between the MDP agenda and the agendas of stakeholders. Most of the proposed innovations were appreciated and adopted. Past planning processes led to fragmentation and divisions, pointing to the need for new agendas and actions. In this context, the MDP was like a new breeze, bringing in innovative ideas for potential change. Most of the development agendas upheld by key informants were in line with the agenda proposed in the MDP. Evidence of convergence was found in the national government’s formal endorsement of the MDP’s ideas in 2017. Furthermore, the convergence was found

to be facilitated by the efforts of “policy entrepreneurs”. Key policy entrepreneurs in this case were national experts, highly positioned political actors and international development partners (see Chapter 2). Arnouts (2010) argued that the role of policy entrepreneurs is crucial because they are proactive and in a position to make significant difference. In Vietnam, they were able to tackle existing policy problems by navigating the push and pull of the political arena. In so doing, policy entrepreneurs were able to change what happened. Policy entrepreneurs are said to be able to create so-called “windows of opportunity” by connecting certain policies to certain problems, and also by navigating the political situation. This chapter confirmed this proposition.

6.2.2 Changing mindsets

The second sub-question referred to stakeholders’ mindsets. Specifically, it asked, “To what extent has the MDP been influential and changed thinking about transformative strategies based on the notions and framings the stakeholders used to move the MDP from the agenda-setting phase to the plan formulation phase, and what was the role of innovations?”

Chapter 3 provided evidence that the MDP was indeed influential in changing the mindsets of political actors. The alternatives proposed in the MDP were observed to be gradually replacing the focus on intensive agriculture. Furthermore, central governmental decisions were enacted, for example, introducing flexibility to rice production targets, and project proposals had been developed using ideas from the MDP.

Looking at the extent to which the MDP was influential and changed thinking about transformative strategies, this chapter looked at several implementation aspects. Specifically, “soft” implementation was the subject of analysis, as this represents a prerequisite step to “hard” implementation. Yet, soft implementation takes significant time in an SDP process. Regarding the MDP, how far and how effective the plan and its component elements could travel through the planning process in Vietnam depended on the ability of the MDP strategic vision and

orientation to influence the mindsets of policymakers and planners (soft implementation). This can lead eventually to changes in formal plans, laws, and regulations, which are needed before hard implementation can begin. This “soft” and “hard” implementation will be discussed further in the next section. Four features of “soft” implementation were found in the Vietnam case. First, the agenda of the MDP envisioned *prospects for change* in the VMD towards agro-industrialization and diversification and capitalizing on opportunities offered by brackish conditions. Second, to imagine these change prospects, key actors had to evince a change in their own thoughts, turning away from the long-standing policies and conventional strategies of the past to *new mental models*. These changes caused actors to realign their agenda and priorities to the strategic directions set out in the MDP. Third, *consent* steadily grew and expanded, especially regarding the ideas for agricultural modernization. Fourth, all these processes, step-by-step, led to the gradual adoption of the MDP in official *decision-making* in the form of policies, laws, and plans. Empirically, a diverse set of actions and decisions that were influenced by the innovative ideas of the MDP came to the fore, often as a result of policy advocacy by individuals – although actual implementation of the MDP had not yet been achieved at the time of this research.

6.2.3 Grassroots acceptance of innovations

The third sub-question concerned stakeholders’ perceptions and their adoption of innovations proposed in the MDP. Specifically, it asked, “How have stakeholders, especially at the grassroots level, perceived the no-regret measures set out in the MDP, and how have these perceptions influenced acceptance of the plan and thus also embracement of the accompanying adaptation measures?”

To answer this research question, three innovations were analyzed. The investigation was interested in the perceptions of grassroots actors (mainly farmers) of the future-oriented innovations proposed in the MDP. Indeed, local-level aspirations and voice crucially matter, as farmers and other grassroots stakeholders will directly or indirectly benefit (or lose out) from the outcomes of strategic

planning decisions. Farmers are the end users of the innovative solutions and strategies proposed, so their views may be most important of all. Data collected through interviews indicate that farmers' decisions were mainly driven by income concerns, though a gradual shift was perceptible towards greater concern for issues of sustainability and ecological balance.

Three innovations (floating rice, room for the river, and the shrimp-mangrove integrated farming model) were analyzed with respect to the multifunctionality of innovations, as no-regret strategies. The results show that farmers considered the ecological benefits of floating rice to be superior to the other innovations. This does not imply that floating rice is an ideal farming system; rather, it indicates a tendency among farmers to prefer “building with nature” practices.

Finally, evidence suggests the need for more “windows of opportunity” – including time, appropriate institutional mechanisms, and resources – to enable wider uptake of the analyzed innovations.

6.2.4 Social construction of innovations

The fourth sub-question concerned the way one particular innovation emerged in the local context from the period preceding SDP. Specifically, it asked, “How has the innovation of lotus farming (put forward in the MDP as a key innovation for a transformation away from triple rice culture in the floodplains) emerged, been socially constructed, and developed as a grassroots-based technology that preceded the MDP?”

Owing to its suitability for local conditions and its multifunctionality, the MDP proposed lotus farming as an appropriate innovation, especially, as an alternative for triple rice in the floodplains of the upper VMD. Lotus farming is a long-standing practice predating the MDP. Yet, it had recently been advocated anew by many actors, not least, those involved in the MDP. In the process of its development and application, lotus farming received a new framing as a suitable climate-adaptive technology. Thus, over time, lotus farming in the study region

received considerable attention. As an innovation, it was constructed and developed from local experience and practices, while also benefiting from various forms of support from a diverse pool of stakeholders, which changed over time.

This research was interested not in lotus farming as a technological artifact itself, but rather in how this technological innovation emerged and what the outcomes of that process were. All relevant social groups expressed an appreciation of this innovation's value. However, it was not yet an implementable fixed technology, at the time of this research, due to constant changes in its development pathway and problems that had not yet been resolved. The analysis suggests that over such a long strategic planning process, sufficient space needs to be provided for an innovation to be shaped, co-developed, and diversified with stakeholder involvement along the way. A key lesson is that development of an innovation may become more stable with expanded involvement of other relevant social groups (rather than just farmers themselves). The most important actors, in the case of lotus farming, were identified as the "supporters" group. This includes development partners, facilitators and institutional advocates. However, more funding and financial support was still crucially needed. At the time of this research, lotus farming had reached the stabilization phase, though at a low level, and it remained in a constant flux of development, modification, and adaptation.

Various changes in the form (design) of lotus farming had been attempted to deliver a satisfactory outcome of the technology. This dynamic added impetus to the modification of the technology itself, for the purpose of adapting to different circumstances and resolving the concerns of those interacting with the development. The findings of this research, in this regard, confirm one of the overall hypotheses of the study; that is, as long as an innovation is multifunctional and able to address most of the salient concerns of stakeholders, it can be successful and consent can be achieved.

Nevertheless, consent at the current time is no guarantee for long-term acquiescence and implementation, though our findings show relatively stable

consent over time in the case of lotus farming. The degree of consent did fluctuate somewhat due to unequal clout of technology stakeholders and involvement of local and external actors therein. For example, the current study found that lotus farmers innovated new ways of doing things, mostly to assuage income burdens and to adapt to changing natural conditions. However, once lotus farmers were familiar with a certain model, they hesitated to change. This harks back to the findings on sub-questions 1 and 2, related to why an innovation may or may not be embraced by farmers. Yet, lotus farming was supported by the international donor community and two important national ministries. The impact of such support is discussed further below.

6.3 Discussion

6.3.1 On policy entrepreneurs as key actors in SDP

Chapter 2 found that the agendas of most key interviewees were aligned with the MDP, indicating convergence (despite some slight divergence) across various stakeholders, on the problem analysis and innovative strategies of the MDP. Convergence occurred due to negotiation of consent for SDP. Divergence occurred due to negotiation of regional consent, as local interests and perspectives had to merge with developed plans for implementation.

Chapter 3 found that, over time, actors and innovations may trickle down from planning to implementation, following different routes in consent negotiations (step forward, step out, step in, sidestep). The constellation of actors and innovations may change over time, but for implementation, they have to fit with the strategic priorities of the plan. Ultimately, the innovation process is a technical-political conversation that engages all levels of actors from the earliest stage to the end; that is, from the problem orientation phase, to plan formulation, to implementation, in accordance with the hourglass framework. High-level dialogue between national experts, as crucial policy entrepreneurs, and other actors can boost the process and pave the way for dialogue and negotiations at all appropriate operational levels. Influential policy entrepreneurs can serve as change-makers, towards a shift in mindsets,

mobilizing other actors and resources, enhancing collaboration, and strengthening the process. The involvement of high-level politicians in the process, such as ministers and the prime minister, is of particular interest and has a distinct added value. Similarly, since these *policy entrepreneurs* were involved from the beginning, they can elaborate interventions in such a way as to ensure political support for the steps to come, so the desired outcomes can be achieved. Chapter 2 demonstrated this being done through the creation of working groups or committees (i.e., the Mekong delta forums and SWSC) in which all the different stakeholders were represented.

6.3.2 Usefulness of the hourglass framework in the Vietnamese context

In linking the finding of this research on the convergence of agendas with the current state of Vietnamese planning and policymaking, it is evident that having a sound problem analysis and a good strategy is not the only thing that matters. A dedicated political process with involvement of different actors, operating in different arenas of decision-making, and acting at different stages of the process is important in merging political streams to achieve convergence. In this sense, the MDP played an effective role in bringing about consent and thus in creating a convergence point at the crossroads where all of the different agendas met. Understanding this function better could help in targeting other policies, leading to better outcomes for decision-makers of the process as a whole. A step-by-step approach is necessary in all planning phases, especially the formulation and implementation phase where stakeholders are engaged and buy-in is secured. Throughout this research, evidence was found for the need to bring together different levels, sectors, spheres of influence, and actor control.

The hourglass framework, as the overarching analytical framework for this research, significantly contributed to the whole of the analysis. Existing literature on strategic delta planning confirms the usefulness of the hourglass visualization for analyzing the components of an SDP process, including proposed innovations, with some studies suggesting certain refinements (Evers *et al.*, 2019; Korbee *et al.*, 2019^{a&b};

Seijger *et al.*, 2016; Seijger *et al.*, 2019^{a&b}). In these works, the hourglass represents the distinct stages of an SDP process, both temporal and spatial.

The central element of SDP is its strategic reorientation of development strategies and trajectories. It defines a starting point that originates from a problem analysis of the current state and thus, how the current state will be affected and changed under future climate threats. A desired future state is envisioned, and development orientations are proposed towards which a change process can get underway. Yet, this process is not fixed, linear and straight, although it can be drawn as a straight line from top to bottom. In reality, it keeps changing unanticipatedly along the way. As visualized in the hourglass, deficiencies are found in the funnel area, after which solution ideas become fixed and agreed upon. Stakeholders should have reached at least some degree of consensus at this point. The case of lotus farming is a good example. The co-evolution and development of lotus neatly illustrates that technological innovations are circuitous, not linear, they co-evolve with the engagement of stakeholders. As circumstances (and actors) change, new configurations and capacities may evolve that were (and probably could not be) anticipated at the inception. The more resources are mobilized and the greater the advocacy and support provided, the more successful planning is likely to be. The success of SDP is thus not measured in terms of the implementation of its proposed measures and innovations, but in its ability to move stakeholders and plans and actions towards the reorientation of development. It is not so much about how to get there, but about progressing towards the desired state. The process leaves room for new and other development strategies and innovations to emerge to achieve this.

Ultimately, the hourglass framework was useful in the context of Vietnam, particularly in the analysis of the trajectory of innovations as they traveled through the SDP process. All four analytical chapters showed that (selected) innovations did travel well through all three planning phases. Although, to get a real innovation implemented, the planning process in Vietnam must first complete the “soft” implementation phase, before “hard” implementation can commence. In reality, soft

implementation aspects are not visible and somehow easily overlooked. But as this study showed that the hourglass framework was effective in representing how the SDP process was structured, the same typology will be helpful in describing “invisible” steps through which a plan is implemented in the real world. Thus, the hourglass framework is recommended for further use in research on delta planning-related themes.

6.3.3 The distinction between “soft” and “hard” implementation in Vietnam

There is some ambiguity in conceptualizing the term “implementation” in Vietnamese, especially in terms of the implementation of the MDP. Notwithstanding the broad definition of implementation used in Chapter 3 of this thesis, we can consider the implementation of the MDP as consisting of both the “soft” and “hard” components. Korbee *et al.* (2019^b) observed that while the SDP approach was being used for various deltas, questions had arisen concerning implementation aspects. A stated characteristic of a strategic delta plan is in fact that exact implementation efforts are not prescribed in the plan itself, but at the operational levels where decisions are made and negotiations conducted.

Soft and hard implementation can, moreover, be understood in terms of the nature of measures. From the actor-network theory perspective (Latour, 2005), soft implementation is related more to “human” artifact and hard implementation is related more to the “non-human” artifact. Hard measures thus represent physical efforts or actions taken to support the process of implementation. These measures are tangible, and easy to identify and keep track of. A dike for controlling floods or a sluiceway construction to manage freshwater are examples of hard implementation. Soft implementation, in contrast, refers to non-physical means, such as “mental” prospects and perceptions of policymakers.

In Chapter 3, soft implementation was characterized by four features: prospect for change, mental change, decision-making, and consent. A change of thought can facilitate project implementation. However, given the intangible nature of such a “soft” characteristic, it is difficult to assess whether or not soft implementation has

been a success. Therefore, it is essential to have some indirect means to evaluate the soft implementation aspects of a strategy. For example, following a workshop or training to raise awareness, a means of assessment could be a final report or the mainstreaming of the acquired knowledge in a specific agricultural practice. Chapters 2, 3, and 5 demonstrated that a shift in thinking did take place in Vietnam at the level of policymakers, experts, and donors, all of whom were important stakeholders. These actors not only expressed their shifting thoughts but went on to initiate action to move away from conventional, unsustainable practices. Such support, however, was not yet clearly evident among farmers, who however, are the most important grassroots stakeholders, and among businesses, though their mindsets did appear to be gradually changing over time (see Chapter 4 and 5).

At the local level, our findings indicate that some strategic ideas from the MDP were being used in ad hoc planning activities. For example, in Chapter 3, we interviewed local authorities in Tra Vinh Province concerning their perceptions of the MDP's ideas. They admitted that many ideas proposed in the MDP had been taken into account when writing the provincial action plans. These plans were the guidelines for some development project proposals.

In conclusion, in the Vietnamese political context, in order for a real innovation to take off, soft implementation has to enter the scene before hard implementation can take place. This was confirmed in Chapter 3.

6.3.4 Adaptability and appreciation of innovations by stakeholders over time

One of the key elements in gaining the appreciation of the various different relevant stakeholder groups is the “multifunctionality” of an innovation. Chapter 4 identified this predominantly as “balancing ecosystem services with sustainable socioeconomic development and the maintenance of livelihoods”. Multifunctionality of innovations facilitated interventions, thereby expanding the number and diversity of stakeholders that engaged with them, especially to include international development partners. This multifunctionality is wide ranged, including regulating, provisioning, supporting, and cultural services.

Among the innovations examined, the floating rice model seemed to offer the highest multifunctionality. Although changes in the flow hydrographic of the Mekong River indicted constraints that could significantly hinder the real implementation of floating rice, this innovation nonetheless satisfied farmers' aspiration to "build with nature" and explore organic agricultural production. National strategies advocated and stimulated expansion of floating rice and floating gardens in some flood-prone areas, mainly in the upper VMD. This, too, gave these innovations an added intrinsic advantage.

