DELTAS IN MOTION: POLITICS OF TRANSLATION AND THE GOVERNANCE OF CLIMATE CHANGE ADAPTATION IN THE MEKONG DELTA, VIETNAM

by

JACOB O. WEGER

(Under the Direction of J. Peter Brosius)

ABSTRACT

Few regions of the world are as threatened by climate change as the Mekong Delta of Vietnam. Rising sea levels are already transforming much of the area into a predominantly brackish environment, which is increasingly beset by alternating flood and drought conditions. Local and regional development pressures—groundwater depletion, uncoordinated land and water use changes, upstream dam developments—combine to create a complicated nexus of sustainability challenges. With deltas in general identified as highly vulnerable to climate change, Dutch actors and expertise have come to play an increasingly prominent role in adaptation efforts in many of the world's major delta regions. Strategies and approaches for which the Netherlands is renowned are being translated through "delta plans" to guide transformations to sustainability in Vietnam, Bangladesh, and elsewhere. As in any development intervention, however, translating knowledge from one context to another is far from politically neutral. Few scholars have addressed the political implications of translating knowledge for the sake of guiding climate change adaptation, however, or just how this works in practice. This dissertation addresses this gap by asking: How is knowledge translated across levels of governance to influence local social-ecological change in transnational climate change adaptation initiatives? By examining the politics of translation involved in governing climate change adaptation in the Mekong Delta, this project investigates how knowledge and power interact with local social and material conditions to shape the trajectory of climate adaptation in a particular locale.

To answer this question, ethnographic research was conducted over approximately 20 months from 2016 to 2018, at sites spanning multiple levels of governance: the Netherlands, Vietnam, and a coastal province of the Mekong Delta. The research focused on actors at each of these levels and the interactions between them: planners and policymakers in the Netherlands and Vietnam; intermediary actors and organizations that broker and translate knowledge across governance levels; and farmers in the Mekong Delta, who draw on socio-material networks to translate knowledge into livelihood and land-use changes. Findings indicate challenges, opportunities, and political dynamics at stake in the translation of knowledge shaping the trajectory of climate change adaptation.

INDEX WORDS: Climate change, adaptation, environmental governance, politics of translation, Vietnam, Mekong Delta

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CHAPTER 1

INTRODUCTION: CLIMATE CHANGE ADAPTATION GOVERNANCE AND THE POLITICS OF TRANSLATION IN VIETNAM

Introduction

In recent years, the Mekong Delta of Vietnam has been grabbing headlines both domestically and internationally for its vulnerability to climate change, as rising sea levels threaten to swallow much of the land area, water and soil are permeated by saltwater, and much of the delta is beset by alternating flood and drought conditions. News outlets sound the alarm bells of impending catastrophe,[1] while international research and development organizations and their Vietnamese partners[2] invest in studying and, hopefully, mitigating the predicted slide towards disaster.

I first became aware of this growing clamor while living in Vietnam about ten years ago. At a "Green Drinks" networking event in Ho Chi Minh City around 2010-2011, I remember watching professors, NGO representatives, and investment fund managers give presentations about the slowly unfolding crisis in the delta. Yet these developments were also presented as

[1] For example: "Will climate change sink the Mekong Delta?" https://news.mongabay.com/2016/10/will-climate-change-sink-the-mekong-delta/; "Drought and 'Rice First' Policy Imperil Vietnamese Farmers," https://www.nytimes.com/2016/05/29/world/asia/drought-and-rice-first-policy-imperil-vietnamese-farmers.html'; "New climate change report highlights grave dangers for Vietnam," https://news.mongabay.com/2018/10/new-climate-change-report-highlights-grave-dangers-for-vietnam/; "Vietnam needs to act in Mekong Delta as land sinking, seas rising: experts," https://e.vnexpress.net/news/news/vietnam-needs-to-act-in-mekong-delta-as-land-sinking-seas-rising-experts-4005471.html; "The Mekong Delta: an unsettling portrait of coastal collapse," https://www.ft.com/content/31bf27a4-1c0e-11ea-9186-7348c2f183af; last accessed November 2, 2021.

[2] For example: https://wisdom.eoc.dlr.de/en/content/objectives-wisdom-project.html; https://www.adb.org/projects/43295-012/main; https://www.giz.de/en/worldwide/18661.html; https://www.worldbank.org/en/news/press-release/2016/06/10/vietnam-building-climate-resilience-and-ensuring-sustainable-livelihoods-of-farmers-in-the-mekong-delta; http://icem.com.au/portfolio-items/delta-developing-long-term-adaptation-tools-for-the-mekong-delta/?portfolioID=2631; last accessed November 2, 2021.

opportunities, as presenters sung the praises of efforts already underway to contribute to "adaptation." These presentations raised more questions for me than they answered, however. What would adaptation look like in the delta? How was climate change being experienced by local people, and how did they make sense of these changes? Farmers, presented as victims, had done little to contribute to the problem of climate change but were now apparently at risk of suffering some of its most direct consequences, and were thus being asked to make significant changes to their lives and livelihoods. Who would benefit most from these ongoing efforts and "opportunities"? And what were local people already doing to adjust to changing conditions? These are some of the driving questions at the heart of this dissertation project.

Adaptation to climate change has become a new paradigm in international development, with countries, regions, and multilateral development agencies asserting the urgent need to facilitate societal adaptation to the immediate and future effects of a changing climate (Scott and Picot 2014; Taylor 2015; Weisser et al. 2013; World Bank 2010, 2013). National governments and international organizations increasingly integrate adaptation goals into their development planning, mobilizing scientific expertise and global finance, and applying lessons learned in one location to others, as they attempt to steer a path of "climate resilience" in many parts of the globe.

In this, Vietnam has emerged as a country of special concern, with its long coastline and dense human population concentrated along it exposed to the risks of sea-level rise. The Mekong Delta especially is often cited as a region highly vulnerability to the effects of climate change (Dasgupta et al. 2007; IPCC 2007; McElwee 2017; McElwee et al. 2010). Scientific reports describe the delta as particularly vulnerable to sea-level rise and related impacts from flooding and salinity intrusion due to its low elevation and dense population, with effects compounded by

intensive agricultural development and upstream dam construction that starve the delta of needed sediments, enhancing subsidence and coastal erosion (Anthony et al. 2015; IPCC 2007; Keskinen et al. 2010; Minderhoud et al. 2017; Tuan and Chinvanno 2011; Tran Thuc et al. 2016). Known as the country's "rice basket," it is an area of high agricultural productivity, helping drive the country's rapid economic growth over the past 30 years. Today the delta is responsible for 90% of Vietnam's rice exports—13% of the world's supply—and most aquaculture and fruit exports, contributing around a quarter of the country's GDP (USAID 2017; Tam 2015; Tatarski 2018). Yet under extreme climate change scenarios, the delta could face nearly 40% inundation over the next century, threatening millions of people's livelihoods and affecting domestic and international food security (McElwee 2017; Tran Thuc et al. 2016).

Not only the Mekong Delta, but major river deltas in general have been identified as hotspots of exposure and sensitivity to climate change-induced hazards and perturbations, as they face challenges from sea-level rise and fluctuating river discharges, combined with ongoing subsidence and the amplifying effects of hydraulic engineering and urbanization, adding up to serious concerns over sustainability (Foufoula-Georgiou et al. 2013; Giosan et al. 2014; IPCC 2007; Kuenzer and Renaud 2012). Recognizing this, Dutch actors and expertise have come to play a prominent role in climate adaptation planning in delta areas, as witnessed with the creation of "Delta Plans" first in the Netherlands and then abroad in Vietnam, Bangladesh, and elsewhere. The promotion of Dutch expertise in "delta management" is also evident in such fora as international conferences[3] and networks including the Delta Alliance[4] and the Delta Coalition[5], as well as articles in high-profile news outlets like the *New York Times*. In 2013, the

[3] http://www.climatedeltaconference.org; http://www.climatedeltaconference2014.org
[4] http://www.delta-alliance.org
[5] http://www.deltacoalition.net

governments of Vietnam and the Netherlands jointly published the Mekong Delta Plan (MDP), a 100-year vision for the Delta's development, as part of a strategic partnership arrangement between the two countries signed in 2010. Directly inspired by the Dutch Delta Plan, published in 2008, the MDP provides a guiding framework for climate change adaptation and sustainable development at all levels of governance (Mekong Delta Plan 2013).

Yet knowledge for adapting to climate change is never just applied in a linear fashion, transferred from one country or level of governance to the next with clear and predictable results. Instead, knowledge moves by way of translation, undergoing transformations of form, content, and meaning as it travels from one context to another, passing through networks of actors that make up chains of translation. This is an inherently political process: knowledge translations are shaped by asymmetries of power, divergent interests, and differing historical, sociocultural, and material contexts, all of which influence the way in which knowledge is applied, its uses and practical effects.

Building on work in political ecology, science and technology studies, and development studies on the politics of knowledge, this research sought to understand the politics of translation at work in the transnational and multilevel governance of climate change adaptation in Vietnam. The research was guided by the question, *How is knowledge translated across levels of governance to influence local socio-ecological change in transnational climate change adaptation initiatives?* More specifically, I focused on three levels of governance, each roughly corresponding to particular actor groups and spatial scales, asking: (1) How do planners and policymakers in Vietnam and the Netherlands produce and translate knowledge about the effects of and appropriate responses to climate change in the Mekong Delta? (2) How do intermediary actors and organizations broker and translate knowledge across levels of governance, and what

interests or agendas are reflected in the process? (3) How do farmers in the coastal Mekong Delta draw on social and material relations for knowledge about environmental and socio-economic change, and how do they translate that knowledge into livelihood decisions?

The rest of this chapter situates the dissertation research in the relevant conceptual literature and then describes the methodological approach used. The next section reviews literature on climate change adaptation and the governance thereof. In the following section, I describe the theoretical framework employed for analyzing the politics of translation. After that, I describe the research timeline and methodology, before ending with a brief overview of the following chapters.

The governance of climate change adaptation

Knowing climate change

The vast complexity of the climate system, which is marked by natural variability at multiple intervals, nonlinear dynamics, and inherent uncertainties in the ability to predict locally specific outcomes, seems to challenge humans' ability to respond effectively to contemporary climate change. Whereas weather describes meteorological conditions that humans experience directly as short-term states or events, climate refers to long-term average weather in a particular place, usually as measured over several decades. Such climatological means, often measured at 30-year intervals, serve as baselines against which to measure shorter-term variability, both of which are important for understanding the range of potential events to which humans and other living things might have to adapt (Kitchen 2014; NASEM 2016; Stocker et al. 2013). Many "extreme events"—weather that is statistically rare for a given place or time of year—are the result of natural variability in the climate system, and may be influenced by factors such as El

Niño-Southern Oscillation (ENSO), monsoons cycles, volcanic eruptions, or the chaotic variability inherent in the climate system. This variability is one source of uncertainty in measuring and predicting climate change (IPCC 2012; Stocker et al. 2013; Kitchen 2014; NASEM 2016).

Scientific evidence for anthropogenic climate change comes from observed changes in the climate system—such as increasing atmospheric and ocean temperatures, diminished snow and ice cover, increasing rate of sea-level rise, links between human activities and increasing greenhouse gas concentrations in the atmosphere—as well as paleoclimate records, theoretical studies of climate processes, and model simulations (Stocker et al. 2013). General Circulation Models (GCMs) use mathematical formulas to represent physical climate processes, which are expressed as algorithms run on powerful computers. Such models have shown substantial ability to reproduce observed features of past and current climate (Kitchen 2014). Working Group I of the Intergovernmental Panel on Climate Change (IPCC) surveys vast numbers of independent scientific studies and makes projections of future global and regional changes from a combination of new model simulations (Stocker et al. 2013). Projections are modeled with the use of multiple scenarios, called Representative Concentration Pathways (RCPs), representing different levels of anthropogenic radiative forcing, to reflect a range of potential 21st century climate policies and emissions pathways.

Because global climate is a complex, nonlinear system, it is very difficult to precisely predict specific events or the size of climatic changes, leaving a degree of uncertainty in representing both past and future climate change. Uncertainty refers here not to ignorance, as it is popularly understood, but rather to a quantifiable range of possible outcomes whose probabilities can be reliably estimated and which, in the IPCC reports, are additionally assigned a level of

confidence based on expert agreement and evaluation of evidence. Sources of uncertainty in measuring and predicting climate change can include natural variability and regional diversity of terrain, scenario uncertainty related to future rates of greenhouse gas emissions, and model uncertainty related to the scientific representation of physical climate processes, available data, and modeling capacity, though there have been many improvements in the latter over the years (Stocker et al. 2013; Kitchen 2014). It remains difficult to attribute the cause of an individual extreme weather event to anthropogenic climate change alone, as countless other factors are constantly at play, yet in this area scientists have also made recent advances as evidence of human influence on the climate system has strengthened (Masson-Delmotte et al. 2021; NASEM 2016).

Adaptation to climate change

In the climate change literature, responses to the problem of climate change are generally classified into two types: mitigation and adaptation. Mitigation, essentially reduction of the greenhouse effect through reduced greenhouse gas emissions or other measures, has traditionally been seen as a *proactive* approach to avoid the worst effects of climate change, while adaptation was seen as *reactive* (and possibly even defeatist), though this view is changing. Following the IPCC, climate change adaptation is commonly defined as: "The process of adjustment to actual or expected climate and its effects," including, in human systems, actions "to moderate or avoid harm or exploit beneficial opportunities" (IPCC 2014, 5). Of course, people have been adjusting to and coping with climate, climate variability, and climate extremes throughout human history (Barnes and Dove 2015; IPCC 2012). In recent years, as it has become clear that significant effects of anthropogenic climate change are unavoidable, adaptation has become the dominant way of framing human adjustments in anticipation of and response to such changes. Yet the

notion of adaptation to climate change encompasses diverse meanings and interpretations. Studies of climate adaptation have often focused at the level of the individual, yet adaptive actions may occur at a variety of scales, from actions taken by individuals or households to prepare for and adjust to change, to actions undertaken by national governments to reduce the vulnerability and exposure of their populations, to international agreements to facilitate funding to help societies adapt (Adger, Arnell, and Tompkins 2005). Adaptation has often been framed as a set of technological or policy options for responding to specific risks, thus privileging narrow short-term goals over longer-term sustainability, yet this approach has also expanded to account for multiple sources of risk and stress, in addition to non-climatic factors that shape people's responses to environmental change (Adger et al. 2009; IPCC 2012; Nelson, Adger, and Brown 2007; Nelson 2011). Within this framework, adaptation is usually conceptualized in terms of the core notions of vulnerability, adaptive capacity, and resilience (Gallopín 2006; Taylor 2015).

Working Group II of the IPCC defines *vulnerability* as "[t]he propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC 2014, 5; Adger 2006; Gallopín 2006; Nelson, Adger, and Brown 2007; O'Brien et al. 2004; Smit and Wandel 2006). More simply put, vulnerability is understood to be a function of exposure, sensitivity to harm, and adaptive capacity. This use is adopted from early research on natural hazards and disasters (Oliver-Smith 2004) as well as work on poverty and food insecurity (Watts and Bohle 1993). Both highlight social-structural factors underlying patterns of risk, with the former drawing attention to the role of external environmental shocks or stresses while the latter focused more on internal economic resources or entitlements available to individuals and households. Integrating these approaches, Adger (2006) related vulnerability to resilience,

suggesting they are best viewed as characteristics of social-ecological systems. Seen in this light, *adaptive capacity*, essentially the preconditions for adaptation (Nelson, Adger, and Brown 2007), refers to the ability of people to mobilize resources, including internal system characteristics such as trust, institutions, or social networks, to not only cope in the short term, but adapt in a way that increases resilience (Nelson 2011). Adaptation policy, then, should aim at reducing vulnerability and enhancing adaptive capacity to foster system resilience (Vogel et al. 2007). What is often unclear, however, is the unit or scale of analysis that is implied by the term "system." As Taylor (2015, 65) observes, in different cases it may be "the individual, the household, the community, the social group, a city, an economic sector, a region or the nation" (Miller et al. 2010; Smit and Wandel 2006), though each represents distinct social-ecological relationships and processes.

Sharing this concern with systems thinking, the notion of *resilience* draws attention to the adaptive capacity of the social-ecological system, broadening out from a short-term focus on narrowly defined risks to consider longer-term trajectories and processes of change (Gallopín 2006; Nelson, Adger, and Brown 2007). With an explosion of interest over the past couple decades, resilience thinking adopts concepts from ecosystems ecology for understanding and managing dynamics of disturbance, reorganization, and stabilization in conjoined social-ecological systems, understood as complex adaptive systems (Adger 2000b; Folke 2006; Orr, Lansing, and Dove 2015). Resilience is defined by Nelson (2011, 114) as the "capacity of a system to absorb disturbances and still retain some of the same structure and function, while maintaining options to develop." This perspective asks how specific actions affect wider systems, and when a dynamic system is likely to encounter a threshold beyond which it will either collapse or transition to another state, with a new structure and function. In this

framework, adaptation is a process of managing system resilience, by influencing a system's components and thresholds. Adaptive capacity, then, is the ability of a system to self-organize and respond to feedbacks, including through social learning processes. However, adaptation actions may just as easily undermine system resilience as enhance it. There are often trade-offs in risks and benefits between different spatial and temporal scales, actors, and desired outcomes. For example, certain adaptive actions by farmers may displace their negative consequences onto other locations or into the future, increasing the vulnerability or reducing the capacity of others to adapt. Some actions may also challenge resilience through adjustments to a limited range of risks that remain inflexible and create path-dependencies, such as with high-cost technological solutions that reduce response diversity, locking systems into narrow trajectories of change. A resilience perspective highlights that these actions may actually be maladaptive in the long run (Eriksen et al. 2021; Magnan et al. 2016; Nelson 2011).

Resilience itself may be undesirable if it refers to the maintenance of structures and functions that reproduce conditions of vulnerability or inhibit flexibility in adaptation options (Eriksen et al. 2021; Nelson and Finan 2009). In stretching the system metaphor from ecosystems to human social units (Folke 2006), resilience thinking has been open to accusations of functionalism, in which human activities are conceptualized as naturally tending toward homeostasis conditions in order to maintain systemic parameters (Taylor 2015). Still, resilience theorists have been quick to point out that resilience does not necessarily imply a normative good. It describes characteristics of dynamic systems in relation to change processes, in which there may be multiple equilibrium states and constant potential for transformation (Folke 2006; Miller et al. 2010). The desirability of a particular system or system state must be clearly defined, rather than taken for granted (Nelson 2011; Nelson, Adger, and Brown 2007). Yet these

are political questions that ultimately require an analysis of power, which in much of the resilience literature remains significantly underdeveloped.

A related set of critiques addresses precisely the unstated normative assumptions, value judgments, and political implications present in much work on resilience (Cote and Nightingale 2012; Nightingale 2015; Taylor 2015). To identify the social-ecological system under study, analysts must decide where to draw the boundaries of the system and which elements to include as internal system dynamics or to view as external shocks or stimuli. In so doing, social and political dynamics that cannot be easily modeled as part of functionally coherent systems, such as questions of power, conflict, and competing interests, are typically relegated to the outside as context or externalities (Jensen and Morita 2020). However, as Taylor (2015, 78) argues, "To maintain the idea of a systemic dynamic, it is, therefore, necessary to externalise a series of socio-ecological relations"—such as capitalist market relations, gendered divisions of labor, or relations of domination and resistance in resource management practices— "that are fundamental to the dynamics of the lived environment." In making their case for a more "situated" resilience approach, Cote and Nightingale (2012) urge researchers to engage more deeply with questions of power and knowledge, including around processes of social and political change, asking the critical question, "resilience of what and for whom" (2012: 475). Taylor adds to this by asking, "what is being sustained, for whom, and on what temporal horizons?" (2015: 78). After all, "one person's resilience may well be another's subjugation, and what is termed resilience might be part of the problem, not its solution" (2015: 79).

The resilience concept has by now become nearly ubiquitous in the climate, environmental change, and sustainability science communities, and widely embraced by the policy and development communities as part of adaptation discourse (Bahadur, Ibrahim, and

Tanner 2013; McEvoy, Fünfgeld, and Bosomworth 2013; Nightingale 2015; Tanner et al. 2015; Taylor 2015). From the literature, various versions of "adaptive management" or "adaptive governance" have emerged as the widely prescribed approach for managing resilience in social-ecological systems under stress or navigating the transition to a new stable state (Folke et al. 2005; Nelson, Adger, and Brown 2007; Pahl-Wostl 2009; Tompkins and Adger 2004). These perspectives emphasize the importance of institutions for sharing knowledge across organizational levels and social networks to enable social learning, flexibility, and coordinated responses to change. Yet critical scholars maintain that this is about more than just institutions—"getting the rules right"—but that the cultural and political context of knowledge production and exchange is itself crucial (Cote and Nightingale 2012, 480). Within the adaptation and resilience literature, some do take a more critical perspective, however, explicitly addressing questions of power and the multiple, relational dimensions of vulnerability, often with a focus on strengthening the adaptive capacity of the poor and marginal, and addressing structural causes of vulnerability (Eriksen and O'Brien 2007; O'Brien et al. 2004; Pelling 2011; Taylor 2015). These authors argue that truly "sustainable adaptation" (Eriksen et al. 2011) means putting social justice as well as environmental integrity front and center and may require deliberate transformation of existing political economic structures and development pathways (Eriksen (Eriksen, Nightingale, and Eakin 2015; O'Brien 2012; O'Brien et al. 2015; Pelling 2011; Pelling, O'Brien, and Matyas 2015; Warner and Kuzdas 2017).

Ascendancy of the climate adaptation paradigm

With widespread recognition that the Earth is on an increasingly unavoidable path of warming, climate change adaptation has become a new paradigm in international development and policymaking, especially in the Global South. In part, this is because the negative impacts of

climate change are likely to be experienced most severely by developing countries and the world's poor, who contributed least to causing the problem (Adger, Paavola, and Huq 2006; Dzebo and Stripple 2015; Mertz et al. 2009; Taylor 2015). Poor and marginal people in those parts of the world may live in particularly vulnerable areas, possess fewer economic resources to adapt, and often rely directly on natural resources for their livelihoods (Adger et al. 2003; Lemos et al. 2007; Thomas and Twyman 2005). Adaptation, then, is an issue of environmental and climate justice (Adger 2001; Adger, Paavola, and Huq 2006; Fisher 2014; Okereke 2010). At the same time, climate change threatens the very project of economic development and the achievements that have been made. Thus, national governments, development organizations, and international institutions have joined forces in calling for the integration of adaptation with development goals (Mertz et al. 2009; Scott and Picot 2014; Weisser et al. 2013; World Bank 2010, 2013), a move that was formalized in 2006 at the United Nations Climate Change Conference in Nairobi, Kenya (Taylor 2015). This takes the shape of prioritizing development for adaptation success and mainstreaming adaptation into existing development policies and programs, creating a mutually reinforcing logic whereby the adaptation paradigm is used as both justification and guidance for development interventions (Ireland 2012; Paprocki 2019; Scoville-Simonds, Jamali, and Hufty 2020; Taylor 2015; Weisser et al. 2013).[6]

Given its role in shaping development priorities, the distribution of public and private resources, and bolstering claims to epistemic authority, the adaptation paradigm is inherently political, yet it is presented as a necessity that stands apart from politics (Scoville-Simonds, Jamali, and Hufty 2020; Taylor 2015). Partially this is because of the seeming naturalness of the notion of "adaptation," which resonates with deeply held ideas about biological evolution, in

[6] Paprocki (2018, 957) calls this paradigm the "adaptation regime": "a socially and historically specific configuration of power that governs the landscape of possible intervention in the face of climate change."

which species adapt to a changing environment over evolutionary time. Reworked through the framework of cultural ecology or ecological anthropology, societal adaptation to environmental challenges is seen as part of a natural evolutionary process. Building adaptive capacity to lessen vulnerability and promote resilience thus becomes a similarly natural response (Taylor 2015). Moreover, taken up in the context of the contemporary climate crisis, the rhetoric of adaptation is suffused with an apocalyptic urgency that helps justify prescribed risk management strategies as necessary for societal—if not species—survival (Scoville-Simonds, Jamali, and Hufty 2020; Stripple and Bulkeley 2014; Swyngedouw 2010). Climate change adaptation might be best understood as a discourse, in the Foucauldian sense: a "set of relations between forms of knowledge, structures of power, institutional practices and prevailing technologies that delineate ways of thinking about and acting upon processes of social and ecological change" (Taylor 2015, 52; see also Foucault 1980).[7] In this, the discourse of adaptation legitimizes particular forms of knowledge, governance, and authority germane to a technocratic politics of intervention (Scoville-Simonds, Jamali, and Hufty 2020).

The roots of this can be seen in the ways that representations of climate change itself often invite a notably technocratic approach to addressing it. Demeritt (2001) describes how the dominant scientific framing of climate change as a global-scale, environmental problem has developed hand-in-glove with the socio-technical apparatus for measuring and representing it and lent itself to a global technocratic politics. That is, it has been seen as resulting from the physical properties of greenhouse gases in the atmosphere, rather than, for example, political-economic structures or societal values. The assumption has been that the best way to understand climate change, then, is through mathematical modeling, and rational policy should be based on

[7] As such, the concept of adaptation mirrors the role of development in Escobar's (1995) telling, while vulnerability approximates that of poverty.

the projections of general circulation models (GCMs) at regional scales. In this view, climate change is a physical, global issue, knowable scientifically by experts and established by consensus, and other considerations (cultural, moral, political) have no bearing on the nature of the problem itself. As Taylor (2015) argues, this understanding is also rooted in the Cartesian separation between nature and culture, which purifies the two into distinct ontological realms, with climate "out there" in the realm of nature contrasted with the social world "in here" (see also Latour 1993). However, not only are understandings of climate and climate change culturally variable (Barnes and Dove 2015; Hulme 2008; Hulme et al. 2009), but the experience of climate itself is mediated by local social and material relations (Barnes et al. 2013). The "externalization" of climate obscures the interweaving of biophysical and social forces in the co-production of lived environments (Latour 1993; Smith 2008; Taylor 2015). As Mike Hulme writes, "the idea of climate is performative; how one comes to know climate, and the account one gives of its changes, is never politically neutral nor without effect on the social ordering of the world" (Hulme 2020, 274). By abstracting climate change from longer trajectories of social-ecological change in which lived environments have been co-produced in highly uneven ways across multiple scales, the discourse of adaptation marginalizes questions of power and creates openings for technocratic colonization (Scoville-Simonds, Jamali, and Hufty 2020; Smith 2008; Taylor 2015).

Through producing, circulating, and applying knowledge about climate change impacts and suitable adaptation strategies, international development organizations such as the World Bank and others play an important role in this process. Reproducing the kinds of analyses of climate and society described above, such organizations seek "a clearly delineated 'object of development' in which cause-and-effect can be easily demarcated and interventions with

predictable results planned" (Taylor 2015, 66). Moreover, they tend to overlook their own involvement in the places and problems they analyze, instead presenting themselves as an objective authority standing outside the objects described. But they produce knowledge that justifies the very interventions in which that knowledge is to be applied (Ferguson 1994; Mitchell 2002). Such circular logic masks the power relations between and across the sites where knowledge is produced, legitimated, and applied. It is in this context that climate change adaptation emerges, as Swyngedouw argues, "as a socio-ecological fix to make sure nothing really changes" (2010, 222).

But is it enough to recognize that climate change adaptation is a discourse that masks and enables particular configurations of power? What then? What happens when that power is deployed via discourses of climate adaptation? These are questions of governance. If the discourse of adaptation renders climate change governable in particular places, how does that practice of governance proceed? What implications does it have for development pathways, vulnerability, and resilience?

Climate change adaptation governance

Climate change adaptation governance is about guiding, directing, or facilitating successful adaptation to the effects of climate change. As a form of managing human-environment relations, it can be understood as a subset of environmental governance, which has been defined as "the set of regulatory processes, mechanisms, and organizations through which political actors influence environmental actions and outcomes," by targeting "incentives, knowledge, institutions, decision-making, and behavior" (Lemos and Agrawal 2006, 298). While the early focus of climate governance was on mitigation (Andonova, Betsill, and Bulkeley 2009; Bäckstrand 2008; Bulkeley and Newell 2015; Stripple and Bulkeley 2014), in recent years

increasing attention has been paid to efforts at governing adaptation (Amundsen (Amundsen, Berglund, and Westskogh 2010; Dewulf, Meijerink, and Runhaar 2015; Persson and Dzebo 2019; Forino, von Meding, and Brewer 2015; Huitema et al. 2016; Termeer et al. 2011; Nieuwaal et al. 2009). As with environmental governance more broadly, which has seen a shift from state-led public administration to more decentralized, globalized, and multi-actor arrangements, these efforts often involve a range of state and nonstate actors operating across scales, including those that bridge state-market-community divides (Lemos and Agrawal 2006; Scoones 2016). As noted above, the climate adaptation literature privileges social learning, flexibility, and coordination across scales to navigate processes of socio-ecological change in ways that promote resilience or sustainability transformations (Folke et al. 2005; Nelson, Adger, and Brown 2007; Pahl-Wostl 2009; Scoones 2016). For such an "adaptive governance" approach to be effective, institutions must be responsive to local needs and accountable to local populations; knowledge must be transmitted upwards as well as down in the administrative apparatus (Agrawal and Ribot 1999; Ribot 2004; Tacconi 2007).[8] Many scholars are increasingly concerned with questions of knowledge and power in the governance of climate change mitigation and adaptation (Bulkeley and Newell 2015; Eriksen, Nightingale, and Eakin 2015; Mahony and Hulme 2012; Nijbroek 2014; Stripple and Bulkeley 2014; Vink, Dewulf, and Termeer 2013). In an assessment of the literature, Huitema et al. (2016) highlight several key choices in climate adaptation governance: problem definitions and framings, including in relation to normative principles; the jurisdictional level, scale, and timing of adaptation actions; and which governance mechanisms, instruments, or processes are involved.

[8] This perspective, however, tends to assume away potentially significant hurdles, including resistance by entrenched interests, lack of local democratic institutions, or prevailing incentives that encourage environmental degradation.

There are two main approaches to the governance of climate change adaptation discernible in the literature that are of relevance here. The first is one that focuses primarily on rural livelihoods in the Global South, addressing vulnerability and adaptive capacity by way of sustainable rural development and processes of agrarian change (Lemos et al. 2007; Newell, Taylor, and Touni 2018; Tanner et al. 2015; Taylor 2015). Long a target of international development initiatives, rural poverty and sustainable livelihoods (Chambers 1983; Scoones 1998, 2015) are here seen as primary factors in producing vulnerability and resilience, respectively. Livelihoods approaches are wide-ranging, having expanded in scope over the years from analyzing the economic assets or "capitals" available to people (Bebbington 1999; Scoones 1998), to a focus on the institutions mediating resource access and management (Ostrom 1990; Leach, Mearns, and Scoones 1999), to incorporating attention to subjective issues of meaning, identity, and agency in livelihoods analysis (Carr 2013; Scoones 2015). The equation of climate adaptation with the adoption of sustainable or "climate-resilient" livelihood techniques is a powerful theme in development policy, as reflected in the World Bank's recent Integrated Climate Resilience and Sustainable Livelihoods Project in the Mekong Delta, launched in 2016.[9] Yet the implementation of sustainable livelihoods projects is often pursued in an instrumental fashion, divorced from social context, the sole mediating condition recognized being that of "market access" or "integration," betraying the neoliberal agenda of many international development organizations (Carr 2013; Mikulewicz 2020; Taylor 2015). This overlooks the fact that markets themselves also reflect structural inequalities (Mitchell 2002), often reinforcing patterns of vulnerability and social exclusion (Taylor 2004; Taylor 2015). By contrast, a number of recent critical approaches to the study of livelihoods highlight the ways in which livelihoods

[9] https://projects.worldbank.org/en/projects-operations/project-detail/P153544?lang=en, accessed November 2, 2021.

themselves are shot through with power and can be seen as sites of governmentality (Carr 2013; Scoones 2015), where conduct is shaped by power relations at multiple scales, from international policy to intra-household dynamics. These studies urge us to consider questions of political economy, social difference, and politics, including the politics of knowledge, in explaining how people adapt to environmental change, and they remind us that climate adaptation is as much about the struggles of people to make a living as it is about adapting to biophysical changes (Scoones 2015; Taylor 2015).

Rather than conceptualizing the governance of climate change adaptation as primarily about managing risk in resource use at the household or local level, the second approach takes a wider lens to consider responsiveness and adaptive capacity at the level of government institutions, policies, and outside interventions. While this body of scholarship is relatively new, it has cohered around the notion that adaptation is a multi-actor, multi-level, and multi-scalar governance problem (Adger, Arnell, and Tompkins 2005; Amundsen, Berglund, and Westskogh 2010; Dewulf, Meijerink, and Runhaar 2015; Stott and Huq 2014), requiring the flexibility of governance institutions themselves. After all, in addition to individual livelihood changes, adaptation may involve such things as infrastructure development, adjustments in land-use planning, or more efficient water supply (Adger, Arnell, and Tompkins 2005; Dewulf, Meijerink, and Runhaar 2015). Many climate adaptation regimes can also be characterized as forms of networked governance, as they comprise various state and non-state actors interacting in non-strictly hierarchical relationships (Dzebo and Stripple 2015; Morrison et al. 2017). One stream of research in this vein, building on work by Vincent and Elinor Ostrom, advocates forms of polycentric governance, in which multiple interacting yet relatively autonomous governing authorities coexist, as ideal for promoting flexibility, responsiveness, learning, and cooperation

for climate adaptation (Morrison et al. 2017). Such research is often both descriptive and prescriptive, as it seeks to identify particularly effective or equitable governance arrangements.

Highlighting the multinational dimension of many networked climate adaptation governance arrangements, and following work on the transnational governance of climate change mitigation (e.g., Andonova, Betsill, and Bulkeley 2009; Bäckstrand 2008), Dzebo and Stripple (2015) describe the emergence of "transnational adaptation governance." In this form of governance, they argue, transnational public-private initiatives are emerging not as an alternative to the role of the state, but alongside it, in the "shadow of hierarchy" (2015: 424). Moreover, this trend is characterized by more "soft" forms of governance, such as agenda-setting, information sharing, and capacity building, rather than "harder" forms that are legally enforced. The next section elaborates the conceptual framework employed in this dissertation, which takes aim at such "soft" governance processes as knowledge sharing and translation, of particular relevance for the transnational and multi-level governance of climate change adaptation.

Towards a politics of translation

This dissertation develops a conceptual framework for analyzing the politics of translation at work in transnational, multilevel governance endeavors. Critical thinkers since at least Benjamin (1996[1921]) and Spivak (1993, 2001) have emphasized the kind of interpretive agency or power expressed in translating words, ideas, and knowledge from one linguistic or cultural context to another. Surveying the broad array of efforts to theorize translational politics in anthropology and related disciplines, Gal (2015, 226) has described "translation" as referring to a "whole family of semiotic practices" that "purport to change the form, the social place, or the meaning of a text, object, person, or practice while simultaneously seeming to keep

something about it the same." Political ecologists, for their part, have taken this analytical premise and applied it to practices of knowledge-making across scales, addressing the political implications of translating local phenomena into supposedly "global" knowledge and vice versa, and highlighting the many incommensurabilities often involved (Brosius 2006; Choy 2011; Hanks and Severi 2014; Hulme 2010; Tsing 2005; West 2005; Wright 2002). For these reasons, translation has often been described as essentially equivalence with betrayal (Baiocchi, Graizbord, and Rodríguez-Muñiz 2013; Choy 2011; Gal 2015; Hanks and Severi 2014). As the Italian adage goes, "Traduttore, traditore!" ("Translator, traitor!").

Here, I draw from actor-network theory in science and technology studies (STS) (Callon 1986; Latour 2005; Law 2007) as well as related approaches in the anthropology of development (e.g., Escobar 1995; Lewis and Mosse 2006; Mitchell 2002; Tsing 2005) to shed light on the discursive and material politics at work as knowledge is transmitted from one context, scale, or frame of reference to the next. Of course, knowledge, ideas, and discourses do not themselves literally travel from place to place, rather different actors "take them up as signs by interpreting them… and reframing them" (Gal 2015, 231; see also Latour 2005). This usage draws attention to the various techniques and strategies by which actors reinterpret and transmit knowledge from one context to another, displacing meaning and action in the process (Ernstson 2013; Latour 2005; Weisser et al. 2013). They do this through the progressive enrollment of participants into a network, allowing themselves to become spokespersons for others' knowledge and interests (Baiocchi, Graizbord, and Rodríguez-Muñiz 2013; Callon 1986; Law 1992). This perspective treats knowledge, power, and influence as network effects (Law 1992), made more durable by extending and stabilizing relations among people and things. In tracing this movement, ANT treats all participating "actants" (human and nonhuman) as potential mediators of action, rather

than just intermediaries conveying unadulterated information. It thus highlights the networked agency of such heterogeneous entities as humans, natural events, texts, scientific paradigms, and technological artifacts, and the ways these come together in contingent associations for the stabilization of knowledge and performance of power (Latour 2005; cf. Appadurai 2015). In addition to this material-semiotic approach, or "flat ontology" (Law 2007), ANT provides a rich vocabulary for unpacking processes of knowledge production and translation—concepts such as "obligatory passage point" (OPP), "interessement" (Callon 1986), and "boundary object" (Star and Griesemer 1989) that will be discussed in later chapters.

Translation of knowledge, in this understanding, is not simply a linear process of transmission-uptake (Jasanoff 2004b; McFarlane 2006), but is in fact always political (Brosius 2006), involving shifting relations and manipulations of power with practical, socio-material effects (Law 1992). This perspective demonstrates that scientific knowledge is always rooted in particular interactional settings and communities of practice (McFarlane 2006), making it difficult to completely abstract from social or material context for successful re-application elsewhere. It also responds to relational understandings of expertise that view "experts" as those who "mediate between the production of knowledge and its application" (Grundmann 2016, 27). In this sense, translation addresses the relationship between the cognitive dimension of knowledge and the practical side of its application (Grundmann 2016; Jasanoff 2004b)—linking processes of planning and implementation, imagination and action, knowledge and world-making, epistemology and ontology (Grundmann 2016; Law 2004; Lewis and Mosse 2006; West 2019); in other words, the ways that knowledge co-produces the world (Jasanoff 2004b).

Translation, in this use, is closely related to several other concepts or perspectives with which it is paired in later chapters. In Chapter 3, on the translation of Dutch delta planning

expertise to Vietnam, translation is linked to the STS notion of *co-production*. According to Jasanoff (Jasanoff 2004a, 2), co-production is "shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it."[10] Just as scientific knowledge and its physical embodiment in technologies are products of society, so too do they feedback into society itself, shaping it in unforeseen ways (Law 2004). Moving beyond either social or natural determinisms, the idiom of co-production helps us to think about the mutually influential relations between nature and society, science and politics, with particular explanatory power for examining processes of socio-ecological change. By emphasizing the specific historical and cultural contexts in which knowledge about the world is produced, co-production "offers new ways of thinking about power, highlighting the often-invisible role of knowledges, expertise, technical practices and material objects in shaping, sustaining, subverting or transforming relations of authority" (Jasanoff 2004a, 4). Understanding science and technology as "indispensable to the expression and exercise of power" (2004a, 14), state power in particular, this perspective illustrates the ways in which science and technology themselves operate as political agents, incorporated into practices of state-making and governance, as well as "in reverse, how practices of governance influence the making and use of knowledge" (2004a, 3). It stresses that the authority of certain kinds of knowledge is tied to the legitimacy of "specific actors, instruments and courses of action" (2004a, 13). A co-productionist framing thus enables us to see how specific forms of knowledge become authoritative—in other words, how expertise, or epistemic authority, is

[10] This should be distinguished from instrumental uses of co-production (Goldman, Turner, and Daly 2018), in which the term comes to stand for practices of collaborative knowledge production or "integration" across disciplinary and institutional divides (Klenk and Meehan 2015). Such interpretations have been popular within climate adaptation research and practice in recent years, yet by abstracting knowledge-making from processes of world-making and the social, historical, and material contexts of which it is always part, they fail to examine the normative and political dimensions of knowledge production and translation (Goldman, Turner, and Daly 2018; Nightingale et al. 2020).

generated. Importantly, expertise is "not simply given by scientific evidence or through the simple function of sound science;" rather, it "has to come into being, maintain stability and undergo challenge" (Beck and Forsyth 2015, 114). In Chapter 3, I use co-production to explore connections between the development of Dutch water management expertise, technologies, landscape, political culture, and geopolitics.

Chapter 4 considers the role of intermediary actors as both translators and knowledge *brokers*. Attention to intermediary actors as brokers and translators has been the focus of much work in the actor-oriented tradition in development studies, including that directly inspired by actor-network theory (Heeks 2013; Keeley and Scoones 2003; Lewis and Mosse 2006; Lie 2008; Long 2015; Long and Long 1992; Mosse 2005, 2008). The actor-oriented tradition attempts to counteract the tendency in some critical development studies literature to portray development discourses as all-powerful oppressive forces, and instead emphasize the micropolitics of individual agency, specific practices, and personal interactions (Lie 2008). "Brokers" refers to actors that operate at the interface between two or more social worlds, governance levels, or knowledge systems, helping to "reveal their importance in negotiating roles, relationships, and representations" (Mosse and Lewis 2006, 10). My focus on intermediary actors here is also influenced by social network studies, which note the important bridging function of certain well-connected actors that enables them to transfer knowledge across otherwise disconnected networks while shaping that which is transmitted in the process (Bodin, Crona, and Ernstson 2006; Burt 2004; Ernstson et al. 2010; Radil and Walther 2018). Such actors are argued to be crucial in facilitating the social learning, cooperation, and cross-scalar coordination necessary for the adaptive governance of climate change adaptation and transformations to sustainability

(Bodin 2017; Bodin, García, and Robins 2020; Eguavoen et al. 2013; Olsson et al. 2006; Pahl-Wostl 2009; Vogel et al. 2007; Westley et al. 2011).

Chapter 5, and to a lesser extent Chapter 4, includes an explicit focus on *materiality* in its treatment of the ways translation brings together shifting associations of humans and nonhumans as they coproduce socio-environmental change. ANT and related material-semiotic approaches understand interactions between humans and nonhumans "through the prism of immanence and affect" (Giminiani and Haines 2019, 4-5; see also Bennett 2010), such that the enactment of material transformations in the environment is the result of mutually determined relations between humans and nonhumans (see also Bakker and Bridge 2006; West 2019). This work has contributed to broader scholarship in the "new materialisms" (Coole and Frost 2010), which seeks to draw attention to the causal and affective agency of material forms, whether organic or not, in human experience and world-making. Thus, Chapter 5 considers farmer livelihoods as a kind of "situated practice" (Lippert, Krause, and Hartmann 2015). As Lippert and colleagues (2015) remind us, such everyday practices of environmental management are situated in material and symbolic relations: they are performed through specific laboring practices embedded in material environments in which both human and nonhuman agency present possibilities and limitations to action; they exist in time and space and are mediated by others' activities, by work routines, material infrastructures, the growth patterns of plants and movement of animals. These symbolic and material relations are part of the networks farmers themselves translate as they interpret their environment and make livelihood decisions. Chapter 5 also draws on emerging literature strongly influenced by the "new materialisms" that highlights the dynamic materiality of delta environments. This work emphasizes the complex and volatile assemblages of infrastructure, hydrology, ecology, and overlapping temporal rhythms that shape human life in

the shifting, amphibious terrain of river deltas (Krause 2017; Krause and Harris 2021; Lahiri-Dutt 2014; Morita 2016).