The critical issue for SDP is that a strategic vision and strategic choices may not be directly supported by farmers, who are technology end-users, as they favor short-term thinking and short-term interests. Vietnamese farmers were not yet ready to implement the innovations proposed in the MDP. However, this does not mean that the plan has no relevance. It has been influential, initially on the local authorities, as discussed in Chapter 2. The authorities were trying to implant these ideas into their own action plans at the grassroots level, with the consent of farmers. Chapters 3 and 4 analyzed what further needed to change before the farmers could support the ideas in the MDP. Here, the cases of the integrated shrimp-mangrove farming model and lotus farming demonstrated that farmers lacked sufficient resources to implement the innovations. However, these innovations had demonstrated, to some extent, their potential for further development and scaling up. Some context-related differences were identified in the two cases. In particular, while "shrimp-mangrove integration" was seen as an appropriate model in some areas (i.e., Ca Mau Peninsula), it was difficult to replicate widely. In contrast, lotus farming was recognized as offering great opportunities, for example, by opening new markets for lotus products, both domestic and international, thus it offered scope for scaling up in similar landscapes. Lotus farming was also receiving significant attention from development partners, such as IUCN, WWF, and the Coca-Cola Foundation.

Yet, this study also underlines that farmers' perceptions and contributions to the outcomes of innovations cannot be underestimated. There is a large reservoir of

knowledge and experience within local communities, as discussed in Chapter 4 and 5, regarding the cases of floating rice and lotus farming. Insights gained from these two cases sheds light on the importance of grassroots stakeholders' contributions, acquired from their own experience and practice. National planning should thus consider them as an important resource and input for decision-making. This pertains particularly to times when economic and development plans are forced to transform, for example, to adapt to more extreme climatic conditions (saline intrusion or floods). Local experience is important for planning and can help point the way to efficient, appropriate, and time-tested innovative strategies. Example innovations in this vein include ecosystem-based agricultural models and agricultural diversification, as well as aquaculture, to deal with drought or floods.

The innovations analyzed in Chapter 4 and 5 demonstrate that a technological innovation is not, and should not be, a fixed thing. Rather, its design is continuously redeveloped and refined, even before reaching the physical implementation stage. Intervention and involvement in this process are inevitable, as these provide impetus to push forward the process of technology development. Stakeholders seek to shape and reshape a technology in such a way as to bring about an outcome that is satisfying to them and addresses their concerns to the greatest extent possible. This happened, in fact, in multiple ways in MDP implementation in Vietnam. For example, lotus farming in Dong Thap and floating rice in An Giang showcase that technology can be successful and can have the potential to be multiplied, while their development is still underway. These innovations continued to be developed and their designs diversified, while multiple outcomes remained possible and future adaptation pathways were still being shaped.

6.3.5 Innovation - reinterpretation and renegotiation in the design and implementation phase

Chapter 5 investigated processes of reinterpretation and renegotiation of innovations throughout the design and implementation phases. Particularly, it

looked at the social construction of lotus farming as a technological artifact. The chapter found that lotus farming as an innovation had gone through many stages of reinterpretation, renegotiation, and redesign. Lotus farmers learned for themselves how to redesign the technology, according to their own reinterpretations of the meaning of the technology throughout the technology development process. Likewise, this tendency was found among the other stakeholders too. The initial interpretation of the technology was very different from that at the end of the study period. Lotus farming was reinterpreted and improved over time. Gradually, the technology was no longer restricted to a single farming purpose, nor did it stick to the original goal for which it was initiated; namely, to remedy unsuitable soil conditions. Instead, the innovation traveled farther, responding to social requirements and the mobility of relevant actors. The analysis of the emergence of lotus farming also illustrates that no innovation is permanent and no artifact is fixed. Solutions to given problems do not remain valid forever, and external factors that affect technology development keep changing. When a network of users is involved in the development of a technological package and when end-users are not considered mere operators of a “black-boxed” technology, they too play a part in a technology being continuously adapted.

This study demonstrated that the dynamics of the SDP process in Vietnam were flexible, involving a wide range of changing actors who interacted intensively during all stages of technology (or innovation) development. This provided ample room for the renegotiation and redesign process.

6.3.6 The market and business sector as a potential advocate

One of the barriers hampering the scaling up of lotus farming was lack of a stable market and the absence of private sector actors. This demonstrates the “hidden power” of markets, as an advocate pushing the development of an innovation, such as lotus farming. Indirect stakeholders, such as NGOs and businesses, did not participate in the whole process. Early on, the lotus market arose spontaneously and was internationally oriented. The export orientation was interpreted as essential for

income opportunities and a chance to improve livelihoods and living conditions (Chapter 5). But attempts to meet demand in that market failed because the international standards and requirements could not be satisfied. Then came a change, which was the rise of a domestic-oriented market for lotus products. This reorientation went hand in hand with a renegotiation, reinterpretation, and redesign process of lotus development among the relevant stakeholders, both beneficiaries and non-beneficiaries (at that time, including farmers, the Taiwanese actor, Vietnamese actors, and local authorities). In addition to other pressures – namely, a new plant disease, labor scarcity, and price fluctuations – interventions by new actors brought new interests, such as political concerns about sustainability and the need to adapt to climate change and to preserve cultural values of the region. These all fed back into changes and modifications in the ways lotus farming was implemented. Thus lotus farming as a technology continued to generate interest, but under new preconditions introduced by new interventions and new actors.

The findings on lotus farming, moreover, demonstrate that farmers do change their ways in agricultural practices, for example, shifting from volume to value-based models. Demand for quality was explicitly seen when the Taiwanese actor stepped out of the game. To meet the growing demand for lotus products, large domestic investors stepped in, and this led to a change in the design of lotus farming models. Nevertheless, farmers were not the only stakeholders benefiting from these trends. Big opportunities also came into reach for other actors: local authorities had the opportunity to play a part in enriching regional cultural values, international development partners had an opportunity to advocate sustainability, scientists had an opportunity to promote adaptive livelihood models. These other actors could play a role in shaping the technology to gain, for them, a satisfactory outcome from it. One potential actor has not yet been significantly involved, that is, business (the private sector). Here, the VMD offers opportunities for food companies to process raw products on-site.

6.4 Implications for policy and practice

This section explores the implications of the research for further studies, for practitioners, and for policymakers interested in Mekong Delta development. Overall, the SDP approach was found to have traveled well in Vietnam, throughout all three phases of the planning process. The proposed innovations necessarily co-evolved with the planning process, driven by a broad range of multidimensional determinants. Zegwaard *et al.* (2019) argued that this co-evolution process implies that deltaic environments do not pre-exist human interventions, but come into being and are made through them. They are ‘concretely made, conjoined or transformed by the co-evolving relations of multiple agents, people, technologies, materials, spirits, ideas or what have you’ (Zegwaard *et al.*, 2019: 238). In relation to the aim of this thesis, this argument ties into the findings from the four analytic chapters addressing the four research sub-questions: (1) a degree of convergence was found between the agenda of the MDP and those of political actors; (2) multifunctionality emerged as a crucial characteristic for uptake of an innovation; (3) soft aspects of implementation cannot be overlooked in an SDP process; and (4) innovations are socially constructed. These conclusions were obtained through a large body of work conducted using a mix of quantitative and qualitative methods.

Among these identified elements, the main focus of the current research was the role of innovation in strengthening an SDP process. A related finding in this regard is that we may still rely too much on the outcomes of innovations, which are largely dependent on the scale and frame in which the innovation is defined and interpreted. The findings of the different chapters varied, though they were largely coherent and consistent in terms of contributing to a sense that “innovation plays a crucial role as a consent builder”. Some innovations concerned a mixed socioeconomic and biophysical planning process (“room for the river”), or socioeconomic processes and outcomes (floating rice, integrated shrimp-mangrove, and lotus farming). Overall, landholdings in the VMD tend to be larger than in other parts of Vietnam, but agriculture here is still mostly based on small-scale production by a large number

of smallholders. This makes it hard to introduce innovations, especially in a rigid, top-down planning system and political context, like that in Vietnam. But the innovations and planning processes studied in this research suggest a new orientation, which is a call for more proactive involvement of businesses and the private sector. International actors have tried to push the Vietnamese agricultural sector towards a more ecologically sustainable orientation. Realization of such a shift requires a mediation process in which both producers and consumers are influenced by various means to stabilize markets and create local production chains.

It must be stressed that the SDP process takes time (Chapter 2 and 3). Therefore, the delivery of a strategic delta plan should not be directly and immediately linked to an investment package. It first needs to get through the “soft” implementation phase, in which a shift in mindset takes place among decision-makers. This shift requires a process of negotiation and discussion, facilitated by legally binding or formal channels (planning processes and legislation). Advocates of that shift were identified in Chapter 2 as “policy entrepreneurs”. The main policy entrepreneurs were found in the SWSC (though this institution existed only until 2018); alongside the prime minister (who was the most important advocate); and a diverse cluster of experts, professors, and scientists who acted as commentators and reviewers during MDP formulation.

Regarding the literature on delta management, this thesis makes a number of scientific contributions, especially to innovation studies. How far the insights gained from this research will contribute to future study depends on how “innovation” is defined and framed. In some instances, this research analyzed innovations as case studies. For example, Chapter 4 explored no-regret innovations for the particular context of the VMD. This frame is well aligned with and thus will advance concepts of multifunctionality and multi-services ecosystems. Chapter 5 delved into a long-standing practice, framed as an innovation, that could well be further re-designed and developed for adaptation to extreme climatic conditions. Lotus cultivation, in this case was framed as a technological artifact embedded in a complex social

network. The complexity of interactions between society and technology was previously analyzed by Van Staveren *et al.* (2017), concerning how a technological system influences social-ecological system trajectories. That work stresses the mutual interaction between social and governmental actors (embedded in a political-institutional setting) as shaping policy choices, with the (historic) construction of a technology (e.g., a hydraulic engineering infrastructure), being the result of these choices and the dynamic delta environment.

In other ways, too, the findings of this study provide starting points for practitioners, researchers, and policymakers involved in planning and decision-making for the sustainable delta development. The analysis of all the innovations (Chapter 3, 4, and 5) emphasized social, economic, cultural, and political processes aligned with the concepts of resilience, coping capacity, and adaptive capacity. Some innovations required more integrated conceptualizations, spanning many domains. For example, “room for the river” was conceptualized as an embodiment of both biophysical and socioeconomic processes that collectively created the potential for a reorientation of livelihoods (both agriculture and aquaculture) and also a shift in governance, including water and land management.

While there is likely little utility in being overly pedantic about definitions, different ways of framing an innovation do influence the outcome and performance of the strategic planning process and subsequently, information for decision-makers and how it is interpreted. Hence, attempts to develop an understanding of the roles of innovations through the hourglass framework in this thesis may be useful for other researchers, as well as decision-makers and end-users.

6.5 Limitations of this research and future scholarly work

In addition to the limitations of the present research enumerated in the analytical chapters, this section summarizes several overarching constraints. These points can also be considered guidance for future research. The first limitation is sample size. In all of the cases analyzed, the sample size was limited by necessity and did not cover all actors involved. Hence, the interviewees did not represent all the

involved stakeholders. Due to this limitation, care should be exercised in generalizing the research findings. This is particularly so given Vietnam's diversity in culture, geography, climate, and agricultural production systems. For instance, Chapter 2 and 3 used the same sample with the same collected data. The interviewees numbered 15 in total. Missing among this number were important key actors, such as the prime minister and certain local officials. However, the interview subjects were highly placed in the Vietnamese political establishment, and they played important roles in the MDP formulation process and in its uptake in policy processes. In Chapter 3, we used only examples that interviewees explicitly attributed to the MDP, even though the MDP was not always considered the decisive factor. By interviewing experts from various levels of the Vietnamese planning system, an overview of the extent that minds had changed and were changing at the various levels could be obtained. The overview, however, was limited by our sample of interviewees. Important differences of perspectives within or between organizations could have been overlooked. At the provincial level, we only examined the influence of the MDP on decisions and actions in Tra Vinh Province. Our case study there revealed that in a piecemeal way decisions and policies in the VMD were influenced by the MDP during the 2013-2016 period. Certainly, more time is needed to adequately explore the ongoing implementation of MDP ideas and strategies, and the extent that new strategic priorities for the VMD boil down into new policies, plans, proposals, and activities on the ground, and changes in farming systems.

Lastly, we did not cover the full scope of the MDP. We focused on agricultural modernization and the interregional approach, and thus paid less attention to MDP proposals for adapting to sea-level rise and for coastal flood protection and water diversion. In Chapter 4 and 5, we selected only four specific innovations for study: floating rice, room for the river, shrimp-mangrove, and lotus farming. These were selected based on the MDP scope, and thus not representative of the diverse pool of innovations that could be derived from all institutional, organizational, cultural, or technological sources. We, therefore, suggest that future

research consider more kinds of innovations, to better understand how stakeholders perceive their roles in strengthening SDP processes.

In Chapter 5, we adopted historical research to create a narrative story of the development process of lotus farming as a technology. A limitation of this method may be in its grasp of the truth, as tellers may not have related events exactly as they happened. Moreover, the narrative of lotus was constructed from the recollections of interview respondents, whose perceptions may have been one-sided or lack the full view of facts. This analysis, moreover, applied the SCOT lens, which bypasses issues of power. Hence, this research also skipped analysis of issues of power, though we do recommend inclusion of this area as an avenue for future research. Thus, future studies might look at power mobilization in analyzing the implementation process or implementation phase; or perhaps to trace implementation. Questions in the regard would be how power was mobilized to foster, enable, or constrain decision-making processes.

In addition, further research could assess performance in implementing innovations in Vietnam. Here, key questions would be how to identify possible issues and hurdles, and how to move innovations or innovative solutions to and through the implementation phase. Another worthwhile theme for further study is the legislative framework that creates institutions and designates specific bodies to enable the implementation of an innovation.

6.6 Conclusion

The MDP has provided a framework for development of the VMD. It offers a unified platform to bring together stakeholders from across administrative boundaries and lays a foundation for integrated planning, budgeting, and investment in the delta. Planning for the VMD needs to be orientated towards changing water use and management towards regimes that are suited to the general tendency of change, while at the same time, harmonizing with the characteristics of the delta's flood, freshwater, and saline ecosystems.

In this study, innovation case studies were selected based on strategic ideas employed in the MDP. Via our case studies, new insights were gained on innovations. A strategic reorientation was also observed for the future development of the VMD, which had inspired new actors to step in. Potential benefits, robustness, and also difficulties of innovations were identified. At the end of the day, this study shed light on the roles of innovations in strengthening SDP processes. Indeed, key innovation features were identified as multifunctionality, reflecting local experience, and addressing multiple concerns of relevant stakeholders. Innovations with these features can be considered good candidates to be accepted and serve to bind different stakeholders. In this sense, an innovation in the role of “consent builder” makes perfect sense. However, in linking national planning to specific innovative solutions, a complete consensus was hard to achieve. From a social construction of technology perspective, innovation is not a fixed technological artifact but a constantly changing actor that is socially constructed, designed, and modified over time. This was confirmed by Zegwaard *et al.* (2019), who argued that a delta is an entity for which any characterization or definition is formed, transformed, or shaped by delta planning activities. These characterizations and definitions are endogenous to the process of change and intervention of which they form part. From a system perspective, innovation is a nested process. Implementation and outcomes at any one stage (or scale) may be influential for the perceptions of stakeholders at another stage (or scale). Similarly, the response and behaviors of forerunner actors at one scale can, for better or worse, reverberate throughout the system as a whole. For instance, this influence is seen among the “policy entrepreneurs” who created momentum for MDP advocacy. Meanwhile, the intensity or range of such interactions and feedbacks may vary, over a long period, as will their influence on the magnitude or behaviors of the subsequent actors in the rest of the process. This conclusion is aligned with the three arguments of Norgaard *et al.* (2009). The first argument is that the vision of a delta’s future must be both dynamic and open to surprise, as visions are highly problematic and the delta will remain unruly until its

problems are seen, interpreted, and responded to through a highly dynamic socio-ecological systems framework. Second, visions of a delta's future must include relevant actors' perceptions and responses to change. Third, interaction between science and policy processes should be well understood, as these are important for innovation to be advocated, because they set up a political lobby that can advocate for further orientation (or reorientation) of delta development.

Rome was not built in a day. The same can be said for implementing SDP, in the VMD or elsewhere. Thus far, MDP implementation has taken numerous sidesteps. Vietnam's prime minister gave the plan his official support; donors such as the World Bank, IUCN and JICA got on board; experts, policymakers, and national ministries (MONRE, MARD) have taken action in line with the plan. Now Vietnam needs to turn to convincing farmers and to stimulating businesses and private sector actors to step in. Since innovation is embedded in a new strategic planning body, it is advocated under a "hybrid" governance form. A "shift" in governance may thus be needed to facilitate the new program in opening a window for innovations. The current study did not attempt to come up with solutions for linking the strategic framework to local planning processes. Rather, it suggests the importance of a platform for analyzing different stages of an SDP process. While the phases visualized in the hourglass framework are not clearly distinguished in the Vietnamese context, the framework certainly turned out to be useful in this specific case.

SUMMARY

Driven by natural processes and human interventions, urbanized deltas worldwide face many problems, including salinity, extreme drought, freshwater scarcity, flooding, and others. In some deltas, initiatives have been launched to address these challenges. The Netherlands has been a frontrunner in long-term strategic delta planning, to conserve deltas and delta resources for the future. The Dutch delta planning approach includes investigation and proposal of future-oriented innovations, such as flood-protection strategies and new, adaptive livelihood models. The Dutch approach has been applied in strategic delta planning for numerous deltas in the world, including the Mekong Delta and the Bangladeshi Delta.

Despite the wide use of the Dutch strategic delta planning (SDP) approach, the literature is remarkably sparse on the dynamics involved in implementation of innovations put forward in the new strategic delta plans. Meanwhile, there is considerable interest in innovative strategies for delta management and a growing body of scholarly work on that subject. The current trend in delta management is towards strategic delta planning forms that bring together different actor groups and sectors. This thesis focuses on the role of innovative solutions for strengthening strategic delta planning processes specifically in the VMD. It analyzes the dynamics of the strategic planning process for the Mekong Delta, with particular reference to the Mekong Delta Plan (MDP), and it investigates how the innovative solutions proposed in that plan may play a key role in fostering and maintaining consent across the key stakeholders at different phases of the planning cycle. This thesis adopts the “hourglass framework” as the main analytical structure for studying the role of the innovations put forward in the MDP. Of special interest is how innovations worked to shape the three phases of the strategic delta planning process and to foster consent among stakeholders on strategic delta development. The three phases of a strategic delta planning process are the following: (i) advocacy and agenda-setting, in which (prioritized) issues are put on the agenda; (ii) formulation, in which a strategy is

developed by the involved government bodies and other stakeholders; and (iii) implementation, in which the strategy is mainstreamed in relevant policies.

This thesis zooms in on the “innovation gap” found in the literature on strategic delta planning processes. It applies exploratory analysis and a mix of multidisciplinary techniques, including qualitative and quantitative methods. For analyzing the convergence of development agendas, a “multiple streams approach” is adopted. To analyze the multifunctionality of innovations, the “Millennium Assessment Framework” is used, which embraces an analysis of ecosystem services. Finally, to analyze how innovation designs are developed, modified, and accepted by relevant social groups, historical research is applied via a social construction of technology perspective. Data was collected by in-depth interviews with key informants, in addition to literature review, focus group discussions, and field surveys and observation.

Some key findings can be noted. Firstly, convergence was found between the agenda put forward in the plan and the agendas of relevant stakeholders. Particularly, the MDP, which was developed employing the Dutch strategic delta planning process, proved able to bind different political actors. Convergence of their agendas was facilitated by the efforts of “policy entrepreneurs”. Key policy entrepreneurs in this case were national experts, highly positioned political actors and international development partners. In Vietnam, they were able to tackle existing policy problems by navigating the push and pull of the political arena. In so doing, policy entrepreneurs were able to change what happened. Even though significant convergence was found between stakeholders’ development agendas for the Mekong Delta, it has remained difficult to achieve physical implementation of the plan in the delta. This is mostly due to the nature of Vietnam's political system, which is “wicked” and complicated.

Secondly, the MDP was indeed influential in changing the mindsets of political actors. Upon completion, the MDP introduced new directions in which the delta could be developed, including proposals of new innovations, such as adaptive

livelihood models and interprovincial coordination mechanisms. These have been influential in changing the mindsets of political actors, especially at lower government levels (i.e., local and regional level). These changes translated into some aspects of implementation, of which, “soft” implementation was the subject of analysis, as this represents a prerequisite step to “hard” implementation. Yet, soft implementation takes significant time in an SDP process. It should lead eventually to changes in formal plans, laws, and regulations, which are needed before hard implementation can begin.

Thirdly, one of the most important findings of this thesis relates to grassroots acceptance of innovations. The innovations put forward in the MDP have been intensively explored in the field across the VMD, particularly nature-based delta livelihood models such as flood-based floating rice and the multiple livelihood opportunities embedded in the “room-for-the river” innovation, alongside the shrimp-mangrove integrated farming model proposed for the coastal zone. Local respondents experimenting with and observing these innovations expressed different perceptions of them. The idea of the “floating rice farming system”, for example, was particularly welcomed as a valued innovation in this specific case, thanks to its “building with nature” value and multifunctionality. This innovation enjoyed broad support from stakeholders, including those living inside the projected implementation region and also those in neighboring provinces. Nonetheless, the case studies in this research remind us that shifting livelihoods, and embracing alternatives, is never easy. The difficulty stems from a variety of factors, not least, vested interests; lack of coordination, for example, between line ministries and sector administrators; missing resources, infrastructure, and finance; conflicting prioritizations; and missing links between regional and national plans. To enable innovations to really take off, evidence from this research points to the need for more “windows of opportunity” – including time, appropriate institutional mechanisms, and resources – to stimulate wider adoption of the analyzed innovations.

Fourthly and last, this research found that innovations were socially constructed, modified, re-interpreted, re-designed, and co-developed over time, in accordance with social demands. Lotus farming provides an example of this. As an innovation, lotus farming eventually reached a low degree of stabilization. This research was interested in lotus farming not as a technological artifact itself, but rather in how this technological innovation emerged and what the outcomes of that process were. All relevant social groups expressed an appreciation of this innovation's value. However, it was not yet an implementable fixed technology, at the time of this research, due to constant changes in its development pathway and problems that had not yet been resolved. Moreover, this study found that innovative ideas spontaneously arising from farmers' own experiences can be a significant help in actualizing technological innovation, or the implementation of livelihood changes. Furthermore, among the relevant stakeholders, the international development partners actor group was found to be the most influential. What is now needed is the emergence of a stable market for lotus and lotus products. For this, the businesses actor group will need to be called upon to step into the game, as they are considered a promising advocate for further SDP realization.

In conclusion, it must be stressed that an SDP process takes time, especially in the political context of Vietnam. Proposed innovations must first enter a soft implementation phase before hard implementation can commence. In advocating implementation and facilitating the process, policy entrepreneurs are crucially important actors (in Vietnam, these included national experts, international actors, ministers, and the prime minister). They were proven, in this research, to create momentum for MDP advocacy. Last but not the least, innovations that are to be implemented cannot be seen as "black boxed" technological artifacts, but as nested processes of which the satisfactoriness of the outcomes still very much depends on the behaviors of stakeholders. Especially influential are the frontrunners who intervene and respond in the earlier stages of the process, and the perceptions of followers, especially end-users.

References

- Ahmed, N., Thompson, S., & Glaser, M. (2018). Integrated mangrove-shrimp cultivation: Potential for blue carbon sequestration. *Ambio*, 47(4), 441-452. <https://doi.org/10.1007/s13280-017-0946-2>
- Albrechts, L. (2004). Strategic (spatial) planning re-examined. *Environment and Planning B: Planning and Design* 31:743–758. <https://doi.org/10.1068/b3065>
- Albrechts, L. (2015). Ingredients for a more radical strategic spatial planning. *Environment and Planning B: Planning and Design* 42(3):510–525. <https://doi.org/10.1068/b130104p>
- Albrechts, L., Balducci, A., & Hillier, J. (2016). *Situated practices of strategic planning: An international perspective*: Routledge.
- Albrechts, L., Balducci, A. (2013). Practicing strategic planning: in search of critical features to explain the strategic character of plans. *DISP* 49: 16–27. <https://doi.org/10.1080/02513625.2013.859001>
- Allen, M. (2017). *The SAGE Encyclopedia of Communication Research Methods*; Sage Publications: Thousand Oaks, CA, USA
- Al Lily, A. E. (2013). The social shaping of educational technologies in Saudi Arabia: An examination of how the social fabric shapes the construction and use of technologies. *Technology in Society*, 35, 203-222. <https://doi.org/10.1016/j.techsoc.2013.04.001>
- Anthony, E. J., G. Brunier, M. Besset, M. Goichot, P. Dussouillez, and V. L. Nguyen. (2015). “Linking Rapid Erosion of the Mekong River Delta to Human Activities.” *Scientific Reports* 5: 14745. doi:10.1038/srep14745.
- Arkema KK, Abramson SC, Dewsbury BM (2006). Marine ecosystem-based management: from characterization to implementation. *Front Ecol Environ* 4:525–532. [https://doi.org/10.1890/1540-9295\(2006\)4\[525:memfct\]2.0.co;2](https://doi.org/10.1890/1540-9295(2006)4[525:memfct]2.0.co;2)
- Arnouts, R. C. (2010). *Regional nature governance in the Netherlands: four decades of governance modes and shifts in the Utrechtse Heuvelrug and Midden-Brabant*. PhD thesis Wageningen University
- Baumgartner, F. R., and B. D. Jones. (2010). *Agendas and instability in American politics*: University of Chicago Press.
- Baumgartner, F. R., B. D. Jones, and P. B. Mortensen. (2014). Punctuated equilibrium theory: Explaining stability and change in public policymaking. *Theories of the policy process* 8: 59-103.
- Béland, D., & Howlett, M. (2016). The role and impact of the multiple-streams approach in comparative policy analysis. In: Taylor & Francis.

- Benedikter, S. (2014). *The Vietnamese hydrocracy and the Mekong Delta: Water resources development from state socialism to bureaucratic capitalism*. Vol. 25: LIT Verlag Münster.
- Benedikter, S. (2016). Bureaucratisation and the state revisited: Critical reflections on administrative reforms in post-renovation Vietnam. *International Journal of Asia-Pacific Studies*, 12, 1-40.
- Benedikter, S., & Nguyen, L. T. (2018). Obsessive planning in transitional Vietnam: Understanding Rampant state planning and prospects of reform. *Journal of Vietnamese Studies*, 13(4), 1-47.
- Berg, B. L. (2001). *Qualitative Research Methods for the Social Sciences*, 4th ed.; Pearson: USA, 2001.
- Biggs, D. A. (2004). *Between the rivers and tides: a hydraulic history of the Mekong Delta, 1820-1975*. PhD diss., University of Washington.
- Biggs, D., F. Miller, C. T. Hoanh, and F. Molle. (2009). The Delta Machine: Water Management in the Vietnamese Mekong Delta in Historical and Contemporary Perspectives. In *Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance*, edited by K. Bakker, 203–225. Bern, Switzerland: International Mountain Society. <https://doi.org/10.4324/9781849770866>
- Biggs, D. A. (2004). *Between the rivers and tides: a hydraulic history of the Mekong Delta, 1820-1975*. Ph.D. thesis. Retrieved from <https://digital.lib.washington.edu/researchworks/handle/1773/10389> (accessed 04 January 2021)
- Biggs, D. A. (2012). *Quagmire: nation-building and nature in the Mekong Delta*. University of Washington Press. <https://doi.org/10.1017/s0395264900013378>
- Bijker, W. E., Hughes, T. P., Pinch, T., (1984). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Cambridge, MA: The MIT Press
- Bjerregaard, P. P. (2011). *The Social Shaping of Technology: A Case Study of Biochar in Denmark*. Master's thesis, Copenhagen Business School, Denmark, Available online at: <https://research.cbs.dk/da/studentProjects/3d892ad3-b2fe-4e55-9edc-566c303a9d6f>. Accessed on 01 February 2021
- Boeije, H. (2009). *Analysis in qualitative research*: Hennie Boeije: Sage publications.
- Bosma, R. H., Udo, H. M., Verreth, J. A., Visser, L. E., & Nam, C. Q. (2005). Agriculture diversification in the Mekong Delta: farmers' motives and contributions to livelihoods. *Asian journal of agriculture and development*, 2(1362-2016-107656), 49-66.

- Bosma, R. H., Nguyen, T. H., Siahainenia, A. J., Tran, H. T., & Tran, H. N. (2016). Shrimp-based livelihoods in mangrove silvo-aquaculture farming systems. *Reviews in Aquaculture*, 8(1), 43-60. <https://doi.org/10.1111/raq.12072>
- Boström, M., Y. Ugglä, and V. Hansson. (2018). Environmental representatives: whom, what, and how are they representing? *Journal of environmental policy & planning* 20 (1): 114-127. <https://doi.org/10.1080/1523908x.2017.1332522>
- Briassoulis, H. (1989). Theoretical orientations in environmental planning: an inquiry into alternative approaches. *Journal of Environmental Management* 13:381–392. <https://doi.org/10.1007/BF01867673>
- Brody SD, Highfield WE (2005). Does planning work? Testing the implementation of local environmental planning in Florida. *J Am Plan Assoc* 71:159–175. <https://doi.org/10.1080/01944360508976690>
- Cairney, P., and M. D. Jones. (2016). Kingdon's Multiple Streams Approach: What Is the Empirical Impact of this Universal Theory? *Policy Studies Journal* 44 (1): 37-58. doi: 10.1111/psj.12111.
- Can ND, Khiem NT, Hossain M, Tuong TP (2010). Farmers' assessment of resource management and farm-level technological interventions in the Mekong Delta. In: Hoanh CT, Szuster BW, Suan-Pheng K, Ismail AM, Noble AD. (eds) *Tropical Deltas and Coastal Zones: Food production, Communities and Environment at the Land- Water Interface*, Wallingford, CABI, pp 307–319
- Chapman AD, Darby SE, Hong HM, Tompkins EL, van TPD (2016). Adaptation and development trade-offs: fluvial sediment deposition and the sustainability of rice-cropping in An Giang Province, Mekong Delta. *Clim Chang* 137:593–608. <https://doi.org/10.1007/s10584-016-1684-3>
- Chauhan, N. S., P. K. Mohapatra, and K. P. Pandey. (2006). Improving energy productivity in paddy production through benchmarking—an application of data envelopment analysis. *Energy conversion and Management* 47 (9-10): 1063-1085.
- Chow, A. (2014). Understanding policy change: multiple streams and national education curriculum policy in Hong Kong. *Journal of Public Administration and Governance* 4 (2): 49-64. doi:10.5296/jpag.v4i2.5184.
- Checkland P, Scholes J (1990). *Soft systems methodology in action*. John Wiley & Sons, Chichester
- Cloete, F., H. Wissink, and C. De Coning. (2006). *Improving Public Policy: From Theory to Practice*: Van Schaik Publishers.
- Cohen, M. D., J. G. March, and J. P. Olsen. (1972). A garbage can model of organizational choice. *Administrative science quarterly*: 1-25. doi:10.2307/2392088.