Research Methodology

Overview, access, and timeline

This research takes a multi-sited, multi-scalar approach (Corson, Campbell, and MacDonald 2014; Marcus 1995; O'Neill et al. 2013) to examining the politics of translation at work in the governance of climate change adaptation in Vietnam. As environmental governance challenges such as climate adaptation are increasingly characterized by complex, multi-scalar processes and cross-scale linkages, O'Neill et al. (2013) argue that studying such problems requires attention to the operation of governance at multiple levels and the relations between them, including with actors that straddle "traditional" levels of governance. Heeding this call, the research focuses on three broad actor-groups representing different levels of governance, and the cross-scalar knowledge relations between them. These I have labeled planners and policymakers, intermediary actors and organizations, and farmers. Research sites, also indirectly correlating with different levels of governance, included the Netherlands, Ho Chi Minh City (HCMC), Hanoi, and Can Tho cities, Vietnam, and Trà Vinh province in the Mekong Delta (see Fig 1.1). Planners and policymakers included in this research were encountered in the Netherlands, Ho Chi Minh City, and Hanoi, and included not just government officials but also international researchers, advisors, and consultants involved in Mekong Delta climate adaptation planning processes or in promoting the MDP in Vietnam. Intermediary actors and organizations included those that bridge between planners and policymakers at the national or transnational level on the one hand, and farmers at the local level, on the other, and were located in HCMC, Can Tho, and

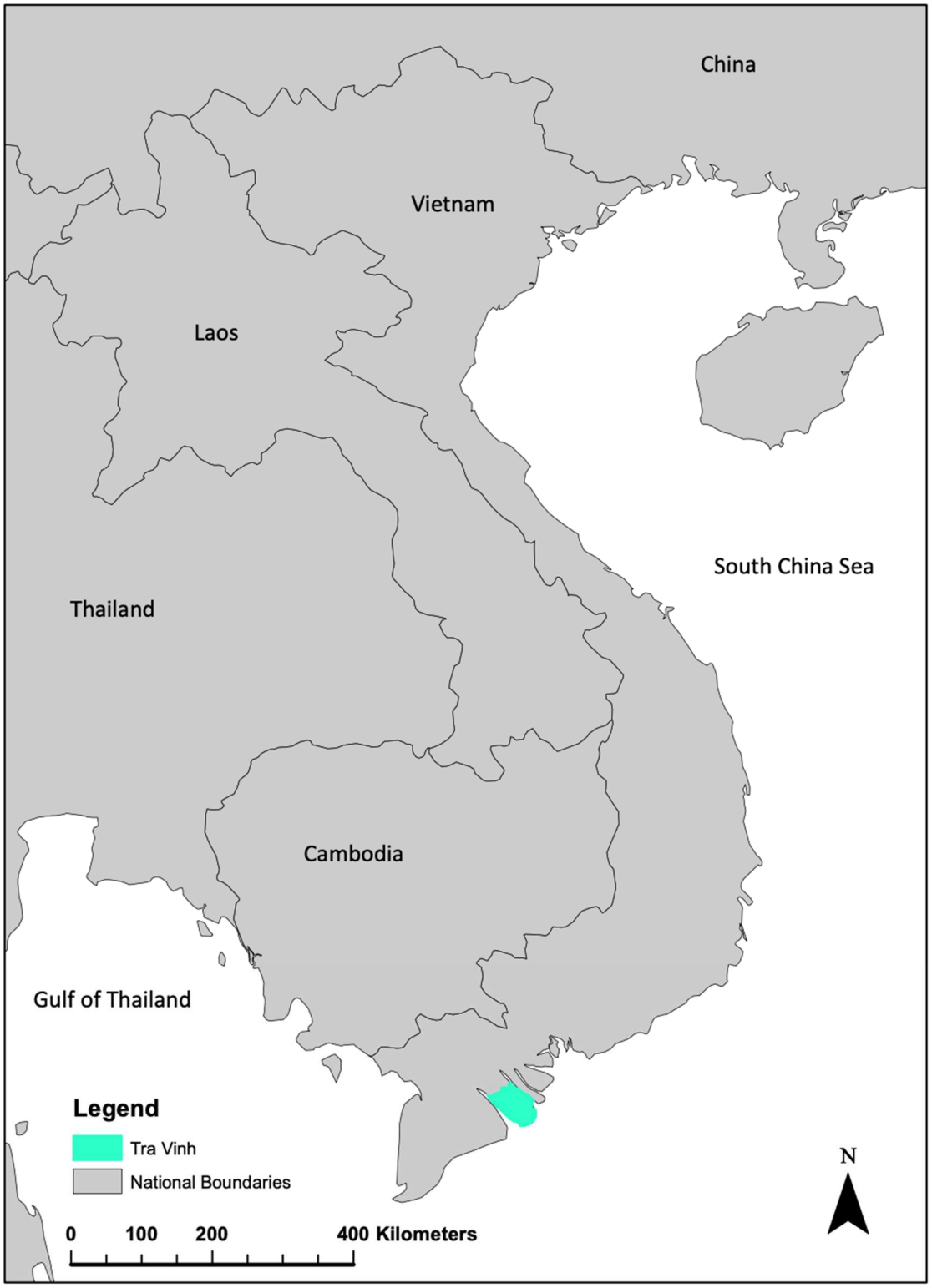

Figure 1.1 Location of Trà Vinh province in Vietnam (courtesy of Jon Hallemeier).

Trà Vinh province. Intermediary actors represent the broadest category, including provincial officials, regional experts, and local researchers and practitioners. Farmers, a more self-explanatory category, were reached at the commune level and on their farms, though I have also included in this category local cadres such as hamlet leaders and Farmer's Union representatives at that level. The research was carried out between September 2014 and May 2018, with research activities concentrated from June 2016 to January 2018 (see Table 1.1).

During an exploratory pre-dissertation trip to Vietnam in December 2013 I was put in touch with the Center of Water Management and Climate Change (WACC) of Vietnam National University – Ho Chi Minh City (VNU-HCMC), which later agreed to be my institutional host for fieldwork in Vietnam. It was also during that trip, in conversations with researchers at the University of Social Sciences and Humanities of VNU-HCMC, that I first heard about the then just-published Mekong Delta Plan. In September 2014, I attended the international conference "Deltas in Times of Climate Change II" in Rotterdam, the Netherlands, where I observed the marketing and promotion of Dutch delta expertise on full display, and serendipitously ran into researchers from WACC. WACC has close contacts with Dutch partners and collaborators, having been originally established with Dutch funding as part of the same bilateral agreement that produced the Mekong Delta Plan. Thus, the Center itself is closely affiliated with the MDP project and might be said to have been invested in its continued relevance (though that did not prevent members from speaking critically of it). Returning to the Netherlands for a month of fieldwork from August – September 2016, through the WACC network I was able to gain access to many people that were either directly or indirectly involved in the creation and promotion of the MDP.

Table 1.1 Research timeline with primary field site location and description of research activities.

Research Timeline		
Dates	**Primary location**	**Activities**
Sept 2014	The Netherlands	Attend "Deltas in Times of Climate Change II" conference in the Netherlands
Summer 2015	HCMC, Tra Vinh	Preliminary dissertation research and internship with Center of Water Management and Climate Change (WACC) in Vietnam
June – Aug 2016	HCMC	Establish research contacts; attend Mekong Delta Forum in HCMC; interviews with planners and policymakers, intermediary actors and organizations (including experts/researchers/practitioners)
Aug – Sept 2016	The Netherlands	Interviews with planners and policymakers, including experts/researchers/practitioners
Sept – Oct 2016	HCMC, Hanoi	Interviews with planners and policymakers, intermediary actors and organizations; attend international climate mitigation and adaptation conference in Hanoi
Oct 2016 – May 2017	Tra Vinh	Establish research contacts, await research permission; participant observation at "Strategic Delta Planning" workshop in Tra Vinh and HCMC; hire local assistant; participant observation with local researchers and extension agents; attend agriculture conference in Can Tho; interviews with intermediary actors and organizations at regional, provincial, and district officials; gather commune-level data; prepare and carry out livelihood survey
June 2017	(Brief trip back to US)	(Research break)
July 2017 – Dec 2017	Tra Vinh	Interviews with intermediary actors and organizations at regional, provincial, and district levels (HCMC, Can Tho, and Tra Vinh); attend international climate adaptation conference in Hanoi; participant observation with provincial hydraulic engineers; interviews + participant observation with farmers; attend Mekong Delta "climate resilience and sustainable development" conference in Can Tho; process survey data; transcribe interviews; archival research in Hanoi
Jan 2018 – May 2018	HCMC	Perform desktop review for WACC in HCMC; archival research in Hanoi; interviews with international consultants/practitioners in HCMC; transcribe interviews; follow-up visits to Tra Vinh, Can Tho

Through WACC I also connected with a small research center affiliated with Trà Vinh University (TVU), the Center of Scientific Research and Production Services (CSP).[11] In 2015, during preliminary dissertation research and a summer internship at WACC, I had helped to develop and pretest a farmer livelihood survey in Trà Vinh as part of a collaboration between the two research centers and it was then that I met the director of CSP. Since then, I had been in touch with both institutes about my project, and both expressed a willingness to support in acquiring the necessary government permissions to carry out my research. For permissions at the provincial level, I was told to wait until I arrived in Trà Vinh, in order to properly submit all required documents. Following a couple months of research in Ho Chi Minh City, a month in the Netherlands, and a brief research trip to Hanoi, in October 2016 I moved to Trà Vinh city, the provincial capital, and rented a small house on the edge of town.

Trà Vinh city was to be my home base where I would conduct interviews with provincial-level actors, and from where I would make excursions to various rural districts and communes, as well as occasional trips to the delta's largest city, Cần Thơ. From the CSP office, I prepared my permission requests, elaborated my research plan, and hired and trained a local university student as my research assistant.[12] I also spent time getting to know the people in my neighborhood, a predominantly Khmer community of small farmers and tradespeople in a semi-

[11] *Trung tâm Nghiên cứu Khoa học và Sản xuất, Dịch vụ*

[12] Over the course of fieldwork, I had two different primary field assistants. At first, I hired a young Khmer woman from the province who spoke English—so that she could both assist with me with Vietnamese if necessary and translate from Khmer for farmers who were more comfortable in that language. In addition to being an occasional interpreter, her affiliation with the university helped legitimate my presence as a foreigner conducting independent research in the province, and she assisted with contacting district and commune offices and helped me organize the commune-level data we collected. Not long after research permission was granted, however, she got married and moved in with her in-laws, who were uncomfortable with her working for a foreign male researcher. I then found a new assistant, another Khmer student from the province, this time a gregarious, sharp, and compassionate young man. He remained with me for the remainder of my fieldwork in Trà Vinh, accompanying me to most interviews with farmers and local cadres.

rural area on the outskirts of town. Over the months I lived there, I participated in holiday festivities at local pagodas, marriage and death anniversary celebrations, birthday parties, and more. The neighborhood kids who adopted me as "uncle" occasionally invited me to go swimming and fishing in the local canals, or to catch field mice from recently harvested fields for a fried afternoon treat, and I taught them some English in return. Much of the first few months I spent revising my research plan and permission requests for the local government, or awaiting a response, a process which took four nearly months before permission was finally granted.

While the waiting was not altogether unforeseen, the bureaucratic hurdles were more onerous, more confusing, and more time consuming that I had expected, preventing me from promptly beginning formal data collection activities and forcing me to adjust my research goals. Others have documented the bureaucratic obstacles foreign researchers often face when trying to conduct long-term immersive studies in Vietnam, particularly in rural or marginal areas or among ethnic minority groups (Luong 2006; MacLean 2013; Reis 2012; Scott, Miller, and Lloyd 2006). I had also heard warnings from colleagues who had previously faced similar delays, but I was still not prepared for how hard it would be to carry out my intended project on the timeline envisioned. First, one must prepare a detailed research plan in Vietnamese, including precise dates, locations, and content of planned research activities, have it confirmed by one's host institute, and then send it to the Provincial People's Committee (PPC) for review, and hope for return of the *công văn* (official dispatch) with an official red stamp of approval in reasonable time (Ehlert 2012; Scott, Miller, and Lloyd 2006). When you finally receive an approved *công văn,* you have official copies made and send them to the relevant entities (or offices) listed in the plan, whom you can then contact directly to request a meeting on the approved date. This must

be done at each step along the way; any misstep means rejection and starting over. Any ambiguities in the plan just provoke further delays, with the plan having to be readjusted and resubmitted, without any clear guidance of what is needed. In the end, I had to submit multiple updated requests with alterations to my research plan before permission was finally granted four months later. But once a plan is officially approved, then there may be more wiggle room, as discretion about how loosely to interpret specific dates or topics listed is largely up to the person receiving you. Like Hull (2012)and MacLean (2013), my research was "mediated to a great extent by paper" (Hull 2012, 27).

During these months, I made connections through the CSP network, getting to know other researchers and extension officers, and deepened my knowledge of the social and ecological complexity of the province. I spent much of this time "deep hanging out" (Geertz 1998), having informal conversations over coffee, meals, or drinks. Colleagues invited me to join them on farm visits to witness the implementation of various agricultural models and attend farmer training workshops. Many became key informants and gatekeepers, opening doors to facilitate research access and providing important information or unguarded perspectives that I would not have had access to otherwise. In some instances, these personal relationships were able to supersede more formal, bureaucratic procedures. It was at this time that my focus shifted more towards institutional ethnography of the local agricultural research and development culture in the province. I also made short trips to Cần Thơ, Ho Chi Minh City, and Hanoi to attend agricultural development and climate change conferences and conduct interviews with various experts and practitioners. Below, I describe the specific methods used and data collected. But first, a brief reflection on my positionality.

Positionality and mobility

While my status as a foreign researcher in Vietnam constrained me in some ways—delaying the start of research activities and making it more difficult to engage in long-term immersion in rural communities, for example—this status, combined with my gender and citizenship, also allowed me greater autonomy and both social and spatial mobility than many of those around me. First, whether due to availability of research funds, lack of family obligations, or lack of personal safety concerns, I could largely determine my own schedule and whereabouts. Like most people in Vietnam, I generally got around by motorbike. This allowed me to come and go frequently between my home in Trà Vinh town, and, on the one hand, various communes throughout the province, and on the other, Cần Thơ or Ho Chi Minh City, or even further—Hanoi—a level of mobility that was especially contrasted with my working-class Khmer neighbors. This mobility became a distinguishing feature of my research process: as I attempted to trace the movement of knowledge between sites and levels of governance, I found myself traveling frequently back and forth across these geographical and scalar positions.

Second, I was often invited to informal feasting and drinking sessions (*nhậu*), whether with farmers, scientists, or local officials. These sessions were helpful for establishing rapport and exchanging information in an unstructured and less-filtered way than might otherwise have been the case, a form of what Fiskesjö (2010) calls "participant intoxication." While such events were not exclusive to men, they were significantly gendered, with women less likely to (be expected or invited to) participate in most cases, as other researchers have noted about research experiences in Vietnam (Gillen 2016; Reis 2012; Scott, Miller, and Lloyd 2006). The importance of *nhậu* was emphasized to me by many friends and colleagues in the delta, who insisted that it

was essential not only for earning the trust of farmers but important also for bonding with professional colleagues or higher-level actors as well.

Field methods and data analysis

1. Interviews

I conducted a total of 133 semi-structured interviews across international, national, subnational/regional, provincial, district, and commune levels, with planners and policymakers, intermediary actors, and farmers or local cadres (see individual chapters for distribution according to actor group/governance level). At the national and subnational/regional level in Vietnam, I sought out participants who had been directly or indirectly involved in planning processes around the Mekong Delta Plan, as well as influential scientific experts, the heads of research institutes, researchers, and practitioners involved in climate change adaptation programming in the delta, including representatives of international development organizations the International Union for Conservation of Nature (IUCN), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the International Fund for Agricultural Development (IFAD), the United Nations Development Program (UNDP), and the World Bank. Participants were first identified and contacted with references provided by my host institute, the Center for Water Management and Climate Change (WACC), and emailed a recruitment letter requesting an interview. After that, interviewees were asked to name individuals and organizations they had collaborated or interacted with on the topic, and to provide references, if possible, to create a snowball sample of the network of planners and policymakers as well as intermediary actors at this level based in Vietnam. Interviews were conducted in either English or Vietnamese as appropriate.

In the Netherlands I interviewed members of the Second Dutch Delta Committee, the Mekong Delta Plan (MDP) consortium and advisory team, as well as officials involved in promoting the Dutch water sector abroad (several Dutch planners and policymakers were based in Vietnam, so interviews took place there), either in person or occasionally over Skype, and always in English. As with interviews at the national/regional level in Vietnam, participants were first identified and contacted with references provided by WACC, and then asked to provide further references. In this way, a snowball sample grew until I had exhausted representative members of the MDP advisory team and other relevant contacts.[13]

In Trà Vinh, provincial and district level participants were helpfully identified through discussions with colleagues at CSP and Trà Vinh University. These included, among others, several offices of the Department of Agriculture and Rural Development (DARD),[14] the Department of Natural Resources and Environment (DONRE),[15] the Department of Planning and Investment (DPI),[16] The Department of Science and Technology (DST),[17] the Cooperative Alliance,[18] the provincial irrigation public works management company,[19] the Farmer's Union,[20] the Women's Union,[21] the Youth Union,[22] and AMD,[23] an IFAD-sponsored climate adaptation project. At the commune level, I conducted in-depth semi-structured interviews with 43 farmers and local cadres. Many of these included a walking/life-history component (Evans and Jones

[13] Of course, several people did not respond to my requests for an interview, but this represented a minority of those directly involved.
[14] *Sở Nông nghiệp và Phát triển Nông thôn*
[15] *Sở Tài nguyên và Môi trường*
[16] *Sở Kế hoạch và Đầu tư*
[17] *Sở Khoa học và Công nghệ*
[18] *Liên minh Hợp tác xã*
[19] *Công ty TNHH Nhà nước Một Thành viên Quản lý Khai thác Công trình Thuỷ lợi của Trà Vinh*
[20] *Hội Nông dân*
[21] *Hội Phú nữ*
[22] *Đoàn Thanh niên Cộng sản Hồ Chí Minh*
[23] AMD stands for "Adaptation to Climate Change in the Mekong Delta"

2011), in which a farmer would give a tour of their land, describing livelihood activities, land-use history, and environmental changes over time. In this way, specific environmental characteristics or physical objects presented themselves as visual cues for more detailed discussion. Interviews were audio recorded when participants gave their permission, transcribed, and entered into MaxQDA for analysis. I then coded for themes that emerged from the material pertaining to the research questions and theoretical framework described above.

2. Participant observation

I engaged in participant observation across each of these sites/levels as well. Participant observation took place at conferences, workshops, research centers, and on farms, and among international development practitioners, "strategic delta planning" consultants, research center colleagues, extension agents, provincial hydraulic engineers, and farmers (see Fig. 1 and individual chapters for details). Field notes were typically jotted in a small notepad first, and then later written out long-hand in a field journal, along with reflections on interviews, process and methods, and emergent questions and themes. The latter were also collected and organized in a separate document on my computer for quick reference later.

3. Livelihoods analysis

In Trà Vinh, I conducted a livelihood survey of 118 households across eleven communes distributed geographically at different locations along the salinity gradient.[24] Communes were selected based on discussion with colleagues at CSP at TVU, and households within communes were selected based on stratified and targeted sampling (see Chapter 5). I hired three additional student assistants for a little over one week to pre-test, practice, and help carry out the survey. The survey instrument is shown in Appendix A (in Vietnamese). After tabulating, cleaning, and

[24] An axis of decreasing salinity concentration as one moves inland away from the coast and mouth of the river.

organizing the data in Microsoft Excel, I ran some basic quantitative analyses, as presented in Chapter 5.

4. Document analysis.

I also reviewed official agency and policy documents collected from conferences and key organizations to triangulate and cross-check my findings, and frequently surveyed international and Vietnamese newspapers to keep abreast of public representations of topics related to the research.

I also collected documentary material from National Archives III[25] in Hanoi on postcolonial land use, infrastructural changes, and rural development planning in the coastal zone of the Mekong Delta. However, due to limitations of space, use of those materials was beyond the scope of this dissertation.

Chapter Overview

The rest of this dissertation is structured as follows. Chapter 2 provides historical and geographic context for the remainder of the dissertation. Drawing on a broad array of secondary literature from history, anthropology, development studies, and environmental sciences, it describes the cultural and political ecology of the delta from the pre-colonial period to the present day, with a focus on the history of agricultural development. It then considers the legacy of such prior transformations for environmental and development challenges and adaptation options today.

Chapter 3 analyzes the historical production of Dutch delta planning expertise and its export to the Mekong Delta. Drawing on secondary literature, semi-structured interviews, and

[25] *Trung tâm Lưu trữ Quốc gia III*

participant observation of conferences and workshops, it traces the evolution of Dutch water management knowledge into the recently branded "Dutch Delta Approach" and examines ongoing efforts to stabilize and promote this expertise as part of the country's foreign policy agenda.

Chapter 4 considers the ways that knowledge for climate change adaptation travels across multiple levels of governance within Vietnam, and its fraught implementation in the local context. Focusing on the translational agency of intermediary actors such as local researchers, extensionists, rural development practitioners, and regional scientific "experts," it examines the production of knowledge for climate adaptation and its translation into local programs and practice. Rooted in an institutional ethnography of research and development practice in Vietnam, the chapter finally considers intersections of the Dutch approach embodied in the Mekong Delta Plan with Vietnamese state planning and development goals.

Chapter 5 focuses on those at the forefront of climate change impacts and environmental management decisions in the Mekong Delta—farmers—in making the decisions that shape how adaptation activities play out across the landscape. It draws on data from livelihood surveys, semi-structured interviews with farmers and local cadres, and participant observation with farmers in an area of Tra Vinh province affected by increasing salinization and a corresponding livelihood transition. Considering changing land use patterns, local perceptions of environmental change, and the dynamic materiality of the delta environment, it examines farmer livelihood choices as they translate various sources of information, local knowledge, and their own priorities into the ongoing transformation of their lived environment.

Finally, Chapter 6 summarizes main arguments and key takeaways from the preceding chapters, speaking directly to the literatures outlined in Chapters 1 and 2 and specifying

contributions to each. It also reflects on the implications of these findings for achieving more equitable and transformative adaptation and suggests areas for further study.

CHAPTER 2

HISTORICIZING ADAPTATION: THE PAST, PRESENT, AND FUTURE OF ENVIRONMENTAL CHANGE IN THE MEKONG DELTA

Introduction

In 2007, two reports were published that thrust Vietnam, and particularly the Mekong Delta, into the spotlight of climate change vulnerability, generating a sense of urgency around the need to integrate adaptation planning into the country's development priorities. First, the World Bank published a report comparing "The impact of sea-level rise in developing countries," which declared Vietnam one of the top 5 countries in the world at risk of damage from sea-level rise, especially in its low-lying and population-dense delta regions (Dasgupta et al. 2007). Second, the IPCC Fourth Assessment Report contained a special section dedicated to climate risks in the world's "megadeltas," particularly those in Asia (IPCC 2007). One of the Fourth Assessment Report's lead authors was a Vietnamese scientist who gained fame in his home country at the end of that year, when the Nobel Peace Prize was jointly awarded to the IPCC authors and former US Vice President Al Gore for their efforts to raise awareness about climate change. In the ensuing period, the scientist traveled extensively around Vietnam and abroad giving presentations about the relationship between global greenhouse gas emissions and risks to the country's population and predominantly agricultural economy (Zink 2013).

Since then, domestic and international attention have focused especially on the Mekong Delta, an area known as the country's "rice basket" for its export-oriented agriculture. This is due in large part to the significance of the delta for the country's economic growth and its

implications for domestic and international food security. Contributing 90% of Vietnam's rice exports—13% of the world's supply—60% of aquaculture and most fruit exports, the delta is responsible for around a quarter of the country's GDP (Käkönen 2008; Tam 2015; Tatarski 2018; USAID 2017). Predicted climate risks include more frequent and intense floods and droughts, heat waves and heavy precipitation events, and, notably, rising sea-levels that push saltwater further inland up rivers and canals, and which could lead to nearly 40% seasonal inundation by century's end (Keskinen et al. 2010; McElwee 2017; Tran Thuc et al. 2016; Tuan and Chinvanno 2011). These problems are compounded by the effects of upstream dam construction, which reduce sediment flows and freshwater discharges, and local overexploitation of groundwater, resulting in enhanced land subsidence and riverbank erosion in the coastal zone (Anthony et al. 2015; Minderhoud et al. 2017).

Human interventions in recent decades have aimed at greater control over the delta's complex ecology and hydrology, enabling the expansion and industrial intensification of agriculture that have contributed to Vietnam's high rates of economic growth. Yet such large-scale interventions, driven by the government's "rice first" policy and vested interests in the hydraulic engineering sector (Benedikter 2014; Brown 2021; Le Thuy Ngan et al. 2018) have set the delta on a seemingly unsustainable development path (Biggs et al. 2009; Magnan et al. 2016; van Staveren and van Tatenhove 2016). In recent years, a discourse of adaptation to climate change—its immediate and future effects—has merged with other sustainability concerns as the dominant paradigm driving socioeconomic development and transformation in the delta, often with calls of great urgency (Brown 2020a; McElwee 2017; Mekong Delta Plan 2013).

This chapter situates these calls in historical and geographic context, by introducing the Mekong Delta region and describing human adaptations to the delta environment from the

precolonial period to the present, as well as the emergence of recent climate change and sustainability concerns. It draws primarily on secondary historical, ethnographic, development studies, and environmental sciences literature. Future iterations of this work will incorporate archival materials collected during fieldwork, as well as primary ethnographic material, to deepen historical contextual understanding of these issues, though these are beyond the scope of this chapter.

The chapter is divided into five sections. Following this introduction, I provide a brief site description of the Mekong Delta region of Vietnam. In the next section, I describe the early historical and cultural ecology of the delta. Next, I trace developments in water management and agriculture over the course of the colonial and postcolonial periods up to the present. I then consider recent socio-environmental challenges related to climate change, upstream dam construction, and general concerns about environmental sustainability. Finally, I summarize key lessons from this history, and reflect on what the trajectory of development and environmental change in the delta means for adaptive possibilities today.

Site Description

The Mekong River flows nearly 5,000 km from the Tibetan Plateau down through China's Yunnan Province and parts of Myanmar, Laos, Thailand, and Cambodia, before fanning out in the Mekong Delta and exiting into the South China Sea in southern Vietnam. The Vietnamese part of the delta (*Đồng bằng Sông Cửu Long* in Vietnamese, or "Nine Dragons River Delta") spans roughly 40,000 square km and is home to nearly 18 million people. Close to two thirds of the delta's land area are devoted to agricultural purposes, and nearly 70% of people work in agriculture, forestry, or fisheries (Le Thuy Ngan et al. 2018; Vormoor 2010).

Approximately 82% of the population lives in rural areas, and there is an average population density of 412 persons per square km (Käkönen 2008). The delta's ecology has been largely shaped by hydrological processes, including the tropical monsoon climate and seasonal flooding of the Mekong River, as well as daily tides from both the South China Sea and Gulf of Thailand (Biggs 2010; Evers and Benedikter 2009). This has created a particularly water-rich environment, an "amphibious ecology" (Brocheux 1995) where seasonal rhythms are dominated by the contrast between wet and dry and the annual flood pulse (Benedikter and Waibel 2013).

Floods occur each year during the rainy season (typically May to October or November) when strong, continuous rainfall coincides with heavy river discharge from upstream and high tidal flow from the sea, raising water levels throughout the delta and causing prolonged inundation in the floodplains of the upper delta (Benedikter and Waibel 2013; Le Thuy Ngan et al. 2018; Le Anh Tuan et al. 2007). The delta is affected by both the Indian and East Asian monsoons, which overlap to form the Southeast Asian summer monsoon (Lau and Yang 1997; Yihui and Chan 2005). In the dry season (typically November or December to April), low river discharges and high tide events raise the salinity level of waters and soils in coastal areas, creating problems for freshwater access and salinity intrusion into canals and fields, which can last for up to six months. In especially dry years, saltwater sometimes penetrates as far as 65 km inland (Le Thuy Ngan et al. 2018).

Scholars typically divide the delta into three geographic regions: the upper delta, the central delta, and the coastal zone (see Fig. 1). These can be further divided into six agroecological zones reflecting different topographic, hydrological, and soil characteristics (Can et al. 2007; Le Thuy Ngan et al. 2018). The upper delta contains the Long Xuyên Quadrangle,

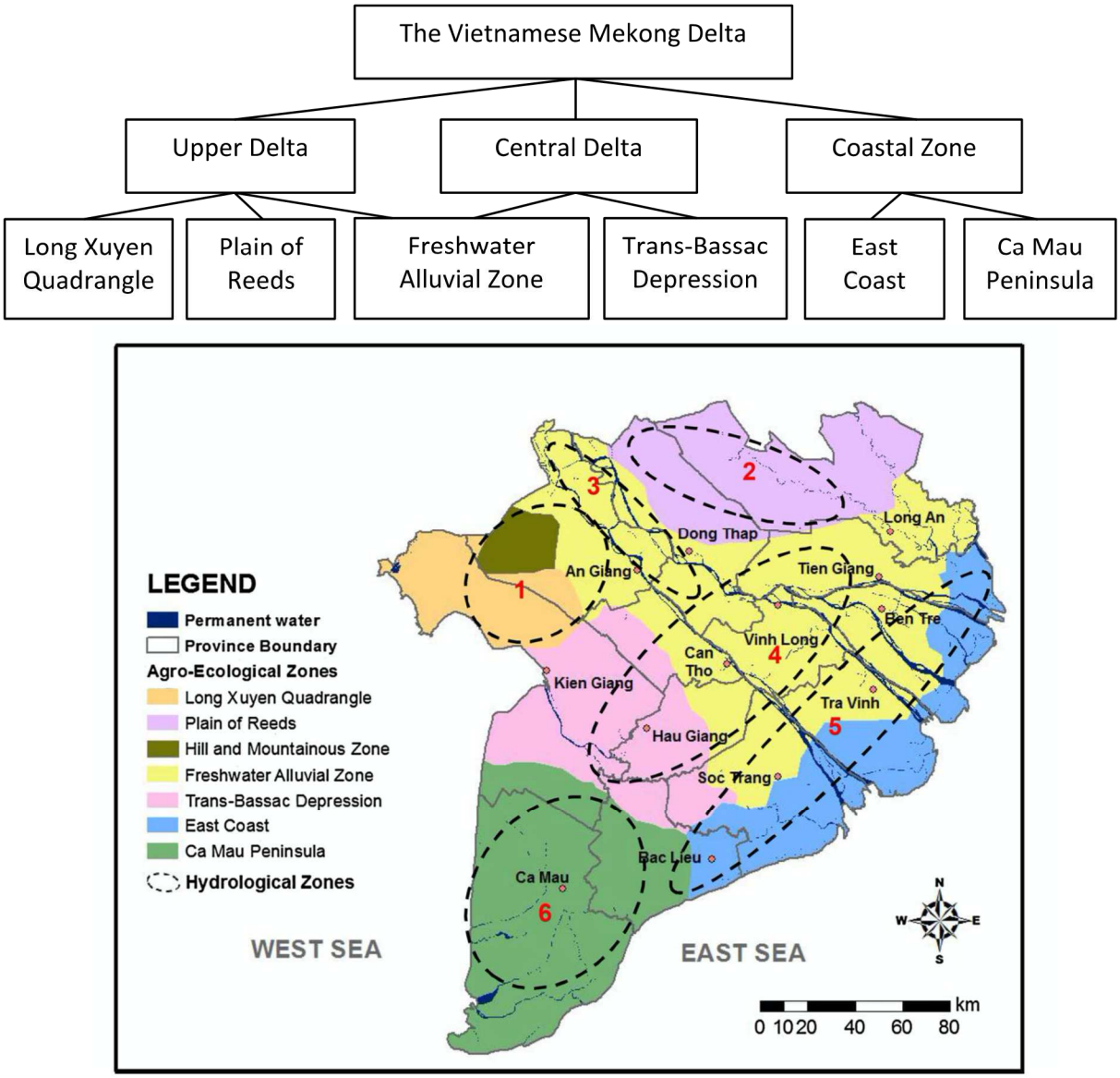

Figure 2.1 Agroecological and hydrological zones in the Mekong Delta, Vietnam. The upper panel describes the spatial hierarchy. (Adapted from Le Thuy Ngan 2018)

the Plain of Reeds, and the upper part of the Freshwater Alluvial Zone. The Central Delta contains the lower part of the freshwater alluvial zone and the Trans-Bassac Depression. The coastal zone includes the Cà Mau Peninsula and the eastern coast of the delta, the location of Trà Vinh province and the focus of local-level research in Chapters 4 and 5.

The story of the delta's development is one of a close relationship between shifts in water management and changing land use practices. With technological advancements in hydraulic management and agricultural innovations, the Mekong Delta was transformed from a naturally regulated water regime where people practiced extensive, adaptive farming methods into an increasingly human-regulated environment, a "modern hydraulic society" (Evers and Benedikter 2009).[26] In the process it has gone from an area dominated by swamps and marshes into one of the most productive areas worldwide in terms of both agriculture and aquaculture, ensuring food security for Vietnam and making the country into one of the world's leading rice exporters (Evers and Benedikter 2009; Garschagen et al. 2012; Le Thuy Ngan et al. 2018; Vormoor 2010).

Mekong Delta formation, settlement, and cultural ecology

In geological terms, the Mekong Delta is a young landmass. It expanded over the past 3,000 years as sediments deposited where the Mekong River meets the sea, at an average rate of about 144 million metric tons per year (Smajgl et al. 2015). The earliest evidence of human habitation is the Oc Eo archaeological sites in what is now An Giang province that are associated with a pre-Khmer civilization, referred to in ancient Chinese texts as Funan, that existed around 2000 years ago. These sites are the presumed location of an ancient maritime port on the trade routes between China and India (Biggs 2010; Stark 2006).

In the first part of the 18th century, when the area was a sparsely populated frontier of the Khmer Empire, migrants from central Vietnam and Ming-loyalist refugees from southern China began settling in the delta (Biggs 2010; Brocheux 1995; Liem 2016; Taylor 2014). While the

[26] The phrase is a reference to Wittfogel's classic work (Wittfogel 1957), in which the management of water plays a fundamental role in centralized economic and bureaucratic development (see also Benedikter 2014; Biggs et al. 2009).

local Khmer population had traditionally established themselves in areas of naturally occurring higher-ground out of reach of floodwaters, such as along ancient inland sand dunes in the mid-coastal zone, the Vietnamese tended to settle in lower-lying areas along rivers and canals, and the Chinese around river ports and coasts (Taylor 2014). This settlement pattern resulted in populations being concentrated in narrow "garden strips" (*miệt vườn*) along waterways and elevated bands, areas with rich, alluvial soils and plentiful freshwater (Biggs 2010). The pattern is especially evident in the central delta around the two main river branches, the *Hậu* (Bassac) and *Tiền* (Mekong), where today's largest delta cities, such as Cần Thơ, Vĩnh Long, and Long Xuyên, are located, an area with favorable soil and water conditions and riverine linkages connecting it to other parts of the delta.

The three main ethnic groups that settled the delta adapted to this amphibious ecology (Brocheux 1995), developing a unique "riverine civilization" (*văn minh sông nước*) (Biggs 2010; Brocheux 1995; see also Taylor 2006). Due to the delta's complex hydraulic landscape, affected by daily tidal pulses from both the South China Sea to the east and the Gulf of Thailand to the west, and by seasonal flooding of the Mekong River and its distributaries, "it is not scarcity of water but its 'taming' and utilisation that has been at stake" (Evers and Benedikter 2009, 417). This, combined with the area's relatively stable tropical climate and alluvial soils, has made for an incredibly fertile region. The delta's dense network of rivers, streams, arroyos, and canals has created a landscape that is communicatively and commercially open, contributing to the area's unique sociocultural patterns. Migrants to the delta brought with them a pioneering "frontier spirit" that has been compared to that of early settlers of the American West, with Vietnamese writers drawing vivid portraits of these migrants as adventurous, independent-minded, and heroic (Biggs 2010; Brocheux 1995; Jamieson 1993). The delta's intermingling of not only Vietnamese,

Chinese, and Khmer, but also Siamese and Malay peoples at different points throughout its precolonial history, created a "fluid cultural and political environment" (Liem 2016, 77), where "[s]ettlement is open, solidarity loose, and mobility high," (Taylor 2006, 38) a uniquely cosmopolitan rural area (Biggs 2010; Taylor 2001, 2007, 2016a). The southern region is also where a civil society independent from the state hierarchy has traditionally been strongest in the country (Jamieson 1993; Luong 1994).

Unlike the Red River Delta in the north, an area that had been intensively shaped and managed by human intervention for much longer, in the Mekong Delta people's livelihoods were historically adapted to the surrounding natural environment and its shifting hydrological boundaries (Biggs et al. 2009; Brocheux 1995; Evers and Benedikter 2009; Taylor 2006, 2014). Although Vietnamese and Khmer before them cleared lands, drained swamps, and dug canals to irrigate their fields (Biggs 2010), to a great extent rice cultivation was limited by natural conditions. Rice production requires sufficient freshwater and favorable soils, so cultivation was concentrated mainly in the alluvial areas of the upper and central delta and in higher-elevation parts of the coastal zone. In the traditional farming system, farmers practiced seasonal cropping of local varieties, typically one crop per year of six-month duration. In the floodplains of the upper delta, the Long Xuyên Quadrangle and Plain of Reeds (covering much of today's An Giang and Đồng Tháp provinces, respectively), cultivation was limited due to high acid sulphate content of soils, long-term deep inundation during the flood season, and the presence of large swamps and flood-tolerant cajuput (*Melalueca)* forests (Biggs 2010; Le Thuy Ngan et al. 2018). Many farmers traditionally grew long-stem floating rice during the flood season (Brocheux 1995; Can et al. 2007; Ehlert 2012), a practice that allowed them to avoid problems associated with acidic soils because the submerged soil was prevented from oxidizing and leaching acidic

sulphates into the water (IUCN & VAWR 2016). Much of the eastern coastal zone and Cà Mau Peninsula were inundated by saltwater for half the year or were covered by extensive mangrove forests. Farmers cultivated rain-fed rice during the wet season when freshwater was plentiful, and practiced extensive aquaculture in brackish tidal areas, taking advantage of naturally occurring species and feed (Le Thuy Ngan et al. 2018). In all these systems, water management mainly occurred at the household level, with irrigation provided by the delta's natural hydrology and little need for additional labor or large-scale organized cooperation (Benedikter and Waibel 2013; Biggs et al. 2009).

Colonial and Postcolonial Development

Colonial era

French colonial rule in Southeast Asia began in 1859 with the conquest of present-day Ho Chi Minh City, or Saigon, and quickly incorporated the Mekong Delta and the rest of southern Vietnam into the colony of Cochinchina. It then expanded to include the central and northern parts of Vietnam and the present countries of Laos and Cambodia as French Indochina, which officially lasted until 1954 and the signing of the Geneva Accord (Brocheux and Hémery 2009). The conquest and subsequent administration of southern Vietnam by the French ushered in a process of widespread landscape transformation and centralized water management that opened the delta for export-oriented agricultural production. Justified by the modernizing ideology of *la mission civilisatrice*, large-scale infrastructural works were seen as representative of colonial notions of "progress," as "steps in some linear process to create a managed, modern landscape—converting wild swamps to peaceful, productive fields" (Biggs 2003, 94).

Building on earlier landscape modifications begun by Vietnamese and Khmer before them, the French introduced technologies that amplified these efforts to hitherto unseen proportions. They drained swamps for cultivation and used large steam-powered dredges to create canals for irrigation as well as commercial and military transportation. These developments encouraged millions of Vietnamese to migrate southwards, turning marshes and mangrove forests into rice fields and developing a thriving rice-based agricultural economy (Biggs 2012; Brocheux 1995). Under French rule, wealthy landowners rented land to tenant farmers, and the delta's population rose from around 500,000 in 1860 to more than 4 million in 1930 (Biggs et al. 2009). The creation of a dense network of canals throughout the delta opened several million hectares of land to agricultural production that had been previously uncultivable due to permanent inundation, thick vegetation, salinity, or acidity (Biggs 2010; Brocheux 1995).

Beginning in the 1930s, the "Dutch dike" strategy became the dominant approach to water management in the delta. Influenced by Dutch landscape modifications as well as the dike-enclosed landscapes of the Red River Delta in the north, the strategy involved constructing encircling dikes to prevent flooding or saltwater intrusion, thereby creating polders,[27] and allowed for the opening of otherwise fallow lands to freshwater agriculture and the resettlement of migrant tenants. Large numbers of farmers from the Red River Delta were relocated to the floodplains and coastal areas of the Mekong Delta to populate these enclosed settlements, known as *casiers*. Large rice estates, gridded with canals for irrigation and drainage and equipped with pumping stations and flood gates, they would in theory allow for intensive agriculture in carefully managed landscapes, but the results were poor (Benedikter 2014; Biggs 2005, 2010; Biggs et al. 2009). First, there were problems with uncoordinated water management. Whereas

[27] Areas of land previously subject to high water levels, but which have been surrounded by a closed dike system (see Chapter 3 for a deeper discussion of the Dutch origins of polders).

water management in the north had been organized collectively in villages, in the Mekong Delta farmers tended to operate on an individual basis, with households managing their own drainage and exchange of water (Benedikter 2014; Biggs et al. 2009). Secondly, in flood-prone areas it ruined the hydraulic conditions necessary for growing traditional floating rice (Biggs et al. 2009). Canals also lowered the water table causing the soil to dry out and turn acidic in many places, and spurring massive wildfires in areas of peat soil (Biggs 2005). These projects were soon discontinued by warfare.

As the only part of French Indochina to be directly administered by the French, Cochinchina had experienced the deepest penetration of capitalist relations of production and the institution of private property (Adger 1999; Jamieson 1993), turning subsistence-oriented peasants into market-oriented farmers. The trend towards rice monoculture in the first half of the 20th century engaged the delta in international commercial markets, yet it also relied on an unstable system of credit and debt that fostered peasant resentment and social unrest (Biggs 2010; Brocheux 1995). French rule generated extreme inequality in both wealth and landholdings across Indochina, as well as severe impoverishment and poor nutrition on the part of the peasantry, fueling anti-colonial resentments that led to wars for independence in the mid-20th century (Aso 2018; Biggs 2010; Brocheux 1995; Brocheux and Hémery 2009; Long 1991; Luong 1992). The end of Japanese occupation during World War II was followed by on-and-off military conflicts in southern Vietnam for the next three decades, for the most part halting major new water management projects, as much older infrastructure was destroyed. However, the period also saw the emergence of delta-scale master-planning by international advisors from the US and the Netherlands (Benedikter 2014; Biggs et al. 2009). At the same time, there was a countervailing trend towards more decentralized, locally adaptive strategies of resource

management, especially in areas controlled by Vietnamese revolutionaries (Biggs 2005; Biggs et al. 2009). The legacy of both tendencies is still present in the delta today.

War in the delta

Large, organized protests by Vietnamese and Khmer tenant farmers against conditions under the French occurred as early as 1926 (Biggs 2005). After the establishment of the Indochinese Communist Party (ICP) by Hồ Chí Minh in 1930, and with worsening economic conditions due to the Great Depression through the 1930s, additional protests were organized by local party members, becoming increasingly fierce as conditions continued to decline. For a brief time, there were attempts to accommodate farmers' demands by the pro-left Popular Front government in Paris, from 1936-1938. But after the Nazi defeat of France in 1940 and subsequent occupation of Vietnam by the Japanese, party members went underground, hiding in marginal swamp and forested areas such as the Plain of Reeds and U Minh Forest in the Cà Mau Peninsula. There, they rebuilt their organization under the banner of Hồ Chí Minh's anti-Japanese militant nationalist organization, the Việt Minh, established in 1941 (Biggs 2005). The next several years saw the rise of a number of Vietnamese nationalist groups, including religious sects and social organizations such as the Cao Đài, the Hoà Hảo, and the Bình Xuyên mafia, competing for influence and even establishing military forces of their own, such that after the defeat of the Japanese the French never wholly regained control in the south (Brocheux 1995).