- Conway, T. (2004). *Politics and the PRSP Approach: Vietnam case study*: Overseas Development Institute London.
- Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., . . . Paruelo, J. (1997). The value of the world's ecosystem services and natural capital. *nature*, 387(6630), 253. <https://doi.org/10.1038/387253a0>
- Cosslett TL, Cosslett PD (2014). The Mekong Delta Provinces. In: Cosslett TL, Cosslett PD (eds) *Water resources and food security in the Vietnam Mekong Delta*. Springer, Cham, pp 23–74
- CPRA Louisiana (2012). *Louisiana's comprehensive master plan for a sustainable coast*. Coastal Protection and Restoration Authority of Louisiana, Baton Rouge
- Cramer, H. J., (2014). *The barriers to empowering niche-innovations in long-term care*, doctoral thesis, the University of Twente
- Crabtree BF, Miller WL (1999). Using codes and code manuals: a template organizing style of interpretation. In: Crabtree B, Miller W (eds) *Doing qualitative research*. Sage, Thousand Oaks, pp 163–177
- Creswell, J. W., A. C. Klassen, V. L. Plano Clark, and K. C. Smith. (2011). *Best practices for mixed methods research in the health sciences*. Bethesda (Maryland): National Institutes of Health 2013: 541-545
- Dinh, Q. X. (2000). The political economy of Vietnam's transformation process. *Contemporary Southeast Asia*, 360-388 <https://doi.org/10.1355/cs22-2g>
- Damman, S.; Helness, H.; Amisigo, B.; Asare, R.; Banu, R. A.; Asante, K. A.; Logah, F. (2017). Sustainability and the social construction of technology: The case of RWH as source of water supply in greater Accra. *European Journal of Sustainable Development*, 6, 41-41. <https://doi.org/10.14207/ejsd.2017.v6n4p41>
- Dang, H. D. (2020). Sustainability of the rice-shrimp farming system in Mekong Delta, Vietnam: a climate adaptive model. *Journal of Economics and Development*. <https://doi.org/10.1108/JED-08-2019-0027>
- Dang, T. D., Cochrane, T. A., & Arias, M. E. (2018). Future hydrological alterations in the Mekong Delta under the impact of water resources development, land subsidence and sea level rise. *Journal of Hydrology: Regional Studies*, 15, 119-133. <https://doi.org/10.1016/j.ejrh.2017.12.002>
- Daniell, K. A., Coombes, P. J., & White, I. (2014). Politics of innovation in multi-level water governance systems. *Journal of Hydrology*, 519, 2415-2435. <https://doi.org/10.1016/j.jhydrol.2014.08.058>
- Desai, A. (2011). Policy agenda setting and the use of analytical agenda setting models for school sport and physical education in South Africa.
- De Geus A (1988). Planning as learning. *Harv Bus Rev* 66:70–74

- Dewar, R. D., Dutton, J. E., (1986). The adoption of radical and incremental innovations: An empirical analysis, *Management Science*, Vol. 32, No. 11
- Dong Thap Province's People's Committee. (2016). Decision 1168/QDD-UBND on Approving "Restructuring the Agricultural Sector" Program in Dong Thap up to 2020: Vision to 2030; Government of Vietnam. Available online at: <https://thuvienphapluat.vn/van-ban/Thuong-mai/Quyet-dinh-1168-QD-UBND-HC-De-an-tai-co-cau-nganh-cong-nghiep-Dong-Thap-2016-2020-2030-329951.aspx>. Accessed on 01 February 2021
- Douven, W., & UDW, U. D. o. t. W. (2013). Integrated Project on Strengthening Strategic Delta Planning Process in Bangladesh, the Netherlands, Vietnam and beyond. NWO- The Netherlands Organizations for Scientific Research. Project proposal. Retrieved from <https://www.nwo.nl/en/projects/w-0769106> (accessed 04 January 2021)
- Duong, V. H. T., Nestmann, F., Van, T. C., Hinz, S., Oberle, P. and Geiger, H.: Geographical impact of dyke measurement for land use on flood water in the Mekong Delta, in 8th Eastern European Young Water Professionals Conference - IWA, pp. 308–317., 2016. Available online at: https://www.researchgate.net/profile/Duong_Vu4/publication/303370408_Geographical_Impact_of_Dyke_Measurement_for_Land_Use_on_Flood_Water_in_the_Mekong_Delta/links/573ead0e08ae298602e6e783/Geographical-Impact-of-Dyke-Measurement-for-Land-Use-on-Flood-Water-in-the-Mekong-Delta.pdf (accessed 04 January 2021)
- Duke, N. C., & Schmitt, K. (2015). Mangroves: unusual forests at the seas edge. *Tropical forestry handbook*. Pancel L., Kohl M.(ed), Springer, 24. https://doi.org/10.1007/978-3-642-41554-8_129-1
- Environment Agency (2012). Thames Estuary 2100: managing flood risk though London and the Thames Estuary. Environment Agency, London
- Erban L, Gorelick S, Zebker H (2014). Groundwater extraction, land subsidence, and sea-level rise in the Mekong Delta, Vietnam. *Environ Res Lett* 9(8):084010. <https://doi.org/10.1088/1748-9326/9/8/084010/meta>
- Evers, J., & Pathirana, A. (2018). Adaptation to climate change in the Mekong River Basin: introduction to the special issue. In: Springer. <https://doi.org/10.1007/s10584-018-2242-y>
- Evers, J., Douven, W., Van der Stroom, J., Hasan, S., Seijger, C., & Phi, H. (2019). A framework to assess the performance of participatory planning tools for strategic delta planning. *Journal of Environmental Planning and Management*, 62(9), 1636-1653. <https://doi.org/10.1080/09640568.2019.1603843>
- Faludi A (2000). The performance of spatial planning. *Plan Pract Res* 15: 299–318. <https://doi.org/10.1080/713691907>

- Flyvbjerg B (2006). Five misunderstandings about case-study research. *Qual Inq* 12:219–245. <https://doi.org/10.1177/1077800405284363>
- Foster, M., & Arnold, G. (2019). The impact of stakeholder engagement on local policy decision making. *Policy Sciences*, 52(4), 549-571. <https://doi.org/10.1007/s11077-019-09357-z>
- Friedmann, J. (2004). Strategic spatial planning and the longer range. *Planning Theory & Practice* 5 (1): 49-67. doi:10.1080/1464935042000185062.
- GED (2018). Bangladesh Delta Plan 2100. General Economics Division, Dhaka
- Geels, F. W., Schot, J., (2007). Typology of sociotechnical transition pathways, *Research policy* 36 399-417
- Geels, F. W., (2011), The multi-level perspective on sustainability transitions: Responses to seven criticisms, SPRU, Science and Technology Policy Research, University of Sussex, United Kingdom
- George AL, Bennett A (2005). Case studies and theory development in the social sciences. MIT Press, Cambridge
- Gibbert M, Ruigrok W, Wicki B (2008). What passes as a rigorous case study? *Strateg Manag J* 29:1465–1474. <https://doi.org/10.1002/smj.722>
- Giordano M, Shah T (2014). From IWRM back to integrated water re- sources management. *Int J Water Resour Dev* 30:364–376. <https://doi.org/10.1080/07900627.2013.851521>
- Goodman, L. A. (1961). Snowball sampling. *The annals of mathematical statistics*: 148-170.
- Grin J, Van De Graaf H (1996). Implementation as communicative action. *Policy Sci* 29:291–319. <https://doi.org/10.1007/BF00138406>
- Guldbrandsson, K., and B. Fossum. (2009). An exploration of the theoretical concepts policy windows and policy entrepreneurs at the Swedish public health arena. *Health Promotion International* 24 (4): 434-444. doi:10.1093/heapro/dap033.
- Guong V, Hoa N (2012). Aquaculture and agricultural production in the Mekong Delta and its effects on nutrient pollution of soil and water. In: Renaud F, Künzer C (eds) *The Mekong Delta: interdisciplinary analyses of a River Delta*. Springer, Dordrecht, pp 363–393. https://doi.org/10.1007/978-94-007-3962-8_14
- Hasan, S., Evers, J., Zegwaard, A., & Zwarteveen, M. (2019). Making waves in the Mekong Delta: recognizing the work and the actors behind the transfer of Dutch delta planning expertise. *Journal of Environmental Planning and Management*, 62(9), 1583-1602. <https://doi.org/10.1080/09640568.2019.1592745>

- Healey P (2009). In search of the Bstrategic in spatial strategy making. *Planning Theory Practice* 10:439–457. <https://doi.org/10.1080/14649350903417191>
- Healey, P. (2004). The treatment of space and place in the new strategic spatial planning in Europe. *International journal of urban and regional research* 28 (1): 45-67. doi:10.1111/j.0309-1317.2004.00502.x.
- Hoanh CT, Phong ND, Gowing JW, Tuong TP, Hien NX, Dat ND (2006). Predicting impacts of water management in coastal zones by hydraulic and salinity modeling. In: Voinov A, Jakeman A, Rizzoli A (eds) iEMSs third biennial meeting: summit on environmental modeling and software. International environmental modeling and software society, Burlington, pp 1–6
- Hoanh, C. T., and D. Suhardiman. (2014). Irrigation development in the Vietnamese Mekong Delta. *International Journal of Water Governance* 2 (2-3): 61-82. doi:10.7564/14-IJWG59.
- Hoanh, C. T., T. Tuong, K. Gallop, J. Gowing, S. Kam, N. Khiem, and N. Phong. (2003). Livelihood impacts of water policy changes: evidence from a coastal area of the Mekong River Delta. *Water Policy* 5 (5-6): 475-488. doi:10.2166/wp.2003.0030.
- Huitema, D., and S. Meijerink. (2010). Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society* 15 (2): 10. <http://www.ecologyandsociety.org/vol15/iss2/art26/>
- Huitema, D., E. Mostert, W. Egas, S. Moellenkamp, C. Pahl-Wostl, and R. Yalcin. (2009). Adaptive water governance: assessing the institutional prescriptions of adaptive (co-) management from a governance perspective and defining a research agenda. *Ecology and society* 14 (1). 26. <http://www.ecologyandsociety.org/vol14/iss1/art26/>
- Huizer, T. (2019). Report on Dutch Experiences with regional coordination mechanism - Dutch lesson learned on regional coordination relevant for the Mekong Delta in Vietnam (C03041.000084).
- Hupe PL, Hill MJ (2015). ‘And the rest is implementation.’ Comparing approaches to what happens in policy processes beyond Great Expectations. *Publ Pol Admin* 31:103–121. <https://doi.org/10.1177/0952076715598828>
- Huynh, T. P. L. (2015). State-Society Interaction in Vietnam, Universitäts-und Landesbibliothek Bonn.
- ICEM (2015). A guide to resilient decision-making in the Mekong delta. International Center for Environmental Management, Hanoi
- Innes JE (1996). Planning through consensus building: a new view of the comprehensive planning ideal. *J Am Plan Assoc* 62:460–472. <https://doi.org/10.1080/01944369608975712>

- JICA, Sanyu Consultants and Newjec (2013). The project for climate change adaptation for sustainable agriculture and rural development in the coastal Mekong Delta in Vietnam. Final Report. Japan International Cooperation Agency, Tokyo
- Joffre O, Bosma R (2009). Typology of shrimp farming in Bac Lieu Province, Mekong Delta, using multivariate statistics. *Agric Ecosyst Environ* 132(1):153–159. <https://doi.org/10.1016/j.agee.2009.03.010>
- John, P. (2003). Is there life after policy streams, advocacy coalitions, and punctuations: Using evolutionary theory to explain policy change? *Policy Studies Journal* 31 (4): 481-498. doi:10.1111/1541-0072.00039.
- Jones, M. D., H. L. Peterson, J. J. Pierce, N. Herweg, A. Bernal, H. Lamberta Raney, and N. Zahariadis. (2016). A river runs through it: A multiple streams meta-review. *Policy Studies Journal* 44 (1): 13-36. doi:10.1111/psj.12115.
- Jordan, A., & Huitema, D. (2014). Policy innovation in a changing climate: sources, patterns and effects. *Global Environmental Change*, 29, 387-394. <https://doi.org/10.1016/j.gloenvcha.2014.09.005>
- Kien, N. V. (2013). How to conserve the floating winter ecosystem of Vinh Phuoc Commune - Tri Ton District - An Giang Province. An Giang union of Science and Technology Associations. Development of Hi-tech Applied Agriculture in An Giang province conference.
- Kien, N. V., & Duc, H. N. (2015^a). Conserving the benefits of floating rice in Vietnam. Retrieved from <http://www.mekongcommons.org/conserving-the-benefits-of-floating-rice-in-viet-nam/> (accessed 04 January 2021)
- Kien, N. V., Oc, V. V., Duc, H. H. (2015^b). Comparing the costs and benefits of floating rice-based and intensive rice-based farming systems in the Mekong Delta. DOI: 10.18488/journal.1005/2015.5.9/1005.9.202.217
- Kien N, Dumaresq D, Howie C (2016). Dike Compartments in the Mekong Delta: Case Studies in Water Governance, Farming Systems and Adaptation to Water-Regime Changes in An Giang Province, Vietnam. In: Blake D, Robins L (eds) *Water Governance Dynamics in the Mekong Region*. Strategic Information and Research Development Centre, Selangor, pp 279–310
- Kien, N. V., & Pittock, J. (2016). Synthesis report of Floating Rice in Vietnam, Cambodia and Myanmar. Retrieved from Vietnam - Research Center for Rural Development An Giang University (AGU), Cambodia- ECOLAND Research Center Royal University of Agriculture (RUA), Myanmar - Cooperative University, Thalyin, Myanmar and Research Association for Development (ARD): https://www.researchgate.net/publication/323689149_Floating_rice_in_Vietnam_Cambodia_and_Myanmar (accessed 04 January 2021)

- Kien, N. V., & Howie, C. (2018). Conservation and development of the floating rice based agroecological farming system in the Mekong Delta. Ha Noi: Agricultural Publishing House. <https://ali-sea.org/aliseaonlinelibrary-dashboard/get/file/Conservation-and-development-of-the-floating-rice-based-agroecological-farming-systems-in-the-Mekong-delta.pdf> (accessed 04 January 2021)
- Kilelu, W. C., Klerkx, L., Leeuwis, C., (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme, *Agricultural Systems* 118 (2013) 65-77
- Kingdon, J. W. (1984). *Agendas, alternatives, and public policies*. Vol. 45: Little, Brown Boston.
- Klein, H. K., and D. L. Kleinman. (2002). The social construction of technology: Structural considerations. *Science, Technology, & Human Values* 27 (1): 28-52.
- Knickel, K., Renting, H., & Van der Ploeg, J. D. (2004). Multifunctionality in European agriculture. *Sustaining Agriculture and the Rural Environment*. Cheltenham, UK; Edward Elgar, 81-104.
- Korbee, D., van Halsema, G. E., & Seijger, C. (2019^a). Strategic delta planning: launching new ideas on managing a Delta, and their travels along actor coalitions, participatory planning tools and implementation timelines. In: Taylor & Francis. <https://doi.org/10.1080/09640568.2019.1647683>
- Korbee, D., Hong Quan, N., Hermans, L., & Ho Long, P. (2019^b). Navigating the bureaucracy: an analysis of implementation feasibility for the Mekong Delta Plan, Vietnam. *Journal of Environmental Planning and Management*, 62(9), 1545-1561. <https://doi.org/10.1080/09640568.2019.1623014>
- Krippendorff, K. (2004). *Content Analysis: An Introduction to its Methodology*. Thousand Oaks, CA: Sage.
- Kuenzer, C., & Renaud, F. G. (2012). Climate and environmental change in river deltas globally: expected impacts, resilience, and adaptation. In *The Mekong Delta System* (pp. 7-46): Springer.
- Kwakkel J, Walker W, Haasnoot M (2016). Coping with the wickedness of public policy problems: approaches for decision making under deep uncertainty. *J Water Resour Plan Manag* 142:01816001. [https://doi.org/10.1061/\(ASCE\)WR.1943-5452.0000626](https://doi.org/10.1061/(ASCE)WR.1943-5452.0000626)
- Laćan I, Resh VH (2016). A case study in integrated management: Sacramento–San Joaquin Rivers and Delta of California, USA. *Ecohydrol Hydrobiol* 16:215–228. <https://doi.org/10.1016/j.ecohyd.2016.09.004>
- Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*; Oxford University Press: New York, USA

- Laurian L, Day M, Backhurst M, Berke P, Ericksen N, Crawford J, Dixon J, Chapman S (2004). What drives plan implementation? Plans, planning agencies and developers. *J Environ Plan Manag* 47:555– 577. <https://doi.org/10.1080/0964056042000243230>
- Le Coq, J.-F., Dufumier, M., & Trébuil, G. (2001). History of rice production in the Mekong Delta.
- Le, T., & Ann, M. (2017). Shrimping horizons: How farmers are saving thousands of miles of mangrove in Vietnam. Retrieved from <https://thefishsite.com/articles/shrimping-horizons-how-farmers-are-saving-thousands-of-miles-of-mangrove-in-vietnam#:~:text=In%20switching%20from%20intensive%20shrimp,the%20farmers'%20reliance%20on%20chemicals.> (accessed 04 January 2021)
- Leemans, R., & De Groot, R. (2003). Millennium Ecosystem Assessment: Ecosystems and human well-being: a framework for assessment. In: Island Press.
- Leeuwis, C., R. Pyburn, and N. Röling. (2002). Wheelbarrows full of frogs: social learning in rural resource management: international research and reflections: Koninklijke Van Gorcum.
- Liu, X., Lindquist, E., Vedlitz, A., & Vincent, K. (2010). Understanding local policymaking: Policy elites' perceptions of local agenda setting and alternative policy selection. *Policy Studies Journal*, 38(1), 69-91. doi:10.1111/j.1541-0072.2009.00345.x.
- Long PH (2017). The Mekong's future flows: quantifying hydrological changes and developing adaptation options. PhD thesis, Wageningen University
- MacKenzie, D., and J. Wajcman. (1999). The social shaping of technology: Open university press.
- Makaske, B., van Driel, W., Marchand, M., Bucx, T., & van de Guchte, C. (2013). Enabling Delta Life-What makes managing land and water in deltas different? Retrieved from
- Mäntysalo R (2013). Coping with the paradox of strategic spatial planning. *disP Plann Rev* 49:51–52. <https://doi.org/10.1080/02513625.2013.859009>
- Mastop H, Faludi A (1997). Evaluation of strategic plans: the performance principle. *Environ Plann B: Plann Des* 24:815–832. <https://doi.org/10.1068/b240815>
- Marchand, M., Dam, R., & Buck, T. (2011). Towards a Mekong Delta Plan: synthesis of water sector assessment. VietNam—Netherlands Cooperation. Retrieved from <https://edepot.wur.nl/330185> (accessed 04 January 2021)
- Marchand, M., & Ludwig, F. (2014). Towards a comprehensive framework for adaptive delta management. Delta Alliance, Delft/Wageningen, Netherlands.[online] URL: [http://www. deltaalliance.](http://www.deltaalliance)

- org/gfx_content/documents/documentation/Towards a Comprehensive Framework for Adaptive Delta Management. pdf.
- Mekong River Commission, M. (2009). Adaptation to climate change in the countries of the Lower Mekong Basin. MRC Technical Paper, 24, 5-24.
- Meijer, P. C., N. Verloop, and D. Beijaard. (2002). Multi-method triangulation in a qualitative study on teachers' practical knowledge: An attempt to increase internal validity. *Quality and quantity* 36 (2): 145-167.
- Meyer, E. T. (2005). Socio-Technical Perspectives on Digital Photography in Professional Practice. PhD Thesis-Indiana University, Bloomington, Indiana. Available online at: http://blogs.oii.ox.ac.uk/wp-content/uploads/sites/27/2007/11/etmeyer_qual_final.pdf. Accessed on 01 February 2021
- Miles MB, Huberman AM (1994). *Qualitative data analysis: an expanded sourcebook*. SAGE Publications, Thousand Oaks
- Minh, T., Yakupitiyage, A., & Macintosh, D. (2001). Management of the integrated mangrove-aquaculture farming systems in the Mekong delta of Vietnam. *Integrated Tropical Coastal Zone Management*. School of Environment. Retrieved from https://www.researchgate.net/publication/265670597_Management_of_the_Integrated_Mangrove-Aquaculture_Farming_Systems_in_the_Mekong_Delta_of_Vietnam (accessed 04 January 2021)
- Molle F, Mollinga P, Wester P (2009). Hydraulic bureaucracies and the hydraulic Mission: flows of water, flows of power. *Water Altern* 2: 328–349
- Mollinga, P.; Veldwisch, G. V. (2016). Ruling by canal: Governance and system-level design characteristics of large scale irrigation infrastructure in India and Uzbekistan. *Water Alternatives*, 9, 222-249. Available online at: <https://core.ac.uk/reader/42550990>. Accessed on 01 February 2021
- Mu, R. (2018). Coupling of Problems, Political Attention, Policies and Institutional Conditions: Explaining the Performance of Environmental Targets in the National Five-Year Plans in China. *Sustainability* 10 (5): 1477. doi:10.3390/su10051477.
- NEDECO (1993). Master plan for the Mekong Delta in Viet Nam: a perspective for sustainable development of land and water re- sources. Euroconsult, Arnhem
- Nguyen, H. H., P. Dargusch, P. Moss, and D. B. Tran. (2016). A review of the drivers of 200 years of wetland degradation in the Mekong Delta of Vietnam. *Regional Environmental Change* 16 (8): 2303-2315. doi:10.1007/s10113-016-0941-3.
- Nguyen, H. Q., Korbee, D., Ho, H. L., Weger, J., Phan, T. T. H., Nguyen, T. T. D., ... Ngo, T. T. T. (2019^a). Farmer adoptability for livelihood transformations

- in the Mekong Delta: a case in Ben Tre province. *Journal of Environmental Planning and Management*, 1-16.
- Nguyen, Q. H., Guerra, J. D. P., Tran, D. D., Korbee, D., Pham, L. D., Do, H. Q., . . . Hermans, L. (2019^b). *Manual for Application of the MOTA framework Theory and Practice (version 1)*. Center of Water Management and Climate Change (WACC) - HCMVNU.
- Nhan DK, Be NG, Trung NH (2007). Water use and competition in the Mekong Delta, Vietnam. In: Be T^T, Sinh BT, Miller F (eds) *Challenges to Sustainable Development in the Mekong Delta: Regional and National Policy Issues and Research Needs*. Sustainable Mekong Research Network (Sumernet), Bangkok, pp 143–188
- Niehof, A., & Price, L. (2001). *Rural Livelihood Systems: A Conceptual Framework*. Wageningen-UPWARD Series on Rural Livelihoods no. 1. WU-UPWARD. In: Netherlands: Wageningen.
- Nguyen, H. Q., Korbee, D., Ho, H. L., Weger, J., Thi Thanh Hoa, P., Thi Thanh Duyen, N., . . . Thi Thu Trang, N. (2019^a). Farmer adoptability for livelihood transformations in the Mekong Delta: a case in Ben Tre province. *Journal of Environmental Planning and Management*, 62(9), 1603-1618. <https://doi.org/10.1080/09640568.2019.1568768>
- Nguyen, Q. H., Guerra, J. D. P., Tran, D. D., Korbee, D., Pham, L. D., Do, H. Q., . . . Hermans, L. (2019^b). *Manual for Application of the MOTA framework Theory and Practice (version 1)*. Center of Water Management and Climate Change (WACC) - HCMVNU. Available online at: https://www.researchgate.net/publication/336813678_Manual_for_Application_of_the_MOTA_framework_Theory_and_Practice_version_1 (accessed 02 March 2021)
- Nguyen, H., Tran, D., Luan, P., Ho, L., Loan, V., Anh Ngoc, P., . . . Sea, W. (2020). Socio-ecological resilience of mangrove-shrimp models under various threats exacerbated from salinity intrusion in coastal area of the Vietnamese Mekong Delta. *International Journal of Sustainable Development & World Ecology*, 27(7), 638-651. <https://doi.org/10.1108/JADEE-08-2019-0120>
- Norgaard, R. B., Kallis, G., & Kiparsky, M. (2009). Collectively engaging complex socio-ecological systems: re-envisioning science, governance, and the California Delta. *Environmental Science & Policy*, 12(6), 644-652. <https://doi.org/10.1016/j.envsci.2008.10.004>
- Nowicki, P. L. (2004). Jointness of production as a market concept. *Sustaining Agriculture and the Rural Environment. Governance, policy and multifunctionality*, 36-55.
- Olesen, K. (2017). Talk to the hand: strategic spatial planning as persuasive storytelling of the Loop City. *European Planning Studies* 25 (6): 978-993. [doi:10.1080/09654313.2017.1296936](https://doi.org/10.1080/09654313.2017.1296936).

- Ontita, E. (2007). *Creativity in Everyday Practice: Resources and Livelihoods in Nyamira, Kenya*. PhD Thesis-Wageningen University, the Netherlands.
- Ostrom E (2007). Institutional rational choice: an assessment of the institutional analysis and development framework. In: Sabbatier PA (ed) *Theories of the policy process*. Westview Press, Cambridge, pp 21– 64
- Pfaffenberger, B. (1988). Fetishised objects and humanised nature: towards an anthropology of technology. *Man*: 236-252. <https://doi.org/10.2307/2802804>
- Pham, T. A. N., Loc, H. H., Tran, D. D., & Quan, N. H. (2020). The inefficiency of Vietnamese prawn-rice rotational crops: A slacks-based data envelopment analysis. *Journal of Agribusiness in Developing and Emerging Economies*. <https://doi.org/10.1108/JADEE-08-2019-0120>
- Phi HL, Hermans LM, Douven WJAM, van Halsema GE, Khan MF (2015). A framework to assess plan implementation maturity with an application to flood management in Vietnam. *Water Int* 40:984– 1003. <https://doi.org/10.1080/02508060.2015.1101528>
- Pinch, T. J., and W. E. Bijker. (1984). The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social studies of science* 14 (3): 399-441.
- Pittock, J., & van Nguyen, K. (2017). Rice: The role of traditional floating rice systems. *Partners in Research for Development*(2), 10. Retrieved from <https://search.informit.com.au/documentSummary;dn=166590154055029;res=IELENG> (accessed 04 January 2021)
- Prell, C. (2009). Rethinking the Social Construction of Technology through ‘Following the Actors’: A Reappraisal of Technological Frames. *Sociological Research Online* 14 (2): 1-12. <https://doi.org/10.5153/sro.1913>
- Pressman JL, Wildavsky AB (1984). *Implementation: how great expectations in Washington are dashed in Oakland : or, why It's amazing that federal programs work at all, this being a Saga of the Economic Development Administration as told by two sympathetic observers who seek to build morals on a foundation of ruined hopes*. University of California Press, Berkeley
- Priemus, H., & Hall, P. (2004). Multifunctional urban planning of mega-city-regions. *Built Environment*, 30(4), 338-349. <https://doi.org/10.2148/benv.30.4.338.57154>
- Priemus, H., Rodenburg, C. A., & Nijkamp, P. (2004). Multifunctional urban land use: a new phenomenon? A new planning challenge? *Built Environment*, 30(4), 269-273. <https://doi.org/10.2148/benv.30.4.269.57153>
- Princen, S. (2009). *Agenda setting in the European Union*: Springer.

- Rahmila, Y. I., & Halim, M. A. R. (2018). Mangrove Forest Development Determined for Ecotourism in Mangunharjo Village Semarang. Paper presented at the E3S Web of Conferences. <https://doi.org/10.1051/e3sconf/20187304010>
- Rawat, P., and J. C. Morris. (2016). Kingdon's "Streams" Model at Thirty: Still Relevant in the 21st Century? *Politics & Policy* 44 (4): 608-638. doi:10.1111/polp.12168.
- Renaud, F. G., & Kuenzer, C. (2012). The Mekong Delta system: Interdisciplinary analyses of a river delta: Springer Science & Business Media. <https://doi.org/10.1007/978-94-007-3962-8>
- Renaud FG, Syvitski JPM, Sebesvari Z, Werners SE, Kremer H, Kuenzer C, Ramesh R, Jeuken A, Friedrich J (2013). Tipping from the Holocene to the Anthropocene: how threatened are major world deltas? *Curr Opin Environ Sustain* 5:644–654. <https://doi.org/10.1016/j.cosust.2013.11.007>
- Renaud FG, Szabo S, Matthews Z (2016). Sustainable deltas: livelihoods, ecosystem services, and policy implications. *Sustain Sci* 11:519–523. <https://doi.org/10.1007/s11625-016-0380-6>
- Rijke, J., van Herk, S., Zevenbergen, C., & Ashley, R. (2012). Room for the River: delivering integrated river basin management in the Netherlands. *International journal of river basin management*, 10(4), 369-382. <https://doi.org/10.1080/15715124.2012.739173>
- Royal HaskoningDHV, Arcadis, Rebel, *et al.* (2014). Myanmar Integrated Water Resources Management Strategic Study. Royal HaskoningDHV, Amersfoort.
- Royal HaskoningDHV. (2013). Mekong Delta Plan-Long-term Vision and Strategy for a Safe, Prosperous and Sustainable Delta. Prepared under the Strategic Partnership Arrangement on Climate Change Adaptation and Water Management Between The Netherlands and Vietnam. Amersfoort: Royal HaskoningDHV. <https://www.deltares.nl/app/uploads/2014/01/Mekong-delta-plan-Long-term-vision-and-strategy.pdf>.
- Sabbatier PA, Weible CM (2007). The advocacy coalition framework: innovations and clarifications. In: Sabbatier PA (ed) *Theories of the policy process*. Westview Press, Boulder, pp 189–222
- Sanh, N., V. T. Xuan, and T. A. Phong. (1998). History and future of farming systems in the Mekong Delta. *Development of Farming Systems in the Mekong Delta of Vietnam*. Saigon: Ho Chi Minh City Publishing House. Saigon Times Group. Vietnam Asia Pacific Economic Center: 16-80.
- Sanko, N. (2001). Guidelines for stated preference experiment design. Master of Business Administration diss., Ecole Nationale des Ponts et Chaussées. s. Retrieved from https://www.b.kobe-u.ac.jp/~sanko/pub/Sanko2001_1.pdf (accessed 04 January 2021)