During the First Indochina War (1945-1954), a war of independence from France, large-scale investments in infrastructure stagnated and much infrastructure was destroyed by warfare (Benedikter 2014), while the Việt Minh and many of their supporters "became allies with the swamp" (Biggs 2005, 460). Retreating to such marginal areas, Vietnamese guerillas and revolutionaries used them as bases from which to defend against incursions by French and, later,

US and South Vietnamese military forces (Biggs et al. 2009). National militaries sought to drain and penetrate the swamps, but local cadres destroyed roads, bridges, and canals and built earthen dams to keep them flooded, "allying themselves with natural forces of hydrology and succession" to extend the wetlands' reach and thereby their own protection (Biggs 2005, 460). Some farmers reverted to growing long-stem floating rice to account for the higher water levels due to damaged drainage canals, while others built clay mounds to plant upland crops such as tobacco. These efforts seem to have been practically-motivated coping strategies, a form of "forced adaptability to the varying water and soil conditions in an area that was simultaneously 'liberated' and 'wasteland'" (Biggs 2005, 460; see also Biggs et al. 2009). Still, in return for this hardship the Việt Minh promised clear titles to land formerly part of large colonial estates. Simultaneously, revolutionary activity in these areas often included literacy efforts and provided organizational and administrative experience, fostering upward mobility for many former tenant farmers.

The First Indochina War officially ended with the signing of the Geneva Accords in 1954, temporarily dividing Vietnam into two states: the Democratic Republic of Vietnam in the north, and the Republic of Vietnam in the south. After that, US financial and technical support to the Saigon government progressively supplanted the French presence in southern Vietnam. During the Second Indochina War (1959-1975), American advisors devised ambitious plans for large-scale resettlement and infrastructure development to realize the delta's vast agricultural potential (Benedikter 2014; Biggs 2010). The Mekong Delta Development Programme (MDDP), initiated in collaboration with the government of President Ngô Đình Diệm, recommended closing off the entire delta and aimed to provide the infrastructural foundation for the Green Revolution, thereby improving social conditions as part of President Johnson's determination to

"win hearts and minds." Tapped to lead the effort was David Lilienthal, chief architect of the Tennessee Valley Authority, but he quickly grew disillusioned with the project upon witnessing the violence of the counterinsurgency effort and the effectiveness of farmers' own technical innovations (Benedikter 2014; Biggs et al. 2009; van Staveren, van Tatenhove, and Warner 2017). American aid also channeled large amounts of money into the establishment of so-called "agrovilles," designed as strategically placed agricultural settlements encircled by dikes and outfitted with modern irrigation and pumping systems. Yet as the war escalated, hydraulic engineering missions were subject to increasing guerilla attacks, and as the southern government lost control over much of the countryside, few of these efforts materialized (Benedikter 2014; Biggs 2010).

Throughout most of the war, floodplains and wetlands in the delta remained largely under the control of rebel groups: the National Liberation Front (NLF), or "Viet Cong" as they were pejoratively called.[28] These areas were repeatedly bombarded and attacked by the US military with napalm and chemical defoliants including Agent Orange, which was strategically applied to forests and crops where guerillas were thought to have bases or supply corridors, destroying thousands of hectares of cajuput and mangrove forests, and leaching chemicals into the soil and water supply. This forced local people to flee their homes in large numbers, cramming waterways with boats stuffed with personal belongings and housing supplies, and adopt "a kind of extreme survivor mentality that required almost constant adaptation to changing environmental and social conditions" (Biggs et al. 2009, 218). As Biggs et al. (2009, 217) argue,

[28] The term is a contraction of "*Việt Nam Cộng sản*," for Vietnamese communist, and was mainly used by outsiders. American soldiers stationed in Vietnam then shortened it further to "V-C," "Victor Charlie," or just "Charlie" to refer to Vietnamese communist forces.

farmers in the Mekong Delta "responded to economic pressure and waterscape transformations by counter-strategies, coping behaviours, opportunistic adjustments and innovations."

Farmers and local people adjusted to the tumultuous circumstances not only by acclimating to life in marginal swamp and forested areas, but through technical innovations that contributed to mobility as well as crop intensification and diversification. While large machines such as steam-powered dredges had been a regular presence on the delta landscape during the colonial period, after the Great Depression and several decades of war, these were largely replaced by the widespread proliferation of small machine technology, which spurred major transformations in resource use strategies, livelihoods, and the mobility of local people. Introduced with US aid programs in the 1960s, small, portable combustion engines now number in the millions across the delta and are used as boat engines, water pumps, and electricity generators. As outboard motors on canoes or sampans, they enable people to move quickly at a moment's notice, a mobility greatly enhanced by the delta's connectivity via its dense network of rivers, canals, creeks, and arroyos. As water pumps, they facilitate irrigation and drainage and enable farmers to increase their yields, supporting the adoption of high-yielding rice and associated chemical fertilizers introduced with the Green Revolution in the 1960s, and contributing to a more decentralized form of water management (Biggs 2012; Vormoor 2010); Vormoor 2010). First introduced in 1966, high-yielding rice varieties, such as IR5 and IR8, were rapidly adopted by farmers over the next several years, further facilitated by reforms in rural credit access and increased availability of agrochemicals. These new varieties took only three months to harvest, so farmers could grow two or more crops per year (Benedikter and Waibel 2013; Can et al. 2007; Evers and Benedikter 2009; Le Thuy Ngan et al. 2018). In areas with inadequate irrigation, farmers diversified in other ways. In coastal areas, some took advantage of

brackish-water filled bomb craters to farm shrimp (Biggs 2005), and in areas with poor soils or drainage others developed raised-bed techniques for cultivating fruit or vegetable gardens (Biggs et al. 2009).

In the early 1970s, in collaboration with the Mekong Committee (precursor to the present-day Mekong River Commission), the Dutch government sent advisors to draft another master plan for total management of the delta, under the name of the Netherlands Delta Development Team (NDDT). This plan, taking its cue from the American-led MDDP and French plans before it, aimed to expand agricultural development by means of large-scale landscape modification and water control, though it also supported allowing controlled flooding in the upper delta and expressed skepticism about replacing individualized irrigation and drainage efforts with complete centralization. Yet it too was constrained by the intensifying war in the delta, and the fieldwork on which it was based was cut short (van Staveren, van Tatenhove, and Warner 2017). However, its primary objective, the expansion of "rice everywhere" was carried over after the country's reunification in 1975 (Biggs et al. 2009), when the adoption of high-yielding rice varieties was enforced as agricultural policy under the planned economy (Benedikter and Waibel 2013). These dialectical tendencies—ongoing attempts at centralized control yet decentralization in practice—have continued to shape agricultural development in the delta in the decades since. Following reunification and the absorption of the south by the communist government in Hanoi, an evolving policy landscape, followed by a new round of investment in large-scale infrastructure projects, transformed things yet again, eventually spurring the twin directions of intensification and diversification (Le Thuy Ngan et al. 2018; Can et al. 2007; Lan 2011).

Agricultural modernization and development

Following independence in the north (1954) and, later, reunification with the south (1975), Vietnam's communist government began a process of collectivizing agricultural production, but in the Mekong Delta, it failed almost as quickly as it began (Benedikter and Waibel 2013; Kerkvliet 2005; Tran 1998). Beginning in 1976, a land reform and redistribution campaign was launched to equalize landholdings, and private land transactions were banned. Thousands of production collectives and agricultural cooperatives were created, but many farmers refused to do collective labor, and instead chose to sell crops on the market (Raymond 2003). Collectivization was unsuccessful in terms of both participation and productive output in the southern part of the country (Do and Iyer 2008). Drops in production led to a major food crisis and economic recession, and Vietnam had to import rice to feed its population until the mid-1980s (Do and Iyer 2008; Raymond 2003). Both declining agricultural yields and everyday forms of peasant resistance, often with the complicity of local cadres, drove shifts in production systems. Cooperatives began contracting farm work out to individual households for more effective results. Whatever surplus households produced beyond the contracted amounts they were allowed to keep or sell as they wished. There was thus an incentive to produce more, and productivity increased. These changes were eventually incorporated into the policy reform process (Tran 1998; Kerkvliet 2005) and by the late 1980s households officially replaced cooperatives as the basic unit of production.

This led to new and more extensive reforms under the banner of *Đổi mới* (renovation), a series of policy changes instituted from 1986 on, that increasingly privatized land use rights to promote agriculture-led growth and move the country toward a market-oriented economy (Akram-Lodhi 2005; Do and Iyer 2008; Vasavakul 2019; Vien 2011). In 1988, Resolution 10,

the first Land Law, granted land-use rights to individual households, and land was allocated with 10-15 years of secure tenure. Investment decisions were also devolved to the household level (Do and Iyer 2008; Luttrell 2002). The Land Law of 1993 went even further, declaring that land, while technically property of the state, could be allocated to individuals and organizations for "stable long-term use" (Luttrell 2002, 73). This gave households the right to inherit, transfer, exchange, lease, and mortgage their land-use rights. It also extended the land lease term to 20 years for annual crop land and 50 years for perennial crop land. This increased tenure security provided an added incentive for investment in the agricultural potential of land (Do and Iyer 2008). Following Resolution 10 and the Land Law of 1993, individual and private economies were recognized as legitimate businesses, allowed to employ workers and transfer use rights to other parties. Facing new competition from households, cooperatives sought ways to remain relevant, so some began providing services better performed at larger scale than what households could do on their own, such as managing irrigation and supplying raw materials like fertilizer (Tran 1998).

With new revenues from market-stimulated growth, the Vietnamese government again turned to investing in the development of large-scale hydraulic infrastructure (Benedikter 2014). To further increase agricultural output and because high-yielding rice varieties only grow under intensive and controlled irrigation (Evers and Benedikter 2009), new infrastructure projects were devised to ensure freshwater during the dry season and flood protection during the wet season (Can et al. 2007; Le Thuy Ngan et al. 2018). In the early 1990s, under the direction of a new Dutch consortium, NEDECO (Netherlands Engineering Consultants), and with funding by UNDP and the World Bank, a "Master Plan for the Mekong Delta in Viet Nam" was formulated, which devised numerous large irrigation development zones, to be surrounded by a ring dike and

outfitted with sluices and pumping stations, though this plan too recommended allowing for controlled flooding in the deep-flood areas of the upper delta (NEDECO 1993; van Staveren, van Tatenhove, and Warner 2017). The World Bank and the Australian government pledged funding to support development of select water control schemes. The largest of these projects were the Quan Lo-Phung Hiep (covering 178,000 ha), in the coastal area of Bạc Liêu and Sóc Trăng, Nam Mang Thit (225,000 ha), spanning Vĩnh Long in the alluvial plain and Trà Vinh in the coastal zone, and the Cai San-Thot Not project (58,000 ha), between Can Tho city and the Trans-Bassac Depression in the central delta (Benedikter 2014).

From the mid-1980s to early 2000s, intensive rice cropping expanded across the floodplains and brackish areas of the Mekong Delta, supported by the extensive development of such flood control and irrigation infrastructures (Can et al. 2007; Käkönen 2008; Vormoor 2010). In the upper delta, dikes have been continuously scaled up (Benedikter and Waibel 2013; Tran and Weger 2018; Tran, Pittock, and Tuan 2018), and canal water in the coastal zone has been sourced from points further upstream to enable freshwater agriculture year-round (Biggs et al. 2009; Hoanh et al. 2003; Le Thuy Ngan et al. 2018). In all, an extensive network of hydraulic infrastructure was built, including "15,000 km of main canals, 27,000 km of secondary canals, 50,000 km of on-farm canals, 80 large sluice gates, 13,000 km of flood-prevention dykes, 1290 km of salinization-prevention dykes, and 450 km of sea dykes" (Le Thuy Ngan et al. 2018, 270). In this way, the area of double and triple rice cropping (2 or 3 crops per year) significantly expanded, replacing single rice cropping as the dominant rice production system, even in the previously brackish coastal zone (Can et al. 2007; Le Thuy Ngan et al. 2018). Monocultures of high-yielding rice became the dominant land-use across the delta during this time.

While these infrastructure projects focused mainly on opening up lands for irrigated rice and protecting fields from flooding and salinity, shifts towards market liberalization and greater decentralization of land-use decisions further encouraged the intensification as well as diversification of agriculture (Can et al. 2007; Biggs et al. 2009; Garschagen et al. 2012; Lan 2011; Le Thuy Ngan et al. 2018). In 2000, Resolution 09/2000/NQ-CP encouraged farmers to use agricultural land more effectively, thus loosening the strong focus on rice production and leading to increased planting of upland crops like fruits and vegetables, especially in the freshwater alluvial zone of the central delta (GoV 2000; Lan 2011; Can et al. 2007). 1994, 1999, and 2001 all saw government decisions aimed at promoting the development of aquaculture in the delta, including: Decision 773-TTg in 1994, which aimed at building the infrastructure needed for aquaculture; Decision 224/1999/TTg in 1999, which promoted the Aquaculture Development Program for 1999-2010; and Decision 173/2001/QD-TTg in 2001, which endorsed growth of aquaculture in the economic development orientation of the delta (Lan 2011; Le Thuy Ngan et al. 2018). By the mid 1990s, the Mekong Delta had developed into both the rice basket of Vietnam as well as the new center of aquaculture production in the country (Evers and Benedikter 2009; Käkönen 2008).

Based on time-series maps and statistical data, Le Thuy Ngan et al. (2018) studied changes in land-use across the delta from the 1970s to 2012. In general, land-use was found to have been highly variable, changing by 14.94% per year between 2001 and 2012. Rice cropping changed the most, evolving from predominantly single cropping of traditional varieties towards double and triple cropping of high-yielding varieties. Aquaculture expanded rapidly in the 1990s before temporarily leveling off, with another expansion after 2000 (Lan 2011). The total area devoted to inland aquaculture in the delta increased by nearly 288,800 ha between 2000 and

2012, with the majority of that in the coastal provinces (Le Thuy Ngan et al. 2018). In Cà Mau province alone, 150,000 ha of rice land were converted to shrimp ponds. Today, brackish water shrimp aquaculture is practiced in all of the coastal provinces, including Long An, Tiền Giang, Bến Tre, Trà Vinh, Sóc Trăng, Bạc Liêu, Cà Mau, and Kiên Giang (Lan 2011).

As the area of shrimp aquaculture rapidly expanded in the coastal zone, the area dedicated to rice alone decreased significantly. Many farmers preferred brackish conditions due to the higher price for shrimp on the export market. With rice farming, farmers typically keep part of their crop for household consumption, but shrimp are raised almost entirely for the market, with 70-80% of Vietnam's shrimp exports shipped to the United States and Japan (Lan 2011). Mangrove forests were often cleared and rice land increasingly converted for the purpose of shrimp farming, resulting in an expanding brackish water zone (Can et al. 2007), with attendant effects on what could be grown nearby, often requiring deep well drilling to acess freshwater (Lan 2011). This process has also led to social conflicts between rice and shrimp farmers at the boundary between fresh and saline water, where formerly freshwater areas have been converted to shrimp farming (Can et al. 2007; Hoanh et al. 2003; Le Thuy Ngan et al. 2018; Smajgl et al. 2015).

Looking back at the history of agricultural development in the Mekong Delta, we can roughly divide it into three periods: (a) traditional rice farming (before 1966); (b) transition from traditional rice to high yielding rice monoculture (1966 to the 1980s); and (c) agricultural intensification and diversification (1980s to 2000s) (Can et al. 2007; Garschagen et al. 2012; Lan 2011; Le Thuy Ngan et al. 2018). Today, the delta is experiencing a new transition, this time from intensification and diversification to a focus on sustainability and adaptation to climate change (Can et al. 2007; Käkönen 2008; McElwee 2017; Mekong Delta Plan 2013). Yet these

goals are complicated by the effects of previous and ongoing development interventions at both local and regional scales.

Challenges for climate adaptation and sustainability

Climate change

Scientific reports have identified Vietnam as highly vulnerable to climate change, with its long coastline and dense human population concentrated along it particularly exposed to the risks of sea-level rise, and the Mekong Delta is expected to experience some of the greatest impacts (Dasgupta et al. 2007; Keskinen et al. 2010; McElwee 2017; McElwee et al. 2010; Tuan and Chinvanno 2011). Predicted effects of climate change in the Mekong Delta include increasing temperatures, wetter wet seasons and dryer dry seasons, and significant influence from sea-level rise, including coastal flooding, erosion, and saltwater intrusion (IRICS 2007; Keskinen et al. 2010; Tuan and Chinvanno 2011). Flooding is likely to become increasingly difficult to forecast in the upper delta, and sea-level rise in combination with more frequent and severe droughts will cause saltwater intrusion to occur for longer periods in the coastal zone and penetrate farther inland (Hanh and Furukawa 2007; Smajgl et al. 2015; Wassmann et al. 2004).

According to the IPCC, a trend of rising temperatures in Southeast Asia is expected to continue, with an increasing number of hot days and warm nights. The region is also projected to experience an increase in precipitation extremes, with a growing contrast between wet and dry season averages. In general, there is expected to be an increase in total rainfall, extreme rainfall events, and interannual variability, with a possible weakening of wind circulation and lengthening of the wet season (Field et al. 2014; Stocker et al. 2013).

According to the IPCC, global mean sea level (GMSL) is rising at a rate of more than 3 mm/year and accelerating and will continue to do so throughout the 21st century, mainly due to glacier and ice sheet melt as well as thermal ocean expansion. By the end of the century, GMSL is predicted to rise between 0.43 m and 0.84 m relative to 1986-2005 (Oppenheimer et al. 2019). Land subsidence, which, combined with mean sea level rise produces enhanced relative sea-level rise locally (Field et al. 2014; Stocker et al. 2013), is a naturally occurring phenomenon, particularly in delta regions, but is amplified by human activities such as groundwater extraction and urban development (Giosan et al. 2014; IPCC 2007). Subsidence rates for the Mekong Delta are estimated to range from 1.0 – 2.5 cm/year (Minderhoud et al. 2017). Sea-level rise will affect coastal wetlands, human habitation, and livelihood activities, by increasing coastal flooding, erosion, and saltwater intrusion, all of which are exacerbated by ongoing subsidence (Field et al. 2014).

Based on a 1 m rise in sea level (at the high end of projections for the year 2100 following the latest IPCC special report on sea-level rise) (Oppenheimer et al. 2019), Vietnam's Ministry of Natural Resources and Environment (MONRE) estimates that up to 40% of the Mekong Delta's total land area would be seasonally inundated (Tran Thuc et al. 2016). Rising sea levels will likely infiltrate groundwater aquifers and increase salinity gradients in large parts of the delta during the dry season months of January through May. Approximately 1.8 million ha of delta land will be subject to increased dry season salinity, including approximately 1.3 million ha by salinity levels above 5 g/l (Smajgl et al. 2015). Increased Mekong River discharge during the wet season could partially reverse these dynamics, seasonally reducing salinity concentrations. However, models also suggest that salinity intrusion will become more severe

with continued construction of dikes and upstream dams, in combination with expected sea-level rise and changes in rainfall patterns (Le Thuy Ngan et al. 2018; Smajgl et al. 2015).

Local sustainability challenges

While expanding the delta's agricultural productivity and contributing to economic growth, the technological and policy interventions described above have had potentially negative consequences for sustainability and social-ecological resilience by degrading natural resources, creating new risks and vulnerabilities, and narrowing available response options (Biggs 2010; Käkönen 2008; Le Thuy Ngan et al. 2018). Recent market reforms have encouraged not only commercialization, intensification, and diversification of farming, but also a concommittant increase in inequality, poverty, and landlessness, while providing economic incentives for environmental degradation, thereby creating opportunity for some but vulnerability for others (Adger, Kelly, et al. 2001; Luttrell 2002; Vien 2011). This is illustrated, for instance, in coastal areas where the presence of saline water and an explosion in the global price of shrimp since the 1980s drove large-scale mangrove destruction for aquaculture ponds, enclosing previously common-pool resources and resulting in biodiversity loss, exposure of acid-sulphate soils, and pollution, as well as entrapment in cycles of debt for many farmers (Garschagen et al. 2012; Luttrell 2002; Sterling, Hurley, and Minh 2006).

The transition from central planning to a market economy produced rapid growth for the increasingly agricultural export-oriented Vietnamese economy (Beresford 2001; Fforde and Vylder 1996), yet it also led to growing socioeconomic inequalities and social differentiation within Vietnam (Akram-Lodhi 2005; Le Coq and Trebuil 2005; Luong 2003; Taylor 2004). Those households that could afford or access the fixed capital, credit, and labor needed to invest in agricultural intensification were able to increase incomes and better weather risks and price

fluctuations. Yet the pace of capital accumulation has been unequal among farmers. Small-scale farmers have faced increasing difficulties securing a stable livelihood base and a minimum level of profitability in the face of rising input costs. Many have suffered losses, even to the point of landlessness (Garschagen et al. 2012; Taylor 2004). The expansion of aquaculture specifically has driven a sharp rise in landlessness as many farmers accumulate debts that can only be paid off by selling some or all of their land. Ethnic Khmer farmers are particularly susceptible to this pattern, as they make up a large proportion of the poor and landless, often working as hired laborers on others' farms or collecting natural aquatic resources to support their livelihoods (Garschagen et al. 2012; IUCN & VAWR 2016). Although the intensification of rice farming and the development of shrimp farms initially generated low-wage employment opportunities for landless laborers and farmers, this has declined in recent years due to growing mechanization (Lan 2011), and the poor and landless increasingly migrate to work in the industrial centers around HCMC (Garschagen et al. 2012).

The delta also faces ecosystem degradation including contamination of water resources with excess agrochemicals, disruption of nutrient replenishment, habitat destruction, and soil salinization (Fabres 2011; Garschagen et al. 2012; Sterling, Hurley, and Minh 2006), effects which challenge the livelihoods of local people as well as the resilience of the social-ecological system. Continuous cultivation of intensive rice without a fallow period has led to the degradation of soil fertility and even soil exhaustion (Can et al. 2007; IUCN & VAWR 2016; Tran and Weger 2018). It also requires heavy agrochemical use, including pesticides and fertilizers, with associated downstream effects on water resources and ecosystems (Beresford and Fraser 1992; IUCN & VAWR 2016). The conversion of natural wetlands into farmland, construction of dikes for flood control, and intensive use of agrochemicals have also resulted in a

substantial decrease in wild fish catch in the delta (Can et al. 2007; Garschagen et al. 2012; IUCN & VAWR 2016). Historically, the catch of wild fish and shrimp from rivers and canals was practiced all over the delta to support livelihoods and was an especially important source of income for poor and landless farmers (Ehlert 2012; Howie 2011).

The expansion and intensification of aquaculture production has been another source of habitat destruction and chemical pollution. Farmers are affected by this contamination particularly in the dry season when ponds are dredged, and waste mud is dumped directly into the canals. The expansion of intensive shrimp farming in the coastal zone has led to serious mangrove deforestation, an increase in the incidence of shrimp disease, water pollution, and soil degradation (Can et al. 2007). As large tracts of mangrove forest have been cleared and rice land converted to shrimp farming, soil and water resources have become increasingly salinized, often requiring deep drilling to access fresh groundwater (Can et al. 2007; Garschagen et al. 2012; Lan 2011; Sterling, Hurley, and Minh 2006). Moreover, intensive shrimp farming produces large amounts of effluent. If not carefully managed, it can infect neighboring shrimp ponds as well as mangrove ecosystems and breeding grounds for other species such as mollusks downstream (IUCN & VAWR 2016). As soil nutrients are depleted and the level of toxicity from chemical contaminants becomes too high, intensive shrimp ponds usually have to be abandoned after around 10 years (Garschagen et al. 2012).

The proliferation of small motors for water pumping has enabled localized water management efforts, which, uncoordinated and unregulated, can have negative environmental impacts as well. Private water pumping operations at wide scale contribute to declining groundwater levels, as 2.5 million cubic cm of water are withdrawn from the delta's aquifers daily, amplifying the effects of subsidence and salinity intrusion (Biggs 2012; Field et al. 2014;

Minderhoud et al. 2017; Nguyen et al. 2020; Smajgl et al. 2015). In some cases, excess groundwater extraction has even contributed to fires resulting from lowered water tables and arsenic poisoning from natural deposits (Biggs 2012).

Enabling the expansion and intensification of rice agriculture has been increasing human regulation of the hydrological regime through large-scale infrastructural works, which bring their own environment impacts and unintended consequences. Dike construction has reduced water retention capacity throughout the upper delta, as well as reducing sediment flows into fields, while displacing the destructive effects of floods onto downstream areas (Käkönen 2008; Le Thuy Ngan et al. 2018). Rice fields thus lose the benefits of flooding, such as limiting pests and disease, maintaining soil fertility, and rinsing away agrochemicals or salinity from fields (Le Thuy Ngan et al. 2018; Tran and Weger 2018). Furthermore, the large quantities of freshwater sourced from rivers for intensive rice farming in the coastal zone have worsened the effects of salinity intrusion, as fruit orchards and rice fields are affected as far inland as the central delta (Le Thuy Ngan et al. 2018; Nhan, Be, and Trung 2007). Not only seasonal floods but also the daily ebb and flow of tides historically carried clean water, fertile sediments, and native fish species through the delta's waterways (Biggs et al. 2009). As those water flows are obstructed by salinity control barriers such as sluice gates in in the coastal zone, the water becomes stagnant and polluted (White 2002).

Moreover, to remain effective, infrastructures require continuous maintenance, which is expensive (Biggs et al. 2009; Smajgl et al. 2015). The canal network must be constantly upgraded to protect it from damage caused by sedimentation and bank erosion (Evers and Benedikter 2009), and dikes and sluice gates must be maintained as well. Authors describe a powerful "hydraulic bureaucracy" (Evers and Benedikter 2009) that has grown around the

ubiquitous water management infrastructures, with strategic groups that compete for influence and resources, including engineering and construction firms that have a vested interest in the continuation of such projects (Benedikter and Waibel 2013; Benedikter 2014). With their constant need for maintenance, especially given the inherent variability of the delta's tropical hydrology and shifting topography, such projects threaten to become "works without end" (Biggs et al. 2009, 216). These factors lead Biggs et al. (2009, 222) to warn of "institutional and infrastructural path dependency" generated by the state and local authorities' reliance on large-scale construction projects and the firms that carry them out, making it "close to impossible to remedy the past transformations of the waterscape."

Upstream dam construction

There are currently eleven dams across the mainstream of the Upper Mekong River, in China, at least that many in operation on tributaries of the Mekong River in Laos, and a total of 200 planned, under construction, or completed in the Lower Mekong Basin countries of Laos, Cambodia, Thailand, and Vietnam, most of which are financed by China (Eyler 2019, 2020; Smajgl et al. 2015). While increased dry season releases from these dams could moderate salinity intrusion in the Mekong Delta, at the same time, reduced flows during the wet season could limit salt flushing (Smajgl et al. 2015). The precise outcomes of the complex combination of the effects of climate change on rainfall and evaporation, and those of upstream dams on seasonal flow patterns and river discharges, and the effect of all of these on salinity intrusion in the delta, are nearly impossible to predict. What seems certain is that they will disrupt the regular seasonality of hydrological conditions to which delta populations are accustomed (Eyler 2019).

Upstream interventions for hydroelectric power and irrigation development in the Mekong Basin could very well lead to reduced freshwater access for downstream areas (Le Thuy

Ngan et al. 2018; Nhan, Be, and Trung 2007). In fact, evidence suggests this has already occurred, when, in 2019, dry season river levels dropped to their lowest point in 100 years (Basist and Williams 2020; Eyler 2020; Lovgren 2019). Effects like this are likely to extend in both space and time the problems of freshwater shortage and salinity intrusion in the delta, when sea-level rise and changes in river discharge volumes are taken together (Le Thuy Ngan et al. 2018). Dam construction and other modifications of the river basin will also significantly restrict sediment transport and fish migrations, so necessary for the health, fertility, and long-term resilience of social-ecological systems throughout the basin (Smajgl et al. 2015; Eyler 2019). The effects of climate change and upstream hydropower development on the Mekong Delta combine to produce added pressure on rural households to adapt to environmental change (Keskinen et al. 2010; Tran, Pittock, and Tuan 2018; Smajgl et al. 2015). The task of preparing for and adjusting to these changes, where uncertainties are high, is quite complex.

Conclusion

The history of environmental change and development in the Mekong Delta is one of ongoing landscape transformation for the sake of agricultural expansion, particularly for rice cultivation. From the pre-colonial period to the present, this has been the driving motivation behind technological, institutional, and environmental changes. People's livelihoods have always been based on the delta's rich natural endowments, especially its abundance of water and fertile soils and relatively stable climate. Early on, humans adapted to this naturally "amphibious ecology" by living with regular floods, pulsing tides, and salinity incursions (Brocheux 1995; Ehlert 2012; Taylor 2014). But people have progressively modified the environment, and from the colonial period on, states have increasingly sought to control the delta's natural hydrological

dynamics in order to scale-up and intensify production (Benedikter 2014; Biggs 2010; Brocheux 1995; Can et al. 2007; Le Thuy Ngan et al. 2018). Such infrastructural attempts at control have led to new environmental problems and created path dependencies and vulnerabilities that challenge the capacity of this system—and individual farmers themselves—to adapt to changing conditions today (Biggs et al. 2009; Can et al. 2007; Käkönen 2008; Le Thuy Ngan et al. 2018; Smajgl et al. 2015; Tran and Weger 2018). Ironically, the very natural forces these interventions sought to restrict, such as floods, sediment transport, and water flow, are essential to the delta's ecological richness and agricultural productivity (Biggs 2010). Yet, at the same time, there have been countervailing tendencies towards decentralization, diversification, and exercises in local adaptation to challenging circumstances (Adger 2000a; Biggs 2005; Biggs et al. 2009), as farmers continue to remake the environment to suit their needs. These characteristics will be valuable for adapting to the environmental challenges the delta faces today and in the future. The next chapter turns now to address the role of Dutch actors and expertise in guiding climate change adaptation governance in Vietnam.

CHAPTER 3

THE PRIEST AND THE SALESMAN: PRODUCTION OF DUTCH DELTA EXPERTISE AND ITS TRANSLATION

> *"In the interminable polders the road-topped dykes and gleaming ditches intersect one another at right angles, a crisscross of perfect parallels. Each rectangle of juicy meadowland contained between the intersecting dykes has identically the same area…. Rolling along those smooth brick roads between the canals, one strains one's eye to count the dykes at right angles and parallel to one's own…. [Holland] is the rationalist's paradise."*
>
> – Aldous Huxley, "Views of Holland" (Huxley 2000[1925], 260-61)

> *"We're taking over the world, one delta at a time. Oh wait, I guess we kind of are."*
>
> – Dutch facilitator at a "Strategic Delta Planning" workshop in Ho Chi Minh City, Vietnam, October 2016.

Introduction

"No element is as intrinsic to the Dutch cultural identity as water," write Tracy Metz and Maartje van den Heuvel in the introduction to their 2012 coffee-table book *Sweet and Salt: Water and the Dutch* (2012, 9). The Dutch, they continue, "handle water ingeniously and with great know-how when they want to control, repel or guide it. They use it for profit, at sea or in the port that is the link between the maritime world and the economy in the hinterlands" (2012, 9). This special relationship to water, we are told, is essential to the national identity of Dutch people, with knowledge of how to manage it practically written into their DNA (Schuetze 2014). In the next paragraph, the authors describe how this relationship has recently become more important than ever:

> The know-how and technology with which the Low Countries have dealt with water have long been a source of wonder for the rest of the world. Now that the climate is changing… rivers are swelling; sea levels are rising. All eyes turn once again to the Dutch: how are they dealing with this? And what can the rest of the world learn from them? (2012, 9)

These passages reflect a common narrative about the Dutch relationship to water: that they have an exceptional gift for resisting and managing hydrological risks and manipulating water to their benefit. Today, with widespread concerns about climate change and rising sea levels, this experience is presented as a form of expertise "the Dutch" possess and are eager to share with the rest of the world.

This chapter interrogates the popular ideas reflected above: the origins of Dutch water management expertise; its relation to the country's culture and politics; shifting approaches to managing the country's watery landscape over time; and recent efforts to export this knowledge abroad, specifically to the Mekong Delta of Vietnam. The Netherlands has indeed been gaining attention for the country's longstanding expertise in water management, suddenly seen as highly valuable for other populous delta regions facing rising sea levels and heightened risk of floods, storm surges, coastal erosion, and other effects of a warming climate. A flurry of newspaper articles advertises Dutch expertise in this regard,[29] and coastal and delta planning projects around the world have been initiated with Dutch advisors at the helm.

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[29] See, e.g.: "The Dutch have solutions to rising seas. The world is watching," https://www.nytimes.com/interactive/2017/06/15/world/europe/climate-change-rotterdam.html?mcubz=2; "Awakening the 'Dutch gene' of water survival," https://www.nytimes.com/2014/06/30/world/europe/netherlands-water-management-system-global-climate-change-sea-level-rise-dutch-gene.html; "Lessons for U.S. from a flood-prone land," https://www.nytimes.com/2012/11/15/world/europe/netherlands-sets-model-of-flood-prevention.html; "Going with the flow," https://www.nytimes.com/2013/02/17/arts/design/flood-control-in-the-netherlands-now-allows-sea-water-in.html; "Dutch masters: the Netherlands exports flood-control expertise,"

In recent years, Dutch actors have developed a strategic approach to "delta management" in the context of climate change, building on the country's long and innovative history of water management. Taking advantage of opportunities presented by the changing climate, they have mobilized that knowledge and experience into a resource to be marketed, sold, and translated to diverse contexts worldwide, in order to assist other countries in adapting to climate change. They have created or are in process of creating plans for climate-resilient development in Vietnam, Bangladesh, Myanmar, Indonesia, Mozambique, and Colombia, and have sent advisors to New York City, Louisiana, and the Sacramento-San Joaquin Delta in California, among other locations. Yet adapting to climate change is a fundamentally political process (Javeline 2014; Eriksen, Nightingale, and Eakin 2015), for which decision-making is embedded in historical and cultural contexts (Nelson, West, and Finan 2009). In this case, where adaptation is directed in large part by actors from the Global North applying knowledge to influence socioeconomic development, governance, and transformations in the Global South, it raises important questions about the politics of knowledge and translation (Goldman, Turner, and Daly 2018; Nightingale et al. 2020; Taylor 2015; Weger 2019; Weisser et al. 2013).

This chapter is an attempt to answer the question, "*How do planners and policymakers in the Netherlands and Vietnam produce and translate knowledge about the effects of and appropriate responses to climate change in the Mekong Delta?*" I address this question first by considering how and why it is that Dutch expertise became so highly valued in the context of climate change and was then transported to international destinations such as the Mekong Delta. Along the way, I explore some of its lingering contradictions, challenges, and political

https://www.earthmagazine.org/article/dutch-masters-netherlands-exports-flood-control-expertise; all accessed October 4, 2020.

ramifications. The translation of this knowledge from the Netherlands to Vietnam cannot be divorced from the historical, cultural, and material contexts of its production—including those imaginaries and ideologies with which it is implicated, or the power imbalances driving its circulation and application. Such a process involves winners and losers, different ways of knowing, and ongoing contestations over meanings and values. Understanding these is essential to addressing questions of accountability, justice, and effective governance in climate change adaptation initiatives more broadly.

The research on which this chapter is based was conducted over a period from late 2014 to late 2017. Initial observations were made at the international conference *Deltas in Times of Climate Change II* in Rotterdam in September 2014, followed by a month of fieldwork in the Netherlands in August-September 2016. I engaged in participant observation at the Mekong Delta Forums of June 2016 and September 2017 in Vietnam, and a workshop on Strategic Delta Planning held in Ho Chi Minh City and the Mekong Delta in October 2016. Interview data are based on 34 semi-structured interviews with delta experts, planners, researchers, and officials in the Netherlands and Vietnam, which took place in offices, cafes, or occasionally over Skype, and typically in English.[30] In the Netherlands, I interviewed members of the Second Dutch Delta Committee, the Mekong Delta Plan (MDP) consortium and advisory team, as well as officials involved in promoting the Dutch water sector abroad. The purpose of these interviews was to understand the historical background of the Mekong Delta Plan, its creation, issues of disagreement or contestation that arose in the process and their resolution, and the sources of data and thinking upon which claims in the MDP were based, as well as the ongoing promotion

[30] Interviews with Dutch or other international actors were all conducted in English, while those with Vietnamese were mainly conducted in Vietnamese, but occasionally in English as appropriate depending on my interlocutor's level of comfort.

of Dutch expertise and the MDP itself. Gathering this data opened a window into the history, construction, and promotion of a so-called "Dutch Delta Approach." In what follows, I trace the history of Dutch expertise in water and delta management from its early formation to its expression in the Mekong Delta Plan and beyond, drawing on a combination of secondary literature, interviews, and participant observation, as well as newspaper articles, government websites, and official documents. More detailed analysis of Vietnamese actors' production, uptake, and translation of knowledge are explored in Chapter 4.

The chapter is divided into five sections. Following the introduction, I describe the historical co-production of Dutch water management expertise together with the country's physical environment and society, including elements of its political culture. The next section examines shifting approaches to water and delta management at the beginning of the twenty-first century, as the country sought to address the long-term impacts of climate change. The fourth section details the construction of the so-called "Dutch Delta Approach" and its translation and promotion via the Mekong Delta Plan and related activities. The chapter ends with a discussion of the politics of translation involved in these developments and implications for the governance of climate change adaptation in Vietnam and elsewhere. The names of a few relatively public figures have been used with their permission; all other names are pseudonyms.

The historical (co)production of Dutch water management expertise

Early history of the Netherlands and the "battle against water"

The Netherlands is situated in the combined deltas of three of Europe's major rivers—the Rhine, Meuse, and Scheldt—and without the protection of natural dunes and a vast system of dikes, dams, and canals, about 65% of its land area would be susceptible to regular flooding from

rivers and the sea (Wesselink et al. 2007). The so-called "battle against water" plays a central role in the historical memory of the Dutch population (Renes 2005), with nature, and especially water, seen as the "hereditary enemy" (Disco 2002, 208) that the Dutch hydraulic tradition sought to tame and control. Yet throughout this history, nature and society have continued to shape one another, in a process of co-production mediated by technology, science, and politics (Bijker 2002; Jasanoff 2004b).

Early landscape modifications to protect the land from floods and prepare it for agricultural use instigated a positive feedback loop of drainage efforts and ongoing subsidence that persists to this day. Early human settlers dug drainage ditches into the slopes of raised peat bogs, causing the land to subside as the peat dried out and oxidized, and a lack of flooding meant it was no longer replenished by new layers of sediment. As the sea level rose, large tracts of land were eventually washed away by massive floods, creating large estuaries and inland saltwater lakes. From the 12th century, drainage alone was insufficient to keep the land dry and dikes[31] were built to keep the water out, creating polders.[32] Sluice gates[33] were built to discharge excess water at low tide. By the 16th century, powerful windmills were developed to pump out water against gravity, enabling increasingly deep polders to be kept dry and ever lower land to be cultivated. Dikes were raised and reinforced as the sea continued to rise and the land subside (Arnold et al. 2011; Renes 2005; Wesselink et al. 2007), spurring a technological arms race against the ever-encroaching sea.

Such developments in physical infrastructure co-evolved with social institutions for water management, as ongoing land protection efforts required increasing planning and coordination.

[31] Dikes are human-made raised embankments or levees.
[32] Areas of land previously subject to high water levels, but which have been surrounded by a closed dike system.
[33] Gates for controlling the flow of water.

Early projects could be managed at the village level, but constructing and maintaining flood defenses required financial resources, technical knowledge, and organizational capacity of a larger scale and complexity (Wesselink et al. 2007). In the 12th century, villagers formed local water management committees, which eventually merged into the regional water boards (*waterschappen*) that still exist today. These councils were responsible for managing the collective action required for tasks such as drainage, dike maintenance, and sluice management, and are often presented as an early example of democratic governance (Arnold et al. 2011; Bijker 2002; de Vries and Wolsink 2009). By the 17th century, Dutch technical and organizational capacity extended to reclaiming lands taken by water, and inland lakes were drained and turned into polders. In the 19th century, materials like concrete and technologies such as the steam-driven pumping station enabled increasingly muscular and engineered means of keeping out the water (Arnold et al. 2011; Wesselink et al. 2007) (see Fig. 3.1). The largest projects were carried out by the powerful state organization Rijkswaterstaat. This agency became the primary water management authority in the country (Arnold et al. 2011; Bijker 2002; de Vries and Wolsink 2009; Wesselink et al. 2007), what Linsten (2002, 565) calls "the ruler of the Delta."[34] Land reclamation accelerated through the 19th and into the 20th century, helping drive growth in intensive agriculture, dairy farming, and urban development (Renes 2005).

[34] Today, Rijkswaterstaat is an agency under the Ministry of Infrastructure and Water Management, "responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands," including waterways, roads, and flood defenses ("About us: Rijkswaterstaat").

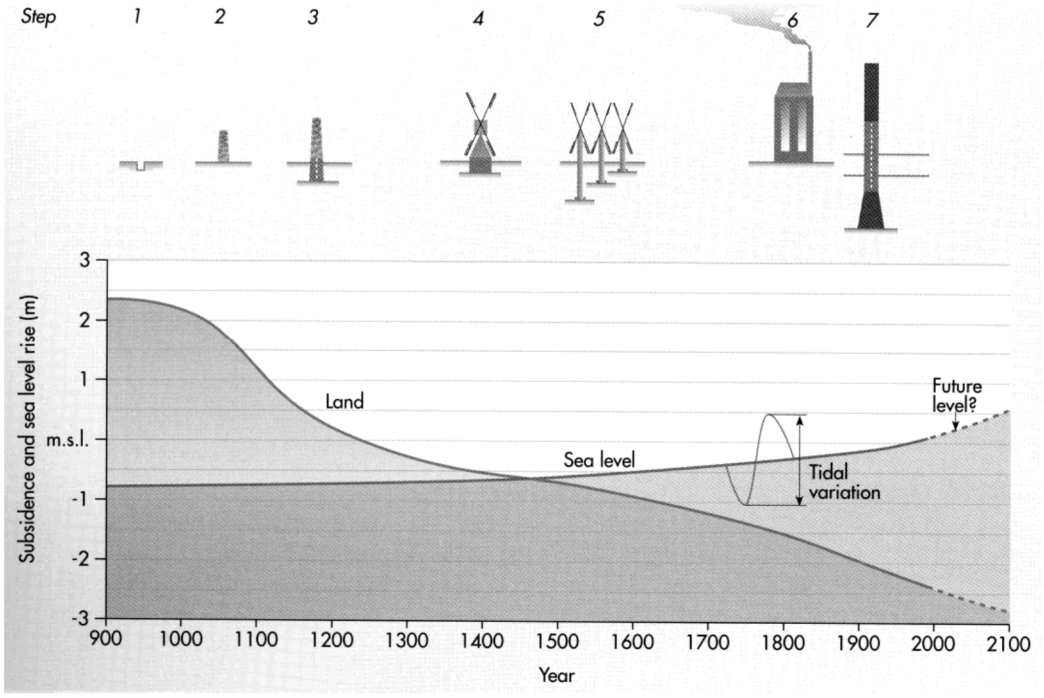

Figure 3.1 Evolution of water management technologies in the Netherlands. (Source: Huisman 1998)

During the Dutch Golden Age of the 17th century, itself fueled by the unsustainable exploitation of peat (Wesselink et al. 2007), the rise in international shipping and commerce enabled Dutch water management techniques to go global. Wetland reclamation became a major focus of land development across much of Europe, for the purpose of developing commercial, export-oriented agriculture. These activities were concentrated along rivers and coasts, areas that were within reach of maritime shipping routes and could be easily integrated into the Amsterdam-centered world system of the time (Renes 2005).[35]

By the 19th century, Dutch engineers no longer dominated such activities in Europe, but they continued exporting them to places like Indonesia, Japan, and elsewhere in Asia via colonial

[35] In a recent book, historian Kees Boterbloem (2020) has suggested that Dutch mercantilism of the early modern period may have been more ruthless and cynically opportunist than typically acknowledged, specifically through Dutch involvement in the global arms trade and perpetuation of international wars (see also Hart 2014). From a different angle, Cook (2007) argues that the expansion of Dutch mercantilism in the 17th century also facilitated the rise of global science in places where the Dutch engaged in trade and commerce.

and trade relations (Morita 2016; Renes 2005). Dutch water management technologies and engineering know-how became renowned, such that techniques initially developed in the Netherlands came to be implemented even in places not directly under Dutch authority, like Vietnam. Biggs (2010) notes that French colonial administrators followed the "Dutch dike" strategy of creating polders to enclose floodplains in the Mekong Delta, a trend followed by successive post-French colonial governments in Vietnam. Later, Dutch advisors were brought in to develop water management and agricultural development plans for the Mekong Delta: first in the early 1970s; again in the early 1990s (NEDECO 1993; van Staveren, van Tatenhove, and Warner 2017); and again, twenty years later, with the Mekong Delta Plan.[36]

The co-production of Dutch water management and political culture

In addition to generating specialized engineering knowledge, the Dutch experience with water management was formative for the development of the country's unique political culture. Indeed, scholars have argued that the historical narrative of a "battle against water" carries "considerable symbolic value for Dutch culture in general and its planning culture in particular" (de Vries and Wolsink 2009, 192). First, the "polder model" has been used to describe a pragmatic and cooperative approach to Dutch politics in arenas including labor negotiations, government policymaking, and the activities of NGOs. This is reflected in the verb *polderen*, or *to polder*, referring to the consensus-seeking negotiations for which the water boards are known and the Dutch officials I spoke with markedly proud. Pieter, a policy coordinator within the

[36] In the 1990s, the "Master Plan for the Mekong Delta in Viet Nam" was created by a Dutch consortium under the name NEDECO (Netherlands Engineering Consultants), led by the engineering company Haskoning (NEDECO 1993; van Staveren, van Tatenhove, and Warner 2017). This plan helped establish a network of Vietnamese students educated at Dutch universities like Wageningen and TU Delft, who would later return to Vietnam to help implement the development strategies promoted therein. Haskoning later merged with another Dutch engineering firm, DHV, to form Royal HaskoningDHV, which would go on to lead the consortium that published the Mekong Delta Plan.