- Seijger, C., W. Douven, G. van Halsema, L. Hermans, J. Evers, H.L. Phi, M.F. Khan, J. Brunner, L.Pols, W. Ligtoet, S. Koole, K. Slager, M.S. Vermoolen, S. Hasan & V.T.M Hoang (2016). An analytical framework for strategic delta planning: negotiating consent for long-term sustainable delta development, *Journal of Environmental Planning and Management*, DOI:10.1080/09640568.2016.1231667
- Seijger, C., Datta, D. K., Douven, W., van Halsema, G., & Khan, M. F. (2018). Rethinking sediments, tidal rivers and delta livelihoods: tidal river management as a strategic innovation in Bangladesh. *Water Policy*, 21(1), 108-126. <https://doi.org/10.2166/wp.2018.212>
- Seijger, C., Hoang, V. T. M., van Halsema, G., Douven, W., & Wyatt, A. (2019^a). Do strategic delta plans get implemented? The case of the Mekong Delta Plan. *Regional Environmental Change*, 19(4), 1131-1145. <https://doi.org/10.1007/s10113-019-01464-0>
- Seijger, C., Van Halsema, G. E., & Korbee, D. (2019^b). A synthesis on strategic delta planning in action: wishful thinking, vested practices and unexpected changes. *Journal of Environmental Planning and Management*, 62(9), 1654-1674. <https://doi.org/10.1080/09640568.2019.1622516>
- Shah, E. (2003). *Social Designs: Tank Irrigation Technology and Agrarian Transformation in Karnataka, South India* (Water Resources Series 4); PhD thesis Wageningen University: the Netherlands.
- Shah, E. ((2008). *Telling otherwise: A historical anthropology of tank irrigation technology in south India*. *Technology and Culture* 2008, 49, 652-674. <https://doi.org/10.1353/tech.0.0054>
- Shah, E. (2012). Seeing like a subaltern: Historical ethnography of pre-modern and modern tank irrigation technology in Karnataka, India. *Water Alternatives* 2012, 5, 507-538. Available online at: <http://www.water-alternatives.org/index.php/alldoc/articles/vol5/v5issue2/182-a5-2-18/file>. Accessed on 01 February 2021
- Smaijl, A., T. Toan, D. Nhan, J. Ward, N. Trung, L. Tri, V. Tri, and P. Vu. (2015). Responding to Rising Sea Levels in the Mekong Delta. *Nature Climate Change* 5 (2): 167–174. doi: 10.1038/nclimate2469
- Smaijl, A. (2018). *Climate Change Adaptation Planning in Vietnam's Mekong Delta*. Retrieved from <https://www.wri.org/publication/climate-change-adaptation-planning-vietnam-mekong-delta> (accessed 04 January 2021)
- Smith, W. (2013). *Agriculture in the Central Mekong Delta: Opportunities for Donor Business Engagement*. Overseas Development Institute: London, UK, 2013. Available online at: <https://www.odi.org/publications/8552-agriculture-central-mekong-delta-opportunities-donor-business-engagement> (accessed on 02 February 2021)

- Soussan, J., Mcgrath, T., & Mai, N. T. N. (2019). The Development of Regional Coordination in the Mekong Delta. Retrieved from Bonn and Eschborn:
- Subramaniam, M., Youndt, M. A., (2005). The influence of intellectual capital on the types of innovative capabilities, *Academy of Management Journal*, Vol. 48, No. 3, 450-463
- Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative research journal*. <https://doi.org/10.3316/qjrj1102063>
- Syvitski JPM, Kettner AJ, Overeem I, Hutton EWH, Hannon MT, Brakenridge GR, Day J, Vörösmarty C, Saito Y, Giosan L, Nicholls RJ (2009). Sinking deltas due to human activities. *Nat Geosci* 2:681–686. <https://doi.org/10.1038/ngeo629>
- Szabo S, Hossain MS, Adger WN, Matthews Z, Ahmed S, Lázár AN, Ahmad S (2016). Soil salinity, household wealth and food insecurity in tropical deltas: evidence from south-west coast of Bangladesh. *Sustain Sci* 11:411–421. <https://doi.org/10.1007/s11625-015-0337-1>
- Talen E (1996). Do plans get implemented? A review of evaluation in planning. *J Plan Lit* 10:248–259. <https://doi.org/10.1177/088541229601000302>
- Teddlie, C., and A. Tashakkori. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*: Sage.
- Teodorović, J. (2008). Why education policies fail: Multiple streams model of policymaking. *Zbornik Instituta za pedagoska istrazivanja* 40 (1): 22-36. doi:10.2298/ZIPI0801022T
- Tessler ZD, Vörösmarty CJ, Grossberg M, Gladkova I, Aizenman H, Syvitski JPM, Foufoula-Georgiou E (2015). Profiling risk and sustainability in coastal deltas of the world. *Science* 349:638–643. <https://doi.org/10.1126/science.aab3574>
- Tong YD (2015). *A cost-benefit analysis of dike heightening in the Mekong delta*. World Fish, Los Baños
- Tran, D. D., Van Halsema, G., Hellegers, P. J., Hoang, L. P., Tran, T. Q., Kumm, M., & Ludwig, F. (2018^a). Assessing impacts of dike construction on the flood dynamics of the Mekong Delta. *Hydrology & Earth System Sciences*, 22(3). <https://doi.org/10.5194/hess-22-1875-2018>
- Tran D, van Halsema G, Hellegers PJGJ, Ludwig F, Seijger C (2018^b). Stakeholders assessment of alternative flood-based farming systems from a sustainable livelihood perspective in An Giang province. *Agric Water Manag* 206:187–199. <https://doi.org/10.1016/j.agwat.2018.04.039>
- Tran D, van Halsema G, Hellegers P, Ludwig F, Wyatt A (2018^c). Questioning triple rice intensification on the Vietnamese Mekong delta floodplains: an

- environmental and economic analysis of current landuse trends and alternatives. *Journal of environmental management*, 217, 429-441. <https://doi.org/10.1016/j.jenvman.2018.03.116>
- Tran, T., & James, H. (2017). Transformation of household livelihoods in adapting to the impacts of flood control schemes in the Vietnamese Mekong Delta. *Water resources and rural development*, 9, 67-80. <https://doi.org/10.1016/j.wrr.2017.04.002>
- Tran, T. A.; Nguyen, T. H.; Vo, T. T. (2019). Adaptation to flood and salinity environments in the Vietnamese Mekong Delta: Empirical analysis of farmer-led innovations. *Agricultural Water Management*, 216, 89-97. <https://doi.org/10.1016/j.agwat.2019.01.020>
- Triet T, Barzen JA, Choowaew S, Engels JM, Ni DV, Mai NA, Inkhavilay K, Soben K, Sethik R, Gomotean B, Thuyen LX, Kyi A, Du NH, Nordheim R, Lam HST, Moore DM, Wilson S. (2013). Persistent organic pollutants in wetlands of the Mekong Basin. USGS, Reston
- Triet, N. V. K., Dung, Nguyen Viet, Fujii, Hideto., Kummu, Matti., Merz, Bruno, Apel, Heiko. (2017). Has dyke development in the Vietnamese Mekong Delta shifted flood hazard downstream? *Hydrology and Earth System Sciences*, 21, 3991-4010. <https://doi.org/10.5194/hess-21-3991-2017>
- Tuan CTH, Hoanh CT, Miller F, Sinh B (2007). Flood and salinity management in the Mekong Delta, Vietnam. In: Be TT, Sinh BT, Miller F (eds) *Challenges to Sustainable Development in the Mekong Delta: Regional and National Policy Issues and Research Needs*. Sustainable Mekong Research Network (Sumernet), Bangkok, pp 14–68
- Umans, L. (2021). Making the shift from the haphazard Mekong Delta to a systemic delta. *Journal of Environmental Science and Policy* (accepted).
- Van Linh, N. (2001). Agricultural innovation: multiple grounds for technology policies in the Red River Delta of Vietnam. PhD thesis Wageningen University
- Van Staveren, M. F. (2017). Bringing in the floods: a comparative study on controlled flooding in the Dutch, Bangladesh and Vietnamese deltas. PhD thesis Wageningen University
- Van Staveren M, van Tatenhove J, Warner J (2018). The tenth dragon: controlled seasonal flooding in long-term policy plans for the Vietnamese Mekong Delta. *J Environ Policy Plan* 20(3):267–281. <https://doi.org/10.1080/1523908X.2017.1348287>
- Van Vo, O., & Huynh, D. N. (2015). Comparing the costs and benefits of floating rice-based and intensive rice-based farming systems in the Mekong delta. *Asian Journal of Agriculture and Rural Development*, 5(9), 202.

- Varis O, Rahaman MM, Stucki V (2008). The rocky road from integrated plans to implementation: lessons learned from the Mekong and Senegal River basins. *Int J Water Resour Dev* 24:103–121. <https://doi.org/10.1080/07900620701723307>
- Vietnamese Government. (2016). Decision No. 593 QĐ-TTg on Pilotting Sub-regional Socio-economic Development Planning. Ha Noi. Vietnam. http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&_page=1&mode=detail&document_id=184257.
- Vietnamese Government. (2017). Resolution No.120/NQ-CP on Sustainable and Climate-Resilient Development of the Mekong Delta. Ha Noi. Vietnam. http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=509&_page=1&mode=detail&document_id=192249.
- Vinh, P. (Writer). (2019). Vietnam's God Lake. In. Vietnam. Retrieved from <https://e.vnexpress.net/news/video/vietnam-s-god-lake-4010634.html>. (accessed 04 January 2021)
- Vink MJ, Boezeman D, Dewulf A, Termeer CJAM (2013). Changing climate, changing frames: Dutch water policy frame developments in the context of a rise and fall of attention to climate change. *Environ Sci Policy* 30:90–101. <https://doi.org/10.1016/j.envsci.2012.10.010>
- Vo, H. T. M., van Halsema, G., Seijger, C., Dang, N. K., Dewulf, A., & Hellegers, P. (2019). Political agenda-setting for strategic delta planning in the Mekong Delta: converging or diverging agendas of policy actors and the Mekong Delta Plan? *Journal of Environmental Planning and Management*, 62(9), 1454–1474. <https://doi.org/10.1080/09640568.2019.1571328>
- Vo, H. T. M.; Van Halsema, G.; Hellegers, P.; Bakker, E. J. (2021). Assessing stakeholders' appreciation of no-regret measures for climate change adaptation in the Mekong Delta. *Journal of Environmental Management*, manuscript submitted.
- Vormoor, K. (2010). Water Engineering, Agricultural Development and Socio-Economic Trends in the Mekong Delta. Vietnam. ZEF Working Paper Series, Bonn, Germany: Center for Development Research (ZEF), University of Bonn. <http://hdl.handle.net/10419/88404>.
- Wagner F, Tran V, Renaud F (2012). Groundwater resources in the Mekong Delta: availability, utilization and risks. In: Renaud F, Künzer C (eds) *The Mekong Delta: interdisciplinary analyses of a River Delta*. Springer, Dordrecht, pp 201–220. https://doi.org/10.1007/978-94-007-3962-8_7
- Wesselink, A., Warner, J., Syed, M. A., Chan, F., Tran, D. D., Huq, H., . . . Pinter, N. (2015). Trends in flood risk management in deltas around the world: Are we going 'soft'. *International Journal of Water Governance*, 3(4), 25–46.

- White, I., (2002). Water management in the Mekong Delta: Changes, Conflicts and Opportunities, IHP-VI Technical documents in hydrology, no.61 – UNESCO-ParisBijker, W. E., T. P. Hughes, and J. Trevor. 1984. Pinch, eds. 1987. The social construction of technological systems: New directions in the sociology and history of technology. Cambridge, MA: MIT Press.
- Wood, A. P., & van Halsema, G. E. (2008). Scoping agriculture–wetland interactions: Towards a sustainable multiple-response strategy (Vol. 33): FAO, Food and Agriculture Organization of the United Nations. Retrieved from <http://www.fao.org/3/i0314e/i0314e00.htm> (accessed 04 January 2021)
- Yamazaki, R. (2000). Agricultural Zoning Based on an Economic Viewpoint in the Mekong Delta of Vietnam. JIRCAS Journal for Scientific Papers(8), 61-74. Available online at: https://www.jircas.go.jp/sites/default/files/publication/jircas_journal/jircas_journal8-_61-74.pdf (accessed 04 January 2021)
- Yousefikhah, S. (2017). Sociology of innovation: Social construction of technology perspective. AD-minister (30): 31-43.
- Zahariadis, N. (1999). Ambiguity, time, and multiple streams. Theories of the policy process 1999: 73-93.
- . (2003). Ambiguity and choice in public policy: Political decision making in modern democracies: Georgetown University Press.
- . (2008). Ambiguity and choice in European public policy. Journal of European Public Policy 15 (4): 514-530. doi:10.1080/13501760801996717
- Zahariadis, N., and N. Herweg. (2017). “The Multiple Streams Approach.” In The Routledge Handbook of European Public Policy, edited by Nikolaos Zahariadis and Laurie Buonanno, 54–63. London: Routledge. doi:10.4324/9781315682723.
- Zahariadis, N. H. (2016). Handbook of Public Policy Agenda Setting. Cheltenham, UK and Northampton, MA: Edward Elgar. Original edition, Eur Policy Anal, 3: 205.
- Zegwaard, A., Zwarteveen, M., van Halsema, G., & Petersen, A. (2019). Sameness and difference in delta planning. Environmental Science & Policy, 94, 237-244. <https://doi.org/10.1016/j.envsci.2019.01.011>
- Zevenbergen, C., Rijke, J., van Herk, S., & Bloemen, P. (2015). Room for the river: a stepping stone in adaptive delta management. International Journal of Water, 3, 121-140. <https://doi.org/10.7564/13-ijwg63>
- Zevenbergen C, van Herk S, Rijke J, Kabat P, Bloemen P, Ashley R, Speers A, Gersonius B, Veerbeek W (2013). Taming global flood disasters. Lessons learned from Dutch experience. Nat Hazards 65: 1217–1225. <https://doi.org/10.1007/s11069-012-0439-3>

- Zohlnhöfer, R., N. Herweg, and C. Huß. (2016). Bringing formal political institutions into the multiple streams framework: An analytical proposal for comparative policy analysis. *Journal of Comparative Policy Analysis: Research and Practice* 18 (3): 243-256. doi: 10.1080/13876988.2015.1095428.

Appendices

Appendix 1: Multifunctionality of three innovations, based on the Millennium Assessment conceptual framework, following Wood and Van Halsema (2008) (For Chapter 4)

Case 1. Floating rice (FR)

From literature	Effect	From both literature and interviews	Effect	From interviews	Effect
<i>Provisioning</i> (Kien <i>et al.</i> , 2015; Kien & Pittock, 2016; Pittock & van Nguyen, 2017).					
- FR has been proven by many scholars to be an environmentally-sustainable farming system.	(+)	- FR is easy to cultivate, and has low labor requirements.	(+)	- "I have extra income coming from capturing wild fish, and other aquatic species."	(+)
- FR has high tolerance for drought (some special local varieties of FR have this function) and flood compared to other crops. FR farming is completely natural, not using plant protection chemicals and inorganic fertilizers.	(+)	- FR can be a good alternative for traditional rice, due to its higher market price than the traditional rice (its higher price outweighs lower yield).	(+)	- "My family cultivated FR before 1975 and will continue it until there is no seed anymore."	(+)
		- FR creates habitats for wild fish and other aquatic	(+)	- Extreme drought in 2016 stopped many farmers cultivating FR: "Last year no flood, so we completely lost out."	(-)

<ul style="list-style-type: none"> - Growing FR creates products that are free of pesticide residues and use less water. - Although FR yields are low (1-3 tons/ha), FR can still fetch good prices if internationally marketed as ecological rice; subsequent growing of vegetables or other crops on the residual moisture can be very profitable; additional livelihood benefits are obtained from harvesting aquatic species (e.g., fish, mud crab, freshwater prawns). 	(+) (+)	<p>species that can be caught or harvested.</p> <ul style="list-style-type: none"> - FR is resistant to aphids, no pesticides are needed, and thus produce is super-clean (organic). - FR's long time to harvest means that it may be low profit; while low yields may mean that it does not meet the requirement of food security. FR cultivation normally requires experience. 	(+) (-)	<ul style="list-style-type: none"> - FR combines well with cassava, leek, and jicama to return good profits. Even if FR fails, its roots still help to make a good underground for these cash crops. - "At the commune scale [Vinh Phuoc, Tri Ton District], we plan to conserve the area of FR as 200 ha to 2020, 500 ha to 2030," according to an official. - "Although FR is not directly bringing a high profit it is a good facilitator for high profits brought by another crops," according to an official. 	(+) (+) (+)
<i>Regulating</i>					
<ul style="list-style-type: none"> - FR enables living with and adapting to floods and restoring 	(+) (+)	<ul style="list-style-type: none"> - FR could address two challenges facing water management in the 	(+) (+)	<ul style="list-style-type: none"> - "We love flood and adapt to live with it. Floods give our crops alluvial [sediments]. I 	(+) (+)