International Water Unit of the Ministry of Infrastructure and Environment (MIE), vividly described the origins of the polder model:

> …we learned how to cooperate because we needed to, because the Dutch problem cannot be solved by one farmer… Where do I put the dike? Oh, it's not in your interest, so you need to be compensated… So we *poldered* until we reached an agreement. […] Polderen is the process of reaching an agreement [so] that all interests are taken into account and we find a middle ground.

The high value placed on compromise in Dutch political culture is driven by this general understanding that they must cooperate, or risk being flooded (Bijker 2002). Pieter continued: "It was a matter of life and death to reach an agreement… The problem must be solved because otherwise you drown! …but the final solution is not disputable, because it is something that needs to be done."

Second, through the project of keeping out the water for collective survival, Dutch culture developed a great deal of trust in the role of government in protecting its citizens. This helps explain the "traditionally large societal acceptance in the Netherlands of government intervention in general and in the physical environment in particular" (de Vries and Wolsink 2009, 192), where governmental responsibility for "keeping their feet dry" is enshrined even in the Constitution (de Vries and Wolsink 2009, 191). Tracy Metz, an American expatriate author and member of the Second Dutch Delta Committee, told me that, unlike countries such as the United States, where responsibility for flood protection is often left up to municipalities or individuals themselves, the Dutch tradition is "built on the conviction that keeping any dike, or group of people, safe from water has significance for the entire country… [It's] very much a

collective, governmental-driven thing." As Robert, one of the engineers involved in preparing the Mekong Delta Plan, put it:

> We still believe that together you can be stronger than alone… you could call it a cultural thing, but the way this country grew is about collaboration. Collaboration in water management. Building a dike together. Defending it together. Reinforcing it together. […] We are very risk aversive here in the Netherlands.

Water management, and especially flood protection, are considered public goods, for which people invest government institutions with the responsibility to minimize associated risks.

Third, water management figures centrally in the singularly technocratic character of Dutch political culture, which exhibits a high degree of confidence in technical solutions and the management system set up to maintain them (Bijker 2002; Wesselink et al. 2007). With its strong reliance on science and engineering, Dutch culture developed a faith that the physical environment could be forever molded to fit the demands of society (de Vries and Wolsink 2009), and that society itself was equally malleable (Bijker 2002). Policymakers, scientists, and engineers often appear to form a closely-knit community (Bijker 2002; Wesselink et al. 2007), and close collaboration between state agencies, private companies, and research institutes is normal. Pieter expressed this confidence clearly when he told me:

> There are no unsolvable water and climate problems. There just aren't. There is a technical water solution for everything. When we encounter problems in USA or Italy or Indonesia or Myanmar or Vietnam or the Netherlands, the biggest problem is how to make a plan, how to involve stakeholders.

Crafted by human labor over the centuries, the Dutch landscape itself is an expression of this culture, reflecting an aesthetic sensibility that privileges rationality and simplicity, as noted by

Aldous Huxley in the epigraph at the beginning this chapter (Huxley 2000[1925]; Metz and van den Heuvel 2012).[37] His description calls to mind Scott's (1998) notion of legibility, where designs for human settlement and agricultural production by the modern state have relied on simplifications "calculated to make the terrain, its products, and its workforce more legible—and hence manipulable—from above and from the center" (1998, 2). As the state became an agent of "homogenization, uniformity, grids, and heroic simplification" (1998, 8), Scott argues, these characteristics "quickly became a powerful aesthetic as well" (1998, 18), embodying an ideology of "high modernism": confidence in scientific and technological progress, expansion of production, mastery of nature, and "above all, the rational design of social order commensurate with the scientific understanding of natural laws" (1998, 4).

Sociotechnical imaginary and path-dependent delta trajectory

Just as aesthetic and ideological principles are embedded in the materiality of the Dutch landscape, water management projects have in turn reinforced a sense of nationalism grounded in the prospect of mastery over nature. Metz and van den Heuvel remark that "Dutch hydro-engineering of the late nineteenth, early twentieth century exudes an undeniable heroism" (2012, 285), and, echoing Pieter above, claim that there "seems to be no water problem for which the Netherlands doesn't have a technological solution" (2012, 29). Specialists and stakeholders from multiple domains unite around a shared faith in rational planning and the country's technical ability to tackle present and future challenges. Following Jasanoff and Kim (2009, 2015), I argue that these can be understood as constitutive of a Dutch sociotechnical imaginary, which would

[37] Visiting the country in the early 20th century, Huxley remarked that he felt a "special affection" for Holland, for the landscape "has all the qualities that make geometry so delightful"—its "simplicity and elegance, elimination of detail and the individual case, its insistence on generalities" (Huxley 2000[1925], 460).

become most visible with the construction of the Delta Works in the second half of the 20th century, but which continues to guide Dutch delta planning projects around the world today.

Jasanoff and Kim define sociotechnical imaginaries as "collectively held and performed visions of desirable futures (or of resistance against the undesirable)" (Jasanoff 2015, 19) that are "reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (Jasanoff and Kim 2009: 120). They can be understood as instruments of co-production, guiding the development of science and social order at the level of the nation-state, making it a useful concept for comparing across national cultures of science and technology policy (Jasanoff and Kim 2009; Meehan, Klenk, and Mendez 2018). Sociotechnical imaginaries carry ideas about acceptable risk and benefit and what constitutes the public good, and can help explain the exercise of state power in "the selection of development priorities, the allocation of funds, the investment in material infrastructures, and the acceptance or suppression of political dissent" (Jasanoff and Kim 2009, 123). By helping generate political will, widely held imaginaries get incorporated into scientific, technological, and political projects, reproducing hegemonic ideas and practices at the expense of others. They thus contribute to the shaping of development pathways (Leach, Scoones, and Stirling 2010) and are especially relevant for understanding trajectories of change in the highly engineered landscapes of many deltas (Biggs et al. 2009; Giosan et al. 2014; Renaud et al. 2013), where the interplay of past technological interventions with social and ecological processes has been described as producing distinctive yet often path-dependent "delta trajectories" (van Staveren and van Tatenhove 2016).

However, the heroism of the Dutch sociotechnical imaginary belies its responsibility for helping to generate such path dependency in the Dutch delta trajectory. For one thing, a logic of consensus is often depoliticizing, serving to erase differences of power, position, and opinion,

reinforce elite-dominated and scientifically-sanctioned rationalities, and eliminate the creative potential inherent in diversity and contestation (Cooke and Kothari 2001; Klenk and Meehan 2015; Scoones et al. 2020; Turnhout et al. 2020). In the field of Dutch water management, clashing professional or epistemic cultures often make achieving true consensus difficult, as the dominant engineering ethos tends to win out (de Vries and Wolsink 2009). Narrowing the pool of ideas, perspectives, and options contributes to this self-reinforcing path dependency. Secondly, the legacy of a "centuries-long threat from high water" creates a generalized sense of vulnerability in the Netherlands, leading citizens to defer to experts and their technologies of water control (Wesselink et al. 2007, 6). Yet the public emphasis on consensus and confidence in technical expertise simultaneously reinforces a popular belief that everything is under control, even while uncertainties remain, whether due to weaknesses in the current system (such as a backlog of needed dike repairs) or future climatic, economic, or other changes.

This gives rise to a situation that Wesselink refers to as one of both *technological* and *political lock-in* (Wesselink 2007; Wesselink et al. 2007). On the one hand, since the draining of the peatlands, infrastructure development and continued subsidence have gone hand-in-hand, such that only "ever increasing efforts can keep the system operational" (Wesselink et al. 2007, 6). On the other hand, the sense of complacency generated by a national narrative of triumph over water undermines the political will necessary for enhancing flood defenses (Wesselink 2007; Wesselink et al. 2007). Several of the those I interviewed pointed out that the average Dutch citizen has little awareness they are living much of their life below sea level: "Ask any citizen passing by if they know how important it is that we have dikes and dams… they'd say, what are you talking about?" All these factors contribute to a potentially unsustainable and maladaptive trajectory (Magnan et al. 2016), limiting options and constraining the flexibility

needed to adapt to an uncertain future. According to Wesselink and colleagues (2007, 7), "at any moment in history the Dutch had to live with the reminders of previous rational decisions with their bounded temporal planning horizons and limited knowledge of consequences. The present Dutch hydraulic socio-technical ensemble is the result, including its weaknesses. And in 1953 these weaknesses became apparent again."

1953 flood disaster and the Delta Works

Early in the morning of February 1, 1953, a strong north-westerly storm coincided with a spring tide, and sent the sea pouring through dikes and surging into the polders of the southwestern delta, inundating 200,000 hectares of farmland and flooding towns and villages across the province of Zeeland. Most people were asleep when it began. In one week, 1,835 people drowned, 72,000 had to be evacuated, and 750,000 were directly affected. More than 200,000 cows, horses, pigs, and other livestock died and over 47,000 buildings were damaged (Bijker 2002; Deltapark Neeltje Jans N.d.; Wesselink et al. 2007). The effects of the North Sea Flood were traumatic and long-lasting for the entire country. The event triggered construction of the Delta Works—the modern achievements of water control for which the country is now famous—and eventually led to a reckoning with ecological politics and renewal of the Dutch approach to water management built on the collaborative tradition established over the centuries.

Immediately, the Dutch government organized to prevent such a disaster in the future. The first Dutch Delta Committee was established to draft a plan for protecting the delta, with Rijkswaterstaat assigned to implement the resulting Delta Plan. The Committee's main proposal was to shorten the length of the coastline, following the principle that the strength of a defensive line is inversely proportional to its length. They recommended closing all tidal outlets in the estuary, except for the northern and southern waterways, to maintain access to the ports of

Rotterdam and Antwerp, where dikes would be strengthened. The Committee also proposed safety standards for all flood defense structures based on statistical parameters, which became law in the Flood Defenses Act of the 1960s (Arnold et al. 2011; Bijker 2002; Deltapark Neeltje Jans N.d.).[38] Because the Delta Project was such a huge undertaking, calling for structures beyond the technical capabilities of the hydraulic engineers at the time, it would be completed step-by-step over 25 years, with the most difficult projects last, in a process Rijkswaterstaat called the "Delta School" (Bijker 2002, 577). Engineers and research scientists worked closely together to develop new technologies appropriate for each site, and the following decades saw major new investments in coastal defenses and water management, with radical innovations in high-tech tools for building dikes, sluice gates, and storm surge barriers (Bijker 2002; Deltapark Neeltje Jans N.d.; Wesselink et al. 2007).

By the early 1970s, only the last and most difficult project remained—a barrier across the Oosterschelde, or Eastern Scheldt waterway, which had become increasingly controversial. Public opinion had begun shifting against closing off the channel to conserve the local ecology and fishing industry. If a solid barrier were built, the saltwater would become fresh and the water level stable, transforming the area's unique flora and fauna and forcing the fishing industry to relocate (Bijker 2002; Deltapark Neeltje Jans N.d.; Wesselink et al. 2007). The controversy pitted an alliance of fisherman, conservationists, and the first ecologists to work at Rijkswaterstaat against a public still traumatized by the memory of the 1953 disaster, and a fierce

[38] Defenses had to be designed to withstand all but the most extreme events. Dikes were to be raised and strengthened to reduce the probability of flooding in different parts of the country, based on qualitative assessments of the relative economic and safety importance of different areas. The resulting measurement is known as the "frequency of exceedance" and is based on the statistical probability that high water levels will exceed the design conditions of the flood defense structures, expressed as 1/n per year. For instance, the safety standard for the urban economic core of the country was set to one flood every 10,000 years, or a probability of 1/10000 (0.01% per year). The less populated agricultural southwest would be protected at 1/4000 (0.025% per year) and other areas at 1/2500 (0.08% per year) (Disco 2002; Wesselink et al. 2007). Once a standard was established for a given area, engineers could then calculate how high and strong barriers needed to be.

political debate was waged between those prioritizing either ecological or safety concerns. In late 1974, the government accepted a compromise solution: a partial closure that would be kept open most of the time but could be closed in the event of a large storm (Bijker 2002; Wesselink et al. 2007; Deltapark Neeltje Jans N.d.). After a period of highly charged political conflict, the barrier was finally opened in 1986, and the resulting Delta Works are now a symbol of national pride.

This event marked a turning point in the field of Dutch hydraulic engineering, hastening the emergence and consolidation of the field of integrated water management while nurturing a nascent ecomodernism. The solution to the Oosterschelde crisis was accomplished by bringing dredging and construction companies into the design process for the first time, in collaboration with state engineers, research scientists, and spatial planners, to seek a compromise that was acceptable to all (Bijker 2002; de Vries and Wolsink 2009; Wesselink et al. 2007). Whereas before, hydraulic engineering had been primarily concerned with flood protection, now economic and safety concerns had to be weighed against ecological ones (Bijker 2002).[39] This new approach "integrated" multiple disciplinary perspectives about the material characteristics of water systems with multi-stakeholder, multi-functional, and multi-level approaches to managing such systems (Disco 2002). As integrated water management became professionalized and institutionalized over the coming decades, it became part of an emerging "ecomodernist" paradigm: "always on the alert for win-win situations between the conflicting claims of modernizing economies and deteriorating nature" (Disco 2002, 232). While emphasizing "sustainability," Disco argues, this new approach carries with it the legacy of technocratic power,

[39]According to Bijker (2002), ecological issues were also translated into safety concerns, albeit at a larger scale. He credits the influence of the 1972 Club of Rome report *The Limits to Growth* with framing environmental politics in this way in the Netherlands at the time, by sending the message that allowing modern civilization to destroy the natural world would eventually bring widespread disaster.

organized around the "authoritarian expertise" of a new professional practice, and playing into nationalistic accounts of Dutch mastery over nature (2002, 233).

A turn to ecology and resilience in Dutch water management

The Oosterschelde controversy of the 1970s ushered in an ecological turn in Dutch water management, while expanding the field to accommodate diverse interests and objectives. One of the first new developments came in 1987 with "Plan Stork," a proposal by a group of landscape architects for combining flood protection with nature conservation. According to this vision, floodplains used for activities such as grazing or brick-making should be left to revert back to "original floodplain habitat," allowing more space for rivers to naturally overflow their banks and reducing the need for dike reinforcements (Wesselink et al. 2007, 10). However, as it conflicted with the dominant engineering approach and mandated safety standards, the plan achieved only limited implementation. Then, in the early 1990s, another shift occurred when the country experienced two near-flood events within two years, this time from swelling rivers instead of the sea. Robert described the significance of these events:

> We had two near disasters, or what we could call a near disaster. We had to evacuate at least 200,000 people with all their belongings, etc.—which, at our scale, it sort of felt like a loss, you know? I mean, we fight the floods and we somehow almost lost.

Those near misses brought back calls for increased safety and upgrading of flood defenses, but these were met with fierce resistance in some quarters. Metz explained:

> There was a huge amount of protest… many of the people living behind those dikes felt that that was only very technocratically-motivated, and… there would be a lot of people living behind a huge wall, basically.

These events prompted a realization that the flood defenses themselves could create a safety hazard, as dikes force the river water higher. Combining concerns with safety and ecology strengthened the view that more resilience in the system was needed (Wesselink et al. 2007).

One major influence on newly emerging initiatives at the time was the design philosophy "Building with Nature," developed and patented by Ronald Waterman, a polymath engineer-turned-politician for the province of South Holland (Waterman 2008). When I visited him at his home in Delft, Waterman explained its full title as, "integrated, multifunctional, sustainable coastal and delta zone development via building with nature," and explained it is targeted at "densely-populated coastal and delta zones, where there is a shortage of space for living, working, tourism, recreation, and infrastructure." Presenting it as a "revival of the great Dutch tradition" of water management, he said it can be used for either of two purposes: "coastal or delta extension, and safeguarding coasts and deltas; so, safety and space."[40] Yet, according to Waterman, the principle of "building with nature" should not be mistaken for a simple application of "green infrastructure." His approach is meant to be a holistic, integrated planning and engineering framework. In practice, however, the term has come to stand for something much more basic: what are often called "soft" engineering or "non-structural" measures, employing natural landscape features and materials, as contrasted with traditional "hard" structures like dams and barriers.

[40] Waterman's influence is widespread: a project manager for the Netherlands Water Partnership (NWP), described him as "the face of the Dutch water sector abroad." This influence can be explained in part by the fact that in addition to working as a scientist and then member of parliament for 33 years, Waterman was kept on as an advisor to the government of South Holland; he has worked as an advisor for the Ministry of Infrastructure and Environment and multiple research institutes in the Netherlands, as well as various ports, cities, and municipalities; has been a visiting lecturer at Dutch universities, and traveled extensively to consult on coastal and delta planning projects around the world. At his house in Delft, he showed me his garage floor covered with row upon row of briefcases packed with lecture notes and supplies for international speaking engagements; he was always ready to go in an instant. (See also: http://www.ronaldwaterman.com; https://www.youtube.com/watch?v=Yt6D3OPtKCI, accessed June 26, 2020.)

Under the influence of "Building with Nature," the water management community in the Netherlands adopted the core idea of "Plan Stork" and incorporated it into the national policy "Room for the River" in 1997 (Wesselink et al. 2007). This policy calls for widening river areas and restoring their ecological integrity by abandoning proposed developments in floodplains and removing or relocating dikes to allow for natural water storage, among other measures (de Vries and Wolsink 2009; Metz and van den Heuvel 2012; Wesselink et al. 2007; Zevenbergen et al. 2015). Around the same time, the slogan "Living with Water" was created, partly as a response to the emergence of climate change on the political agenda, and partly to expand the aims of water management beyond flood protection (de Vries and Wolsink 2009; Wesselink et al. 2007). Now, "enhancing spatial quality" became an added goal, to account for conservation, housing, recreation, and business activities. A national PR campaign was launched, encouraging the population to consider water as a "friend" rather than an enemy (Metz and van den Heuvel 2012; Wesselink et al. 2007). Yet in practice, the goal of multifunctional use and "spatial quality" remain ambiguous enough to be interpreted in numerous ways, allowing for easy appropriation by powerful real estate and business interests (Wesselink et al. 2007).

The ecological turn spurred by the Oosterschelde controversy was given added push by the two high water events in the 1990s and the growing debate over climate change, both of which encouraged resilience thinking over strict safety concerns. De Vries and Wolsink (2009) note in this shift a "spatializing" of water management: tighter coupling of water management with spatial planning, witnessed, for example, in wider-scale planning for water systems and water-related risks; policies aimed at expanding space for flood retention across the landscape; and calls to integrate water management with other forms of land use and development. Encouraging a broader ambit for water management, it has emerged together with a discourse

advocating adaptation or resilience to floods. This trend sits uneasily with the older technocratic paradigm of control, reflected in large-scale infrastructures and out-of-date safety standards (de Vries and Wolsink 2009; Wesselink et al. 2007) and the locked-in trajectory they fortify. Today, as climate change scenarios predict heightened flood-risks from rising seas and larger river discharges amidst a range of uncertainties (Arnold et al. 2011; Wesselink et al. 2007), a tension exists between the path dependency of the current delta trajectory and newer imaginaries that envision more flexible and adaptive pathways.

Climate Change and the Second Dutch Delta Committee

Hurricane Katrina, in 2005, was widely seen as a "wake-up call" in the Netherlands, dramatically highlighting the vulnerability of densely populated delta areas to the effects of a warming climate.[41] With economic damage estimated at $27 billion (Deltacommissie 2008), Katrina underscored for the Dutch the importance of planning for a climate changed future. By the end of 2007, the government commissioned a new Delta Committee chaired by a former Minister of Agriculture, Cees Veerman. The Committee's mandate was to come up with recommendations to protect the country from the impacts of climate change, which it interpreted as involving both water safety and sustainable development, with a 100-year view towards the future (Deltacommissie 2008). Whereas previous water management initiatives had occurred in response to local events, this was the first to anticipate future ones based on climate change modelling (Zegwaard 2016).

[41] It remains difficult to attribute the cause of a single extreme weather event to anthropogenic climate change alone, as countless other factors are constantly at play. However, physical understanding of the climate system suggests that higher atmospheric and sea-surface temperatures should drive an increase in the magnitude of tropical cyclones such as hurricanes (NASEM 2016), and in recent years evidence of an increased proportion of major storms (Category 3-5) and, especially, human influence on their increase, has strengthened (Masson-Delmotte et al. 2021).

In September 2008, the Committee released its final report, *Working together with water: A living land builds for its future* (Deltacommissie 2008), which proposed 12 key recommendations for managing the Dutch delta. The report was warmly received by the media and political establishment, and the government accepted all of its major recommendations (Verduijn, Meijerink, and Leroy 2012), among them the establishment of a so-called *Delta Program* for elaborating and implementing their recommendations and directed by a specially-appointed *Delta Commissioner*. Drawing together people, knowledge, and resources from across the country's water governance system, the Delta Program aims to develop integrated climate proofing solutions for the country over the short and long-term. These should lead to the identification of investments to be financed by a *Delta Fund*, with a budget of around 1 billion euros per year set aside for the coming decades.[42] As Robert put it, "that is ensuring continuity in a system that we consider vital to the existence of the country." Yet some worry the Delta Program represents too much continuity in the way water management is done in the Netherlands (Seijger et al. 2017), unable to escape the lock-in fixed by 800 years of fighting against water and the encroaching sea. For example, the Committee's first recommendation was that the flood protection standards "of all diked areas must be raised by a factor of 10" (Deltacommissie 2008, 12). With the Delta Committee and Delta Program, the "delta" was made to stand for not just the southwestern delta that was the focus of the Delta Works, but more broadly for the entirety of the watery country (Zegwaard 2016). In the words of a researcher from the IHE Delft Institute for Water Education: "Here in the Dutch delta, everything is developed and well-protected. All we

[42] See https://www.government.nl/topics/delta-programme/organisation-of-the-delta-programme, accessed July 7, 2020.

want is to secure it as it is." But, he cautioned, it is "not really innovative… the really strategic choices… are now already long gone off the table."[43]

Beyond its concrete recommendations, the Committee succeeded in raising public and political awareness of the urgency of climate risks to the Dutch delta, helping legitimize adaptation on the national policy agenda (Verduijn, Meijerink, and Leroy 2012; Zegwaard, Petersen, and Wester 2014).[44] One of the most significant outcomes of the Committee's report was that it re-framed the ways in which water problems in the Netherlands are understood: through the lens of climate adaptation and re-scaled to the wider "delta" region as a whole and a long-term time horizon. The perceived spatial and temporal dimensions of local water problems and proposed solutions were stretched through the prism of long-term change in the delta social-ecological system (Zegwaard, Petersen, and Wester 2014). Climate change itself was framed as just one of multiple drivers of uncertainty to be "adaptively" managed—that is, rationally and over a long time—for which tools were being actively developed (Zegwaard, Petersen, and Wester 2014).

With the second Dutch Delta Committee and resulting Delta Program, water management and climate change adaptation became increasingly subsumed within the emerging logic of "delta management." This has helped to relegitimize the Dutch state through the fresh embrace of a national science and technology project (Jasanoff 2004b; Jasanoff and Kim 2015) and to reposition it internationally as the vanguard of climate adaptation in delta regions. As Stefan, a Dutch diplomat based in Hanoi, remarked in discussing his country's progress in water and delta

[43] Presumably he was referring to spatial planning options less dependent on hard infrastructure, such as those adhering more closely to the "building with nature" approach described above.
[44] As with "keeping their feet dry," government responsibility to act on climate change in the Netherlands is often presented as a "duty of care" for its citizens, as well as for the ways in which the country can be a role model for others (Dirikx and Gelders 2010; Schwartz 2019).

management: “many of these ideas have also been developed elsewhere and we’ve borrowed from that… [but] in the Netherlands through the Dutch Delta Program, we have taken it a step further.” The challenges posed by climate change, Metz and van den Heuvel write, have inspired a new generation of “designers, public officials, engineers and water administrators” in the Netherlands to come together, producing “an unending flood of ideas and designs for the future of the delta” (2011, 33). Guided by technocratic confidence in the nation’s ability to control an unruly nature and rooted in the collective narrative of the country’s age-old battle against the sea, the Dutch sociotechnical imaginary has expanded to consolidate a vision of sustainable delta management in the face of climate change. Almost immediately, government leaders decided this new approach was worth exporting. According to Wesselink (2007, 2), the messages “communicated by the Dutch water management community, including government ministries, engineering companies, the scientific community, and even the royal family… both at home and on visits to flood-prone areas such as New Orleans, [were]…: ‘We have everything under control, our land is protected from flooding by the large engineering structures of the Delta works (and we’d like to sell you the know how)’.”

Seizing the Opportunity: Constructing the “Dutch Delta Approach” and exporting it abroad

Problematizing delta vulnerability to climate change

Hurricane Katrina and the attendant identification of delta areas with vulnerability to climate change defined a problem space that the emerging Dutch delta management apparatus was more than willing to fill. Now that “water management” had been reconfigured as “delta

management," the country turned to exporting this broader, integrated framework of delta expertise. As Pieter from the Ministry of Infrastructure and Environment (MIE) put it:

> [We] boast that we have a very prosperous and safe delta, and we look at other deltas in the world, which are essentially very promising… where a lot of prosperity could be, but looking at Bangladesh, Vietnam, Myanmar… Colombia or Egypt or Mozambique, they're poor deltas. […] We think… we have quite an innovative approach… and all the knowledge that we have developed here, we export it, try to use it in… the Delta Plans that we make abroad.

Like the Delta Committee's report, scientific assessments were increasingly noting the complex vulnerability of delta regions to the effects of climate change, particularly due to sea-level rise and increasing variability of river discharge volumes. For example, the IPCC Fourth Assessment Report in 2007 included a special section on the vulnerability of large and population-dense *megadeltas*, due to heightened risks from floods, storm surges, coastal erosion, and land loss as a result of both sea-level rise and human modifications to the landscape (IPCC 2007). Such reports stress that the effects of sea-level rise are amplified by low-lying topography, ongoing subsidence, and extensive infrastructure and urban development, undermining delta sustainability and directly affecting millions of people around the world (Bucx et al. 2010; Foufoula-Georgiou et al. 2013; Giosan et al. 2014; IPCC 2007; Kuenzer and Renaud 2012; Renaud et al. 2013; Renaud, Szabo, and Matthews 2016).

Many of the Dutch experts I spoke to emphasized, on the one hand, the appeal of delta areas for human habitation, and their inherent precariousness on the other. As one of the authors of a report comparing the vulnerability and resilience of 10 deltas globally (Bucx et al. 2010) explained: "Deltas are… very fertile and very nice to live in, and that's why they attract a lot of

people. But they can also have a lot of hazards and adverse conditions. In order to stay there and do what we want, we invest a lot in our infrastructure to keep… the hazards out, [so] that we can keep living there." Describing the characteristics of deltas and pressures they currently face, the report presents a "scorecard" on which various deltas are evaluated according to a set of standardized indicators including natural resources, land and water use, infrastructure, and governance (Bucx et al. 2010). It thereby establishes an equivalence between deltas that renders them amenable to the same frames of analysis and recommended adaptation measures, while allowing them to be ranked according to degree of "need." The Mekong Delta was repeatedly identified by my interlocutors as one of most vulnerable in the world to the effects of sea-level rise due to its low-lying topography, high population density, reliance on agriculture, and the combined effect of local and upstream demands on land and water resources, justifying it as a prime candidate for experimentation with the Dutch approach to delta management.[45] As the problem of delta vulnerability to climate change was being defined, the relevant knowledge needed to solve the problem was simultaneously identified in the form of Dutch delta management expertise.

Constructing the "Dutch Delta Approach"

Building on the country's legacy of water management, and following the experience of the Second Delta Committee, Dutch actors promptly assembled a framework for planning and managing deltas *in general* in response to climate change. Participating actors in the scientific, business, and policy communities helped to stabilize this emerging body of knowledge, which came to be known as the "Dutch Delta Approach" (DDA), through their mutual enrollment and adherence to a set of conceptual principles, scientific studies, and methodological tools. Key

[45] Interviewees often referenced a 2007 World Bank report that listed Vietnam as one of the top five countries in the world most vulnerable to sea-level rise, largely due to its two major delta regions (Dasgupta et al. 2007).

components include an "integrated" approach, "strategic" planning with the use of scenarios, and adaptive management.

First, like its precursors "Building with Nature" and "Room for the River," the DDA is based on a holistic, integrated approach to knowledge and planning to accommodate multiple land uses, policy sectors, and stakeholder groups. Similar to approaches such as integrated water management, integrated river basin management, or integrated coastal zone management, the adjective "integrated" here suggests both a reorientation of planning and management to a wider spatial scale and encourages coordination across functional uses and sectors (Seijger et al. 2017; Zegwaard 2016). Waterman, the father of Building with Nature, described an "integrated" approach to me as one that aims to solve problems in relation to one another, while taking account of spatial relationships and using multiple disciplinary perspectives, to create "added value." Emphasizing the spatial dimension of integrated planning, some noted that it is about thinking of the delta itself as a coherent entity. According to a researcher from Deltares, a Dutch research institute focused on delta issues, often "governments do not think of a delta as a uniform management entity." He continued:

> If you look for instance at Vietnam… Provinces do not think about what the impact of their plans is on the downstream, other provinces… Then suddenly you have coastal erosion, and everybody is, Oh my God, coastal erosion! What happened? …But they don't look at the real origin of the problem.

Others stressed that an integrated approach brings together different levels of governance and stakeholder groups. As another researcher from Deltares commented, "to implement interventions in a perfect way, you need to address the governance aspects, the institutions, the

financing… You need to bring more stakeholders to the table… That's something the Netherlands has to offer to integrated approaches."

Second, the framework employs strategic planning with the use of scenarios, making the delta appear governable in both space and time, by subsuming anticipated yet still uncertain effects of climatic and socioeconomic changes to the rationality of modeling and decision-support tools. Drawing on strategic spatial planning for urban and regional development, strategic planning here involves a deliberate process of changing thinking and institutions through the development of a long-term vision and its means of implementation, i.e., the identification of investment priorities (Friedmann et al. 2004; Healey 2009; Seijger et al. 2017; Seijger, Halsema, and Korbee 2019). Scenario planning is the primary method used here. Initially developed by Herman Kahn, RAND Corporation strategist and founder of the conservative American think-tank the Hudson Institute, and later adopted and refined for the private sector by Pierre Wack at Royal Dutch Shell, scenario planning is a forecasting technique that seeks to go beyond mere prediction to account for the irreducible uncertainty of the future by accounting for multiple possible future worlds in decision-making processes in the present (Cooper 2010; Faubion 2019; Samimian-Darash 2021).[46] Today scenario planning is commonly deployed as a long-term planning and risk-analysis tool across a range of sectors, including military strategy, finance, climate, energy, and epidemiology, especially by those institutions "with a vested interest in world systemic events" (Cooper 2010, 171).

[46] While Kahn is generally considered the father of scenario planning, Wack is often credited as its spiritual guru (Faubion 2019; Samimian-Darash 2021). Kahn was influenced by such Cold War-era strategic planning frameworks as game theory, cybernetics, and systems theory (Faubion 2019), and is credited with coming up with the nuclear strategy of MAD (mutually assured destruction), but by moving away from their equilibrium assumptions to embrace a more open-ended uncertainty, scenario planning might be understood as a complement to the modeling of complex adaptive systems in the natural sciences; hence its adoption by the IPCC to model climate change futures (Cooper 2010). Wack's ambition was precisely to change how managers think about and envision the future, by bringing uncertainty to the heart of decision-making as "a form of thinking, experiencing and acting" (Samimian-Darash 2021, 20), so as to come up with new, hitherto unthinkable strategic solutions.

In the Dutch Delta Approach, scenario planning is employed as a collective visioning exercise wherein participants create quadrants divided by axes representing major drivers of uncertainty, and then imagine plausible scenarios for each by projecting out to alternative future states. For the Dutch Delta Program, climate change was placed on one axis and socioeconomic growth on the other, generating scenarios based on the outcomes of either high or low growth, and moderate or rapid climate change (see Fig. 3.2). The four scenarios are then used to identify responsible investments through a process of "back-casting" from imagined futures to the present. Rather than selecting a single end-goal, the idea is to consider multiple possible futures to make decisions in the short term that are advantageous—or at least not disadvantageous, in a cost/benefit estimation—regardless of whichever future unfolds. Ellen, a researcher from

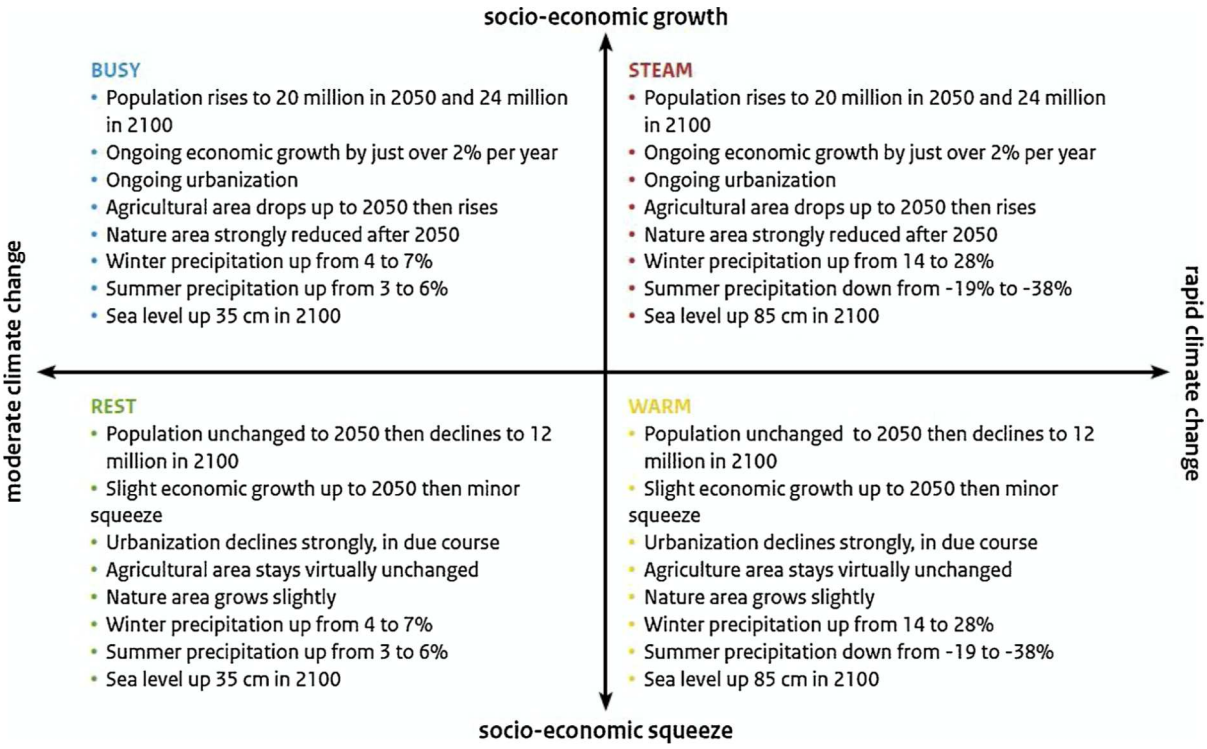

Figure 3.2 Scenarios used in the Dutch Delta Program. (Source: Zegwaard et al. 2019)

Deltares, contrasted this method with traditional planning:

> [U]sually you take one projection or maybe you deviate a little bit from that and based on this projection, you make your decisions. The key aspect of this is that you're using multiple, you're saying we cannot predict, [instead we are] using multiple different futures to stress-test our strategies… to identify the short-term "no regrets."

"No regrets" refers to development choices and investment decisions for which benefits are estimated to outweigh the costs regardless of future scenario. According to Viktor, "they need to fit in all or most of the scenarios, because you don't know in the end where you go. You cannot be one hundred percent certain." Or, as Ellen put it: "The idea is to think ahead… what can we implement without any regrets for over 50 years no matter what the future will be?"

As a strategic planning tool, scenarios are used to support policymaking under conditions of deep uncertainty.[47] They are often used together with "adaptation pathways," developed largely by Marjolijn Haasnoot (Haasnoot et al. 2012; 2013), another Deltares researcher, which describe a sequence of policy and planning options over time given various uncertainties, objectives, and future scenarios, in order to facilitate robust decision-making. Mathematical and computer modeling allow these to then be mapped onto a decision-tree or "route map" to identify when "tipping points" or "sell-by dates"—moments when conditions have changed such that alternative policies must be implemented—are likely to occur (Eisenhauer 2016; Marchand and Ludwig 2014). Whereas earlier Dutch approaches to water management had translated historical events into norms via statistical probabilities, the new approach is invested in future-making with

[47] Whereas common lay use and understanding of "uncertainty" tends to equate it with ignorance or lack of knowledge, scientific understanding of uncertainty generally refers to a range of possible outcomes where probabilities for each can be reliably estimated (see, e.g., Footnote 38 about flood safety standards in the Netherlands). "Deep uncertainty," however, refers to complex situations where it is impossible to reliably assign a probability distribution based on past frequencies.

the scenario planning methodology (Zegwaard 2016; Zegwaard et al. 2019). While the integrated approach generates the spatial scale of delta management, constructing the delta as a coherent object of governance, strategic planning establishes the temporal dimension, extending it into a projected long-term future.

The third element in this body of knowledge unites the above integrated and strategic planning approaches with theories of adaptive management for social-ecological resilience (Folke et al. 2005; Nelson, Adger, and Brown 2007; Pahl-Wostl 2009; Tompkins and Adger 2004). This perspective, which has seen an explosion of interest over the past two to three decades, applies concepts from ecosystems ecology for understanding and managing dynamics of disturbance, reorganization, and stabilization in conjoined social-ecological systems (Adger 2000b; Folke 2006; Orr, Lansing, and Dove 2015). The resulting Adaptive Delta Management (ADM) framework, largely developed in the office of the Delta Commissioner as part of the Delta Program (Marchand and Ludwig 2014; Zevenbergen et al. 2013; 2015) and refined through Dutch delta planning activities abroad, emphasizes the importance of recursive learning processes. A report from the Delta Alliance defines ADM as:

> a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reduce uncertainty over time via system monitoring… The Dutch Delta Program formulates Adaptive Delta Management (ADM) as phased decision-making that takes uncertain long-term developments into account… [It] encourages an integrated and flexible approach to land and water management with [the] aim to reduce vulnerability [and] limit the risk of over- or underinvestment in future challenges such as flood risk management and freshwater supplies. (Marchand and Ludwig 2014, 2)

According to Zevenbergen et al. (2013, 1222), ADM "promotes 'opportunistic adaptation' (incorporation of adaptation into urban renewal, regeneration or development and other shorter-term responses) and 'mainstreaming adaptation' (uptake of knowledge into longer-term planning and policy processes)." Framing it as "typically Dutch," the official Delta Program website asserts, "the government is taking the right steps at exactly the right time. Moving along with the developments where possible, adjusting course when required."[48] Adaptive Delta Management thus aims to rationally, flexibly, and iteratively (with learning and revision) manage uncertainty and change in delta regions along a sustainable, climate-resilient path.

Together, these components were packaged as the "Dutch Delta Approach," a brand ready-made for export. A brochure with this title published by the Dutch government in 2014 describes "12 building blocks for a delta approach" and the "preconditions for sustainable delta management," with examples of 10 deltas worldwide where Dutch advisors are engaged in delta planning (Weger 2019; Zegwaard et al. 2019). Highlighting the deliberate branding at work, Minkman and van Buuren (2019, 114) write, "The 'Dutch Delta Approach' (DDA) became an international label, used by Dutch experts to share not only ideas and knowledge about delta planning, such as the legacy of ADM, but also its underlying values (solidarity, flexibility, and sustainability), and technological innovations."

Promoting Dutch expertise, romancing Vietnam

Targeting Vietnam as the first international destination for the "Dutch Delta Approach," Dutch actors promoted this body of knowledge through activities aimed at aligning Vietnamese partners with the political and economic interests of the Dutch state, by building on the infrastructure already laid down by international activities of the Dutch water sector. According

[48] https://english.deltaprogramma.nl/delta-programme/question-and-answer/on-what-is-the-delta-programme-based; https://english.deltaprogramma.nl/delta-programme/the-approach, accessed October 26, 2020.

to Viktor, "every large project worldwide that has to do with water had Dutch engineers involved. The airport in Hong Kong, the Palm Island[49], Suez Canal, Panama Canal… name it, worldwide, the Dutch are there if it's water." This work has been profitable; Dutch export of water knowledge and technology totals over $9 billion per year (Corder 2017; Dutch Water Sector 2020). Water is central to the country's foreign policy, a fact reflected in the personnel staffing their embassies abroad. For example, Dutch embassies in Vietnam and several other countries include a position known as "First Secretary for Water and Climate" in a high-level diplomatic role.[50] Describing the country's interest in exporting water knowledge, Robert was explicit that it is about "economic policy. Promoting that we're good at water… [E]specially our big contractors… the dredgers, they need to have their work all over the world… that is keeping the Dutch as the country where you need to be if you need water knowledge."[51]

Beginning in 2008, the Ministry of Infrastructure and Environment's "Global Water Program" (GWP), facilitated a shift to cooperation with delta regions. According to Viktor, the former coordinator of the GWP: "at that time, we'd just established Deltares, which is a merger of all the research institutes in Holland related to delta management, and then we said, okay, we are experts in delta management, so let's focus our international cooperation on other deltas in the world." As noted above, Vietnam's Mekong Delta was considered one of the most climate-threatened due to the risks associated with sea-level rise, so it was considered a logical place to

[49] An artificial island in the shape of a palm tree off the coast of Dubai, United Arab Emirates.
[50] The specific history of these positions is a topic I intend to study in further detail in the future.
[51] International water sector activities are typically coordinated through the Netherlands Water Partnership (NWP), a public-private networking organization that works with the Dutch government to execute the program "Partners for Water," a "policy on sharing water knowledge and positioning Dutch knowledge worldwide," according to one NWP project manager. The NWP aims to connect Dutch "knowledge institutes and universities, consultants, suppliers of stuff—pumps, materials—and NGOs," to opportunities in foreign markets. The Netherlands Enterprise Agency (RVO) then helps to operationalize these opportunities by executing tenders and providing subsidies, financing, and other support to Dutch companies and organizations.

start. Its importance as a center of agricultural production strengthened this choice.[52] Within this context, bilateral cooperation with Vietnam was funded as part of the Dutch government's "Aid-to-Trade" agenda, a policy of foreign development support in which aid projects are expected to transform into trade relations (Bakker, Kishimoto, and Nooy 2017), established largely in response to the 2008 financial crisis as an effort to make development assistance more commercially advantageous for the Dutch state (Büscher 2019). The initial aim was "to expand the commercial market share for our… engineering companies in Vietnam," Viktor said. "Everybody more or less said, alright, in five years we will start profiting from this. But now it's five years later and it's not happening." He elaborated:

> Dutch engineers are really expensive… The only reason they involved the Dutch engineers is because we have the quality label. […] I think… we should just acknowledge that… the real value of that is just in Holland branding. Not only water, but also agriculture, transportation, core development, the spinoff is much wider than the direct investment in any delta.

The idea was that promoting Dutch knowledge now could lead to commercial opportunities for Dutch companies later—in water, construction, and agriculture.

Most people I spoke with made clear that knowledge-sharing and business interests should work together. Herman, another advisor for the MDP, said they call this "the triangle": "government-to-government, knowledge-to-knowledge, business-to-business. Our education, and the funding by the government, promotes that we transfer knowledge. But of course, we are merchants, so we also would like to have some business from them." Pieter, from the Ministry of

[52] Agriculture is another major area of Dutch strategic expertise and market interest, as the small country is the second-largest exporter of agricultural goods in the world (behind the US) in terms of export revenue. It is known for its high-tech, high yielding, "sustainable" agricultural methods, in which Wageningen University is a world leader.

Infrastructure and Environment, described this as a "very Dutch" approach: "the priest and the salesman—a bit of preaching but also a bit of, we want to help you, but we also want to earn money." Because short-term profits are likely to be low, knowledge export was emphasized as part of a longer-term strategy of branding Dutch expertise. As Stefan put it, "we have to be realistic that our strength is in our knowledge base, and in our consulting." No longer restricted to water management, the broader field of delta management, according to Robert, spans "from hydraulics, dike engineering, river engineering, coastal engineering to the governance issues."

High-level visits by Vietnamese leaders to the Netherlands and vice versa opened the door for bilateral discussions about cooperation in delta management and helped create demand in Vietnam for Dutch expertise. By turns, the Vietnamese prime minister, deputy prime ministers, and other policymakers were invited to witness firsthand Dutch achievements in water and delta management. Dutch officials also traveled to Vietnam, including the prime minister and then-crown prince and now king of the Netherlands, Willem-Alexander. Before becoming king, in 2013, he was appointed as a kind of "special water manager of the Netherlands," Robert told me: "We used him as a sort of promoter for Dutch activities in water."

In 2009, the two countries signed a memorandum of understanding that established Veerman, the chairman of the Dutch Delta Committee, as special advisor to the Vietnamese prime minister on water management affairs—described by Robert as a "political trick to keep us somehow involved and having some influence in Vietnam." These discussions established that the Vietnamese wanted to do something similar as the Dutch that would, in the words of Wim, one of the main authors of the MDP, have "political clout." In 2010, the prime ministers of both countries signed a "Strategic Partnership Arrangement" (SPA) for long-term collaboration in water management and climate change, laying the groundwork for the Mekong Delta Plan. The

SPA affirmed that the two countries aim "to strengthen bilateral cooperation, knowledge exchange and capacity building" in fields including climate change adaptation, land and water management, and governance. By showcasing Dutch achievements and promoting the DDA, Dutch actors sought to create demand for their product, a strategy Seijger et al. (2017, 1489) euphemistically referred to as "negotiating consent": raising "awareness and appreciation" that "the integrated and congruent approach" of Dutch delta planning is "needed to come to a more desirable future for the delta."

The SPA also established higher education and research partnerships, funding research centers at Vietnamese universities, and offering scholarships to Vietnamese graduate students to study at Dutch universities and carry out research in Vietnam.[53] By training students who will go back to their home countries to continue disseminating the knowledge they gained, these programs aim "to bring knowledge from the Netherlands… to developing countries," according to an MDP contributor from Deltares. As Pieter put it, "We try to have the students that will go to the ministries in a few years." Much of this strategy is motivated by a concern for brand reputation as a long-term investment. "We are a small country," Viktor explained,

> but everybody in the Mekong Delta knows Holland, and the young people that want to study water management, or agriculture, they want to do it in Holland. And in 20 years, those young people will be the new leaders in Vietnam. And I think if they know Holland, and they see the good, and we have a good reputation, there will be spinoff in terms of trade, but it will take time.

[53] My own host institute in Vietnam, the Center for Water Management and Climate Change (WACC), for example, was established in 2012 with Dutch funding, from a grant of 2.5 million euros to Vietnam National University in Ho Chi Minh City. The Dutch project director who worked closely with WACC in its early days was also one of the primary authors of the Mekong Delta Plan.

These activities aim to build research and development capacity in Vietnam that is linked to (or reliant on) Dutch knowledge and largesse by training students, researchers, and future leaders.

At the same time as capacity building projects were introduced, a consortium of Dutch and Vietnamese actors was coming together to translate the Dutch experience to Vietnam. Once the SPA was signed, the Dutch government issued a tender for proposals from Dutch companies and knowledge institutes to work on the Plan. Engineering firm Royal HaskoningDHV won the bid to lead the consortium; other members included representatives from Wageningen University, Deltares, and Rebel Group financial consultancy, and Viktor (formerly of the Global Water Partnership) stepped into the role of Chief Technical Advisor. Providing supervisory guidance was a group of Dutch "strategic advisors" led by Veerman, mostly former members of the Dutch Delta Committee. The main partner on the Vietnamese side was the Ministry of Natural Resources and Environment (MONRE),[54] with the Ministry of Agriculture and Rural Development (MARD)[55] in a supporting role. The whole process was to be overseen by a steering committee chaired by the Vietnamese prime minister and consisting of the heads of several government ministries, "to act as a counterpart to the Delta Committee," according to Wim. However, as I discuss below, the process was fraught with tensions and misunderstandings from the start, starkly highlighting the politics of translation at work in efforts to draft a Delta Plan for Vietnam modeled on the Dutch experience.

The DDA in action: creating and mobilizing the Mekong Delta Plan

The first steps towards formulating the MDP began in late 2010 with high-level discussions between Dutch and Vietnamese delegations. The Dutch participants quickly found their expectations of collaboration and consensus were not matched by their Vietnamese

[54] *Bộ Tài nguyên và Môi trường*
[55] *Bộ Nông nghiệp và Phát triển Nông thôn*

counterparts. In 2011, Viktor relocated to Vietnam, and researchers from Deltares and Wageningen began collecting data, mainly from Vietnamese institutes with whom they already had relationships. The Dutch expected that the Vietnamese partners would run the show, with them providing "technical support." The idea was "to have a kind of carbon copy of the Dutch process," Wim said, with "much stronger involvement and establishment of a Vietnamese steering committee, with working groups operating in the dedicated fields of agriculture, water management, climate change, and so on… [But] that was just not forthcoming." The working groups never came together, and commitment from the Vietnamese ministries was wanting. Problems of inter-ministerial competition, lack of funding, and personal conflict impeded the process. MONRE (Ministry of Natural Resources and Environment), with a mandate on water and climate change, was tasked to lead, but as a newer and less powerful ministry than MARD (Ministry of Agriculture and Rural Development), lacked the necessary resources and influence over means of implementation. Due to the ongoing "ministerial turf battle between MARD and MONRE" (Benedikter 2014, 280), the latter was unable to secure the budget to cover planning activities on their end, and the former retreated into the background. Moreover, the vice minister of MONRE at the time, officially the project lead and Veerman's counterpart in Vietnam, was described by the Dutch participants I spoke to as a difficult person to work with: a "dreadful man," who was "arrogant, doing big speeches all the time," and "would get cross in meetings" and accuse them of "being in it for the money, whereas we didn't get a penny!"[56] Yet he was politically influential, which presented a "real barrier to collaboration." Realizing they would not win the battle, the Dutch decided to go it alone. They would create a Delta Plan on their own—as if "the Mekong Delta was our country, then we would do it like this," Viktor said.

[56] Their home universities or research institutes did, however, receive a fee for their services.

That initial version received a good deal of criticism from Vietnamese partners, but it also recruited the participation of a wider network of participants, who reviewed the Plan and provided feedback for its revision. Recognizing their own objectives reflected in the nature-based solutions and adaptive approach of the MDP, the International Union for the Conservation of Nature (IUCN) was the first external organization to get involved. Next, the Southwest Steering Committee (SWSC), a Vietnamese party-state organ that provided development guidance to Mekong Delta provinces, offered their support. Drawing on this expanding network, the Dutch team convened a focal group of Vietnamese experts to review the draft plan, who delivered hundreds of pages of feedback. In 2012, they presented the second draft at a session of the Mekong Delta Economic Conference (MDEC) to provincial leaders from all 13 provinces. According to Viktor, the second draft had changed relatively little from the first,[57] but by then the Vietnamese experts had thrown their collective weight behind the Plan—attributed to an intentional effort of "stakeholder management" on the part of Viktor and the Dutch team—and, engaging their "phone network," urged local leaders to embrace it. Before long, the Mekong Delta Plan was widely accepted as the way to go. Notably, however, feedback was only provided by elites; absent from any process of stakeholder consultation were farmers or other local beneficiaries.[58]

One of the major sticking points was the scenario planning methodology at the heart of the Dutch approach. The original idea was to use the same framing as in the Dutch Delta Program, with four scenarios based on plausible outcomes along the two axes of climate change and economic development, but this had to be adjusted and renegotiated along the way. The team

[57] He told me: "the analysis was slightly improved, explanations were clearer, but the core content was the same."
[58] IUCN and several Vietnamese experts did convene one workshop with farmers but plans to do a "roadshow" to discuss the Plan with farmers throughout the Delta never materialized.

sought to identify key trends affecting the Mekong Delta's development and decided that the degree of spatial planning and coordination was more critical than climate change. Thus, the horizontal axis was made to represent effectiveness of land and water management policies, and the vertical axis economic growth and diversification. This created four scenarios ranging from business-as-usual spatial planning and governance under conditions of low growth—labeled the "food security" scenario—to a scenario of diversified economic growth centered on the two urban areas of Can Tho and Ho Chi Minh City—labeled "dual node industrialization" (see Fig. 3.3). In between were scenarios representing poor spatial planning and high economic growth—"corridor industrialization"—and effective spatial planning under the current growth trajectory—"agro-business industrialization." "Food security" was meant to be the fallback scenario, whereas "dual node industrialization" was what Viktor called the "big envelope," where "we assume that all the Vietnamese master plans are being implemented"—in other words, an overambitious vision in which each province ends up with its own international airport and deep-sea harbor, among other wish-list items. "You would need three Mekong Deltas" to accomplish their goals, he told me. That scenario was "more or less what we have in the western part of Holland," he said, which was very attractive to the Vietnamese leaders who visited.

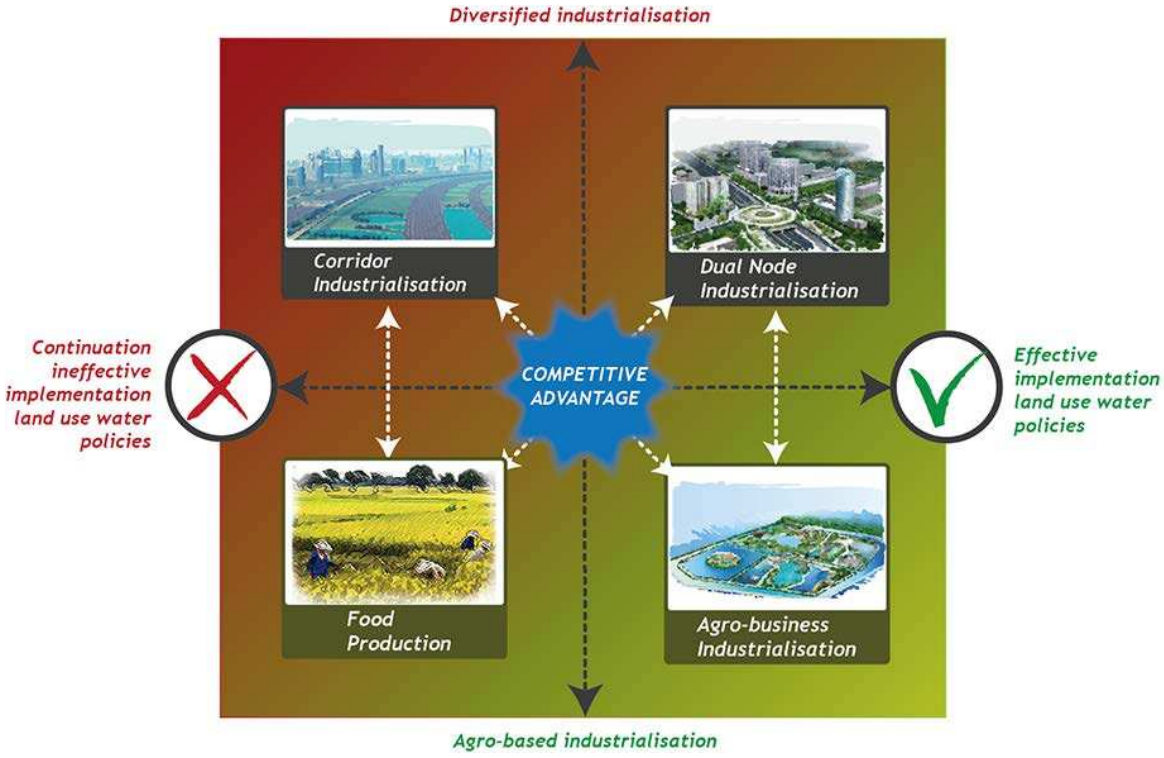

Figure 3.3 Scenarios used in the Mekong Delta Plan. (Source: Mekong Delta Plan 2013)

However, there was confusion on the part of the Vietnamese participants over how the scenario planning methodology was meant to be used, and the labels the authors chose only made matters worse. For instance, the "food security" scenario was meant to convey a future of mostly rural, subsistence-based activities with poor coordination and low economic growth, yet Vietnamese leaders were reluctant to view this as something undesirable. For them, "food security" conjured a necessary condition that their country had worked hard to achieve. From wartime until the early 1990s, Vietnam had struggled to feed its population, but in recent decades had become one of the top exporters of rice worldwide, most of it from the Mekong Delta.[59]

[59] See Gorman (2019) for a discussion of the historical, cultural, and political factors behind the equation of "food security" with "rice security" and particularly self-sufficient and abundant rice production in Vietnam.

However, by subsidizing intensive rice production and building dikes and sluice gates to extend the growing area—enabling up to three harvests per year in some places—the government's "Rice First" policies were undermining the resilience of the delta's ecosystems, keeping the price of Vietnamese rice low on the international market, and keeping many rice farmers impoverished (Gorman 2019; Mekong Delta Plan 2013). This was widely seen by many domestic and international experts as one of the biggest obstacles to climate adaptive sustainable development in the Delta, yet it was difficult to convince Vietnamese leaders to de-emphasize high-volume staple food production in favor of higher-value goods, open markets, and different land and water use priorities. Only by connecting a reliance on rice production to a "gloomy storyline," said Ellen, did the Vietnamese leaders eventually say, "Okay, we don't want that."[60]

In the course of discussions, it became clear that the Vietnamese participants just did not get the scenario approach. There was a shift "from four uncertain scenarios, all possible," Ellen explained, "to kind of business-as-usual scenarios under high and low growth: this is how the Mekong is going to look like in 50 years if you do not change anything." The Vietnamese participants started to look at it as, "Okay, we want the right-hand side; we want to avoid the left-hand side." The scenarios became much more normative, Ellen told me, as participants began to consider, "where do we have impact? Where can we do something towards, really, strategies?" A decision was made to choose "agro-business industrialization" as the preferred scenario, based on the Delta's "natural competitive advantages" and current economic trajectory, but moving in a more sustainable, high-tech, value-added direction. The Dutch participants agreed this made sense as a kind of intermediate step, a foundation to avoid falling back on the less advantageous scenarios and open a path towards more diversified economic development. At that point, many

[60] In the process, the Dutch advisors also decided to change the name of the scenario from "food security" to "food production" to better convey this distinction.

of the Vietnamese participants wanted to simply remove the other scenarios entirely, but Robert, the lead author, refused. The Dutch argued that they needed to remain aware of the other possible outcomes, to understand the potential risks. This took some convincing, but eventually the assembled participants agreed. "Agro-business industrialization" and strategies for its implementation became the "essence of the plan," Robert said.

For many Vietnamese participants, however, the idea of having four open-ended possibilities was unhelpful. That was in part because the four scenarios seemed arbitrary, arrived at by reducing complex processes to simple, idealized portraits. According to one of the Vietnamese experts involved, the reasoning behind the scenarios was not adequately explained: "We asked them, why four, not five? … they assume that everybody knows, and we are curious why they came up with that. The way they work towards [those] four. Like, you woke up in the middle of the night and thought about four scenarios, or what?" With climate change, he added, projections are likely to be updated several more times before the end of the century, making the exercise seem somewhat moot. Yet according to several participants, which scenario was preferable was never really in doubt, even if the methodology or assumptions behind it were. "In general, we all agree about what *could* be," one of them told me; that is, about the trends affecting the Delta, its natural advantages and desirable future state. Moreover, as a representative from IUCN noted, "That's the direction that the government wants to go in… a lot of their policies are already directed towards that." Others argued that the approach copied the Dutch experience too directly and was just not appropriate for the different conditions in Vietnam. Many suggested more research was needed, and only then "we can formulate better simulation of scenarios, and we can guide the investors and planners with more focus into a more

certain direction." Indeed, most Vietnamese participants I spoke with expressed unease with the lack of attention given to how to reach this imagined future.

It is also possible there may have been some semantic confusion around the word "scenario." The Vietnamese term that was used, "*kịch bản*," also means "script," as for a play or a film, implying a much more narrowly guided process than the Dutch had in mind. This apparently small misunderstanding or tension between meanings starkly illustrates the politics of translation at work here. Dutch knowledge was transformed through travel in a way that allowed it to be implemented in a new context, albeit slightly differently than intended. The incident thus represents a case of productive friction (Tsing 2005) in the governance of climate change adaptation in Vietnam. Notably, the outcome of this translation was still largely determined by power and politics. To gain traction within the Vietnamese planning system, the scenario approach was translated in a way that reaffirmed hegemonic interests and ideals.

Still, the MDP's very lack of specificity was central to its success in attracting support, especially from the international donor community and eventually the Vietnamese government itself. "It was intentional to not be detailed," Wim told me, as it was meant to be "a strategic policy document… not a master plan… This is a plan to form policy positions and strategic choices." Nearing completion of the final draft, Dutch team members in Vietnam presented it to the donor community for recruitment, as a "strategic framework for development coordination." Organizations including UNDP, the World Bank, and the German development organization GIZ came on board, endorsing the Plan as it resonated with many of their own concerns. Yet for the Plan to be implemented, it needed to be integrated into Vietnamese policies and programs, and thus required buy-in from the top echelons of the Vietnamese government. In late 2013, a Mekong Delta Working Group of donor agencies issued a joint statement in support of the

Plan.[61] At a meeting in December, Victoria Kwakwa, then head of the World Bank in Vietnam, read the statement aloud to the Vietnamese prime minister, sending a powerful signal of support to the government, and urging the Plan's use as a guiding framework for policy. In 2016, the MDP became the basis for a $310 million World Bank loan for Integrated Climate Resilience and Sustainable Livelihoods in the Delta. Then, in late 2017, the Vietnamese government formally endorsed the principles and recommendations laid out in the MDP and echoed by the World Bank, issuing Resolution No. 120 on the Sustainable and Climate Resilient Development of the Mekong Delta (GoV 2017).[62] Thus did the Dutch model prevail in Vietnam.

Branding and marketing the DDA abroad

After the MDP was published and had gained the support of the development community and the Vietnamese government, Dutch actors continued their efforts to reinforce and advance the position of Dutch expertise for climate change adaptation and development in delta countries. These activities can be understood as efforts at brand management and marketing of the Dutch Delta Approach (DDA) (Minkman and van Buuren 2019), including those more reflexively geared towards synthesizing, reflecting on, and learning from the experiences of Dutch delta planners abroad. The MDP is a sample product, and future Dutch delta planning endeavors depend on its success. As with investments in training a new generation of scientists, engineers, and planners, the Dutch approach continues to be promoted through various international fora, as well as scholarly efforts to hone the model of Dutch delta planning—now rebranded as "strategic delta planning."

[61] The list included the embassies of Australia, Finland, Germany, Japan, and the Netherlands; and organizations including IUCN, the United Nations Development Program (UNDP), the World Bank, the Asian Development Bank (ADB), and the International Fund for Agricultural Development (IFAD).

[62] This has now been followed by a new master plan, the "Mekong Delta Integrated Regional Plan," led by Royal HaskoningDHV with financing from the World Bank, set to launch in early 2021 (Brown 2020a, 2020b; Doan 2019).

International fora where the promotion of Dutch delta management expertise takes place range from research and advocacy networks to conferences and international speaking tours. The Delta Alliance,[63] established in 2010, is an international knowledge network based in the Netherlands that aims to facilitate knowledge exchange between delta regions by connecting researchers around the world, through so-called "delta wings." With the Dutch wing providing most of the funding and leadership, the Delta Alliance enables the DDA to be promoted within and towards research institutes globally. The more recently established Delta Coalition[64] connects actors in the political arena through policy dialogues. Formed in 2016, it is driven by the conviction that "we have to put deltas … on the international policy agenda." Sitting at the center of these networks, the Netherlands maintains its dominant place in delta research and planning. In the 2010s, the country hosted two large "Deltas in Times of Climate Change" conferences, gathering international participants from the science, business, and policymaking communities, while putting Dutch achievements and business opportunities on full display.[65]

Additionally, a network of Netherlands-based researchers has been directly engaged in reflecting on the global travels of Dutch delta planning. In so doing, they consolidate and stabilize the approach *a posteriori*. As participants in a research program on "Strategic Delta Planning" (SDP), they have studied the dynamics of delta planning and implementation in various countries. A key document of this project is the article by Seijger et al. (2017), in which the authors retroactively define "strategic delta planning" as "a public-sector led process through

[63] http://www.delta-alliance.org
[64] https://www.deltacoalition.net
[65] As noted in this chapter's introduction, the Netherlands has also received a lot of press coverage in recent years for its expertise in adapting to climate change. Articles celebrate Dutch technical innovations and experience for the lessons they can provide to the US and the rest of the world. A familiar presence in many of these arenas has been Henk Ovink, Dutch "Special Envoy for International Water Affairs." Tall and charismatic with a shaven head, he travels the globe spreading the gospel of Dutch water expertise in speaking engagements, diplomatic settings, Ted talks (https://www.youtube.com/watch?v=w-6sVkD5lBI), and published Op-eds.

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" (2017, 1486). This work is driven by the question "What makes strategic delta planning successful?" on the assumption that "success" in such processes is broadly desirable, yet without unpacking the values, norms, or power dynamics that shape ideas of success and criteria for its evaluation.[66] The politics involved are largely black-boxed and ignored. Seijger et al. (2017) present "negotiating consent"—i.e., poldering—as a neutral process. They identify "consent" with consensus, and claim the goal is to accommodate diverse interests "such that different actors are prepared to 'go along with'" and accept that "an integrated and holistic vision is necessary" (Seijger et al. 2017, 1489, 1494).

Now abstracted from the "Dutch" label and rebranded with the more technical name "strategic delta planning," the DDA gains greater specificity and ease of mobility as a universally deployable knowledge (Choy 2011; Tsing 2005; Zegwaard et al. 2019). Through the experiments of Dutch delta researchers and practitioners in different settings, the model becomes increasingly stabilized as an authoritative body of theoretical and practical knowledge. It has come to resemble a "standardized package" (Fujimura 1992), with particular concepts (e.g., "adaptation pathways") and methods (e.g., "scenario planning") that can be taught and applied endlessly and everywhere. According to Fujimura (1992), standardized packages help to explain both the stability and dynamism of certain widely applied scientific theories, and "can be used by scientists to define their areas of expertise and power" (1992, 205). However, as Lave (2011,

[66] The article depicts an "hourglass framework" that closely resembles visualizations of the "translation" concept from ANT (e.g. Callon 1986; Star and Griesemer 1989), by which multiple and contested interests are channeled through a narrow process of strategic delta plan formulation (i.e., the "obligatory passage point").

275) points out, an "appealing standardized package is not, in itself, enough to ensure success;" instead, "prospective users must learn the package exists and be trained to use it."

This much was evident, for example, in a "Strategic Delta Planning" workshop I attended in Ho Chi Minh City and the Mekong Delta in October 2016. Dutch facilitators led the assembled researchers and practitioners from Vietnam, Bangladesh, and Myanmar through a series of design charettes and exercises geared toward understanding the SDP framework in practice. The premise was simple: urbanizing deltas face threats, for which sustainable development is urgently needed; this creates demand for "strategic delta planning" (contrasted with "normal" delta planning); and by studying SDP in practice attendees could better understand its role and how it may be used to enable "consent" among stakeholders. It quickly became clear that the purpose of the workshop itself was to persuade participants to accept strategic delta planning as the "obligatory passage point" (OPP) (Callon 1986) for sustainable development in delta regions; indeed as the very meaning of "sustainability." By defining the problem to fit the tool they provided, the Dutch consultants aimed to create demand and offer a solution in the same stroke (Hasan et al. 2019; Weger 2019; Zegwaard et al. 2019; see also Li 2007), thus making themselves indispensable to delta governance and sustainability. Over lunch on the last day of the workshop, one of the organizers joked to me that the Dutch were in the business of "taking over the world, one delta at a time." He then paused, as if the thought had just struck him, and said uneasily, "I guess we kind of are."

Discussion

The Dutch consultants I spoke with were proud of their planning approach for supposedly getting Vietnamese actors to think longer-term and strategically about the future, which they

contrasted with the 5-year planning cycles typical of communist countries such as Vietnam. The latter approach, they argued, constrained the Vietnamese planning system to commit to actions based on near-term predictions, rather than allowing for flexible and strategic adjustments aimed at achieving long-term goals. Herman and others argued that the strength of the Dutch approach lie in helping the Vietnamese to think with scenarios, and to think about planning in an iterative way. "For them it opened up an opportunity," he said, suggesting it allowed the Vietnamese participants to say what was already on their minds about the future. This enabled them to establish a direction for development, a more integrated and comprehensive vision for the Mekong Delta, and to pursue strategies that deviate from existing master plans. This was always the purpose of the Delta Plan, my Dutch interlocutors said: to be a visioning artifact for imagining a sustainable and climate resilient future and strategizing how to get there; but it was only a first step. On the other hand, the Vietnamese participants routinely faulted the process for lacking nuance, specificity, and concrete implementation procedures. They argued that nothing short of a new, overarching master plan would be sufficient to achieve the transformative changes urgently needed. Yet for the Dutch, that was never its only purpose; this was more than a neutral process of "negotiating consent" among stakeholders. As Stefan from the embassy described to me: beyond "idealistic" motives, "we're also here, all of us, involved in geopolitical interests."

The management of water is essential to—indeed, co-produced with—Dutch historical identity, Dutch political culture, and Dutch geopolitics. Starting in the 19th century, Dutch water management, as a set of knowledge practices embodied in political and technological forms, began to go global, spread through Dutch commerce and maritime trade networks, establishing them as international experts at keeping the sea from invading the land. Now, in the context of a

changing climate and rising sea levels, these forms have been translated and stabilized into an emerging framework of "delta management" to be exported and applied globally. Yet this has been a political process from the start, as Dutch actors maneuvered to create demand for and focus attention on their product: Dutch expertise in delta management. This chapter has sought to open the black box of this process by exploring the politics of translation at the heart of sending Dutch delta management abroad and its application to Vietnam.

Building on post-structural insights about the production and circulation of knowledge as integral to the exercise of power (Escobar 1995; Foucault 1980; Said 1978) and actor-network theory's attention to networks and material forms in the stabilization of knowledge (Callon 1986; Latour 2005; Law 1992), attending to the politics of translation here helps to elaborate the discursive and relational maneuvers actors use to establish themselves as indispensable to particular projects, and the messy frictions and displacements that often result (see also Brosius 2006; Gal 2015; Lewis and Mosse 2006; McFarlane 2006; Tsing 2005). By defining the problem of delta vulnerability to climate change and the relevant expertise needed to solve it, Dutch actors claimed to provide the single way forward under the mantle of "Dutch delta expertise," also known as the "Dutch Delta Approach." This was presented as an "obligatory passage point" (OPP) (Callon 1986), the recipe for sustainability that delta countries must follow in order to achieve climate-resilient development. Corresponding to what Callon (1986) calls "interessement," Vietnamese actors were "made interested" (Heeks and Stanforth 2013; McElwee 2016) through the overtures of the Dutch water sector and capacity building programs. Elite actors in Vietnam were further enrolled for support and legitimacy around the object of the draft Mekong Delta Plan, enlarging the actor-network of Dutch delta planning so it could wield influence with the Vietnamese government. The MDP thus became a "boundary object" (Star

and Griesemer 1989), open enough to interpretation for diverse parties to see their interests and agendas reflected in it yet coherent enough to mobilize resources for its implementation, and thereby a vehicle for the translation of Dutch expertise to Vietnam (Weger 2019).

From its origins in Dutch water management history, through shifts in recent decades towards increasingly "integrated" and "spatialized" approaches, Dutch water management knowledge was progressively repackaged as expertise in "delta management." Justified by scientific attention to the problematic of delta vulnerability to climate change, the Dutch Delta Approach was stabilized through the theoretical and practical work of planners, scientists, engineers, and public officials, simultaneously producing this new body of knowledge and "deltas" themselves as objects of governance subject to such knowledge. This is about making the notion of "Dutch delta expertise" stand in for a complex history of specific achievements—translating a diverse array of people, events, ideas, and technologies into a cohesive narrative with a national flavor. It is what Latour (2005, 231-32) might call a "collecting statement," a kind of performative speech that not only traces new connections but also breathes new life into that which it describes as it circulates. In addition to translating this knowledge via specific Delta Plans such as the one in Vietnam, Dutch actors have engaged in a variety of projects aimed at promoting and reinforcing the position of Dutch expertise relative to climate change adaptation and delta management in other countries, seen here as a form of marketing and brand maintenance (Minkman and van Buuren 2019) that aims to create demand for a product that is "partly invented in the process" (Zegwaard et al. 2019, 242). In this process, the DDA has been rebranded with a more technical veneer as "strategic delta planning," thus becoming a "standardized package" (Fujimura 1992) ready for universal application. These activities continue efforts to expand and strengthen the actor-network of Dutch delta planning abroad.

There are clear parallels here with prior neocolonial development ambitions. Describing the rise of Integrated Rural Development poverty alleviation programs in the 1970s, Escobar (1988, 434) writes that "only a comprehensive and integrated strategy" was deemed capable of successfully addressing "the complex factors involved in the causation of malnutrition and hunger," paving the way for the development of a whole new "integrated" body of knowledge. As Escobar demonstrates, such knowledge and its associated practices were deeply political, generating countless programs and institutions that altered social relations in the target countries, even as the politics of such programs were hidden beneath the guise of apolitical technocratic intervention (Ferguson 1994; Li 2007). To justify the growing development apparatus as this field became increasingly professionalized and institutionalized, countries of the so-called "Third World" had to be defined as deficient in some way—i.e., lacking "development"—so that international consultants and those from the recipient countries trained in the new disciplinary knowledge could apply their specialized expertise. This performs the same function as classifying all delta regions as similarly "vulnerable to climate change" does in the present case, with production of a specialized integrated body of knowledge designed to address their deficiencies. Much like the critiques of "consensus" discussed above, scholars have argued that the ambiguity of such "integrated" approaches often allows for easy cooptation by the powerful, thus re-centralizing power despite the proclaimed goals of multi-disciplinary, multi-functional, multi-stakeholder frameworks (Biswas 2004; Mehta et al. 2016).

There is also a certain scalar politics implied by the Dutch Delta Approach. First, the universalizing of delta characteristics and vulnerabilities to climate change reflects a global framing that suggests all deltas will be affected more-or-less equally, legitimizing them as objects of universal knowledge and intervention. However, a number of commentators have

observed that the dominant scientific framing of climate change as a global environmental problem (rather than one rooted in political-economic processes or societal values, for instance, or experienced in terms of local and regional variability) privileges generic techno-managerial solutions abstracted from locally lived realities and situated knowledges (Demeritt 2001; Hulme 2010; Nightingale et al. 2020; Taylor 2015). Such "whole-view" perspectives, or "panoramas" in the words of Latour (2005), give "the impression of complete control over what is being surveyed" (Latour 2005, 188). Similarly, taking an "integrated" view of each delta helps to establish the spatial scale of delta governance. By considering the delta region as an integrated whole, the delta is produced as an ontological entity, extending the domain of management to the parameters of the "delta" system in question—defined by social-ecological, political, and administrative boundaries—such that it can be understood and managed in a coherent way (Zegwaard 2016; Zegwaard et al. 2019). This reality does not pre-exist its representation; rather, what we understand to be reality, the categories we use, are created in their representation. In being represented, they are also naturalized, taken to be the reality they represent—giving cause to act on them in particular ways (Escobar 1995; Mitchell 2002). This new spatial entity influences governance strategies and trajectories of socio-environmental change. Strategic planning with scenarios then works to extend rational planning into an uncertain future. This is a gaze that generates epistemic authority by allowing agents to imagine the ability to predict, and therefore control, the dynamics of the whole (Scott 1998). The new knowledge framework thus produces the delta in both spatial and temporal dimensions, defining its object in terms of an integrated regional, biophysical, socioeconomic, and administrative space amenable to long-term "adaptive" management, prediction, and control.

Yet what is lost and what remains in the translation of the Dutch approach to Vietnam? And what are the implications for the governance of climate change adaptation in the Mekong Delta? As a "mode of thinking" and "source of practices" (Escobar 1988), even a "standardized package" (Fujimura 1992), the Dutch approach cannot be divorced from the historical, cultural, or material contexts of its production. Importantly, the approach carries with it particular ideological, political, and aesthetic values that are constitutive of the Dutch sociotechnical imaginary of delta control (Jasanoff and Kim 2009, 2015). This imaginary, rooted in principles of Cartesian rationality and the high-modern aspirations of technoscientific mastery over nature, guides the Dutch vision of delta planning expressed in the Dutch Delta Program and the Mekong Delta Plan. In its current iteration it might best be described "ecomodernist" (Bäckstrand and Lövbrand 2006; Disco 2002; Sullivan 2017), reflecting a particular "imaginary of resilience" (Yarina 2018) that unites a discourse of nature-based solutions with a reliance on large-scale hydraulic infrastructure, strategic spatial planning with consensus-seeking deliberation, and the opportunism of neoliberal economics.

Much like their experiment in Vietnam, delta management knowledge in the Netherlands tends to be produced by technocratic elites, while other stakeholders are left behind. Citing the disciplinary congruence and institutionalized relations between experts and bureaucrats in Dutch water management, Edelenbos and colleagues (2011) argue that there is decidedly less congruence or collaboration among "stakeholders" than there is between those experts and bureaucrats. Similarly, application of the Dutch Delta Approach in Vietnam primarily serves the interests of, and is accountable to, elite actors: Dutch technical experts, firms, and the Dutch state; international financiers; and Vietnamese experts and bureaucrats.[67] This highlights one of

[67] The interests of the latter group is a topic that will be explored in more depth in the following chapter.

the potential contradictions at the heart of the Dutch approach: its tendency to narrow options and reinforce path-dependent development trajectories, while supposedly accommodating diverse perspectives to enable flexibility in the face of uncertainty. Given this, it seems reasonable to suppose that ongoing efforts to promote Dutch expertise in delta management abroad—international educational partnerships and capacity-building programs, for example—insofar as they fail to adequately respond to local needs and contexts, are likely to reproduce business-as-usual approaches to development, further entrenching powerful interests and leaving little room for truly transformative—and adaptive—change.

But abstracted from its sociocultural origins, the Dutch Delta Approach begins to break down in friction with other contexts. Applied to the distinct political and planning environment of Vietnam, for example, the very logic of scenario planning fell apart in the deliberative process. The scenario methodology, supposedly open to all plausible future possibilities, instead helped to confirm the dominant sociotechnical imaginary of the present (i.e., "agro-business industrialization"). Nevertheless, by attending to the politics of translation, we can discern such convergences and divergences, tensions and misunderstandings in the way knowledge is applied in the governance of climate change adaptation, and thereby gain insight into the "moments of influence" (Witter et al. 2015) shaping trajectories of socio-environmental change in particular places.

Others have also examined the transfer of Dutch delta planning expertise to other countries as a process of translation (Hasan, Evers, and Zwarteveen 2020; Laeni et al. 2020; Minkman and van Buuren 2019; Yarina 2018; Zegwaard 2016). This analytical lens has a practical purpose, in that it can shed light on cultural and political tensions (Weger 2019) or bottlenecks in governance (Zegwaard 2016) that may present barriers to successful and equitable

climate change adaptation. Translation in these instances is not just about the transfer and application of technical knowledge, but also about the imaginaries with which it is intertwined, and the particular social and material contexts in which it is embedded (Jasanoff 2015; Minkman and van Buuren 2019; Weisser et al. 2013; Yarina 2018). It is important to ask, what exactly is being translated that may go unacknowledged? What are the power dynamics involved as knowledge is translated to different historical, cultural, and political contexts and implemented in practice, and with what practical and material effects? The next chapter turns now to focus on these translational politics within Vietnam.

CHAPTER 4

"NOTHING FOR FREE": INTERMEDIARY ACTORS AND CROSS-SCALAR KNOWLEDGE TRANSLATION FOR CLIMATE ADAPTATION IN THE MEKONG DELTA

> *"The people that don't want to adapt, get poor. The people that want to adapt, they got rich already."*
>
> – Applied agricultural scientist, Trà Vinh University

> *"I'm not afraid because I can say no to what I don't like. That's the thing. And behind me, there's a gang of scientists. Everybody is my buddy, you know? We share the way of thinking, so we are like an alliance."*
>
> – Mekong Delta expert, Cần Thơ

Introduction

One afternoon in late 2016, I found myself sitting in Trâm's[68] office in the Department of Agriculture and Aquaculture at Trà Vinh University (TVU), sampling shots of local "wood apple" wine (*rượu trái quách*) that her department produced and was preparing to market. While awaiting permission from the provincial People's Committee to carry out formal research activities, I had discovered the value of forging relationships with people who could act as key informants and "gatekeepers" (Scott, Miller, and Lloyd 2006), providing access to data and personal contacts, and generally helping me navigate the institutional, cultural, and ecological complexities of the province. Trâm had been particularly helpful in this regard, and we had developed a warm friendship since the evening I first met her at a barbecue restaurant with colleagues from my host institute. Early mornings, I often joined her and her friends for coffee.

[68] All names used are pseudonyms.

They included other agriculture and aquaculture researcher-technicians from TVU, extension agents from the provincial Department of Agricultural and Rural Development, and program staff from AMD, an internationally funded climate adaptation project. They would occasionally invite me to join them on farm visits for technical training workshops or field assessments, and generously shared program documents and valuable perspectives on my research. That day, I was following up with Trâm to ask for a copy of an AMD project report on which she had collaborated. Downing the shot in front of her, she looked at me and responded in English, "nothing for free."

I was familiar with this refrain, and its Vietnamese equivalent, *"không có gì miễn phí,"* which was something of a catchphrase for Trâm, always said with a wink and a playful smile. Although she did not expect anything immediately in return, it was her way of acknowledging the fact that she was doing me a favor and some sort of reciprocity would eventually be expected (Bauer 2011; MacLean 2013). Over time, however, I came to see this statement as representative of the way knowledge for and about climate change adaptation is used in Vietnam: transactionally, within a political economy of development that values such knowledge as a strategic resource and privileges the ability to use it to turn a profit (Bauer 2011; Benedikter 2014; MacLean 2013). In this system, intermediary actors like Trâm and her friends—researchers and practitioners working in rural development—play an important role in translating knowledge between government decision-makers and farmers, and thereby influencing the trajectory of social-ecological change under the banner of "adaptation to climate change." But they do so within a system of structural constraints they must navigate in order to advance both personal and public interests.

Because adaptation actions can be initiated at multiple scales, from individual livelihood changes to national policy instruments (Adger, Arnell, and Tompkins 2005), successfully coordinating these efforts involves effective communication and knowledge exchange among state and non-state actors at multiple levels of governance, including scientists, policymakers, and local stakeholders (Amundsen, Berglund, and Westskogh 2010; Dewulf, Meijerink, and Runhaar 2015; McElwee et al. 2010). To promote social-ecological resilience, scholars stress the need for social learning and knowledge exchange across scales to enable flexible, responsive, and adaptive governance (Folke et al. 2005; Hulke and Diez 2020; Nelson, Adger, and Brown 2007; Pahl-Wostl 2009). In order for institutions to be responsive to local needs, knowledge must be transmitted effectively upwards as well as down within hierarchical systems of governance (Agrawal and Ribot 1999; Ribot 2004). Scholars of science and technology studies (STS) as well as policy and development studies, however, critique linear models of knowledge transfer and policy implementation. Knowledge and its expression in policy, they argue, are never simply applied in a linear fashion with direct and predictable results. Rather, they are reinterpreted, selectively appropriated, and transformed through socio-political processes (Jasanoff 2004b; Jensen and Morita 2020; Keeley and Scoones 2003; Le Meur 2006; McFarlane 2006; Reis 2012; Seijger et al. 2019).

This chapter fills a gap in the literature by examining the agency of intermediary actors that translate knowledge between actor groups and across levels of governance for the purpose of influencing climate change adaptation. While many authors address the political dimensions of climate change adaptation (e.g. Javeline 2014; Nelson, West, and Finan 2009), including the politics of knowledge (Cote and Nightingale 2012; Eriksen, Nightingale, and Eakin 2015; Goldman, Turner, and Daly 2018), few consider explicitly the politics of *translation* involved as

knowledge travels across scales and networks to be implemented in practice. Based on ethnographic research with Vietnamese scientists, bureaucrats, local researchers, rural development practitioners, and agricultural extension agents, this chapter attempts to answer the question: *How do intermediary actors and organizations broker and translate knowledge across levels of governance, and what interests or agendas are reflected in the process?* I argue that the domain of climate adaptation in Vietnam has opened a political space for certain actors to have a renewed voice, agency, or influence over the trajectory of socio-environmental change and development in the delta. At the same time, this is a space of contestation, with complex power dynamics and constraints at play. An analytical focus on intermediary actors and the politics of translation helps to unpack and illuminate these dynamics.