<p>floodwater dynamics and good freshwater supplies.</p> <ul style="list-style-type: none"> - The flood tolerance of local FR varies depending on water levels and rice varieties. The submergence tolerance of FR is shown by the fact that the plants are completely submerged for 10 days while still surviving, recovering, and developing. 	(+)	<p>Mekong Delta, which is lack of water in the dry season and excess water in the rainy season. FR could help address the challenges of global climate change, particularly, the lack of freshwater due to competition and overexploitation of irrigation for intensive production.</p>	<p>do not mind how big or high the flood is.”</p> <ul style="list-style-type: none"> - “What I care about now is how to find good alternatives for other crops that are combined with FR, both for soil improvement and also income improvement,” according to an official. 	(+)
Cultural (Kien & Duc, 2015)				
<ul style="list-style-type: none"> - FR has a long tradition in Vietnam. - FR offers the potential for ecotourism. 	(+)	<ul style="list-style-type: none"> - FR is a traditional crop with a history of hundreds of years in the Mekong Delta; the respondents interviewed had cultivated FR since the 1970s. 	<ul style="list-style-type: none"> - “We have a family tradition of doing this, we do not want to lose this tradition.” - “One of the aims of FR is also for developing ecotourism,” according to an official. - “We want to go back to ‘primitive times’ in terms of 	(+)

				<p>purifying the environment and ecology. That's why we plan to expand FR. We stopped FR for too long, so we want it back. But it is still just a plan," according to an official.</p> <p>- "FR is our tradition, but due to the economic growth requirement, it was stopped for a long time, we want to revive it," according to an official.</p>	(+)	(+)
Supporting (Kien <i>et al.</i> , 2015; Kien & Duc, 2015; Kien & Pittock, 2016; Pittock & van Nguyen, 2017)						
- FR is drought tolerant. Local varieties are resistant to drought at the beginning of growth.	(+)	- FR keeps the ecology balanced, e.g., maintaining wild fish stocks.	(+)	- "FR does not need any fertilizer at all."	(+)	(+)
Drought stimulates plant roots to go deeper and stick to the soil and branch, so as to overcome the flood later.		- FR maintains biodiversity.	(+)	- "Yes, I do think about environment and ecology, FR brings in many species of bird, fish, and others."	(+)	(+)
		- FR does not degrade soil fertility and health (sedimentation is allowed,	(+)			

<p>- FR varieties are strongly influenced by short day photo-microbes. The photosensitivity is increasingly short, so it is possible to divide FR into growth groups such as early, medium, and late ripening.</p> <p>- The ability to kneel is an important protective feature for FR grains to avoid breaking. This feature varies from one variety to another. The ability to kneel is less influenced by natural conditions, including shallow or deep water conditions due to its flexibility in reaching out above the water levels.</p>	<p>(+)</p> <p>(+)</p>	<p>and no pesticides are used).</p>	<p>- "I like to alternate with many types of crops [together with FR] to enrich the soil."</p>	<p>(+)</p>
--	-----------------------	-------------------------------------	--	------------

Case 2. Room for the river (RR)

From literature	Effect	From both literature and interviews	Effect	From interviews	Effect
Provisioning (Vinh, 2019)					
- The local community called the Binh Thien reservoir “Heaven Lake” because it was their main source of livelihood, providing for freshwater supply, aquaculture, and tourism. It even provided space for residential purposes. The storage covered 300 ha in the dry season, up to 1,000 ha in the flood season at a depth of 4 meters.	(+)	- RR supports local livelihoods, including agriculture, aquaculture, and tourism. - RR designs are flexible, allowing buffer zones to enable extra cultivation in dry seasons.	(+)	- “My main job here is fish capturing [by nets or bushes] naturally from the Binh Thien reservoir to create income; fixed cages for raising fish [mainly tilapia].”	(+)
		- Binh Thien reservoir is the main source of agriculture in the region. For cultivation, water is pumped directly from the reservoir to the fields. Especially rice cultivation requires a lot of freshwater. In terms of aquaculture,	(+)	- “Some people capture other aqua species, like mussels.”	(+)
- From June, the water level rises with the Mekong River flood stage. The entire Binh Thien reservoir is inundated, lasting approximately 6 months	(+)			- “I never want to be relocated to another place because I am used to this place. My family’s living completely relies on this Binh Thien reservoir.”	(+)
				- “I have conducted multi-models that support mutual benefits, including livestock, fish, coconut... This is a	

<p>with floods some 3 m in depth. This is a key resource for flood-based livelihoods and ecological benefits.</p> <ul style="list-style-type: none"> - The fauna is rich with freshwater fish, prawns, and crab providing high nutritional and economic values. 	<p>(+)</p>	<p>local livelihoods rely on resources from the Mekong River system in the flood season. In the dry season, although fish farming is not officially allowed, some spontaneous small-scale fishing ponds are set off, which help guarantee sufficient livelihoods.</p> <ul style="list-style-type: none"> - The landscape around Binh Thien reservoir is suitable for developing ecotourism, with splendid nature and cultural values. The local authorities have already planned for this and are calling for further investment. 	<p>(+)</p>	<p>closed cycle. I installed one pumping engine on the Binh Thien reservoir for withdrawing freshwater.”</p> <ul style="list-style-type: none"> - “I have lived here since 1965. At that time we could capture on average 5-6 tons of fish every day from this Binh Thien reservoir. After 2000, it significantly declined, to 300 kg max.” 	<p>(+)</p>
			<p>(+)</p>	<ul style="list-style-type: none"> - “There are more than a hundred pumping engines installed on the Binh Thien reservoir for domestic water use [not drinking].” 	<p>(-)</p>
				<ul style="list-style-type: none"> - “This area is not suitable for any types of upland crop, or even rice, so we are looking for an optimal model.” 	

Regulating (Vinh, 2019)					
- RR ensures ample water supply.	(+)	- Although the water is mainly provided by the Mekong River system, the water quality in Binh Thien reservoir is not opaque due to sediment, but very clean, thus augmenting freshwater supply.	(+)	- “Binh Thien reservoir is the main source of water supply for the entire region. Only a small number of households have tap water. The majority have installed pumping stations to withdraw water from the Binh Thien reservoir. There are hundreds of pumping engines to get water from the Binh Thien reservoir for domestic use. Especially, in the dry season, the Binh Thien reservoir plays a crucial role in ensuring local water use,” according to an official.	(+)
- RR enables water to be stored for the dry season.	(+)				
- During the flood season, the Binh Thien reservoir was recognized as helping to mitigate flood hazards downstream.	(+)	- As the largest reservoir in the Mekong Delta, it has a great influence on irrigation systems across the entire Mekong Delta. - One of the reservoir’s functions is to prevent groundwater exploitation in order to reduce the risk of land subsidence.	(+)		(+)

				<ul style="list-style-type: none">- “Soils here are dry and poor, lack fertility, and lack freshwater, so we treasure this Binh Thien reservoir for its natural freshwater supply.”- “Thanks to the Binh Thien reservoir, we have not touched the groundwater yet.”	(+)
Cultural (Vinh, 2019)					
<ul style="list-style-type: none">- The reservoir was surrounded by roads which enable, as tours can be organized serving markets in Dong Thap, Kien Giang, and Can Tho.- RR creates beautiful landscapes- The reservoir is located close to the border with Cambodia (Khanh Binh border gate and two other international gates), and is thus convenient for	(+)	<ul style="list-style-type: none">- The Binh Thien reservoir is a good example that reflects most key features of the RR strategy. In that regard, it serves as a good reference for outreach and decision making.- RR protects local spiritual values.- RR strengthens the potential to develop ecotourism.	(+)	<ul style="list-style-type: none">- “I do not want to move out of the region, but I do fully support the idea of ecotourism.”- “We want to protect this Binh Thien reservoir because it is our spirit, we have installed a trash collection system so no trash is thrown into the Binh Thien reservoir.”	(+)

organizing international tours to Cambodia.	<ul style="list-style-type: none">- Residents in the RR region value the Binh Thien reservoir because of its significance in terms of what is locally called “God-sent gifts”.- For the community, the reservoir is a natural water source, especially when freshwater is scarce across the entire Mekong Delta.	<ul style="list-style-type: none">- “There has been no human intervention to the flow of this Binh Thien reservoir [water flows in and out naturally]. Any human effort to modify the Binh Thien reservoir has failed. So now it remains the same as it was.”- “Although not yet officially ecotourism, students like to come here to take pictures, boat, and see the natural lotus and water mimosa in the reservoir. The water here is always clean all year round.”- “We are planning for ecotourism, developing more tourism services for local people at the buffer zone of the Binh Thien reservoir,” according t an official.	<div>(+)</div> <div>(+)</div> <div>(+)</div>
Supporting (Vinh, 2019)			

<ul style="list-style-type: none"> - RR minimizes damages caused by floods, while minimizing risks of erosion and dike breakage. 	<p>(+)</p>	<ul style="list-style-type: none"> - Binh Thien reservoir provides transportation functions and facilitates connections between adjacent areas. 	<p>(+)</p>	<p>(+)</p>
<ul style="list-style-type: none"> - RR enables a transportation function. 	<p>(+)</p>			
<ul style="list-style-type: none"> - RR provides habitat for rare species of fish that migrate to the area during flood seasons. The flora is also diverse. 	<p>(+)</p>			<p>(-)</p>

Case 3. Integrated shrimp-mangrove farming system (SM)

From literature	Effect	From both literature and interviews	Effect	From interviews	Effect
Provisioning (Minh <i>et al.</i> , 2001)					

<ul style="list-style-type: none"> - It is not clear if livelihoods can be secured from this system, as SM does not seem to deliver substantial profits. - SM offers a sustainable method of cultivation, as no pesticides, chemicals or fertilizers are needed. The products are thus organic. - SM can be initiated with low investment; no feed is needed. 	<p>(-)</p>	<ul style="list-style-type: none"> - SM is been considered a sustainable model of shrimp farming (after the shrimp-rice model). - SM needs a large area. Some farmers do not have access to this much space. - SM provides no other income while waiting for the harvest. 	<p>(+)</p>	<ul style="list-style-type: none"> - “People prefer intensive shrimp due to the short time to harvest and huge profits if successful. However, they could lose everything if it fails. So, SM is more sustainable,” according to an official. - “I don’t like SM because it gives low profit but needs a long time to harvest.” - “I did intensive shrimp and had negative income from 2004-2013, due to shrimp disease. I could not switch to SM but I support it because of many advantages: low risk of failure, no negative income. I recommend farmers not to go for intensive shrimp because this model requires a big 	<p>(+)</p>
<p>(+)</p>	<p>(-)</p>	<p>(+)</p>	<p>(+)</p>		<p>(+)</p>

				investment, dependency on natural conditions and high risk of disease.”	
Regulating (Ahmed <i>et al.</i> , 2018; Duke & Schmitt, 2015); (Bosma <i>et al.</i> , 2016)					
- SM is consistent with flood control, erosion protection, climatic and biological regulation, detoxification, and coastal protection.	(+)	- SM farmers must cope with salinity issues.	(+)	- “We do not need to destroy mangrove forest to create more surface area, but still conserve it, it is good for the environment.”	(+)
- SM can lead to increased biodiversity, at a small scale.	(+)	- SM promotes water self-purification, as the low density of shrimp per pond enables the water to remain clean and unpolluted.	(+)	- “We are suffering from salinity for many years so only shrimp farming is what we think of, but we do not have land for shrimp-mangrove.”	(-)
- The effect of leaf litter decomposition on the shrimp pond environment may vary according to mangrove species, as they may contain different constituents. This issue requires farmers to have the required knowledge.	(-)	- SM minimizes pollution (as the shrimp grow in nature).	(+)		
- The design of the shrimp pond (canal system) affects mangrove development. In		- The amount of fallen leaves varies according to the specific conditions, and can cause environmental pollution.	(-)		
		- SM’s low-density shrimp production yields large size shrimp which bring a good market price.	(+)		

inundated mangrove platforms, fallen leaves might cause problems during the rainy season as their rapid decomposition may result in water polluted by leachates through rainwater seepage.	(-)				
Cultural (Rahmila & Halim, 2018)					
SM offers potential for ecotourism.	(+)	- SM had not yet been implemented at the locality.	(-)		
Supporting (Bosma <i>et al.</i> , 2016)					
- SM brings sedimentation and nutrients.	(+)			- "Yes, I do not need to give any food for shrimp, the food is coming from the mangrove."	(+)
- SM offers feeding, shelter, and nursery grounds for aquatic species.	(+)			- "I also do not need to clean up the pond before putting shrimp babies in, the pond is clean already."	(+)
- The decomposition of mangrove tree trunks and leaves is a direct source of feed and an important source of "green manure" for the food	(+)				

chain in the coastal ecosystem. SM enriches the nutrients in the shrimp pond.					
---	--	--	--	--	--

Appendix 2: Selected statistical results (for Chapter 4)

Region 1

Tests of between-subjects effects^a

Dependent Variable: Rating

Source		Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Intercept	Hypothesis	791.523	1	791.523	1883.777	.000
	Error	186.037	442.756	.420 ^b		
FR01	Hypothesis	608.223	1	608.223	1303.808	.000
	Error	181.001	388	.466 ^c		
SM01	Hypothesis	.321	1	.321	.689	.407
	Error	181.001	388	.466 ^c		
RR01	Hypothesis	1.286	1	1.286	2.756	.098
	Error	181.001	388	.466 ^c		
Respondent	Hypothesis	13.179	55	.240	.514	.998
	Error	181.001	388	.466 ^c		
DonationVNDye ar	Hypothesis	9.669	1	9.669	20.726	.000
	Error	181.001	388	.466 ^c		

Region 2

Tests of between-subjects effects^a

Dependent Variable: Rating

Source		Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Intercept	Hypothesis	1280.149	1	1280.149	945.037	.000
	Error	313.450	231.396	1.355 ^b		
FR01	Hypothesis	3.056	1	3.056	3.203	.074

	Error	370.163	388	.954 ^c		
SM01	Hypothesis	.181	1	.181	.190	.664
	Error	370.163	388	.954 ^c		
RR01	Hypothesis	63.752	1	63.752	66.824	.000
	Error	370.163	388	.954 ^c		
Respondent	Hypothesis	160.391	55	2.916	3.057	.000
	Error	370.163	388	.954 ^c		
DonationVNDye ar	Hypothesis	11.723	1	11.723	12.288	.001
	Error	370.163	388	.954 ^c		

Region 3

Tests of between-subjects effects^a

Dependent Variable: Rating

Source		Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Intercept	Hypothesis	831.875	1	831.875	496.125	.000
	Error	794.922	474.087	1.677 ^b		
FR01	Hypothesis	27.552	1	27.552	15.183	.000
	Error	754.899	416	1.815 ^c		
SM01	Hypothesis	.169	1	.169	.093	.761
	Error	754.899	416	1.815 ^c		
RR01	Hypothesis	.002	1	.002	.001	.973
	Error	754.899	416	1.815 ^c		
Respondent	Hypothesis	67.206	59	1.139	.628	.985
	Error	754.899	416	1.815 ^c		
DonationVNDye ar	Hypothesis	.003	1	.003	.002	.966
	Error	754.899	416	1.815 ^c

Breusch-Pagan Test for Heteroskedasticity^{a,b,c}

Chi-Square	df	Sig.
.292	1	.589

a. Dependent variable: Rating

b. Tests the null hypothesis that the variance of the errors does not depend on the values of the independent variables.

c. Predicted values from design: Intercept +
FR01 + SM01 + RR01 + region +
Respondent(region) + DonationVNDyear +
FR01 * region + SM01 * region + RR01 * region

Appendix 3: Interview guide (For Chapter 5)

Main questions (flexible, to be modified according to the interviewee type).