Conceptual-Analytical Framework: Intermediary Actors and the Politics of Translation

Attention to intermediary actors as brokers and translators has been the focus of much work in the actor-oriented tradition in development studies as well as applications of actor-network theory (Heeks 2013; Keeley and Scoones 2003; Lewis and Mosse 2006; Lie 2008; Long 2015; Long and Long 1992; Mosse 2005, 2008). "Brokers" here refers to actors that operate at the interface between two or more social worlds, governance levels, or knowledge systems, helping "reveal their importance in negotiating roles, relationships, and representations" (Mosse and Lewis 2006, 10). I draw on the related concept of "translation" from actor-network theory (ANT) in STS to refer to processes of "mutual enrollment and the interlocking of interests that produce project realities" (Mosse and Lewis 2006, 13). This concept highlights the discursive and relational strategies actors use to connect and extend networks, standing in as spokespersons for others' knowledge and interests while funneling and reinterpreting them through an "obligatory passage point" (Baiocchi, Graizbord, and Rodríguez-Muñiz 2013; Callon 1986;

Latour 2005). In this view, knowledge, power, and influence can be understood as network effects, stabilized and strengthened through the expansion of heterogeneous associations of people, materials, and ideas (Law 1992). This perspective thus sheds light on the interpretive or translational agency of actors as they enroll allies and negotiate meanings (Benjamin 1996[1921]; Choy 2011; Corson, Campbell, and MacDonald 2014; Gal 2015; Spivak 1993; Witter et al. 2015), transforming knowledge from one context, scale, or frame of reference to the next, including by embedding it in material objects and practices (Brosius 2006; Hanks and Severi 2014; McElwee 2016; McFarlane 2006; Tsing 2005; Weger 2019; Wright 2002).

Scholars in related fields have also highlighted the pivotal role of intermediary actors that share knowledge in contexts of networked and multi-level governance. Attention to such key actor groups as scientists (Aso 2018; Dilling and Lemos 2011; Grundmann 2016; Hegger et al. 2012; Zink 2013), bureaucrats (Benedikter 2014; Ferguson 1994; Hull 2012; Korbee et al. 2019; MacLean 2013; Reis 2012; Weisser et al. 2013), and agricultural extension agents (Hicks 2004; Taylor and Bhasme 2018; Tran and Rodela 2019) has demonstrated their agency as knowledge brokers, linking knowledge producers, policymakers, and knowledge users, and thereby influencing policy implementation and material outcomes. Social network studies similarly note the important bridging function of certain well-connected intermediary actors that enables them to transfer knowledge across otherwise disconnected networks while shaping that which is transmitted in the process (Bodin, Crona, and Ernstson 2006; Burt 2004; Ernstson et al. 2010; Radil and Walther 2018). Such actors are argued to be crucial in facilitating the social learning, cooperation, and cross-scalar coordination necessary for the adaptive governance of climate change adaptation and transformations to sustainability (Bodin 2017; Bodin, García, and Robins

2020; Eguavoen et al. 2013; Ernstson et al. 2010; Olsson et al. 2006; Pahl-Wostl 2009; Vogel et al. 2007; Westley et al. 2011).

The focus of this chapter is on the translational agency of intermediary actors who broker and translate knowledge between the "high level" of planners and policymakers on the one hand, and the "on-the-ground" level of local implementation on the other.[69] However, as Gal (2015, 232) reminds us, there is really no "middle;" rather, translations occur at multiple interdiscursive points, producing chains of translation that may include practices of inscription, selective appropriation, or discontinuities in information flows (see also Le Meur 2006). This work may be mediated by material artifacts such as technologies or texts (Latour 2005), including reports and policy documents, which help draw together wider associations of people, places, and things as they coproduce their objects of governance (Hull 2012; MacLean 2013). Here, I use "knowledge" broadly to refer to information, ideas, or practices mobilized in the name of climate change adaptation and reflective of particular identities, interests, and power relations (Foucault 1980; Haraway 1988; Keeley and Scoones 2003). Such knowledge is also mediated by powerful national, transnational, and global discourses, meaning it both reflects and shapes institutional practices, including policymaking and implementation (Adger, Benjaminsen, et al. 2001; Ferguson 1994; Keeley and Scoones 2003).

Methods and Positionality

Research for this chapter was carried out between October 2016 and January 2018 primarily in Trà Vinh province, in the coastal Mekong Delta of Vietnam, as well as during shorter visits to Cần Thơ, Ho Chi Minh City (HCMC), and, less frequently, Hanoi. In Trà Vinh, I

[69] My use of "intermediary actors" here is not to be confused with Latour's (2005) distinction between (human or non-human) "mediators" and "intermediaries," of which the latter are simply conduits for unadulterated information. Rather, "intermediary actor" in my usage denotes a structural position within multi-level networks of governance, a human actor with translational agency; in this sense, a mediator.

was hosted by a small research center under the auspices of Trà Vinh University (TVU), the Center for Scientific Research and Production Services (CSP),[70] whose director I initially met during preliminary research in summer 2015 through a collaboration with my host institute in HCMC, the Center for Water Management and Climate Change (WACC).[71] At CSP, I was provided office space and assistance with filing paperwork and other logistical issues. However, after arriving in Trà Vinh I waited nearly four months until official permission was granted by the Provincial People's Committee (PPC) to carry out formal data collection activities such as interviews, surveys, and independent field visits to rural areas, and additional permission requests had to be submitted for subsequent phases of research. This was not altogether unexpected: others have documented the bureaucratic hurdles foreign researchers often face trying to conduct long-term immersive studies in Vietnam, particularly in rural or marginal areas or among ethnic minority groups (Luong 2006; MacLean 2013; Reis 2012; Scott, Miller, and Lloyd 2006). During this time, in addition to re-drafting research plans and permission requests, I made connections through the CSP network, getting to know other university researchers and extension agents, and shifted my immediate focus to understanding the institutional culture of rural development research and practice in the Mekong Delta.

This chapter thus takes inspiration from institutional ethnography (Billo and Mountz 2015; Corson, Campbell, and MacDonald 2014; Nader 1972) in accounting for the structures, norms, practices, and discourses through which knowledge for climate change adaptation is translated by various actors. Data on which the chapter is based are drawn from semi-structured interviews (N = 62) with Vietnamese scientific experts and researchers, agricultural extension agents, provincial bureaucrats and government officials, as well as conversations with journalists

[70] *Trung tâm Nghiên cứu Khoa học và Sản xuất, Dịch vụ*
[71] *Trung tâm Quản lý Nước và Biến đổi Khí hậu*

and foreign development professionals; participant-observation of farm visits, extension workshops, project meetings, and conferences on climate change adaptation, agriculture, and sustainable development; and countless informal conversations, time spent "deep hanging out" (Geertz 1998) with colleagues, friends, and acquaintances over coffee or food and drinks. Semi-structured interviews addressed such topics as interviewees' professional activities and responsibilities, their understandings of "climate change adaptation" (*sự thích ứng với biến đổi khí hậu*) and ideas about its implementation, and their collaborative or communicative interactions with other stakeholders. In addition, I frequently surveyed local newspapers to keep abreast of public representations of these issues and reviewed key agency and policy documents to triangulate and cross-check my findings across multiple sources.

In this chapter, I focus on the knowledge brokerage and translation practices of select intermediary actors at the regional and provincial levels in the Mekong Delta and Trà Vinh province, respectively: agriculture and rural development researcher-practitioners[72], extension agents, AMD project staff, and regional scientific "experts." In the following section, I present a brief overview of Vietnam's governance system as it pertains to climate change adaptation in the delta and describe the relevant network of actors highlighted herein. Then, drawing on ethnographic data, I elaborate on three dimensions of knowledge translation by these groups of actors: (1) the structural and financial constraints shaping knowledge sharing practices by researchers and practitioners; (2) the translation of knowledge into farmer livelihood models; and (3) the specific agency of scientific experts. Finally, I summarize and reflect on key themes

[72] This group includes applied scientists, researchers, and agricultural technicians that provide outreach to farmers as well as insights and advice to provincial authorities and tend to operate primarily at the provincial level. Vietnamese farmers often simply refer to people in this position (me included) as "kỹ sư" (engineer). I use the designation "researcher-practitioner" to distinguish them from extensionists (working for the provincial extension office), though their activities overlap a great deal, and also from more widely known and highly regarded scientific "experts," who are more likely to work across several provinces. The latter are also typically based in the larger urban hubs of Cần Thơ and Ho Chi Minh City (HCMC).

revealed by these segments and their implications for the governance of climate change adaptation in the delta.

Vietnam's Governance Setting

In 1986 a series of liberalizing political and economic reforms known as *Đổi mới* ("Renovation") were launched at the Sixth National Congress of the Vietnamese Communist Party (VCP), formally initiating the country's transition from Soviet-style central planning towards what is known officially today as a "socialist-oriented market economy." While these reforms and concomitant reintegration into global markets heralded significant economic development in the decades to come, there has been less change in the political-administrative realm, where the VCP maintains a monopoly on power and adheres to Leninist institutions of governance (Benedikter 2016; Benedikter and Nguyen 2018; Gainsborough 2010b; MacLean 2013). By legalizing private ownership and commerce, reducing subsidies for state enterprises, and providing a greater role for foreign investors, reforms paved the way for high rates of economic growth and rising standards of living throughout the 1990s and 2000s (Benedikter 2016; Benedikter and Nguyen 2018). The dismantling of state-run agricultural collectives and promotion of household-level food production helped bring the country back from the brink of famine and led to a thriving agricultural export economy, particularly in rice and driven largely by the Mekong Delta (Do and Iyer 2008; Le Coq and Trebuil 2005; Taylor 2004).[73] Yet the VCP maintains a firm grip on the country's overall policy direction through top-down planning, a swelling bureaucratic apparatus, and limited "civil society" participation channeled mainly

[73] It should be noted that despite these positive developments, like much of the country, the Mekong Delta has also witnessed rising socioeconomic inequalities, areas of persistent poverty, and growing rates of landlessness (Akram-Lodhi 2005; Garschagen et al. 2012; Gorman 2019; Le Coq and Trebuil 2005; Taylor 2004)

through party-affiliated mass organizations[74] (Benedikter 2016; Salemink 2006; Zink 2013). In this context, the party-state has increasingly relied for continued legitimacy upon its ability to sustain economic performance (Benedikter 2016; Vasavakul 2019) while maintaining a degree of responsiveness to societal concerns (Kerkvliet 2001; Mattner 2004; Reis 2012)

The Vietnamese state is defined by the tight coupling of the VCP, which exercises political leadership at all levels, with the parallel structure of the government, which administers daily affairs. The Central Committee of the Communist Party determines the country's overall political course, and through the principle of democratic centralism, all decisions made at higher levels must be implemented at levels below (Benedikter and Nguyen 2018; Phuong, Biesbroek, and Wals 2018). A system of rigid top-down planning and bottom-up reporting is distributed across national, provincial, district, and commune levels (see Fig. 4.1). Sectoral line agencies, where most of the planning authority resides, are hierarchically subdivided into national-level ministries, provincial-level departments, and district-level offices. These are subject to a system of dual subordination, where each level is answerable both to the one above it and to the People's Committee at the same jurisdictional scale (Benedikter 2016; Benedikter and Nguyen 2018). People's Committees are responsible for integrating national development strategies into local socioeconomic development plans (SEDPs), signing the legal documents used for day-to-day governance activities, financial disbursement across policy sectors, and translating lower-level requests into formal proposals to be sent to higher levels for approval (Benedikter and Nguyen 2018; Phuong, Biesbroek, and Wals 2018). However, due to administrative restructuring, institutional overlap, and unclear allocation of mandates, in recent decades the planning

[74] Under the umbrella of the Vietnam Fatherland Front and funded by the state, these include such organizations as the Vietnam Farmers' Union, Women's Union, and Ho Chi Minh Communist Youth Union. They are responsible for disseminating information, supervising and mobilizing citizens, implementing policy, and recruiting new party members (Kerkvliet 2001; Quan Thi Thanh Hai 2017; Vasavakul 2003).

landscape has become increasingly fragmented and uncoordinated (Benedikter 2016; Benedikter and Nguyen 2018; Seijger et al. 2019; Vasavakul 2019).[75] Plans are formulated in terms of—often overambitious—quantitative targets in areas such as socioeconomic development, agriculture, and industry, so that performance can be evaluated against numerical benchmarks (Benedikter and Nguyen 2018; Seijger et al. 2019).

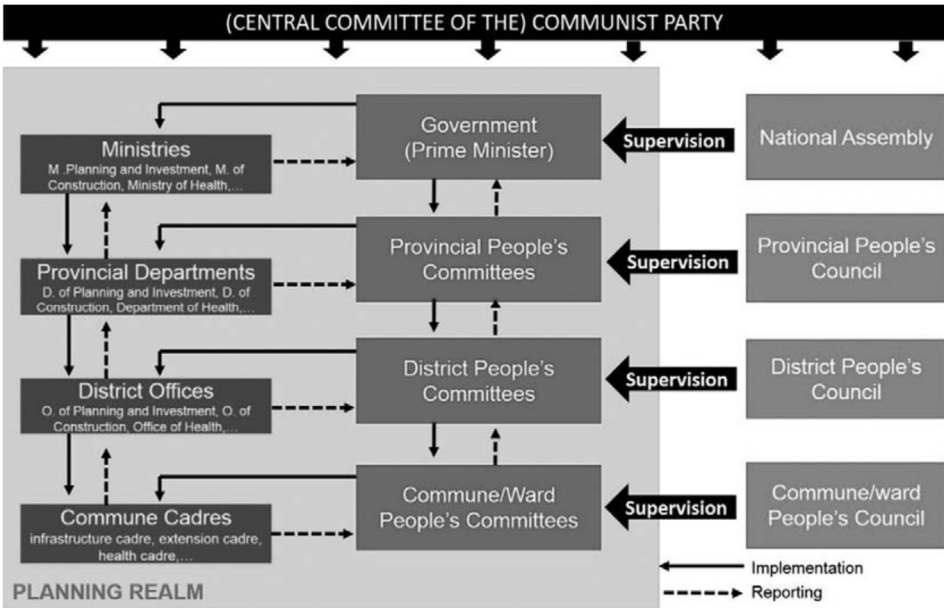

Figure 4.1. Simplified organizational chart depicting Vietnam's planning system. (Source: Benedikter and Nguyen 2018)

Despite some reforms that have transferred greater fiscal and administrative responsibilities to the provincial level, formal decision-making power remains largely centralized, with little downward accountability (Benedikter 2016; Fritzen 2006; Vasavakul 2019). Nevertheless, outside of formal institutions, numerous studies have documented the

[75] Benedikter and Nguyen (2018) cite a total of 19,285 planning documents in effect during the 2011-2020 period, scattered across administrative levels and the country's 63 provinces and municipalities. Yet there is often a lack of coordination "between ministries, between provinces, and between the ministries and the provinces" (Seijger et al. 2019, 7), with consequences for issues such as land and water management or infrastructure, which necessarily cut across jurisdictional boundaries. However, in October 2017, the government approved a new Law on Planning which seeks to overcome these challenges by empowering the Ministry of Planning and Investment (MPI) to implement regional, multi-sectoral planning (Brown 2020a; "The Vietnamese planning system" n.d.).

informally decentralized nature of governance in Vietnam, where Hanoi often holds little enforcement over local affairs in practice (Benedikter and Nguyen 2018; Kerkvliet 2005; MacLean 2013; Mattner 2004). Scholars remarking on this situation frequently invoke the Vietnamese proverb "the king's edicts stop at the village gates" (*phép vua thua lệ làng*) in reference to the traditional autonomy of localities in Vietnam or examples of when individuals push back against policies imposed from above. Kerkvliet (2001) has described the relationship between the Vietnamese state and society as a "dialogic" one, and characterized the state itself as "responsive-repressive" (2009)—that is, demonstrating both sensitivity to public concerns and firmly resisting anything that might threaten its stability or the hegemony of the VCP.

Within this hierarchical multilevel governance setting, a number of documents have sought to integrate climate change adaptation with development planning in Vietnam. Foremost among these, the National Target Program to Respond to Climate Change (NTP-RCC), approved in 2008, provides the legal basis for mainstreaming climate adaptation activities into development policies and programs (GoV 2008; Phuong, Biesbroek, and Wals 2018). Responsibilities for implementation are delegated to various ministries, sectors, and localities, with the Ministry of Natural Resources and Environment (MONRE) taking the lead, the Ministry of Planning and Investment (MPI) coordinating, and specific supporting duties allocated to mass organizations and other entities. With regard to the effects of climate change in the agricultural sector, the Ministry of Agriculture and Rural Development (MARD) is responsible (Phuong, Biesbroek, and Wals 2018). "Mainstreaming" refers to the integration of climate change adaptation into existing development goals, strategies, policies, and budgets (Beckman et al. 2013). This is generally pursued either by making existing projects "climate-proof" or prioritizing adaptation in future projects (Beckman et al. 2013; Klein et al. 2007). At subnational

levels, this occurs primarily via annual and five-yearly SEDPs formulated by provincial People's Committees (Phuong, Biesbroek, and Wals 2018). In this way, Fortier (2010, 238) claims, climate change adaptation is subsumed by the party-state's "attempt to maintain course on growth," or, as Lindegaard (2020, 117) puts it, a "rebranding of existing interests as climate change adaptation."

For the Mekong Delta, the governance of climate change adaptation in recent years has been strongly influenced by the Mekong Delta Plan (MDP), produced by a consortium of Dutch consultants and Vietnamese partners in 2013. Seeking to address fragmentation in the Vietnamese planning system and lack of regional land and water management coordination (Seijger et al. 2019), the MDP presents an integrated, long-term sustainable development vision for the delta based on a path of "agro-business industrialization" (Mekong Delta Plan 2013). Locating many of the delta's sustainability problems in the country's "rice first" policies, which aim to maximize rice production through subsidies and a reliance on hydraulic engineering structures to prevent floods in the upper delta and extend the reach of freshwater into the coastal zone (Biggs et al. 2009; Gorman 2019; Le Thuy Ngan et al. 2018), it instead recommends more adaptive land and water uses, such as flood-based agriculture in the former area and brackish-water aquaculture in the latter. In general, it recommends upgrading the delta's agricultural economy through the application of modern technology, shifting from a focus on maximized yields to higher-quality products to meet international consumer demand, and improving value-chains through the development of specialized food processing industries and public-private partnerships. After limited initial involvement from the Vietnamese government, the MDP received the endorsement of a number of Vietnamese scientific experts, as well as the Southwest

Steering Committee (SWSC), a regional political organ of the party-state,[76] the International Union for Conservation of Nature (IUCN), and numerous foreign development agencies, including the International Fund for Agricultural Development (IFAD) and the World Bank. Since then, several new policy documents have been issued by the Vietnamese government that aim to establish the principles laid out in the MDP in legal form (Brown 2020a). Nevertheless, at the time of my fieldwork in Trà Vinh, only the most well-connected researchers and government officials seemed to have any awareness that the MDP existed (see also Korbee et al. 2019; Seijger et al. 2019).

In this chapter, I focus on actors operating at the regional and provincial levels in the Mekong Delta who play a key role in the transmission and translation of knowledge shaping climate adaptation in practice. Figure 4.2 presents a highly simplified visualization of this governance network,[77] illustrating the structural positions and relationships among the actor groups highlighted here: staff of an official development assistance (ODA)-funded climate adaptation project (AMD); researcher-practitioners from Vietnamese universities and research institutes; agricultural extension agents from the Center of Agricultural and Aquacultural Extension[78] at the provincial Department of Agriculture and Rural Development (DARD),[79] and regional scientific "experts." In addition to those that are the primary focus of this chapter, other significant intermediary actors and organizations shown here include the Southwest Steering

[76] The Southwest Steering Committee was later disbanded, in October 2017, along with the two other regional steering committees in Vietnam (http://en.nhandan.com.vn/politics/domestic/item/ 5562902-vietnam-to-disband-regional-steering-committees-in-bid-to-downsize- public-sector.html, accessed 2 October 2018).
[77] Highly simplified in part because it elides such distinctions as those between the parallel structures of the Communist Party and the Vietnamese government, and also those between the hierarchically nested structures of districts and communes.
[78] *Trung tâm Khuyến nông Khuyến ngư*
[79] *Sở Nông nghiệp và Phát triển Nông thôn*

Committee (SWSC)[80] and mass organizations (e.g., the Farmers' Union,[81] Women's Union,[82] and Communist Youth Union[83]). The ODA-funded project is the IFAD project "Adaptation to Climate Change in the Mekong Delta" (AMD)[84]. Universities and research institutes include those that operate regionally, including WACC and others based in HCMC and Cần Thơ, as well as those in Trà Vinh, including CSP and related units of Trà Vinh University

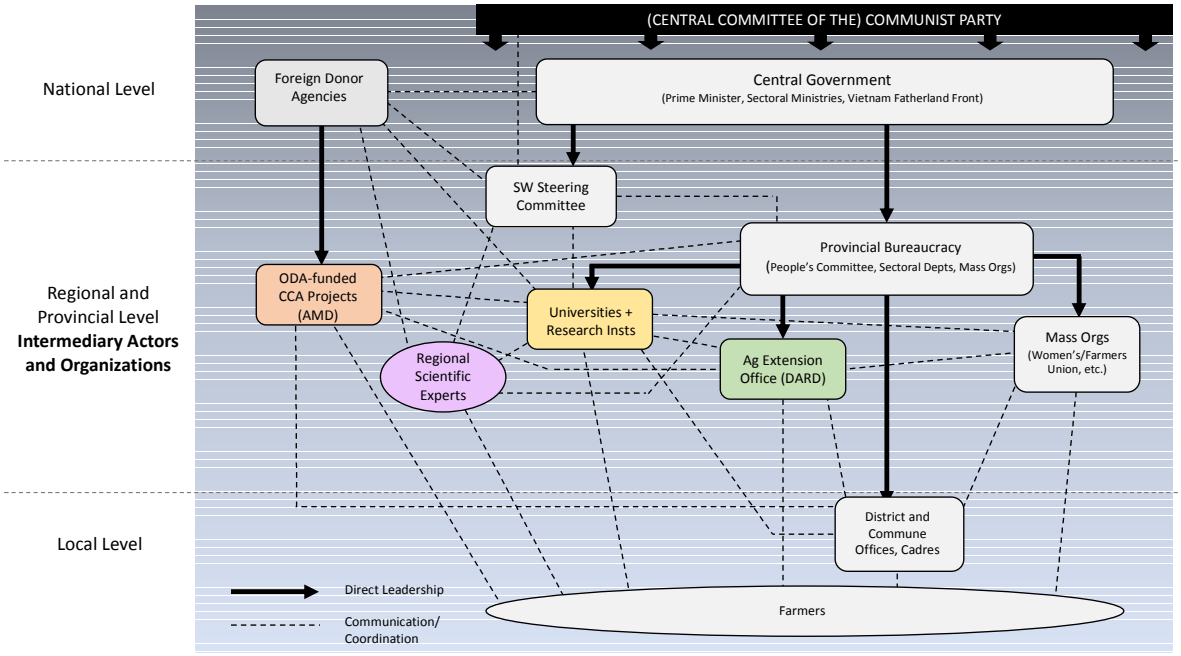

Figure 4.2. Simplified representation of governance structure relevant to climate change adaptation in the Mekong Delta. Actor groups that are the focus in this chapter are highlighted in color. (Illustration by author)

[80] *Ban Chỉ đạo Tây Nam Bộ*
[81] *Hội Nông dân*
[82] *Hội Phú nữ*
[83] *Đoàn Thanh niên Cộng sản Hồ Chí Minh*
[84] AMD ran from 2014-2020 and was active in both Trà Vinh and the neighboring province of Bến Tre.

(TVU). As always, this is only one way of drawing the far more complex, dynamic, and constantly evolving actor-network of climate change adaptation governance in the Mekong Delta.

"Nothing for Free"

Trâm's catchphrase, "nothing for free," illustrates the way in which scientific and technical knowledge is circulated within the political economy of development that characterizes climate change adaptation in the Mekong Delta. Intermediary actors such as Trâm and her friends—researcher-practitioners in agriculture and rural development—play a key role transmitting and translating knowledge upwards, downwards, and horizontally within this system. Vertically, knowledge-sharing is constrained by a rigid hierarchical system of top-down planning and bottom-up reporting (Benedikter and Nguyen 2018; Phuong, Biesbroek, and Wals 2018), which shapes the ways that knowledge for climate change adaptation is produced, circulated, and applied by different actors to meet the expectations and incentives of authorities. Most significantly, as noted above, the "mainstreaming" of adaptation means that such activities are integrated into the framework of socio-economic development planning at national, provincial, and local scales (Benedikter and Nguyen 2018; Phuong, Biesbroek, and Wals 2018). As Thành, the director of an applied research center at TVU explained, the province's annual and 5-yearly "Resolution" (*Nghị quyết*) "provides the orientation" within which all climate change adaptation activities must fit: "[We] have to look at the different objectives, and how to meet each one, by which solutions." This "orientation" guides research and development activities and incentivizes findings that align with provincial development goals and targets.

This means that knowledge produced by scientific researchers or information reported by bureaucrats is often translated to fit the demands and expectations of the provincial government. Describing how local researchers translate the knowledge and livelihood innovations of farmers into usable data for climate change adaptation (see also Tran, Nguyen, and Vo 2019; Tran, Pittock, and Tuan 2018), Thành told me they first have to "convert" it (he used the English word) into something more "complete" to qualify for government support. He offered a hypothetical example: Suppose there's a farmer who has found a way to live sustainably in an area of increasing salinity, he said. "He has a plot of land with mangrove forest inside, and he harvests shrimp, but he doesn't get rich." Despite high temperatures and increasing salinity, Thành continued, the farmer receives enough income to live. "We try to increase the productivity of his model… to get more shrimp… but not break the ecosystem. We increase every factor a little, trying to find a sustainable agro-ecosystem for a more successful livelihood." Once they have something more profitable, he said, they then suggest this "livelihood model" (*mô hình sinh kế*) to the agricultural extension office or request funding from the provincial Department of Science and Technology (DST) to help "spread it in reality."

Duy, formerly employed by an institute under the Ministry of Agricultural and Rural Development (MARD)[85] responsible for irrigation planning in the delta, described the structural constraints researchers often face in this way: "What do you want? You want money," and because of this, provincial authorities "will force you to go in their direction." For instance, he said, if the province wants to build a canal, "but we found it will cost a lot of money," the budget is already fixed, so "they don't want to change… [Therefore] we need to find a way… that they will accept." Despite anticipated excessive long-term costs or negative impacts, he explained,

[85] *Bộ Nông nghiệp và Phát triển Nông thôn*

researchers are under pressure to find solutions that conform to the province's development targets, though he conceded that this "is bad from a scientific standpoint." Similarly, as many foreign researchers have observed, there is a tendency when collecting information via formal channels in Vietnam to be met with "official" responses, in which anything that does not conform to official narratives is filtered out (Bauer 2011; Ehlert 2012; Kerkvliet 2001; Scott, Miller, and Lloyd 2006). When I interviewed provincial-level bureaucrats from the Department of Natural Resources and Environment (DONRE)[86] or the Women's Union,[87] for example, respondents often gave standard, pre-formed answers about their office's activities, with some agreeing only to send me pre-written statements detailing their organization's policies. The reliability of statistical data about localities, collected and managed by local cadres in often non-transparent and inconsistent ways (Bauer 2011; Reis 2012; Tan 2012), is equally to be questioned. In sum, information is often reported about how things *ought* to be rather than how they *are* (Bauer 2011; Benedikter and Nguyen 2018; Scott, Miller, and Lloyd 2006).

This situation gives rise to what MacLean (2013) calls a kind of "papereality." The term describes

> institutional contexts where official representations of reality take precedence over actual conditions. (Five-year plans, which purportedly take present conditions into account when setting future targets, are an example par excellence of this phenomenon.) "Papereality" thus sustains a gap between what people claim and what people actually accomplish, fostering mistrust in the process. Ideological demands, political pressures, material shortages, social obligations, and technological limitations further contributed to

[86] *Sở Tài nguyên và Môi trường*
[87] *Hội Phú nữ*

> this persistent problem, and they prompted high-level officials to design new forms of documentation to mitigate it (MacLean 2013, 7).

Yet new forms of documentation (reports, plans, the plethora of legal documents including decrees, orders, decisions, resolutions, circulars, and so on), replete with empty bureaucratic rhetoric, just contribute to the problem, MacLean argues, fostering in turn "partial illegibility" (cf. Scott 1998): the limited ability of high-level officials to effectively read, and hence maintain administrative control over, the countryside. The other side effect MacLean mentions above—mistrust—was a problem noted by several of my interlocutors, describing either local people's distrust of party-state authorities and institutions (Bauer 2011), or with comments like "people just don't trust one another here," when observing that others tend to seek individual short-term advantage over long-term, collective goals (see also Harms 2014). Whether regarding public faith in state institutions or people believing others look out mostly for themselves, this lack of trust compounds (e.g., Kerkvliet 2005).[88]

Horizontal knowledge-sharing among actors is where the transactional nature of knowledge exchange can be seen most clearly, as people use data and other research outputs to acquire social and material resources. Since the *Đổi mới* reforms of the 1980s, the Vietnamese government has encouraged the progressive commercialization of science and technology. Due to public sector fiscal constraints, Vietnamese universities and research institutes have looked elsewhere to make up budgetary shortfalls, and liberalizing reforms have allowed them to operate as firms on the market. Today, direct commercial or government contracts for applied research, technological services, and consulting make up a significant part of institutes' activities (Bauer 2011). In this context, research outputs—data, reports, scientific knowledge and skills—

[88] On the general erosion of trust in contemporary Vietnamese society, at institutional and personal levels, see also Nghia Thu Nguyen (2021).

become resources that organizations or individual scientists can leverage to supplement meager salaries or enhance market competitiveness, thereby opening up further opportunities to acquire resources. As the vice director of a HCMC-based research institute told me, "People use data for fishing,"[89] in explaining why data is not easily accessed or freely shared in Vietnam, but rather sold for a fee. For the same reason, different units of TVU compete with one another to sell wood apple wine and other value-added agricultural products, and during my time there played host to a stream of visiting delegations from other countries—the Netherlands, Germany, Japan, Belgium, Thailand—to explore opportunities for collaboration. Collaborative partnerships, especially with international entities, both enable the expansion of professional networks and provide access to additional sources of funding. One of their primary outcomes is the organization of joint conferences or workshops, which facilitate knowledge exchange while providing important opportunities for informal networking (Bauer 2011; Zink 2013).

To overcome these structural and financial constraints and the lack of trust they engender, intermediary actors frequently turn to informal means of knowledge sharing. Indeed, it is often via personal relationships and informal interactions that people are best able to access information and resources or navigate bureaucratic hierarchies in Vietnam (Bauer 2011; Gainsborough 2010b; Reis 2012; Zink 2013), a form of sociality especially characteristic of southern Vietnamese society (Luong 2018; Taylor 2016b). For example, the common practice of informal feasting and drinking sessions (*nhậu*), often over lunch, nearly always preceded or, more likely, immediately followed formal meetings and workshops, whether with foreign delegations, scientists, local officials, farmers, or some combination thereof, leading to many an

[89] The leaders of several research institutes expressed versions of the sentiment "knowledge is power" or "information is power" in explaining their motivations to hold onto research outputs in order to enhance their social and market position (see also Bauer 2011).

afternoon hangover. This was touted by my colleagues, such as Trâm and her friends, as an essential means of establishing rapport with people, especially if I wanted to interview them or in other ways seek to glean information or knowledge from them. This advice did not only apply to foreigners like me: it is typical for local researchers and practitioners also to sit with farmers or officials to share food and toast glasses of beer or spirits, and in this way enroll one another in relationships of mutual trust. This practice was explained to me as a form of social etiquette or courtesy (*xã giao*) important for the maintenance and reinforcement of social relations (*quan hệ*), thereby fostering group cohesion (Gillen 2016; Harms 2013; Luong 2018).[90] For intermediary actors responsible for translating knowledge across levels of governance, formal knowledge sharing may be constrained by rigid hierarchies and budgetary shortages, but informal, face-to-face interactions allow for more dynamic exchanges that build trust and facilitate cooperation toward shared goals (Bauer 2011). Many authors suggest that informal networks and interactions such as these (often labeled "social capital") are key to social learning processes and the adaptive capacity of institutions and communities (Adger 2003; Hulke and Diez 2020; Olsson et al. 2006; Tran, Nguyen, and Vo 2019; Tran, Pittock, and Tuan 2018; Tran and Rodela 2019).

Livelihood models and model farmers

From the road, the golden-green of maturing rice fields stretches into the distance; in the other direction, the landscape is checkered with rectangular ponds separated by grass-covered earthen bunds and sparse trees. In the midst of a landscape transitioning to predominantly

[90] Although these sessions were by no means exclusive to men, there was a significant gendered dimension to them, with women less likely to (be expected or invited to) participate (Gillen 2016; Harms 2013; Reis 2012; Scott, Miller, and Lloyd 2006). However, as the active participation of Trâm and her female colleagues suggests, to succeed in a traditionally male-dominated field like agricultural research and development, one may feel pressure to engage in such forms of sociality.

brackish-water shrimp farming, the raised road that cuts through the commune of Long Sơn acts as a salinity barrier, preventing much of the saltwater from the seaward side from permeating the soil and rice fields on the other. Arriving in the heat of midday for a training workshop (*hội thảo tập huấn*) on raising blue-claw shrimp with Hương from AMD (the IFAD-funded project), several of her colleagues, and a cameraman from the Trà Vinh television station, I walk between the ponds to a house with motorbikes strewn in front. The farmer hosting the event offers a demonstration for the camera. Taking a prawn from the bucket, he deftly tears off its long, indigo-colored front claws, while Hương explains for the camera that at this stage, around four and a half months old, farmers should remove the claws and return the shrimp to the water so they can continue to grow. Minutes later the seminar begins, with a 30-person mixed group of men and women seated around tables under a tarpaulin cover next to the house, beneath a large AMD banner announcing the workshop. Hương stands in front, with two women from the provincial extension center, one from the commune's agricultural office, and a young man in the blue shirt and red scarf of the Communist Youth. The women stress that brackish-water aquaculture is a crucial means of adapting to climate change here, and that blue claw shrimp (*tôm càng xanh*; *Macrobrachium rosenbergii*) is a highly effective model for doing so. The extensionists describe the required inputs of feed and chemicals, techniques to avoid disease, and the yields that can be expected if procedures are properly followed. Although this species grows more slowly than others, they explain, it requires fewer pesticides and is therefore cheaper to raise and more sustainable, as one can continue cultivation for many years with little risk of disease, and thus crop failure. The farmer piloting the project stands to share his experiences, vouching for the ease and profitability of this model. After a period of discussion, food is

brought out and everyone settles in for a large banquet lunch, with plenty of shrimp to eat and beers for toasting.

Nearer to the coast, in Đôn Châu commune, farmers have taken advantage of the salinity by cultivating shrimp for much longer. This time, I have come for a workshop on raising white-leg shrimp (*tôm thẻ*; *Litopenaeus vannamei*) with Lan from the provincial extension center. There are around 20 farmers in attendance, of whom just two are women. Lan passes out pamphlets and begins her slideshow presentation. Projecting an air of technical expertise, she describes in detail the process of cleaning out an old pond, removing the sludge, preparing the underlying soil with lime (Ca(OH)□) to neutralize the pH, then refilling the pond and treating the water with chlorine and nutrients, measuring and adjusting the pH, and finally running the electric aerator fans to increase dissolved oxygen in the water. She insists that though the input costs for cultivating this species are quite high, it is a more productive and therefore profitable alternative to giant tiger prawn (*tôm sú*; *Penaeus monodon*), which most of the farmers currently raise. Instead of taking 5-6 months to mature, white-leg shrimp only take around 2.5 months, so one can potentially get up to four harvests per year, and with high stocking densities can earn a much greater profit overall. Concerns are raised about disease, and Lan explains that white-leg shrimp are voracious eaters, so if they begin to eat less it is likely because of a bacterial infection, in which case farmers should add Vitamin C and digestive enzymes to the pond. Still, the farmers express concerns that the larvae they purchase will be of low quality and therefore more susceptible to disease. They distrust the suppliers, most of whom are based either in neighboring provinces or in Central Vietnam and argue that even if they pay premium prices suppliers may still try to "cheat" them by providing larvae mixed with low-quality, "weak" seed.

If disease appears in just a few it can quickly spread to the whole batch. In this case, Lan recommends they join a cooperative group for enhanced bargaining power.

Such training workshops are a common occurrence in rural Trà Vinh, events where some combination of extension agents, AMD staff, representatives of mass organizations, and researcher-technicians from TVU (broadly, in this context, "extensionists") promote so-called "climate-resilient agricultural models" (*mô hình nông nghiệp thích ứng với biến đổi khí hậu*). AMD operates as a "project coordination unit" in the province, bringing together public- and private-sector entities to strengthen the adaptive capacity of institutions and target communities. Its mission, according to the project director, is "to see how farmers can increase their income and make their livelihoods more sustainable," while prioritizing poor, female-headed, and ethnic minority (Khmer) households[91]. Collaborating with researchers and government offices, they disseminate knowledge via workshops, pamphlets, and occasional TV spots; fund infrastructure projects such as paved roads; and channel financing to farmer households to support the adoption of new livelihood models. Depending on the particular soil and water conditions, these models aim to provide resistance to drought, waterlogging, salinity, or new pests, while reducing input costs and generating higher profits. Crops such as chili peppers, peanuts, cucumber, and maize are promoted, often in combination with water-saving drip-irrigation technology and/or organic fertilizer, as well as various breeds of livestock and shellfish. Typically, AMD will first invest in pilot experimental plots with select farmers, then implementing agencies such as the extension office and university research centers work to scale up "successful" models to the community level. All such activities must fit within the scope of, and therefore contribute to, national and

[91] As others have observed, programs that focus on supporting women and minority households can sometimes have unintentionally exclusionary or culturally alienating effects (Carr 2013; Cons and Paprocki 2010; Taylor 2004).

local socio-economic development policies and goals. According to the AMD director, these are then "shaped to be adaptive to climate change" by the activities of AMD and its partners.

As climate change adaptation is mainstreamed in this way, not only are existing policies and programs shaped to be adaptive, but knowledge for climate adaptation is itself translated in such a way as to further the productivity goals of the state. In Trà Vinh, for example, the SEDP for 2016-2020 declares that the province should: "Strive for the production value of the entire agricultural sector to increase by an average of 5.5%; the annual rice output reaches over 1.3 million tons; over 50% of communes achieve new countryside criteria" (Trà Vinh People's Council 2015).[92] Based on current conditions and land uses, the Department of Agriculture and Rural Development (DARD) then updates land-use plans to achieve target production volumes. In this way, increasing the value of agricultural production becomes one of the guiding principles of climate adaptation activities, prompting extensionists to emphasize productivity and profitability of livelihood models, and therefore, in all likelihood, intensification as well.[93] While all sectors have their own plans for reaching specified targets, one of the overarching goals, according to officials from the Department of Planning and Investment (DPI),[94] is to get "private businesses to do business here." Smallholder farmers are increasingly encouraged to pool their resources and join cooperatives to take advantage of economies of scale and plug into wider markets, and AMD prioritizes value-chains by supporting enterprises that buy products from farmers and investing in cooperatives that do business with private companies. But such models of "cooperative capitalism" have been found elsewhere to exacerbate rural inequality and

[92] "Phấn đấu giá trị sản xuất toàn ngành nông nghiệp tăng bình quân 5,5%; sản lượng lúa hàng năm đạt trên 1,3 triệu tấn; trên 50% số xã đạt tiêu chí nông thôn mới." (Translation by author.)
[93] Many, however, question the potential for intensive shrimp farming to be "sustainable" in practice, due to effects including mangrove deforestation, soil and water pollution, and excessive groundwater extraction (for modulating temperature and salinity levels), as well as the high risks farmers face from disease susceptibility and market volatility (Be, Dung, and Brennan 1999; Lebel et al. 2002; Luttrell 2002; Nguyen and Ford 2010).
[94] *Sở Kế hoạch và Đầu tư*

dispossession through land transfer from small to larger farmers within cooperatives (Paprocki 2018). This, paradoxically, is often given as justification for these programs in Vietnam; the idea being that a shift to larger-scale farming operations will enhance input efficiency and spatial coordination across the landscape while reducing population pressure on resources.

One of the most important government programs guiding rural development in Vietnam, and thus climate adaptation activities, is the "New Countryside Program." This program designates a set of 19 "criteria" for communes to strive for in areas such as infrastructure development, poverty reduction, health, education, and environmental protection in order to qualify for special funding from the central government (GoV 2016b). While variations on the theme have been around since the 1980s (MacLean 2013), in its present form the program has existed since 2009 and reflects the post-*Đổi mới* emphasis on development through privatization, restructuring, and marketization, relying largely on individual entrepreneurial initiative to mobilize labor and resources to achieve specified targets (Nguyen 2017).[95] In essence, the program rewards high performers. According to Nguyen (2017, 5), the "overriding message… is that local communities and people should own and thus be responsible for their development." Yet, observers note, the top-down imposition of these goals does little to empower local people's attachment to place, leading them to prioritize individual short-term interests over longer-term sustainability (Nguyen and Nguyen 2020). The party-state, however, leans on a discourse of "civilization" (*văn minh*) to motivate people. Program documents encourage standards of cleanliness, behavior, and morality for people to follow in order to lead a "civilized lifestyle" (*nếp sống văn minh*) and achieve the status of "cultured" (*văn hoá*) family or hamlet so that they

[95] Officially titled "Building the New Countryside" (*Chương trình xây dựng nông thôn mới)*, the national program is modeled after a Chinese program "The New Socialist Countryside," initiated in 2006 (MacLean 2013; Nguyen 2017).

can serve as a model for others (Trà Vinh People's Committee 2017b, 2017a), following what MacLean (2013) refers to as the party-state's longstanding promotion of forms of "guided self-regulation" and "emulation" to shape conduct. Much has been written about the civilizational discourse prevalent in post-colonial Vietnam, in which a state-led vision of modernity and social order is tied to an imagination of urbanity, industry, and technological progress, while contrasted with the supposed "backwardness" of poor and rural areas (e.g. Bradley 2004; Harms 2011, 2014; Schwenkel 2020; Taylor 2001). Seen through this lens, the "New Countryside" program can be understood as part of wider state-led efforts to "civilize" the countryside and "build socialism" (MacLean 2013; Nguyen 2017) through the moral and economic improvement of its citizens.

A similar discourse was on display at a conference on "restructuring agriculture" (*chuyển đổi cơ cấu nông nghiệp*) to respond to climate change held in Cần Thơ. Representatives from science, government, and agribusiness gave back-to-back presentations about the urgent need to adapt, contrasting "improper" (*không đúng cách*) traditional farming methods with products and technologies deemed necessary for practicing "smart" agriculture (*nông nghiệp thông minh*), while companies like Dow Chemical and Yanmar equipment advertised their wares outside. Such an approach reflects the global discourse around "climate-smart agriculture" (CSA), which Newell and Taylor (2018, 108) describe as a paradigm that "seeks to square the goals of climate change mitigation and adaptation with the need to increase productivity in the agricultural sector and reduce poverty and hunger in developing countries." By defining and delimiting the solutions that are advanced as climate-smart, powerful actors such as the World Bank, FAO, and IFAD, as well as agricultural research organizations and agribusiness companies, promote a version of CSA that tends to support "business-as-usual modes of agrifood production and

governance" organized around industrial, private sector-led, and export-oriented agriculture (2018, 109). Much like previous notions of "sustainable intensification," these authors argue, this discourse further entrenches the power of dominant agribusiness interests that derive from their "control over production, finance and technology in the current food regime" (2018, 119). At the same time, local actors may seize on the popularity and ambiguity of the "climate-smart" label to reap the benefits of enhanced authority and access to material resources (Newell, Taylor, and Touni 2018).