Topic 1. Soft implementation: how the lotus farming model affects people's thinking in improving local livelihoods to cope with floods and directions to sustainability?

- Are you a lotus-farmer? What type of lotus farming you are doing and why not others?
- For how long have you done this? How did you start with lotus, who introduced it to you?
- What are the advantages/disadvantages of the farming lotus?
- What is the current status of practicing this model at your locality?
- What changes in the lotus farming model will occur in the future when compared to the current farming models?
- Who is knowledgeable about lotus farming? What kinds of people are changing their understanding of dealing with floods and climate change?
- Who is supporting the practice of this model? Who doesn't? And who is changing?

Topic 2. Hard implementation: How is the lotus farming model implemented in practice?

- Which (formal) decisions and activities include adaptive agricultural models in general and flood-based farming systems in particular? (e.g., plans, policies, regulations, research programs)
- Where is the lotus cultivation model implemented in the Mekong Delta? What are the criteria for applying lotus cultivation models in these areas?
- What technologies were used when implementing the lotus farming model?

- What creative ideas are relevant when implementing the lotus farming model?
- What are the recommendations for applying and replicating the lotus cultivation model to other areas?

Topic 3. Historical perspective

- When did you know about lotus farming?
- As you know who started the lotus here, what was the reason they planted lotus at that time? What did they do before planting lotus?

Topic 4. Network

- In practicing these models, who are you collaborating with?
- Do you find yourself collaborating with / or working with someone else to improve the lotus farming development?
- Specifically, among the social groups outlined below, which are the relevant groups that may affect the development of lotus farming?
 - Group of farmers
 - Local government groups
 - Researchers/scientists group
 - Business group (could be a company or a buyer)
 - Group of foreign organizations
 - Non-governmental organization
 - (Is there any other relevant group, according to you?)
- Which of the 5 groups according to you think the most important role to develop lotus cultivation, which group contributes the least?

Topic 5. Future potential

- Do you continue to farm lotus in the future, why?
- If you do not continue to with lotus, what are your alternatives?

Other things to mention

- Do you have any specific aspirations or suggestions for improved lotus cultivation and increased productivity?
- Do you have any specific aspirations or suggestions to promote the construction of a lotus product purchasing and processing company on the spot?

Assuming you do not have the expected returns from practicing the model, will you continue it? Why so?

Acknowledgements

My Ph.D. journey has finally reached its end. This achievement is a milestone in my career representing a long process and overcoming tons of ups and downs. The journey was excitedly started by my eagerness and curiosity about how successful delta managers have managed their deltas all over the world (i.e. Dutch delta). This motivation leveraged my enthusiasm for entering such a wonderful adventure, together with my project team – the UDW (Urbanizing deltas of the world) project. The project has been successfully done as a great contribution to expanding the way of my critical thinking, not only from the perspective of a researcher but also as a delta manager. The lessons I gained from engaging in this process, should be uncountable and priceless. They enrich my academic knowledge and significantly increase scientific values that are related to the domains of climate change and delta management, both national and global scales. In the completion of this thesis that was only possible by the support I received from many individuals or institutions, I would like to hereby express my thanks to all who have helped me on the way.

My sincere gratitude is, first and foremost, expressed to Dr. Gerardo van Halsema and Prof. Petra Hellegers, my supervisor and promotor. It was my supreme privilege and honour to study under your supervision. You have taught me the methodology to carry out the research and to present the research works as clearly as possible. Gerardo, you are not only my supervisor, you are a wonderful motivator and a great supporter. I can never forget how supportive you are of all my work, either it is a small piece of text or a lengthy article. Once you put your hands in, these become beautifully polished. You offered all your enthusiasm once you read my writing then gave your comments, in every single detail. I will always be grateful and remember how you supported me to patiently explain things in every meeting. Your inputs are always critical but rational, knowledgeable, and understandable, in such a scientific way that I could sufficiently follow and make the work publishable. Thank you very much for

your immense knowledge. Petra, it was such a blessing to be your student. You have been so kind and supportive not only in academics but also in my personal life. I still remember the day I got approval for my proposal, you had silently sent me a small message “congratulations” during a seminar with a sweet smile on your face. I could warmly feel your wholehearted happiness. Although it was such a small text, it inspired me and motivated me a lot. For me, you are a perfect model of both an academic professor and a chair group holder. Petra and Gerardo, I could not have imagined having a better supervising team as you are.

I would like to, secondly, thank my local supervisor, Dr. Nhan Kieu Dang, for his genuine support throughout this research work. His dynamism, vision, sincerity, and motivation have deeply inspired me. I am grateful for his contribution also as a co-author. Together with him, my deep and sincere gratitude is expressed to other co-authors: Dr. Chris Seijger, Prof. Art Dewulf, Prof. Quan Hong Nguyen, Dr. Evert Jan Bakker, Dr. Andrew Wyatt for your collaboration and for providing invaluable guidance throughout this research. To Chris, please remember that you are not only a project fellow, a postdoc, an instructor, you are also considered as my tutor. I have learned from you how to be professional in the academy. To Quan, I thank you very much for being a wonderful collaborator. I am grateful for all things you have helped me with, especially for the empirical experiences. To Andrew, thank you very much for being supportive, especially to some of my field trips. You are a source of inspiration that I enjoyed hours listening to your wisdom. I would also like to thank Art for his lessons and transferred knowledge about a very new field to me. I thank you for your patience during the discussion I had with you on the assignments. To EJ, you know that I am very grateful to you such that I don't have enough words to say. Thank you for being a teacher with a great sense of humour, for your blessings, prayers, empathy, and many more. Thank you for connecting me to the CSMN, and, I am extending here my heartfelt thanks to Ed and Margreet and all my friends there, for wonderful mental support.

My wholehearted thankfulness would also go to the team of the UDW-NWO project, who gave me the golden opportunity to grow in my academic pathway. Dr. Wim Douven, Dr. Leon Hermans, Dr. Jaap Evers, Dr. Dorien Korbee, Shahnoor Hasan, you are not only my project fellows, but also my teachers, guides, friends, both financial and academic supporters. Your immense knowledge seems unlimited during dozens of meetings and discussions. Working with UDW has been such a blessing and a valuable experience in my whole professional life. I am in debt for all your kindness and support. During my Ph.D. course, the project team has been like another family, with uncountable beautiful memories together. You will be always remembered with my most profound appreciation.

In a close connection with this project, there is an important space for my gratitude toward the Water Resources Management Group and WASS, Wageningen University. My Ph.D. would not be completed without all your support (i.e. facilities, peer review, knowledge exchange, courses, finances, and so on), especially to our sweet secretary Maartje Sijtsma, for providing me with solid support; to Lennart in the Expat for all logistic arrangement; to all staff and Ph.D. fellows Heleen, Marcela, Bert, Maria, Marleen, Pieter, Alex, Rutgerd, Jeroen, Harm, Henk, Jaime, Gert Jan, Saskia, Matthijs, Lena, Esha, Wahib, Shah, Melle, Hanan, Xiulu, Seyed, Rinchu, Fulera for many sweets and coffee meetings, and many fruitful discussions. I would also love to thank Michelle Luijben for English editing. My thanks to you will never suffice. Especially, Maria, you have been such a wonderful staff who cares and loves all of the international students including me, I will never forget your kind support and friendship. Also to Henning Jansen, you are such a special friend I have ever met, thanks a lot for the very nice discussions and the time we have worked together in the Mekong Delta.

I would also like to express my special love and thanks to my best friends here in the Netherlands, who I met only a few years back, but have become an

important part of my life Kaja Hribar, Wan Quanxing, Smriti Tiwari. We have spent all moments together including ups and downs. I could not overcome many difficulties and hardships during my Ph.D. without your love, support, and endless encouragement. You have been so patient to lift me whenever I was down and celebrate every step forward with me. Other special friends to whom I owe a big debt are Mr. Jaap van Seventer, Mr. Jaap Jr van, Ms. Stephanie and Ms. Rosemarie, and the home-sweet-home in Ermelo, thank you very much for considering me as one of your family members, likewise, I always consider you as my home in the Netherlands, and thanks a lot for your continuous encouragement to my study.

To my home institution and my colleagues who have been wholeheartedly supporting me from overseas, I am extending here my loving thanks to the Faculty of Environment, especially the leader board Prof. To Thi Hien, Prof. Truong Thanh Canh who at the very beginning wrote recommendation letters for me to take this Ph.D. course, and have continuously cared about my progress, and been always willing to help without hesitation, whenever I need. I thank very much all other colleagues who non-stop contacted me for encouragement and leveraging my motivations to complete my Ph.D. work. My gratitude is respectively expressed to the collaboration and support of Dr. Pham Duy Tien (An Giang University), and Dr. Pham Kim Long (Tra Vinh University) who helped me conducting my field trips in An Giang and Tra Vinh provinces. I also like to thank WACC (Center of Water Management and Climate Change Adaptation) for supporting me in logistics and all procedures of papers and documents, necessary for the field trips. My big thanks would also go to Dr. Mohanasundar Radhakrishman (via the connection of WACC) for supporting me in composing a graphic for the research's design. Without all your help, my thesis would not be comprehensively finished.

I owe big thanks to my M&M, Prof. Martin Verstegen, and Mrs. Mariet Verstegen, for your dedicated help, support, correction to some pieces of my

work although it is not completely fitting to your expertise. I will forever memorize how sweet and loving you are, whenever listening to your share and advice. I, and my Vietnamese friends, always owe you a big debt in many aspects of life, especially in the Netherlands, not our motherland, as you always made us feel at home. Such a big blessing to know you in my life. I also cannot forget to mention here my Vietnamese friends, Van Anh, Thu Trang, Phi Long, Thuy Ngan, Ba Hieu, Duc Dung, Hong Luan, Duc Huy, Hai Yen, Ai Nguyen, Bich Diep, Nhung Pham, Huyen Nguyen & family, Viet Nguyen, Mr. Chinh Ngo, Mrs. Thu Vi, Hong Lien, whose friendship, and help was such a huge encouragement and motivation for me. My special thank is to Mr. Chinh Ngo, for helping me with a beautiful thesis cover. My sweet thanks to Van Anh and Trang, the closest and the most trusted friends that I always thought of and came to first, I do appreciate your true friendship and love which lifted and took me to the end of my Ph.D. journey.

Last but not the least, I am extremely grateful to my great family (both my side and my husband's side), my beloved parents, parents-in-law, my loving husband, Anh Chi Hai, hai em Mai Nhat, Ut Thuy, my nieces, and nephews for their love, forgiveness, caring and sacrifices for educating and preparing me for my future. I especially love to thank my loving daughter, a little angel of my life Ha Truc Linh, for her love and "friendship", I love you very much and this dissertation I would make as a gift for your inspiration and motivation, to further pursue your study abroad. You are forever the most important part of my life.

It would be difficult to name everyone, so whose names have not been mentioned here, but in one way or another, have contributed to my Ph.D. journey, are forever grateful for me, and will always stay in my heart. Thank you all very much again for making the completion of this Ph.D. dissertation possible. I look forward to any new opportunities that could connect us again in the future. Big THANKS from Hoang to all 🌸

Vo Thi Minh Hoang
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
WASS introduction	WASS	2015	1.0
Writing the PhD research proposal	WUR	2015	5.0
Inception Workshop on NWO-UDW research project	IHE Delft Institute for Water Education	2015	0.8
Future Deltas Symposium	Utrecht University	2015	0.3
Delta Envisioning Support System day – Practical Participation	IHE Delft Institute for Water Education	2015	0.3
Participatory planning tools for strategic delta planning and management	Ho Chi Minh City, Vietnam	2016	0.3
Dynamic deltas	Zeeland, The Netherlands	2017	0.3
B) General research related competences			
Research Approaches to Land and Water Management, WRM-32306	WUR	2015	6.0
Systematic approaches to reviewing literature (SLR)	WASS	2016	4.0
Researching socio-technical practices, innovation and responsible futures, CPT-37806	WUR	2016	6.0
Policy and governance theories for analysing water issues	WASS	2018	2.0
Grasping Sustainability	SENSE	2017	2.0
Basic Statistics	SENSE – PE&RC	2018	1.5
C) Career related competences/personal development			
Technics for Writing and Presenting a Scientific Paper	WGS	2015	1.2
Atlas-ti	WASS	2017	1.0
Infographics and Iconography	WUR Library	2018	0.3
WASS PhD council	WASS	2015-2017	3.0
Tutoring 4 MSc students on final Thesis	VNU-HCMUS (Vietnam)	2016 and 2018	4.0
Organising PhD symposium	WUR	2017	1.0

<i>"Political agenda-setting process in the Vietnamese Mekong Delta"</i>	International Conference on Geology and Earth Science, Rome, Italy	2018	1.0
<i>"Innovating water management strategies for the Vietnamese Mekong Delta"</i>	5th International Climate Change Adaptation Conference, Cape Town, South Africa	2018	1.0
<i>"Perception of the Vietnamese Mekong Delta's farmers towards floating rice as a cultivation way to adapt to flood"</i>	2nd CSDS Conference: Critical perspectives on governance by sustainable development goals – Water, Food and Climate, University of Amsterdam, the Netherlands	2018	1.0
<i>"Political agenda-setting for strategic delta planning in the Mekong Delta - Converging or diverging agendas of policy actors and the Mekong Delta Plan?"</i>	WRM's Mid- term review, to the International Advisory Committee, WUR	2018	1.0
<i>"Innovation and farmers adapting to climate change in the Mekong Delta"</i>	Roundtable on Climate and Security, Embassy of Vietnam, The Hague, The Netherlands	2018	1.0
Total			45.0

*One credit according to ECTS is on average equivalent to 28 hours of study load

List of publications

- Seijger, C., W. Douven, G. van Halsema, L. Hermans, J. Evers, H. L. Phi, M. F. Khan, V. T. M. Hoang, et al. 2016. An analytical framework for strategic delta planning: negotiating consent for long-term sustainable delta development. *Journal of Environmental Planning and Management* 60 (8): 1485-1509. <https://doi.org/10.1080/09640568.2016.1231667>.
- Hoang Thi Minh Vo, Gerardo van Halsema, Chris Seijger, Nhan Kieu Dang, Art Dewulf, Petra Hellegers, 2019, Political agenda setting for strategic delta planning in the Mekong Delta – Converging or diverging agendas of policy actors? *Journal of Environmental Planning and Management* <https://doi.org/10.1080/09640568.2019.1571328>
- Chris Seijger, Hoang Thi Minh Vo, Gerardo van Halsema, Wim Douven, Andrew Wyatt, 2017, Do strategic delta plans get implemented? The case of the Mekong Delta Plan, *Journal of Regional Environmental Change* <https://doi.org/10.1007/s10113-019-01464-0>
- Hoang Thi Minh Vo, Gerardo van Halsema, Petra Hellegers, Bakker Evert-Jan, 2021, Assessing stakeholder's appreciation of non-regret measures for climate change adaptation in the Mekong Delta, (Submitted) *Journal of Environmental Management*
- Hoang Thi Minh Vo, Gerardo van Halsema, Petra Hellegers, Andrew Wyatt, Quan Hong Nguyen, 2021, The emergence of lotus farming as an innovation for adapting to climate change in the upper Vietnamese Mekong Delta, *Land* <https://doi.org/10.3390/land10040350>

The research described in this thesis is a result of collaboration between Wageningen University as one of the consortium members of the integrated project Urbanizing Deltas of the World (UDW) and other members engaged in the project. This project research was funded by NWO (Netherlands Organization for Scientific Research), project number: W 07.69.106.

Cover design: Adina – Branding and Strategy Company (Vietnam)

Print: ProefschriftMaken

Financial support from Water Resources Management – Wageningen University for printing is gratefully acknowledged.