As these examples show, successful adaptation to climate change is here translated as increasing incomes under conditions of environmental stress and uncertainty, mediated "through scientific knowledge, technical expertise, and the rules of the market" (Mikulewicz 2020, 17). Extension services commonly rely on successful "model" farmers to facilitate the transfer of knowledge, technologies, and practices to target communities "through networks combining extension agents, research institutions and private sector interests" (Taylor and Bhasme 2018, 1). In the Mekong Delta, Hicks (2004, 243) observes that extensionists often favor "supporting the strong"—model, or progressive farmers—with "private resources to invest… relative financial security to be able to risk experimentation, and access to televisions and information that engendered a wider knowledge of non-traditional farming methods." Such farmers provide a real-time demonstration of the benefits of applying new farming techniques and can be held up as role models for others to emulate, a tactic long employed by the party-state to mobilize labor and resources (MacLean 2013; Nguyen 2017), as well as providing extensionists themselves with potential material benefits from increased legitimacy or relationships with private sector contacts looking to promote their products (Hicks 2004; Taylor and Bhasme 2018). It is no

surprise that similar criteria were used to define adaptation success. Thành expressed a popular viewpoint when he told me:

> Successful adaptation is someone who is able to turn bad conditions to their advantage… The people that don't want to adapt, get poor. *The people that want to adapt, they got rich already* […] Some farmers are very conservative. Even though they recognize that the climate is changing, they don't want to change. But some other people are very willing to change, *and they follow the advice of local authorities and scientists*.

These comments clearly define the characteristics of the ideal adaptation subject: a farmer who is proactive, entrepreneurial, eager to apply scientific expertise and heed the authorities, and who becomes wealthy by doing so (see also Mikulewicz 2020). In one commune near the mouth of the Mekong River, where the transition to intensive shrimp farming is nearly complete, I met a man the local media had dubbed the "shrimp billionaire"[96] (*tỷ phú tôm*) for his riches earned through the industrial cultivation of giant tiger prawn. Appointed commune agriculture-aquaculture officer, he was held up as a model of success for his ability to apply modern technology to "adapt" to the saline conditions. The success of intensive shrimp farming in general was credited with helping his commune to achieve nearly all criteria to reach "New Countryside" status, and it too was promoted as a model for neighboring communes to emulate.[97]

[96] "Tỷ phú tôm sú ở Mỹ Long Nam" https://www.bienphong.com.vn/ty-phu-tom-su-o-my-long-nam-post27645.html, accessed 24 April 2021. (Note: 1 billion VND was equal to about $43,92050,000 USD at the time of fieldwork.)

[97] https://dangcongsan.vn/chung-suc-xay-dung-nong-thon-moi/tin-tuc-su-kien/my-long-nam-tra-vinh-giau-len-nho-con-tom-su-92436.html; http://thmylongnama.pgddtcaungang.edu.vn/tin-tuc-su-kien/tin-cua-truong/my-long-nam-dat-18-19-tieu-chi-xay-dung-nong-thon-moi.html, accessed 24 April 2021.

The agency of scientific experts

Some of those with the greatest agency to advance their visions of adaptation and development in the delta are Vietnamese scientific "experts," often well-known environmental scientists with activities and influence across multiple provinces. Much like the "retired reformists" mentioned by foreign consultants involved in drafting the Mekong Delta Plan, these are individuals whose structural position and social status mean they are "both close enough to the ruling elite and still powerful enough to have an influence in the Vietnamese political domain" (Hasan et al. 2019, 1592). Zink (2013, ix) observes that Vietnamese scientists "are creative agents with both visions of their future and significant space for self-determination," especially in the new political space created by climate change (Benedikter 2014; Vo et al. 2019). Many were educated abroad, often at universities in the US or Europe, and over time have achieved the authority to assemble both facts about the environment and wide audiences (Zink 2013, 4). By giving talks, publishing reports, and collaborating on projects with foreign and domestic partners, they translate knowledge to influence the course of climate adaptation in the delta, reaching public officials through formal and informal channels. Enrolling forms of mass media, they reach even wider audiences while increasing their authority and recognition. Less beholden to formal bureaucratic constraints or obligations to implement specific policies, such authority enables them to advance their own agendas. Many were consulted on draft versions of the MDP and gave extensive feedback, providing the Plan with some of its only local input. Yet they maintain a detached skepticism, aligning themselves with its recommendations as it suits their goals and interests. By purportedly working on "the environment," these experts can work indirectly on the state, shaping development discourses and practices at local and regional scales.

Hùng and the gang

The first time I met Hùng, he was wearing a Mardi Gras t-shirt, having just returned from the US with a delegation of Mekong Delta scientists as part of the US State Department's Lower Mekong Initiative (every time I saw him after that, he was dressed in the more typical attire of a Vietnamese man of his profession, a plain white collared shirt). He had been particularly impressed by nano-membrane desalination technology he'd witnessed that offered potential to help avoid the infrastructural approach to saltwater management pushed by authorities in the delta who, he said, were strongly influenced by the engineering-focused approach dominant in the very different conditions of the Red River Delta around Hanoi. A wetlands ecologist by training, he had come to Trà Vinh University that day to give a presentation on sustainability challenges facing the Mekong region at a meeting with a Thai university delegation. He spoke excellent English, with confidence and humor, and delighted in sprinkling his conversation with mocking imitations of President Trump, whom had just been elected a few months prior.

Interviewing Hùng for the first time at an outdoor café in Cần Thơ two weeks later, he offered to introduce me to several people I had been unsuccessfully trying to get in touch with. "They're my buddies!" he exclaimed between puffs of his cigarette, and invited me out to eat and drink beer (*nhậu*) with them that evening. He proceeded to tell me about this group of friends, "the delta gang" he called them, mostly other scientists from Cần Thơ University (CTU) and affiliated research institutes who regularly meet for coffee and discuss challenges facing the delta. Local sons who feel a close connection to the mud, water, and rural lifeways of the area, he explained, they for the most part think similarly about such issues and are unafraid to speak out and be critical of dominant approaches to development. And they get away with it, he said, because they are well-known and respected scientific figures, and they support each other. They

had formed an informal alliance, he told me. When one of them speaks out, the others are behind him. He described how they are able to influence public officials in their networks, such as a friend and "ad hoc" member of the gang from the Southwest Steering Committee (SWSC). Moreover, several are a familiar presence in the local media. "I'm like Trump!" he said, grinning widely, because he loves the media attention.

Deliberate and strategic use of the media to promote their ideas was a common theme when I spoke with other members of this group as well. Sometimes they publish opinion articles in local newspapers or appear on television to talk about environmental problems or sustainable livelihood techniques, hoping to reach farmers as well as sway government officials and the wider public. They are skilled networkers, organizing field trips and enlisting local journalists to report on stories they consider important, and cultivating those relationships so journalists continue to seek them out for information. One expert told me that when speaking to the press or on television about the environment, he knows that he can speak freely. But, he pointed out, the same is not true for just anyone: he has decades of name recognition, and lots of data to back him up.[98] Another, who referred to "the gang" as an informal "think tank," observed that just five years earlier, when they would speak about climate change, few people in the delta knew what they were talking about. Now, he estimated some 70% of local officials and farmers alike both know who they are and are conversant in climate change.[99]

[98] In the late 1970s and early 1980s, a well-known agricultural scientist responsible for introducing high-yielding rice varieties to the delta became famous as "Dr. Rice" on television. He told me that despite getting into trouble for speaking critically on his show about the collectivization policies then in place—which had him labeled a reactionary—recognition of his contribution to his country's economic development eventually earned him a place in the National Assembly, the country's legislative body. Many of the other experts I spoke with had previously studied under him.

[99] According to Pham and Nash (2017), until recently Vietnamese news outlets reporting on climate change tended to quote government sources instead of scientists and focused more on global processes rather than local impacts and vulnerabilities.

Hùng, at another meeting, described how he likes to use the Vietnamese social networking app *Zalo* to post critical comments about environmental and development issues in Vietnam. He told me of a recent occurrence in which the Agriculture Department of a neighboring province was said to have forced their staff to eat contaminated fish just to prove it was safe. After posting a strongly worded criticism on social media, he sat back and watched the "likes" and comments come rolling in. Usually, this kind of criticism of government entities on social media can get you in trouble in Vietnam (Paddock 2017). However, it can also be a powerful tool for building ideological support in a country where more than half the population are active Internet users and there are some 50 million Facebook accounts (Hue Trong Duong, Hong Tien Vu, and Nhung Nguyen 2019, 4). Hùng acknowledges that his status as an "expert" confers on him the ability to criticize the government when it is framed within the context of his scientific expertise, not least because of the privilege that comes from public recognition and his participation in institutional networks.

Some of these scientists are unequivocal about criticizing the party-state, which they see as out of touch with local issues and in the pocket of powerful vested interests. Many express disdain with leaders from the north deciding the course of the delta's development. For some, this is expressly political. After the reunification of Vietnam following the Second Indochina War (AKA the "Vietnam War"), northern cadres were sent to the south to take up positions of power, such that for many years, government leaders in the south were primarily northerners (Benedikter 2014). One told me that this was just "a continuation of the war," with efforts by the north to exert domination over the south. But for others, decision-makers in Hanoi are simply outsiders who do not understand the complexities of the Mekong Delta. Instead, they argue, centrally mandated water management policies are rooted in the distinct historical and

environmental conditions of the Red River Delta. Politicians and planners have come to rely on a dense patronage network of what Benedikter (2014) calls "hydrocrats," with vested interests in promoting capital-intensive infrastructure like dikes, canal systems, sluice gates, and pumping stations to protect against floods and salinity in order to facilitate intensive rice monocultures (Biggs et al. 2009; Fortier and Trang 2013; Seijger et al. 2019). The problem, according to Hùng and his friends, is that this approach obstructs the Delta's natural hydrology, undermining the resilience of ecosystems and preventing more adaptive land and water uses. This has at times pitted them against government scientists and engineers from the north in tense public exchanges about the merits of structural interventions for adapting to sea-level rise. Beware when they use the term "active adaptation," Hùng cautioned: it signals a structural approach. They seek adaptation by means of control.

Although local experts appear to unanimously agree with the Mekong Delta Plan's diagnosis that many of the Delta's sustainability problems can be addressed by reducing emphasis on maximum rice yields and shifting to adaptive water management and higher-quality products, they are openly critical of the Dutch-led document as well. Paralleling their criticism of decision-makers from the north, many of these critiques are of the form, "they are outsiders, they just don't understand our system intimately like we do." More precisely, most of them boil down to expectations of what a "plan" must be to gain traction within the Vietnamese system of governance. Experts argued that the MDP lacks substance and needs further research, additional data, and clearer explication of the conceptual thinking behind it, as well as more local input, particularly from farmers. Additionally, nearly all of them I spoke to argued that it needs concrete implementation procedures, as in a master plan. As is, they insisted, "the MDP is not a

plan; it's just a vision."[100] Still, the vision the MDP presents of "agro-business industrialization" is widely supported. Experts variously spoke to me of the need to improve agricultural products along the whole value chain; the necessity of considering future uncertainties by emphasizing "no regrets" options; the challenge of facilitating coordinated livelihood transitions in different agroecological zones; and the importance of regional, integrated planning: all objectives outlined in the MDP. Where they deviate from it, and often from each other, is around how to get there.

Such disagreements center on the kind of sustainable development pathway the Mekong Delta should take. Many of these experts downplay the risks of climate change, emphasizing instead the more immediate and entwined threats of upstream dam construction and local activities such as high-diking and excessive groundwater extraction. By reducing sediment deposition and drawing down the local aquifer, they point out, such activities accelerate subsidence (Erban, Gorelick, and Zebker 2014; Minderhoud et al. 2017)[101] and contribute directly to riverbank and coastal erosion (Anthony et al. 2015), undermining the long-term ability of the Delta to support human habitation. There are also differences of opinion between those experts who advocate pursuing economic development first and those who prioritize ecological values. Some expressed versions of the sentiment, "once Vietnam raises its economic status, only then can it focus on the environment," explaining that "agro-business industrialization" will help raise incomes across the delta, thereby reducing vulnerability and increasing adaptive capacity as well as the government's ability to invest in conservation. Many conceded that some farmers will not be able to afford this transition but argued that they have no

[100] To be clear, this is how the purpose of the MDP was described in the document itself, and by those responsible for drafting it. Yet it would seem that semantic confusion around the meaning of the word "plan"—given the history of top-down central planning in Vietnam—created divergent expectations.
[101] Subsidence rates for the Mekong Delta are estimated to range from 1.0—2.5 cm/year, an order of magnitude higher than global mean sea-level rise (Minderhoud et al. 2017).

long-term attachment to the land, and anyhow, “selling noodles in the city is better than farming.” Others, like Hùng, prioritize the integrity and connectivity of the delta’s ecosystems, decrying the loss of biodiversity and increase in pollution seen in recent decades (Campbell 2011; Sterling, Hurley, and Minh 2006) and expressing skepticism about so-called “sustainable” forms of agri- and aquacultural intensification.

Despite their vocal critiques of the MDP and high-level planning processes from which it sprung, local experts align themselves with such initiatives when it advances their personal and public interests. For example, Hùng told me about an instance in which he was recently hired to facilitate discussions with the leaders of three provinces about implementing Decision no. 593 on a pilot regional coordination mechanism for the delta. Inspired by the MDP, the prime minister’s Decision aims to establish interprovincial linkages in the fields of agricultural production, water management, and infrastructure (GoV 2016a; "The Vietnamese planning system" n.d.). Invited to facilitate the discussion for coordinating water management in the Plain of Reeds, Hùng agreed, he told me, so long as they let him do it his way. A natural depression in the northern part of the delta, the Plain of Reeds previously functioned as a freshwater reservoir, home to numerous species of fish and migratory birds. In recent decades, the extensive construction of high dikes has enabled farmers to plant three crops of high-yielding rice per year but largely prevented flood retention. “The hydrology is obstructed, it’s handicapped now,” he told me, having lost the benefits of freshwater storage, fertile sediments, and migrating fish and bird species that the floodwaters bring (Buckton and Safford 2004; Le Anh Tuan et al. 2007; Tran and Weger 2018). Starting with a visioning exercise, he asked the officials to imagine what the area might look like in 20 or 30-years’ time, encouraging them to think holistically of sustainability in social, economic, and environmental dimensions. “That's the difference,” he told

me. “Usually when you look at plans here in Vietnam, the only thing they look at is how much money you're going to get,” rather than giving due attention to environmental and social factors. “PPP is the formula: Profit, people, and planet. I'm trying to introduce that concept… into the minds of the decision-makers here.”

By participating in institutional planning processes such as these, Hùng aligns himself with both the MDP and the Vietnamese state, using his position to translate knowledge in a way that advances his vision of sustainability and the public interest. Yet doing so is in his private interest as well. Affiliating himself with these powerful actor-networks creates opportunities to take advantage of the outsourcing of state functions (Benedikter and Nguyen 2018) and secure project contracts and thus his own livelihood. One of the last times we spoke, he told me he and a group of foreign development consultants in concert with the Ministry of Planning and Investment (MPI)[102] had recently completed drafting the terms of reference (TOR) for a new integrated Master Plan for the Mekong Delta, to be based on the MDP. Once the government opened a bid for the project, he intended to work with its likely winner to craft the master plan that would eventually result, and he hoped to join the technical advisory board that would be appointed to oversee its implementation. The contract eventually went to Royal HaskoningDHV, the same Dutch consultancy behind the Mekong Delta Plan, with financing from the World Bank. The resulting “Mekong Delta Integrated Regional Plan” (MDIRP), was set to launch in early 2021 (Brown 2020a; Doan 2019).

[102] *Bộ Kế hoạch và Đầu tư*

Discussion

In recent years, a transnational, networked, and multi-level governance apparatus (Bäckstrand 2008; Dewulf, Meijerink, and Runhaar 2015; Dzebo and Stripple 2015) has emerged to integrate climate change adaptation into development in the Mekong Delta. Attention to the politics of translation at work within this governance system helps shed light on the social-relational and discursive strategies through which different actors contribute to the trajectory of social-ecological change in the delta, bringing into sharper relief the complex mechanisms and interactions that produce project outcomes (Lewis and Mosse 2006; Seijger et al. 2019; Tsing 2005; Witter et al. 2015). Drawing on the concept of translation from actor-network theory and inspired by institutional ethnography, this chapter has explored the role of intermediary actors that broker and translate knowledge at the regional and provincial levels, and the interests or agendas that are reflected in the process. The Vietnamese governance system is defined by a strict hierarchical politics of implementation, yet this chapter demonstrates that the discourse of climate change adaptation has opened a space of political agency, enabling intermediary actors to exert influence over the course of development planning and practice by exercising their translational agency, and in such a way advancing both public and private agendas.

By asserting their status as gatekeepers of knowledge, and positioning themselves as indispensable to its flow, interpretation, and use, the intermediary actors described here—researcher-practitioners, extension agents, staff of an ODA-funded climate adaptation project, and scientific experts—translate knowledge across levels of governance, connect and extend networks, and access resources, while shaping climate change adaptation in practice. This chapter has shown that the production, circulation, and application of such knowledge is mediated and constrained by the development goals and policies of the Vietnamese state, as

actors follow provincial development strategies and attempt to meet ambitious production targets. As a result, formal channels of knowledge translation tend to reproduce a kind of "papereality" (MacLean 2013) that sustains mistrust of institutions and fellow citizens, undermining cooperation and effective governance. They also promote a transactional exchange of knowledge, while actors seek out novel opportunities to supplement their incomes. To overcome these structural and financial constraints and the lack of trust they engender, actors often turn to informal relationships and interactions for sharing knowledge. After all, transactional relations, as debt relations, are a form of sociality (Graeber 2011; Sahlins 1972); when informalized, they become more egalitarian, dynamic, and cooperative, and more likely to reflect shared values and notions of the collective good.

When translating knowledge into practice for farmers, researcher-practitioners—extensionists and AMD staff in particular—focus on applying technical solutions in the form of enhanced "livelihood models." This propagates an approach to climate adaptation that sites the locus of (and responsibility for) adaptation at the scale of the individual farming household. The emphasis here is high-tech, profitability, and a central role for the private sector. Drawing together representatives from science and government, international organizations, successful pilot farmers, television programs, and agricultural technologies establishes the authority of those speaking on their behalf and enables the dissemination of knowledge. With such a network behind them, extensionists and other agricultural technicians perform their expertise through technically sophisticated presentations replete with the symbols of scientific knowledge (e.g., numeric figures and chemical formulae inscribed on pamphlets and PowerPoint slides), further shoring up their authority to persuade farmers how best to adjust their livelihoods to uncertain and changing environmental conditions. Informed by the tools of emulation and self-regulation

campaigns (MacLean 2013), and mediated by discourses of modernization and "civilization" (Harms 2014), wealthy "model" farmers are held up as images of climate adaptation success. Adaptation becomes about seizing environmental and market opportunities to make a profit; systemic questions of long-term sustainability or social-ecological resilience are backgrounded to the urgency of short-term, individual economic benefit.

Finally, well-known regional scientific experts tend to have the greatest agency to navigate the above structural constraints on knowledge sharing, often advancing more critical perspectives, and with wider influence, than other intermediary actors. Due to their acquired epistemic authority, as well as relative social status and prestige, they can get away with public expressions of criticism with little fear of repercussion. Indeed, their networks often include direct and informal relationships with government officials. Through such personal and institutional networks, as well as their strategic use of mass and social media platforms, their translations reach wide audiences, and their scientific authority carries weight. While these experts are more likely than others to promote more holistic and longer-term visions of sustainability, some also prioritize economic development as a necessary precondition for increasing farmers' adaptive capacity or pursuing ecosystem-based approaches to adaptation. Like their hedged criticisms of the party-state, these experts tend to align themselves with the Mekong Delta Plan cautiously and strategically; not wholeheartedly, but in ways that advance both private and public interests. Hùng, for example, is not shy about his critiques of the MDP, yet aligns himself with it when it suits his vision of sustainability and allows him to win project bids. Like other intermediary actors, experts wield climate adaptation knowledge for personal and collective benefit, translating it in ways that reflect the influence of hegemonic discourses as well as their own visions of the public good.

As important nodes in the actor-network of climate adaptation governance in the delta, the intermediary actors described above play a key role in shaping the kinds of socio-environmental futures that are envisaged, and, eventually, produced, and in so doing they advance both public and private interests. On the private side, the political economy of development in the delta today places a premium on knowledge associated with climate change adaptation, allowing its spokespersons—in other words, translators—to reap material rewards. For those that promote versions of "climate-smart agriculture," there may be lucrative opportunities from enhanced professional legitimacy or access to resources through the market. For others, scientific knowledge itself becomes a resource for mobilizing capital. On the public side, translating knowledge for climate adaptation is a way to contribute to social learning and advance one's vision of sustainable development and the collective good. For many in Vietnam, however, climate adaptation itself is synonymous with economic development (Beckman et al. 2013), and pursuing the latter is an adequate substitute for the former.[103] Moreover, by "mainstreaming" adaptation through the framework of existing development policies and programs, their translations work to further the economic objectives of the state. Indeed, it could be said that the state development vision (embodied in the provincial socioeconomic development plan (SEDP)) is the "obligatory passage point" (Callon 1986) through which climate change adaptation knowledge must be translated, suggesting the greatest translational agency is with the state itself. As Scoville-Simonds and colleagues (2020, 3) argue, "'mainstreaming' adaptation into existing development logics and structures perpetuates an anti-

[103] This corroborates the findings of other authors that rural transformations in "late socialist Asia" are being driven by "state and individual ambitions for future prosperity," particularly those urban and elite goals that "often intersect uncannily well" with state development visions (Wilcox, Rigg, and Nguyen 2021, 12).

politics machine," not only "reproducing development-as-usual, but in fact reinforcing technocratic patterns of control" (see also Ferguson 1994).

This might best be understood as an example of "environmental rule" (McElwee 2016), in which interventions justified by abstract notions of environmental "sustainability" work to further entrench state power and control over both people and nature. Based on her historical and ethnographic analysis of forest governance in Vietnam, McElwee (2016) details the politics of translation that assemble diverse actor-networks of people, objects, and ideas to coproduce social-ecological trajectories, while reproducing regimes of power. As others have argued, Vietnam's climate change strategy is based largely on reinforcing and extending "existing power relations in both politics and production" (Fortier 2010, 242; see also Lindegaard 2020). In the Mekong Delta, this is centered on a political economy driven by accumulation through agricultural modernization, with dominant state and private interests tightly intertwined in the agri-food and hydraulic engineering sectors, which are themselves increasingly vested in the continuation of this model (Benedikter 2014; Fortier and Trang 2013; Lindegaard 2020). Lindegaard (2020, 119) argues that in the realm of climate adaptation policy, Vietnamese "national elites and politicians have to some extent exploited donor agendas for their own ends" by adopting and domesticating international development discourses and rationalities. Guided by a national development vision of "industrialization and modernization" (Tan 2012), the country's climate response adheres closely to the complementary global discourses of "ecological modernization" and "green governmentality" (see also Fortier 2010; Bäckstrand and Lövbrand 2006), translated here into a justification for technocratic management, *sustainable growth*, and the development of new sites of accumulation through technological modernization. This is also

a framing of adaptation that aligns with the vision of agribusiness industrialization and technological modernization presented in the Mekong Delta Plan.[104]

According to McElwee (2016), who in turn draws on Foucault's work on "governmentality," environmental rule proceeds in large part by extending authority relations through processes of knowledge-making and subject formation. As an expression of power/knowledge (Foucault 1980), the discourse of climate change adaptation seeks to actively "materialize a particular vision of a model adaptation subject" (Mikulewicz 2020, 16; see also Agrawal 2005; Li 2007). By promoting especially successful farmers as the adaptation ideal, extensionists and others work to create subjects who will seize the opportunity of environmental change with entrepreneurial initiative, applying scientific expertise and modern technology to get rich. They are obedient yet proactive, attuned to the market, thoroughly "modern" and representative of the "civilized" ideals that link individuals' private interests to the national project of development (Harms 2014). Prioritizing household wealth generation within a top-down politics of implementation, the state thus displaces responsibility for adaptation and development onto the individual while reaping the rewards of continued—or even enhanced—legitimacy. This approach is by no means unique to Vietnam. As Carr (2019, 71 n1) observes, there is a "high degree of convergence" between the dominant framings of adaptation and resilience "and the neoliberal emphasis on individual responsibility" (see also Mikulewicz 2020).

While aligned in many ways with a neoliberal discourse of development, in Vietnam this is paradoxically justified by the long-term goal of "building socialism" (MacLean 2013;

[104] Indeed, in both their broadly "high modernist" orientations to planning (Benedikter and Nguyen 2018; MacLean 2013; Scott 1998) and the specifically "ecomodernist" (Disco 2002) vision embedded in the MDP, there is remarkable overlap between the Dutch and Vietnamese sociotechnical imaginaries (see previous chapter).

Schwenkel 2020).[105] It is worth reflecting on the intersection or overlap between socialist and neoliberal modes of governmentality that can be discerned in the field of climate change adaptation in Vietnam. As others have noted, through decades of engagement with international donors, the country has indeed been influenced by neoliberal-inspired development agendas, though what has emerged is a kind of uniquely Vietnamese blend of neoliberalism and state socialism (Gainsborough 2010a; Schwenkel and Leshkowich 2012; Thiem 2015). Although programs like "New Countryside" (Nguyen 2017) and so-called "new-style cooperatives" aim to boost the "collective economy" (Hicks 2004; Trà Vinh People's Committee 2017c) and create morally improved, "civilized" subjects, with their emphasis on the profit motive and individual wealth creation they follow a model of mobilizing "enlightened self-interest" for national development à la Adam Smith (2003 [1776]). Thus, MacLean (2013, 204) observes, "it has become increasingly difficult to determine where 'socialist' techniques for promoting moral and economic conduct end in rural areas and where 'neoliberal' ones begin."

To what degree does this approach to climate change adaptation represent a transformation to a more sustainable and climate resilient path? By mainstreaming adaptation into existing development programs, the same economic logic is reproduced, equating climate adaptation with profitability and economic growth. Near the end of 2017, the Vietnamese prime minister issued Resolution No. 120, which emphasizes aquaculture over rice production and aims to improve product value chains in line with the development vision in the MDP (GoV 2017). Yet given the profit motive at the center of most adaptation activities, it seems likely many will continue to seek the private, short-term benefits of intensive cultivation and maximum yields, in some areas potentially replacing one unsustainable, intensive monoculture (rice) with another

[105] See Wilcox, Rigg, and Nguyen (2021) for a discussion of how this same contradictory fusion can be found in other late socialist countries in Asia, such as China and Laos.

(e.g., shrimp), as farmers and local officials seek ever increasing returns. Indeed, efforts to encourage more sustainable, low-intensity, integrated polyculture or rotational systems have faced difficulties (Nguyen et al. 2019; Osborne 2018). This, however, will further contribute to ongoing socioeconomic differentiation and increasing inequality, favoring large landowners over small while generating wealth for some and debt, poverty, and landlessness for others (Gorman 2019). As long as systemic questions of trust and cooperation or the longer-term resilience of ecosystems are sidelined, the delta is unlikely to overcome its current path-dependent trajectory (Biggs et al. 2009; Fortier and Trang 2013; van Staveren and van Tatenhove 2016), resulting in maladaptation rather than adaptation (Magnan et al. 2016; Eriksen et al. 2021). What appears most resilient, in the near-term at least, is the ability of Vietnam's party-state to capitalize on new opportunities for economic growth.

On the other hand, there may be openings for those who make themselves an indispensable part of the actor-network of climate change adaptation to influence this trajectory (Olsson et al. 2006). Indeed, the ongoing economic transition since the height of state socialism has allowed more room for individual agency in future-making projects (Wilcox, Rigg, and Nguyen 2021). At the provincial level, researchers and extension agents are actively engaged in sharing knowledge across levels of governance, enabling social learning and overcoming barriers of mistrust to both facilitate cooperation at the local level and make the government more responsive to local people. One issue of contestation, and a potential switch-point or opening for change to occur (Bee and Basnett 2017), is around how much these actors prioritize "rewarding the strong" versus assisting the vulnerable.

Scientific experts have perhaps the greatest agency to speak out and influence the course of adaptation in the delta. They are already pushing for greater consideration of the negative

impacts of local development interventions and advocating skepticism towards structural adaptation measures and the powerful interests behind them. A major issue of contestation and potential switch-point here is around the question of whether to prioritize economic growth or ecological resilience in pursuit of sustainable development. Partisans of both approaches, however, seem to agree that "development" of some kind is essential, a necessary path of incremental change towards the modern, sustainable future they envision (Harms 2014; Kerkvliet 2009; Wilcox, Rigg, and Nguyen 2021; see also Bassett and Fogelman 2013).

A final note about structure and agency in the context of Vietnamese political culture. Despite the strict hierarchical politics of implementation governing climate change adaptation in Vietnam, there are also countless examples of Vietnamese behavioral and interpretive flexibility in the face of formal rules. In recent history, government policy has often followed the bottom-up accumulation of so-called "fence-breaking" (*phá rào*) activities, autonomous local actions by individuals contrary to government regulations (Benedikter and Nguyen 2018; Kerkvliet 2005; Vasavakul 2003), such as those that initiated the process of agricultural de-collectivization and market-oriented reforms leading to *Đổi mới*. Even more recently, farmers are known to have destroyed sluice gates in the coastal Mekong Delta in order to access freshwater for shrimp cultivation in areas zoned for less-profitable rice production (Hoanh et al. 2003). More subtly, despite the well-documented Vietnamese tendency to be guarded about expressions of dissent, which has been explained by the traditional emphasis on saving face (Bauer 2011; Scott, Miller, and Lloyd 2006) as well as government prohibitions against speech deemed to reflect negatively on the party-state (MacLean 2013), others have documented an array of strategic miscommunications (Salemink 2006), slippery spaces (Zink 2013), and practical forms of obliquity (Jamieson 2008) Vietnamese people regularly deploy to exercise influence and

facilitate cooperation even in cases of stark disagreement.[106] Reflecting on my interlocutors' frequent criticism of the Mekong Delta Plan—that it wasn't specific enough and required detailed top-down implementation procedures to be effective, as in a so-called Master Plan—perhaps what they realized was this: in this governance system, a Master Plan provides the necessary formal legitimacy and structural girders within which there is room to maneuver, agency to act, interpret, and influence others. The flexibility and responsiveness necessary to adapt to increasingly uncertain conditions may come through more informal means, as the adaptability of Vietnamese people across time and space suggests (Jamieson 2008; Luong 2003; Taylor 1998). In the next chapter, I explore the livelihoods decisions made by farmers in the face of such uncertainty and consider manifestations of adaptability at the local level.

[106] For example, there is an expression, "*đừng vạch áo cho người xem lưng*," which translates to "don't pull up your shirt to show your back" and means roughly, "show what is attractive and cover up what is ugly," and hints at such evasiveness for the sake of social harmony and flexibility.

CHAPTER 5

THE MUDDY MATTER OF ADAPTATION: LIVELIHOODS, LAND USE, AND FARMER DECISION-MAKING

Introduction

Sitting on the tile floor in the front room of his newly constructed house in Đôn Châu, recently built with combined earnings from shrimp farming and state support for the families of revolutionary soldiers, Uncle Thắng, or "Victory" (so named for his parents' anticipation of the war's impending outcome),[107] pulled a wrinkled piece of paper from under the corner of the sedge mat covering the wooden platform bed behind him. It was an official government dispatch with the word "*Thông Báo*" typed across the top in bold letters: "Notification." He explained that this paper governed the rice cropping calendar for the area, stipulating in which month to plant which crop. As the Farmer's Union representative for his hamlet, he was responsible for supporting farmers in adhering to this schedule. According to the document, farmers should have planted a second crop in May, to be able to plant a third crop now, in September. But because of the drought conditions the previous year, causing saltwater to advance further into the freshwater area than normal, farmers were not able to grow a winter-spring crop, and were thus only planting their second crop now, with no chance at all of a third this year.

Across the main road in front of his house, Uncle Victory and his wife raise shrimp, crab, and fish together in the same pond surrounded by mangrove and nipa palm. They have been practicing extensive aquaculture here for ten to fifteen years, he says, and have increased their

[107] As usual, all names used are pseudonyms.

productivity in recent years. Now, they cast shrimp "seed" sporadically and harvest several times a year, earning anywhere from 500,000 to 3 million VND ($22 – $132 USD) per harvest.[108] Asked if they plan to try intensive aquaculture, his wife says they "don't dare!" Their eldest son tried it once already, they tell me, but failed when the shrimp became diseased, and lost about 50 million VND ($2199). It requires too much investment up front, even with sufficient technical know-how, and is a bigger risk than they are willing to take on without sufficient resources.

Making such a transition requires capital, manual labor, and technical knowledge. Those who have done so often sleep in a shack next to their ponds to keep watch and protect against theft, afraid someone might come along and ruin their investment. But many farmers now earn enough to send their children to study aquaculture at university. The biggest houses and fanciest motorbikes in rural areas, and even shiny new karaoke establishments in the provincial capital, are paid for largely with wealth gained from shrimp farming. As aquaculture has become increasingly technically sophisticated and commercialized, farmers refer with admiration to those who have succeeded in it, jokingly calling them "*Bác sĩ*"— "doctor"—and praising their knowledge, skills, and riches gained. And for those that can make it work, it is seen as a sustainable alternative to less profitable freshwater crops.

Farmer livelihoods in the coastal Mekong Delta have been undergoing a transition in response to rapid economic and ecological transformations since the 1990s. In recent years, the effects of climate change—rising sea levels, increasing temperatures, unstable weather patterns—have made these dynamics more acute, and the tight coupling of livelihoods and environmental change continues to shape the delta's developmental path. Despite the interventions of technocratic experts and the transnational governance apparatus currently

[108] All currency conversions are calculated at 2017 rates.

engaged in promoting "adaptation to climate change" in the Mekong Delta, this process can only be understood in light of the decisions made by famers, literally "on the ground," transforming the landscape with their labor, and coproducing socio-environmental change (Carr and McCusker 2006; Lippert, Krause, and Hartmann 2015; Nguyen et al. 2019).

The operation and efficacy of the "adaptation regime" (Paprocki 2018)[109] must thus be understood in the context of these livelihood decisions. As previous chapters have showed, Vietnamese and international planners and policymakers, particularly Dutch development consultants (Chapter 3), as well as intermediary actors including extension agents, researchers, local officials, and experts (Chapter 4), all play a key role in translating knowledge to shape the trajectory of climate adaptation in the delta. Ultimately, however, farmers themselves are the ones whose accumulated decisions have the most direct influence over processes of socio-ecological change through their individual adaptation actions. This is not to say that farmers are not constrained in their actions, or limited in their adaptive capacity, nor that capacities and opportunities are not distributed in a highly uneven way across the population; it is to recognize farmers as the everyday environmental managers they are (Lippert, Krause, and Hartmann 2015). Their translations of the information and knowledge at their disposal—as assembled from such sources as environmental signals, material forms, social relationships, and the market—into livelihood decisions represent potentially adaptive responses to change and uncertainty. Moreover, in Vietnam, no less in the Mekong Delta, farmers have often been at the vanguard of policy change, with land use or agricultural development policies only later catching up to practice (Kerkvliet 2005; Le Thuy Ngan et al. 2018; see also Taylor 2007). Still, they are subject

[109] Paprocki (2018, 957) defines *adaptation regime* as "a socially and historically specific configuration of power that governs the landscape of possible intervention in the face of climate change."

to, and subjects of, governance interventions in the name of agricultural modernization, development, and sustainability which aim to shape human-environment relations according to others' visions and interests (Biggs 2010; Fortier and Trang 2013; McElwee 2016; Wilcox, Rigg, and Nguyen 2021). The trick is to make sense of farmers' adaptive agency within the context of these structural power relations, and material constraints and affordances.

This chapter attempts to answer the question: *How do farmers in the coastal Mekong Delta draw on social and material relations for knowledge about environmental and socio-economic change, and how do they translate that knowledge into livelihood decisions?* I argue that the changing livelihoods practices of farmers themselves illuminate strategies of resilience and resistance that at times align with, and other times against, those visions of adaptation imposed from above. Indeed, such forms of resilience may not be what scientific experts, development professionals, or politicians have in mind.

Livelihoods, adaptation, and the dynamic materiality of deltaic environments

This chapter draws substantially on two partially related bodies of literature: first, that on agrarian livelihoods in the context of rural development and adaptation to global change (e.g., Carr 2013; Scoones 2015); second, the emerging body of literature on the dynamic materiality of deltaic environments, particularly that grounded in ethnographic work and informed by perspectives from political ecology and science and technology studies (STS) (e.g., Krause and Harris 2021). Livelihoods approaches, at their most basic, aim for a holistic understanding of how people make a living in specific places, typically with the normative goal of fostering poverty alleviation and sustainability (Bebbington 1999; Chambers 1983; Ellis 2000; Scoones 1998). As Scoones (2009, 2015) and Carr (2013, 2014) have both argued, while these approaches were institutionalized through international development programming in the late 1990s, they

often got forced through a straightjacket of systematic application that concentrated them on the economic dimensions of human wellbeing, assuming farmers to be strict "rational actors" and focusing primarily on such categories as "assets," "capitals," and material rewards. Although these were often understood as mediated by social and institutional processes, such "assets and capitals" approaches tended to leave little room in their analyses for such human dimensions as power, agency, or subjectivity (Carr 2014; Scoones 2015), and, Carr (2014) argues, provided insufficient attention to how and why particular livelihoods choices are made.

Yet livelihoods decisions and outcomes are profoundly influenced by power, politics, and governance at multiple scales, from national and international processes to inter- and intra-household dynamics. One attempt to better reckon with issues of power, politics, and identity in livelihoods analyses is the livelihoods as intimate government (LIG) framework devised by Carr (2013, 2014, 2019). Building on Foucault's work on governmentality and its extension by Agrawal (2005) into the realm of environmental subjectivities, the LIG framework understands livelihoods as "local efforts, internal to a given community or social unit, to align a project of rule with the self-guidance of the ruled" (Carr 2013, 102). According to this framework, particular livelihood strategies are "socio-ecological projects" (Carr 2019) held together through tools of coercion (social, political, or institutional techniques), discourses (framings and narratives of problematic or appropriate livelihood strategies), and the mobilization of identity. They are efforts to align strategies for managing vulnerability with local "understandings of desirable and appropriate social and material outcomes" (Carr 2013, 103). If prevailing strategies are called into question by challenges to human wellbeing (e.g., environmental or economic shocks or stresses), thus no longer aligning with desired outcomes, participants may make adjustments or seek to transition to a new strategy.

In rural contexts at least, livelihoods and adaptation are inseparable (Carr 2008; see also Birkenholtz 2011; Scoones 2015; Smit and Wandel 2006; Tanner et al. 2015). Carr (2008, 693) defines "adaptation strategy" as "shorthand for a set of tacit understandings of and practices related to environment, economy and society… a suite of beliefs and practices related to risk and its management that takes shape under locally specific conditions of uncertainty." Local people's everyday adaptation practices include livelihoods experiments and innovations: "sometimes intensifying existing practices in response to local scarcities, at other times changing livelihoods altogether" (Scoones 2015, 67). While such activities may either promote or undermine the resilience of wider-scale social-ecological systems (Magnan et al. 2016; Nelson 2011), the durability of particular activities that maintain vulnerability for some, underpinned by political-economic structures and processes, is said to require systemic transformation—or transformative adaptation—to achieve more socially just and sustainable outcomes (Carr 2019; Folke et al. 2010; Nelson, Adger, and Brown 2007; Pelling 2011; Schulz and Siriwardane 2015; Scoones et al. 2020; Tanner et al. 2015; Warner and Kuzdas 2017).

As rural livelihoods work on the biophysical environment, and wider-scale land use changes influence the kinds of livelihood options available, Carr and McCusker (2006) argue that livelihoods and land-use change can be understood as co-producing one another, both expressions of power/knowledges operating in a given social context. Choices about both are always structured by social relations of power and production, themselves bound up with the knowledges and understandings that are the conditions for and result of these relations (see also Jasanoff 2004a). Put another way, livelihoods and land uses are manifestations of "the social processes by which individuals and groups come to understand the challenges facing their everyday lives" and the options that are available to them (Carr and McCusker 2006, 794).

Patterns in the landscape then "reflect… complex relations of meaning and materiality that manifest themselves in these patterns" (2006, 801). Hence, we might ask: how are environmental and economic shocks or stresses, and other social and material information, translated into specific livelihood practices or strategies? How is such information interpreted and responded to? And what is the recursive relationship between resulting practices and the social and material environment, i.e., socio-ecological change?

As Lippert and colleagues (2015) remind us, everyday practices of environmental management are situated in material and symbolic relations: they are performed through specific laboring practices embedded in material environments in which both human and nonhuman agency present possibilities and limitations to action; they exist in time and space and are mediated by others' activities, by work routines, material infrastructures, the growth patterns of plants and movement of animals, as well as the specific desires and expectations motivating them. Adaptation strategies are not strictly the result of higher-level power relations, but also the product of messy and contingent local practices that relate only indirectly to formal plans (Lippert, Krause, and Hartmann 2015), but which nonetheless structure the lived experience of climate vulnerability and resilience for rural people (Birkenholtz 2011; Taylor 2015).

Deltaic environments are the site of particularly messy convergences of social and material processes, and an emerging literature at the intersection of anthropology, political ecology, and STS turns special attention to the dynamic materiality of these environments. Building on the work of scholars such as Raffles (2002), Biggs (2010), and Lahiri-Dutt (2014) among others, this body of scholarship takes a historically and geographically situated, empirically grounded, material-semiotic approach to understanding the complex social and material relations that constitute river deltas as spaces of human habitation as well as economic

and cultural production. As landscapes formed by the deposition of sediments where rivers meet the sea, deltas are characterized by histories of intense human modification, ecological and hydrological variability, unstable and shifting terrain, and often extensive infrastructural interventions for resource extraction and agricultural or urban development. Scholars engaged in this work take on such themes as the "amphibiousness" and volatility of delta life (Krause 2017; Morita 2016), highlighting the centrality of water in the lifeworlds of delta inhabitants and unsettling binaries of wet/dry (Lahiri-Dutt 2014) to foreground hybridity, malleability, uncertainty, and the multivalent meanings of that land/water admixture so ubiquitous to delta life—mud (Cortesi 2018; Zegwaard 2016); the role of infrastructural interventions in structuring lived reality and delimiting adaptive possibilities (Biggs et al. 2009; Morita 2016; Morita and Jensen 2017; van Staveren and van Tatenhove 2016); and the overlapping temporal rhythms at play in delta life (Cons 2020; Krause 2017; Krause and Harris 2021; Paprocki 2019).

This chapter offers a livelihoods analysis attuned to questions of power, knowledge, and decision-making, as well as the dynamic materiality of deltaic environments, to make sense of climate adaptation processes at the local level. It is divided into five sections. The following section presents an overview of the study area. Next, I describe the research methods and sampling procedure used. Then, key findings are presented, divided into four subsections: (1) land use and livelihoods; (2) perceptions of environmental change; (3) livelihoods decision-making; and (4) adaptation in local perspective. Finally, I offer some conclusions on these findings in light of the research question posed above and reflect on their theoretical and practical implications.

Study Area: Trà Vinh province

At the mouth of the Mekong River Delta between the *Hậu* (Bassac) and *Cổ Chiên* rivers, two of the Mekong's main distributaries, is Trà Vinh province. It is bordered by the provinces of Vĩnh Long to the northwest, Sóc Trăng to the southwest, Bến Tre to the northeast, and the South China Sea to the southeast. This part of the delta has long been inhabited by Khmer people, who trace their ancestry back to the Funan civilization based in the delta as early as the first century BCE. In the mid-18th century, migrants from central Vietnam and southern China began settling the delta, which was then part of the Khmer Empire, and it was later annexed by the French as part of the southern colony of Cochinchina (Biggs 2010; Brocheux 1995; Taylor 2014). Today, the province has a population of around 1,009,000 inhabitants, an area of 2,358.3 km^2, of which 1,477 km^2 (or 147,700 ha) is agricultural land, and an average population density of 443 people per km^2. Kinh (or ethnic Vietnamese) make up around 69% of the population, Khmer about 30%, and Hoa, or Chinese, around 1%. In 2010, about 57% of the population worked in agriculture, forestry, or fisheries, a number that has been steadily declining for the past several years.[110] Most of the province has an elevation between 0.1 – 1.0 m above sea level, reaching 4 m at the highest point. Like the rest of the Mekong Delta, it has a tropical monsoon climate, with two seasons: the rainy season, typically May to November, and the dry season, typically December to April. This area of the coastal zone, however, has a microclimate that is slightly more arid than the overall average for the delta.[111]

As one moves from the northwest border of the province towards the sea (a distance of around 60 km), the landscape changes significantly, passing through several different agroecological zones. The border with Vĩnh Long province (which was merged with Trà Vinh

[110] Data provided by the Trà Vinh Department of Planning and Investment.
[111] Data provided by the Center for Water Management and Climate Change, Vietnam National University-HCMC.

from 1976 until 1992 under the name Cửu Long, or 9 Dragons, province, named after the Vietnamese term for the Mekong Delta) is located at the edge of the freshwater alluvial plain in the middle of the delta, an area of lush vegetation and fruit orchards along *miệt vườn*, or "garden strips," built up over millennia where regular floods deposited layers of rich sediment (Biggs 2010). The landscape then opens to an expansive plain dominated by rice paddy and crops such as sedge and coconut, crisscrossed by small streams and canals lined with nipa palm. The provincial capital, Trà Vinh city, located near the northern edge of the province, straddles a major canal just inland from the Cổ Chiên River. Continuing southeast beyond Trà Vinh city along the main highway, the landscape is again crossed by several rivers and large canals and the road continues through small towns, before rice fields eventually give way to a landscape progressively pitted by shrimp ponds, many freshly dug, others left empty or abandoned. Moving inland towards the middle of the peninsula, the land becomes slightly elevated, in an area predominantly inhabited by Khmer communities organized in narrow strips along ancient sandy ridges (Taylor 2014), a micro-topographical distinction but a significant social and hydrological one (see Fig. 5.1). Here, there is abundant freshwater and good drainage, wooded areas surround centuries-old pagodas, and people farm rice or vegetables year-round. Continuing further towards the coast, the soil becomes drier, the vegetation sparser and the shrimp ponds more numerous, until finally, in areas where mangrove forests have been cleared and swamps drained, the landscape is completely dominated by dry, cracked mud and rectangles of dark water churned by rotary fans, occasionally with lines strung overhead to keep the birds away.

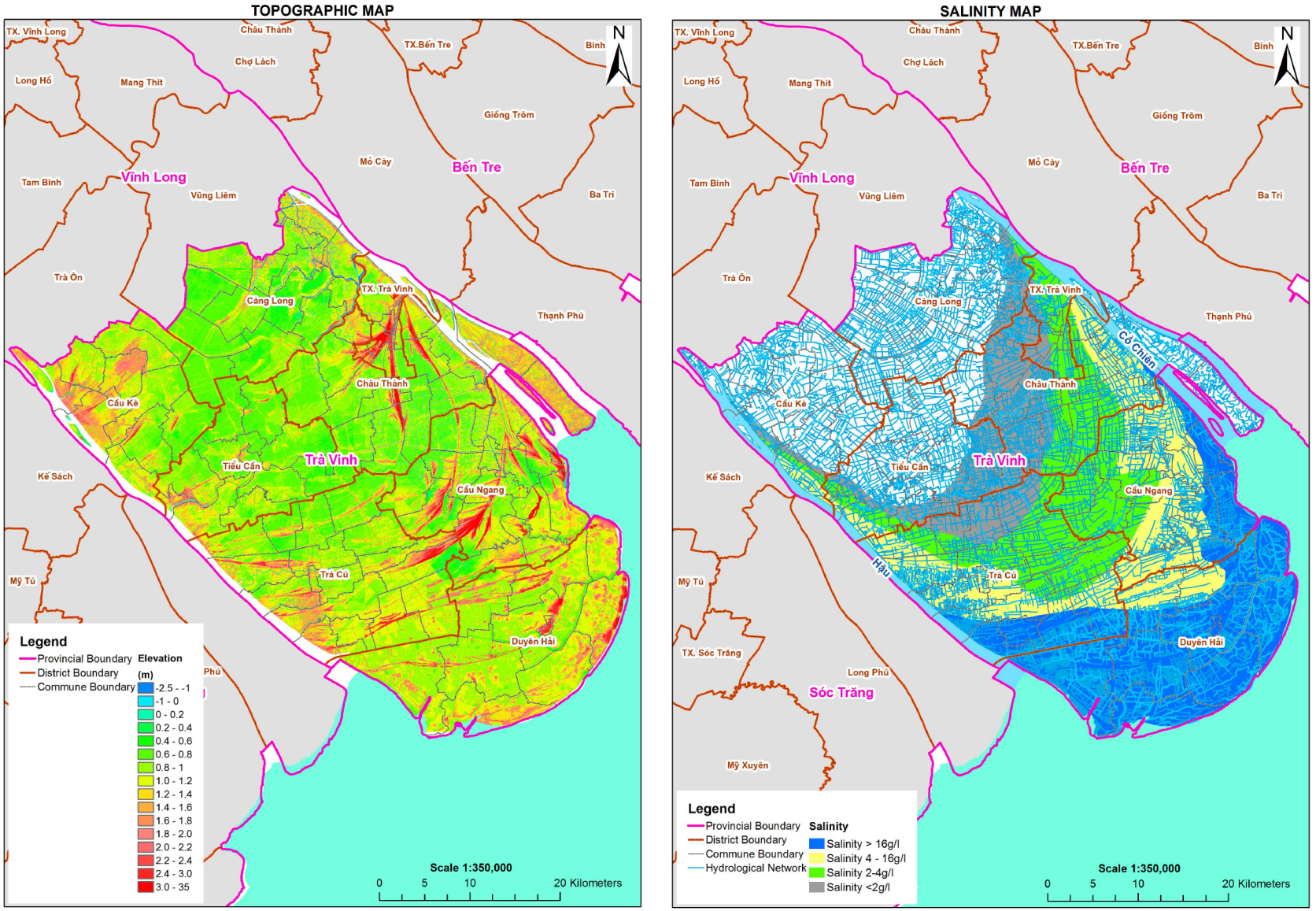

Figure 5.1 Topographic and salinity maps of Trà Vinh province. (Source: Center of Water Management and Climate Change)

With climate change, temperatures are expected to rise and a moderate increase in rainfall is predicted for Southeast Asia, as well as an increase in precipitation extremes, with a growing contrast between wet and dry season averages (Field et al. 2014; Stocker et al. 2013). Sea level will continue to rise through the 21st century, at a likely growing rate, the effects of which are compounded by enhanced subsidence in the delta due to groundwater extraction, hydraulic engineering, and the trapping of sediments by upstream dams (Field et al. 2014; Stocker et al. 2013). Subsidence rates for the Mekong Delta are already estimated to range from 1.0 – 2.5 cm/year, an order of magnitude higher than global mean sea-level rise (Minderhoud et al. 2017).

The combination of sea level rise, subsidence, and more frequent and severe droughts in the Mekong Delta are predicted to cause salinity intrusion to occur for longer periods in the coastal zone and penetrate farther inland (Le Thuy Ngan et al. 2018; Hanh and Furukawa 2007; Smajgl et al. 2015; Wassmann et al. 2004). This will likely infiltrate aquifers and may lead to increased salinity in approximately 1.8 million ha of delta land in the dry season, with 1.3 million of that affected by salinity levels greater than 5 g/l (Smajgl et al. 2015) making it no longer viable for intensive rice cultivation.[112] In early 2016, an El Niño-induced drought, the worst the country had experienced in nearly a hundred years, caused salinity intrusion to penetrate nearly 100 km upstream, with at least 40% of arable land affected and a reduction in rice output of 1.1 million metric tons; more than 208,000 households lacking freshwater for domestic use; and damage estimated at $250 million USD (Joint Assessment Mission on Drought and Saline Intrusion 2020; Mollet et al. 2016; Nguyen et al. 2020).

[112] Productivity of most rice varieties drops off sharply as salinity levels increase (Smajgl et al. 2015), with 4 ppt (4 g/l) considered the upper limit for intensive rice cultivation (Joffre and Bosma 2009), and alternating rice-shrimp models tolerating salinity above 8 ppt (IUCN & VAWR 2016). The optimal salinity level for shrimp, on the other hand, ranges between 12-15 ppt (CGIAR Research Program on Climate Change 2016).

Methods

Continuing this dissertation project's multi-sited, multi-scalar approach (Corson, Campbell, and MacDonald 2014; Marcus 1995; O'Neill et al. 2013), the research for this chapter was carried out at the provincial level and below, across several rural communes in two districts of Trà Vinh province. Research employed mixed field methods inspired by the livelihoods approaches described above (Carr 2013; Scoones 2015) and informed by a network ontology to account for complex socio-material relations across scales (Birkenholtz 2011; Janssen et al. 2006; Nabavi and Daniell 2017; Rocheleau and Roth 2007). In this vein, Birkenholtz (2011) advances a "network political ecology" that examines the interactions between regional-scale systems of production and resource use, meso-scale effects of climate variability and change, and local experiences and adaptations, to explain causality of socio-ecological change in areas affected by climate perturbations and offer more generalizable insights about adaptation decision-making. Following Birkenholtz (2011), research for this chapter combined both "extensive" (e.g., survey) and "intensive" (e.g., ethnography) methods to document both wider-scale patterns and locally specific social processes in the production of vulnerability and strategies of adaptation. In so doing, I used a stratified and targeted sampling procedure (Bernard 2006) to get a full picture of the range of diversity across the study area, with a focus on farmers affected by changing water resources at the fresh/saline water transition zone.

The research for this chapter was carried out primarily between February and December 2017. As described in the previous chapter, after arriving in Trà Vinh in October 2016, I waited four months before official permission was granted by the Provincial People's Committee to begin formal data collection procedures. Hosted by the Center for Scientific Research and

Production Services (CSP) of Trà Vinh University (TVU), I was provided office space and administrative support, and gained access to a network of local agriculture and rural development researchers and practitioners. Over the next several months, I focused on learning more about the institutional, cultural, and ecological complexities of the province, hired a research assistant, and spent much of my time revising research plans and submitting new requests to local officials. Sometimes I joined colleagues on field visits to experimental farms, workshops with farmers, or local canal and dike maintenance surveys. Attending to the ways that knowledge moves and power and influence operate across levels of governance, I frequently traveled—typically by motorbike—back and forth between sites: the provincial capital, district and commune offices, and individual farming households.

In February 2017, after permission was granted, I began conducting interviews with provincial and district officials and colleagues. I also began visiting the government headquarters of various communes to collect data about land use, agricultural/aquacultural production, and demographic and socioeconomic characteristics. Usually, local cadres would sit with me for a time and answer general questions, before providing a recent official report of descriptive and quantitative data—though these were highly inconsistently reported across locations. I tabulated this information for comparison across communes, to determine a procedure for sampling within communes, detailed below. I also developed a livelihood survey instrument, based on one developed with WACC (my host institute in HCMC) and CSP during preliminary dissertation research in summer 2015. After hiring three additional student assistants,[113] together we revised,

[113] Two male students from the Department of Agriculture and Aquaculture at TVU, and one female student from the English Department, all nearing graduation.

pre-tested, and practiced the survey, which we then carried out with 118 households (N=118) across eleven communes over seven days in May 2017.

Returning to my field site in July after a brief trip to the US, I focused on a narrower set of communes for ethnographic and participatory methods with farmers. Interspersed with ongoing interviews of provincial and district officials (N=29), I conducted semi-structured, open-ended interviews with farmers and local cadres[114] (N=43). Often, farmer interviews included a walking/life-history component (Evans and Jones 2011), in which a farmer would give a tour of their land, describing livelihood activities, land-use history, and environmental changes over time. In this way, specific environmental characteristics or physical objects presented themselves as visual cues for more detailed discussion, while providing a physical illustration or opportunity for demonstration. On many occasions, I stayed overnight in communes for several days at a time, sleeping in farmers' homes, and participated in activities such as harvesting rice, pond preparation, or feeding and harvesting shrimp. Below, I provide details of my sampling procedure, decisions made in selecting communes and sampling within them, for both the survey and in-depth follow-up research.

Sampling Procedure

I decided to carry out the livelihood survey across eleven communes representing different agroecological zones distributed geographically at various locations along the salinity gradient. These included Vĩnh Kim, Kim Hoà, Long Sơn, Nhị Trường, Trường Thọ, Hiệp Mỹ Đông, Hiệp Mỹ Tây, and Mỹ Long Nam, in Cầu Ngang district, and Đôn Châu, Hiệp Thạnh, and

[114] I typically interviewed one or two of the latter per focal commune, either commune agriculture/aquaculture officers, local hamlet leaders, or representatives of the farmers' union. These people were themselves often farmers or from farming families and knew the local context well.

Trường Long Hoà in Duyên Hải district (outlined in Fig. 5.2). These are communes with varying water resources and corresponding land uses, which are at different stages in relation to

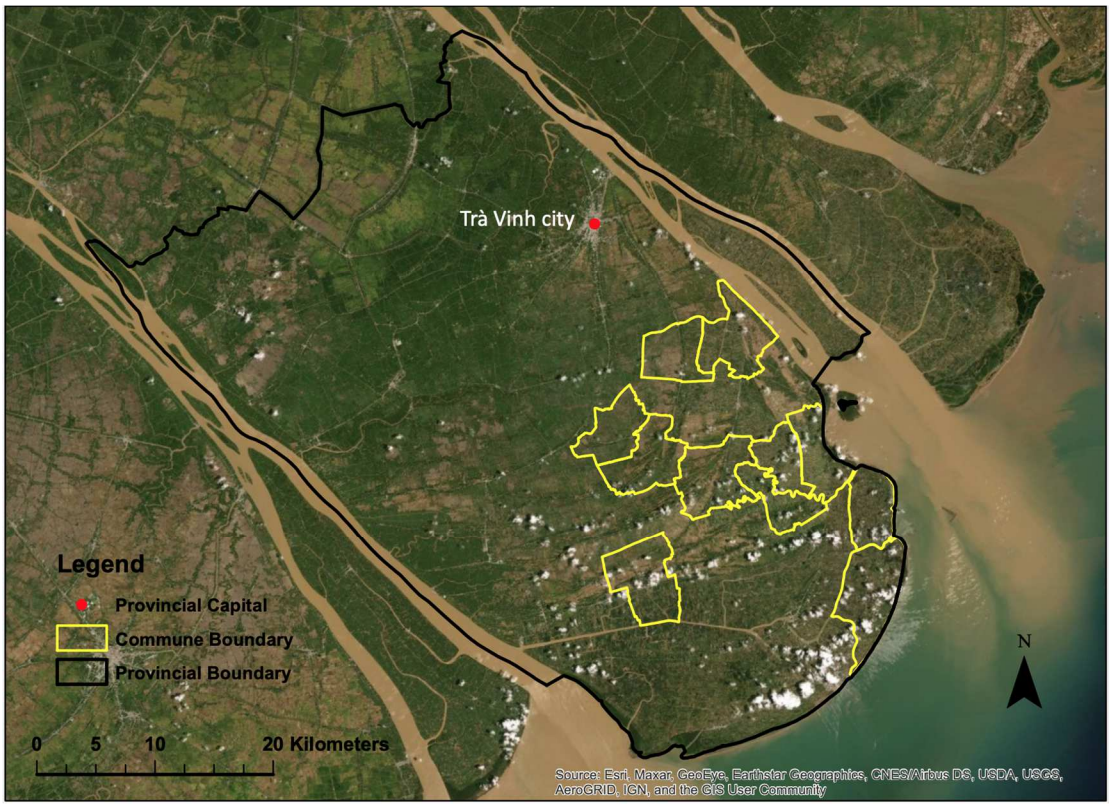

Figure 5.2 Locations of eleven communes where livelihood survey carried out (courtesy of Jon Hallemeier).

an ongoing process of livelihood transition in response to increasingly brackish conditions. Commune demographics varied as well, particularly regarding the ratio of Kinh (ethnic majority) to Khmer households.

The original goal was to pursue a stratified, probability proportionate-to-size sample for each commune (Bernard 2006). However, due to time and logistical constraints, as well as incomplete commune-level data and the knowledge that I would need to rely on local cadres to select individual farmers, my ability to achieve a representative sample was limited. Instead, I

provided each commune with criteria for selecting a given number of farmers from each of several categories, to cover as much of the potentially relevant diversity in each location as possible. For each commune, I asked to survey between 10-12 households, distributed proportionally first by land use/livelihood type, and then again among several more specific variables. For example, for one commune I might request 10 households, from which 5 are rice farmers, 3 aquaculture farmers, and 2 grow vegetables; of those, I might then ask for 7 Khmer households, 2-3 female-headed, 4 designated "poor,"[115] 1-2 landless farmers,[116] and at least 2 farmers who are former cadres themselves. Of course, these categories were not collectively exhaustive nor mutually exclusive, and with populations that ranged from around 4,000 to more than 17,000 per commune (average = 9,928), the samples could not be deemed representative. Nevertheless, they would provide a snapshot of the heterogeneity within and between communes, reflecting the overall diversity of the study area, while helping me to narrow down a focal sample for more in-depth research with farmers later. Once I determined criteria for each of the eleven communes, these were then entered into an official letter from CSP, which my assistant Sang and I delivered by hand to each commune at least a week before returning to carry out the survey.

Typically, we would meet the local agriculture/aquaculture officer, who had organized a meeting at a local administrative building to which they had invited farmers more-or-less according to my criteria. After introducing myself, the purpose of the research, and obtaining

[115] According to Decision No. 59/2015/QĐ-TTg, a "poor household" in a rural area is one that meets one of two criteria: having a monthly per capita income of 700,000 VND (equal to about $30 USD at the time) or less, or lacking in three or more indicators measuring access to basic social services (e.g., access to health services, health insurance, adult education level, school attendance status of children, housing quality, housing area, domestic water supply, hygienic latrines, use of telecommunications services) (GoV 2015).
[116] Those who perform agricultural labor or recently lost their agricultural land.

informed consent, my assistants would then sit down with the farmers one-on-on to go through the survey questions, filling it out based on farmers' responses. On occasion, if not enough farmers showed, or a category in the requested criteria had not been met, the local cadre would take us directly to a farming household to ask for an interview.[117] In addition to demographic and socioeconomic characteristics, the survey asked questions about primary and secondary land use, cropping schedules, yields and incomes, water access and use, adherence to official land-use plans, and supplementary livelihood activities (see Appendix A). Next, it asked about improving or worsening livelihood conditions, access to material inputs and credit, and interest in changing to a different farming strategy. It then asked about factors influencing livelihood decision-making, perceptions of environmental change, sources of information consulted for making livelihood decisions, and membership in or access to various social organizations. Finally, it ended with an open-ended question about what farmers need most or recommend for improving their situation. Table 5.1 presents a general overview of respondent characteristics in each commune, including range of landholdings reported by respondents. Landholdings were reported in "công," a Vietnamese measure equal to 1000 m^2, or 1/10 of a hectare. Thus, 1 hectare is equal to 10 công.[118] Although some wealthier landowners also reported leasing parcels of land from others, those amounts are not included here.

Based on the commune-level data collected, as well as insights gleaned from conversations with farmers and local officials while carrying out the survey, I selected a narrower sample of five communes for in-depth, farm-level research, stratified into two levels of

[117] Farmers appeared comfortable expressing themselves in front of local cadres, with whom they often had friendly relations. Many seemed to take this as an opportunity for sharing their experiences with cadres as well, who were anyway already aware of many of the farmers' concerns.

[118] This is the case for southern Vietnam. However, a "công" is measured differently in the other regional divisions of the country. In central Vietnam, 1 công = 360 m^2; in northern Vietnam, 1 công = 500 m^2.

priority. Of highest priority, Long Sơn and Đôn Châu both sit right at the salinity boundary, straddling a road-dike that separates an area zoned for freshwater crops from one increasingly dedicated to brackish-water aquaculture. Both are affected by increasing salinity levels, credited

Table 5.1 Overview of survey respondents.

Location	# Respondents					
Commune	Total	M	F	Kinh / Khmer	Avg. Age	Landholding size range (1000 m^2)
Vĩnh Kim	12	9	3	12 / 0	52	0 – 15.6
Kim Hoà	10	8	2	4 / 6	49	0 – 48
Long Sơn	14	7	7	6 / 8	62	0 – 28
Hiệp Mỹ Tây	10	7	3	10 / 0	47	1 – 15
Hiệp Mỹ Đông	10	3	7	10 / 0	53	2 – 16
Mỹ Long Nam	10	7	3	10 / 0	55	0 – 17.5
Đôn Châu	12	7	5	0 / 12	51	0 – 40
Nhị Trường	9	7	2	1 / 8	51	0 – 10
Trường Thọ	11	8	3	2 / 9	49	0 – 40
Hiệp Thạnh	10	3	7	10 / 0	53	0 – 46
Trường Long Hoà	10	8	2	10 / 0	53	0 – 31
Totals	118	74	44	75 / 43	52	

with largely driving the shift to aquaculture that is expanding in coverage and intensification. The next level of priority, Hiệp Mỹ Đông, Vĩnh Kim, and Kim Hoà, are all more stable in terms of the livelihood transition (see Fig. 5.3). While they also include areas of both brackish water aquaculture and freshwater agriculture, these three include more instances of rotational rice-shrimp cropping, following seasonally fluctuating salinity levels. Farmers were asked for

interviews by first contacting the local agriculture/aquaculture officer, who would generally introduce me to either a hamlet leader or Farmer's Union representative, who would begin by

Figure 5.3 Location of five focal communes for in-depth research with farmers (courtesy of Jon Hallemeier).

taking me directly to a farming household for an interview. After that initial point of contact, it became easier to meet and interview additional farmers, as either the local representative or farmers themselves would introduce me to other farmers in the area. Occasionally, Sang and I would contact farmers by phone who had participated in the livelihood survey to request a follow-up interview. In many cases, however, follow up interviews were selected purposively to fill gaps in the survey results, seeking out farmers directly affected by salinity intrusion, for example, or those who had recently changed livelihood strategies.

Table 5.2 presents a comparison of general characteristics between the focal communes that were the focus of in-depth research with farmers. In-depth interviews here include those with local cadres, who were also from these communities and usually engaged in farming activities themselves. A nearly equal amount of time was spent with farmers in Long Sơn and Đôn Châu, followed by Hiệp Mỹ Đông; in all three I conducted interviews and engaged in participant observation of farming and social activities.

Table 5.2 Focal communes for farm-level research.

Commune	Area (ha)	Population	# Households	% Ethnic minority (Khmer)	# In-depth interviews
Long Sơn	3,091	11,440	2,769	50.82 %	12
Đôn Châu	3,129	13,785	3,294	75.62 %	15
Hiệp Mỹ Đông	1,560	6,125	1,572	4 %	7
Vĩnh Kim	3,370	17,675	4,169	~1 %	3
Kim Hoà	2,250	11,300	2400	68 %	6

Findings

Land use and livelihoods

The communes of Long Sơn and Đôn Châu both straddle major roads built upon ancient sandy ridges (or *phno*, in Khmer) that function as natural dikes, separating the water resources on either side (Taylor 2014). To the inland side, the land is slightly elevated and used for freshwater crops like rice and vegetables. To the other, water sources are brackish for much of the year, and the landscape is being increasingly taken over by shrimp ponds, the vegetation and clayey soil excavated in large rectangular pits surrounded by raised mud banks.

Table 5.3 shows respondents' land use according to official plan versus in practice. The columns for "Land/water use plan" correspond to the number of farmers who reported their land

as being zoned according to the government issued land-use plan for freshwater use, brackish/saline water use, or alternating fresh and saline depending on the season. The numbers in each cell do not always add up to the total number of respondents for each commune, either because respondents did not possess land for farming and deemed the question irrelevant, or they did not know. Looking at the variability in these numbers across locales gives a sense of the different agroecological zones predominant these communes, or at least the way they are

Table 5.3 Land use according to official plan and actual land use.

Location		Land/water use plan (# farmers)			Actual land use (# farmers)		
Commune	Total respondents	Fresh	Brackish/ saline	Fresh / Brackish by season	Planting rice/veg	Brackish aquaculture	Rice/veg + aquaculture
Vĩnh Kim	12	6	2	3	3	5	0
Kim Hoà	10	6	0	2	4	1	1
Long Sơn	14	6	5	0	4	0	2
Hiệp Mỹ Tây	10	2	8	0	2	5	2
Hiệp Mỹ Đông	10	0	5	4	1	5	3
Mỹ Long Nam	10	2	1	7	3	6	0
Đôn Châu	12	6	5	0	3	2	3
Nhị Trường	9	8	0	0	7	0	0
Trường Thọ	11	10	0	0	9	0	0
Hiệp Thạnh	10	0	7	1	1	2	4
Trường Long Hoà	10	2	7	1	2	2	4
Total	118	48	40	17	39	28	19

formally designated. The following group of columns, labeled "Actual land use," correspond to the number of farmers whose primary agricultural land use falls into one of these categories—rice/vegetables, brackish aquaculture, or some combination of freshwater crops and aquaculture, whether rotationally or simultaneously. These numbers do not reflect the total coverage area of each land use in each commune, only the number of respondents representing each land use activity. Other livelihood activities, such as livestock rearing, off-farm labor, etc., are not included here. Note that the total numbers of respondents reporting freshwater crops, brackish

aquaculture, or a combination of the two do not match the numbers for the corresponding officially designated land use plans. This mismatch—a gap between de jure and de facto reality—suggests that farmers are changing their livelihood strategies before state land-use plans can catch up, or land-use plans themselves are being adjusted for changing conditions while some farmers are not yet able to change accordingly.

While most of the communes in the table above are situated along the brackish water transition zone, where farmland is in the process of being converted to saline-tolerant aquaculture, the list includes some outliers for comparative purposes. For example, Nhị Trường and Trường Thọ, in Cầu Ngang district, are located further inland, atop the convergence of sandy ridges that forms a kind of micro-plateau in the middle of the province. For this reason, they are mostly insulated from salinity intrusion, with plentiful access to fresh surface and groundwater and no farmers that I saw yet experimenting with brackish-water aquaculture. In fact, the first time in living memory that these locations had been affected by salinity intrusion was the major drought event that occurred in the first half of 2016. By contrast, Hiệp Thạnh and Trường Long Hoà, in Duyên Hải district, are located directly on the coast, and have nearly completely transitioned to intensive shrimp farming over the past 20-30 years, as farmers took advantage of easy access to saltwater. As shown in the table, however, several farmers still plant freshwater crops in this area as the season allows.

Although much of the province's hydrology is naturally brackish, local researchers described areas of predominantly rice-growing to me as "typical" villages, suggesting that use of brackish water for aquaculture was still seen as something innovative, even slightly transgressive. That is because until recently, nearly all agricultural land in the province was slated for rice growing—at least one crop per year, and up to three per year where conditions

allowed. From the mid-1980s to early 2000s, intensive double and triple cropping of high-yielding rice varieties expanded across the Mekong Delta, including into formerly brackish areas of the coastal zone, supported by the extensive development of large-scale irrigation and salinity management infrastructures and the government's so-called "rice first" policies (Can et al. 2007; Gorman 2019; Käkönen 2008; Le Thuy Ngan et al. 2018; Vormoor 2010). New canals were dug to provide freshwater from points further upstream and drain soils of acid buildup, and dikes and sluice gates were built to keep out the salinity, enabling freshwater agriculture year-round (Benedikter 2014; Biggs et al. 2009; Can et al. 2007). In Trà Vinh, the Nam Măng Thít irrigation project, a system of dikes and sluice gates encircling three quarters of Trà Vinh province and part of neighboring Vĩnh Long, was constructed from 1993 to 2004 (Le Thuy Ngan et al. 2018).[119] Funded by the World Bank, the project encompasses a total of 170 sluice gates and an area of some 140,000 hectares of agricultural land in the province.

Yet saltwater continued to permeate the land via an extensive network of streams and canals, and many farmers seized the opportunity to continue farming shrimp due to the higher price paid on the export market,[120] sometimes even within the zone designated for freshwater. By around the year 2000, a slowly expanding zone of brackish-water aquaculture had appeared around the perimeter of the Nam Măng Thít project in Trà Vinh, creating a fragmented land-use pattern in the buffer zone between fresh and saline areas and generating water management conflicts between neighboring farmers (Hoanh et al. 2003; Le Thuy Ngan et al. 2018). Around

[119] Typically, sluice gates are closed when water levels are low (such as for much of the dry season) and at high tide to prohibit saltwater intrusion, while when river flow is high (during the rainy season) and the tide low they are opened to allow water to drain out.

[120] With rice farming, farmers typically keep part of their crop for household consumption, but shrimp are raised almost entirely for the market, with 70-80% of Vietnam's shrimp exports shipped to the United States and Japan (Lan 2011).

the same time, shifts towards market liberalization and greater decentralization of land-use decision-making encouraged both intensification and diversification of agriculture (Biggs et al. 2009; Can et al. 2007; Garschagen et al. 2012; Lan 2011; Le Thuy Ngan et al. 2018). In 2000, Resolution 09/2000/NQ-CP loosened the emphasis on rice production in the delta, encouraging farmers to use land more effectively and promoting diversification of cropping systems (Can et al. 2007; GoV 2000; Lan 2011). This led to increased planting of upland crops like fruits and vegetables and contributed to the boom in shrimp production already underway since the mid-1990s (Benedikter and Waibel 2013; Vormoor 2010).

Prior to the year 2000, shrimp cultivation was primarily practiced extensively outside of freshwater project areas devoted to rice, while after 2000 many farms converted to semi-intensive and later, intensive, systems, and some farmers even pumped saline water into the freshwater zone to replace rice culture (Can et al. 2007; Lan 2011). Aquaculture systems are generally divided into four model types along a spectrum of intensification: extensive (*quảng canh*), improved extensive (*quảng canh cải tiến*), semi-intensive (*bán thâm canh*), and intensive (*thâm canh*). At the extensive end, pond size is usually larger, and both larvae and feed are traditionally recruited from the surrounding environment, though farmers may also release fry sporadically (also referred to as *thả lan*, or "casting loose"). Cultivation requires few inputs, and with low stocking densities there is lower risk of disease yet also lower economic returns. Farmers harvest on a regular basis, and average annual yields range between 75 and 240 kg/ha. With improved extensive systems, ponds may be treated with Derris root (*derris elliptica*; a plant toxic to fish) to eliminate fish, and lime powder ($CaCO_2$) may be added to raise the pH level of water in areas with acidic soils. Fertilizers may also be added to promote algal growth for shrimp to feed on, and fry are added to increase stocking density. Shrimp are harvested every 4-6

months. Moving up a level in intensification, greater investment is required in both capital and labor. Farmers apply chemicals such as sterilizer and bio-enzymes in pond preparation and add additional feeds such as rice bran, rice, and processed pellets, as well as vitamins. Ponds are surrounded by complete mud dikes for water management, and typically aerated with fans to increase the oxygen content of water. Added chemicals require frequent water exchange, and ponds should be re-dredged every three years to eliminate buildup of sediment and toxins. With intensive (sometimes colloquially referred to as *công nghiệp* or "industrial") systems, ponds are typically smaller in size (1000-10000 m^2), and inputs increased and strictly controlled, enabling the highest stocking density and fastest rate of growth, with annual yields up to 6,200 kg/ha. As stocking density increases (from 1-2 shrimps/m^2 at the extensive end up to 15-30 shrimps/m^2 at the intensive end), the size of mature shrimp tends to decrease, thus fetching a lower price by weight, and the risk of disease goes up (Garschagen et al. 2012; IUCN & VAWR 2016; Joffre and Bosma 2009; Joffre et al. 2015; Lan 2011; Nguyễn Thanh Phương, Trần Ngọc Hải, and Long 2009).[121]

In recent decades, black tiger shrimp (*Penaeus monodon; tôm sú*) has been the most commonly cultivated species in both extensive and intensive systems, but more recently, many farmers have begun to shift to white-leg shrimp (*Litopenaeus vannamei; tôm thẻ*). Tiger shrimp can take 4-6 months to mature when grown intensively, but the smaller and faster-growing white-leg shrimp only 2.5 months, so ponds can be stocked more densely, and farmers can increase harvests from two or three up to four times per year. However, the latter also requires more oxygen and chemical inputs, is more susceptible to disease, and causes higher rates of

[121] Some aspire to an even more technically advanced form of "super-intensive" (*siêu thâm canh*) cultivation.

pollution due to greater release of waste (IUCN & VAWR 2016; Lan 2011). Combined rice-shrimp systems have also been used in some parts of the delta since the early 1990s. In these, farmers typically rotate one crop of rice in the rainy season with one crop of brackish-water shrimp in the dry season. Although the saline-tolerant rice varieties required produce lower yields than normal high-yielding varieties, evidence shows that the combined output of such integrated polyculture systems remains more profitable than intensive rice cultivation alone (Can et al. 2007; IUCN & VAWR 2016).

The total area dedicated to rice or other crops is still dictated by the Ministry of Agriculture and Rural Development (MARD) and driven by the national food security agenda (Gorman 2019; Smajgl et al. 2015). Official land use plans cover 5 or 10-year periods and designate the main land use categories for each commune, district, and province based upon pre-defined production targets for specific crops. However, there is a good deal of local-level negotiation and decision-making that still takes place. As Garschagen et al. (2012, 98-99) explain:

> These plans set out the main land use categories (e.g., rice production, fruit tree orchards, aquaculture, etc.) for a given spatial entity. The farmers producing within this spatial unit are free to choose the detailed form of production under the dedicated category (i.e. […] which varieties of rice or which type of fruit trees they are planting). However, in theory they should not shift the production into an entirely different category […] Yet, at the local level, land use decisions and the way to achieve production targets are much less standardized than the theoretical planning framework may suggest. They depend heavily on local consultation and negotiation processes at commune or village level.

As such, land-use change often does not follow a prescribed and well-coordinated pattern but is instead based on quasi-autonomous and sometimes conflicting decisions by farmers, as water needs between rice and shrimp farmers diverge, for example.

Despite continued subsidies for rice producers and other inducements to maintain national self-sufficiency of this food staple (Gorman 2019), rice farming in the delta is not generally seen as a profitable pursuit (Taylor 2004). As an expression shared with me by one HCMC-based Vietnamese Mekong Delta expert puts it, "if you keep on doing rice in the Mekong Delta then no one will die of hunger, but they will be hungry until they die!"[122] For many farmers who can afford to, shifting from rice to a potentially more suitable crop is an easy choice. This is especially the case as rice farmers increasingly suffer from crop failure due to drought and salinization, as Uncle Victory explained above, and localities are no longer able to meet their production quotas. Local authorities have largely acquiesced, and now justify the transition to brackish aquaculture by reference to the twin trends of sea-level rise and increasingly unavoidable salinity intrusion.

Perceptions of environmental change

In March, at the peak of the dry season, the sun shines hot, the air is clear, and the light cuts sharp shadows and bright colors. Driving through the countryside, one sees countless yellow-brown fields and empty ponds, the ground baked dry. The closer one gets to the coast, the harsher the landscape appears, a desolate moonscape of shrimp ponds surrounded by dry, salt-encrusted and cracked earth. By mid-May, much of this has begun to change. The air feels thick, humid, and in the wake of the rains, insects have once again exploded in abundance. At night, I

[122] "Làm lúa ở Đồng bằng Sông Cửu Long, thì không ai chết đói, nhưng sẽ đói cho đến chết."

pass by groups of men with headlamps walking up from the fields, out collecting crabs or frogs in buckets. In the morning after a long rain, clouds hang dark and heavy in the sky. By July, the landscape is green and lush again—from the fields lining the roads to the water hyacinth (*lục bình*) swelling slow-moving bodies of water. This predictable oscillation between wet and dry seasons confers a temporal rhythm that structures life here in myriad ways: cropping schedules, holidays, even people's moods. People may ask one another, "*Có buồn không?*" "Feeling sad?" after the rains arrive, but they mostly go about their daily lives unfazed, just another rotation around the sun.

Yet this predictability is eroding. Year upon year the weather is becoming less consistent, farmers tell me, the seasons more irregular. Sometimes heavy rains come in the middle of the dry season, or they persist longer into the new year. By contrast, the previous year's El Niño-induced drought strained freshwater resources and permitted saltwater to penetrate into the interior of the province like never before. This September, after more than a week in which the rains disappeared at the height of the wet season, a headline across the top of the *VnExpress* website blares, "Vietnam on red alert as worst storm in years bears down." A low-pressure system has developed over the South China Sea, pulling in moisture from the atmosphere around it, and is heading for the Central Coast of Vietnam, the part of the country most frequently battered by tropical storms. The Mekong Delta will get some of it too. The news article declares apocalyptically, "its destruction might be the worst the country has ever seen."

Figure 5.2 shows survey respondents' perceptions of environmental changes over the previous decade, based on their assessment of ten primarily abiotic environmental characteristics

that might affect farming.[123] This is an aggregate of all respondents; disaggregating by location, land/water use zone, or type of farming would potentially yield different results in some categories (but see Fig. 5.4). However, over the whole study area, clear trends emerged in each category. Temperature, drought conditions, salinity, and period of salinity intrusion, as well as water pollution and crop disease, were all reported to have increased in recent years by a majority of respondents; by contrast, rain volume, groundwater, and sediment/soil quality were reported by a majority as having decreased. Rain frequency was the one category noted by a clear majority of respondents as having become unstable in recent years.

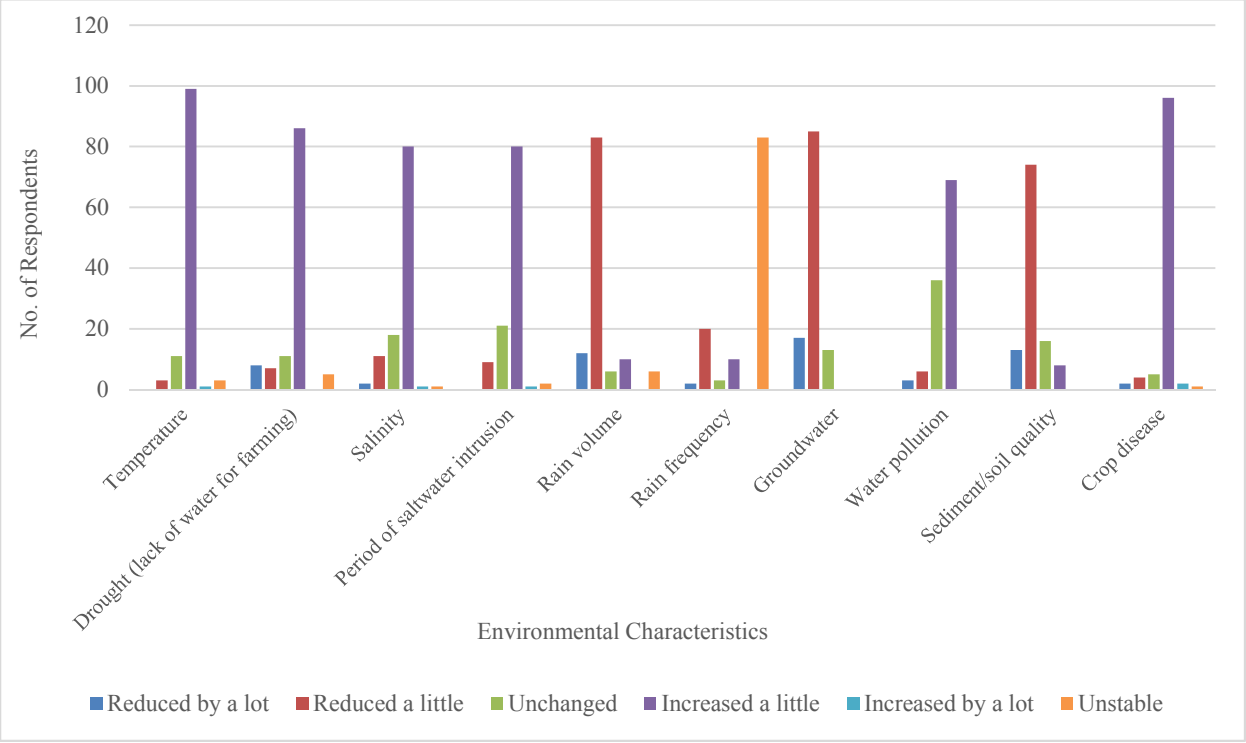

Figure 5.4 Perceived environmental changes in past 10 years.

[123] Presented with this list of ten environmental features or events (temperature, drought, salinity, period of saltwater intrusion, rain volume, rain frequency, groundwater, water pollution, sediment/soil quality, and crop disease), farmers were then asked whether, in the last 10 years, they had reduced by a lot, reduced a little, were unchanged, had increased a little, increased by a lot, or were more unstable.

Nearly all farmers I spoke with described increasingly variable weather patterns and the difficulties this caused for their farming operations. Many were especially concerned about the changing seasonality of rain. One farmer said it was becoming "unbalanced": "it's like you expect six months of rain but the rain doesn't come. Only after seven or eight months then it rains." Others described a rainy season that lasts longer than expected:

> Until a few years ago, whichever season you were in, that was the season you were in! In the past, the end of the rainy season, in December, was the end of the rain. Until April or May and then the heavy rains came again. Now, often the rain doesn't stop. Even up to February, *Tết*,[124] it's still raining. That's not supposed to be rainy season! But then in the sunny season the temperatures are higher now than before—33, 35 degrees—really high!

Unseasonal rain is a challenge for aquaculture, as it can disrupt fragile pond systems, causing a sudden drop in temperature and salinity or washing acid buildup and toxins into the water. Many farmers described this rain as causing a "shock" to shrimps' immune systems, making them succumb to disease more easily. Freshwater crops are not spared either. When rice is beginning to bloom and gets pummeled by a heavy downpour, it too can kill a crop. One farmer of upland crops told me that, with the weather so "odd" this year, and hot ("so hot it could kill a person"), few can still manage to grow watermelon, which cannot tolerate such extremes. Extreme heat causes heat stress, but too much rain causes waterlogging and the fruit rots in the field. Another farmer, describing this recent abnormality, said: "Last year, the sun was fierce, we never had a year with such strong sunshine as last year. But this year, my God, it's rained so much!"

[124] Vietnamese Lunar New Year celebrations, usually around the end of January or early February.

Many farmers were quick to attribute these changes to climate change. Some even offered a reasonably sophisticated account of it. For example:

> As far as I know, the last few years the earth has been getting warmer. The ice in Antarctica is melting, and areas around here are likely to become the sea in some provinces. I live here, and the past two years the rains have been erratic. When it rains, it rains too much, but if it's sunny it's too sunny. Especially, the weather has been very conducive to diseases of poultry and livestock. A lot of diseases have appeared. The sign is clear, an alarm that the weather is changing unpredictably. I know the earth is getting warmer. And it's affected by our deforestation.

Another was concerned about the contribution of farmers such as himself to climate change:

> Speaking generally about climate change, I'm a farmer so I'm also one part of the cause. Have you seen it on TV? Because of industrial development, and air pollution, is one part. One part is when we farm rice, we spray chemicals, we burn straw. Burning straw also contributes to climate change, or the greenhouse effect. I can understand, but that problem, I can't limit it, understand?

Most described how such changing conditions affect their farming activities, including how rapid shifts in temperature and precipitation are detrimental and "the environment can't handle it."

Of particular concern were changing water resources. Figure 5.5 shows perceptions of environmental change for five variables related to water resources, disaggregated by commune for three of the focal communes along the brackish water transition zone that were the focus of in-depth research with farmers. As above, this chart reflects near consensus that four of these characteristics (drought, salinity, period of salinity intrusion, and water pollution) have increased over the past decade, while only groundwater was perceived as having decreased. With the

extreme drought in 2016, salinity intrusion became an issue even in communes that had never before been affected. Communes such as Nhị Trường, an inland sandy area well within the freshwater project zone, suffered crop damage as saltwater permeated beyond the dikes for the first time. And in Kim Hoà, a higher concentration of salinity came earlier in the year than expected, making it past the main sluice gate before it was fully closed.

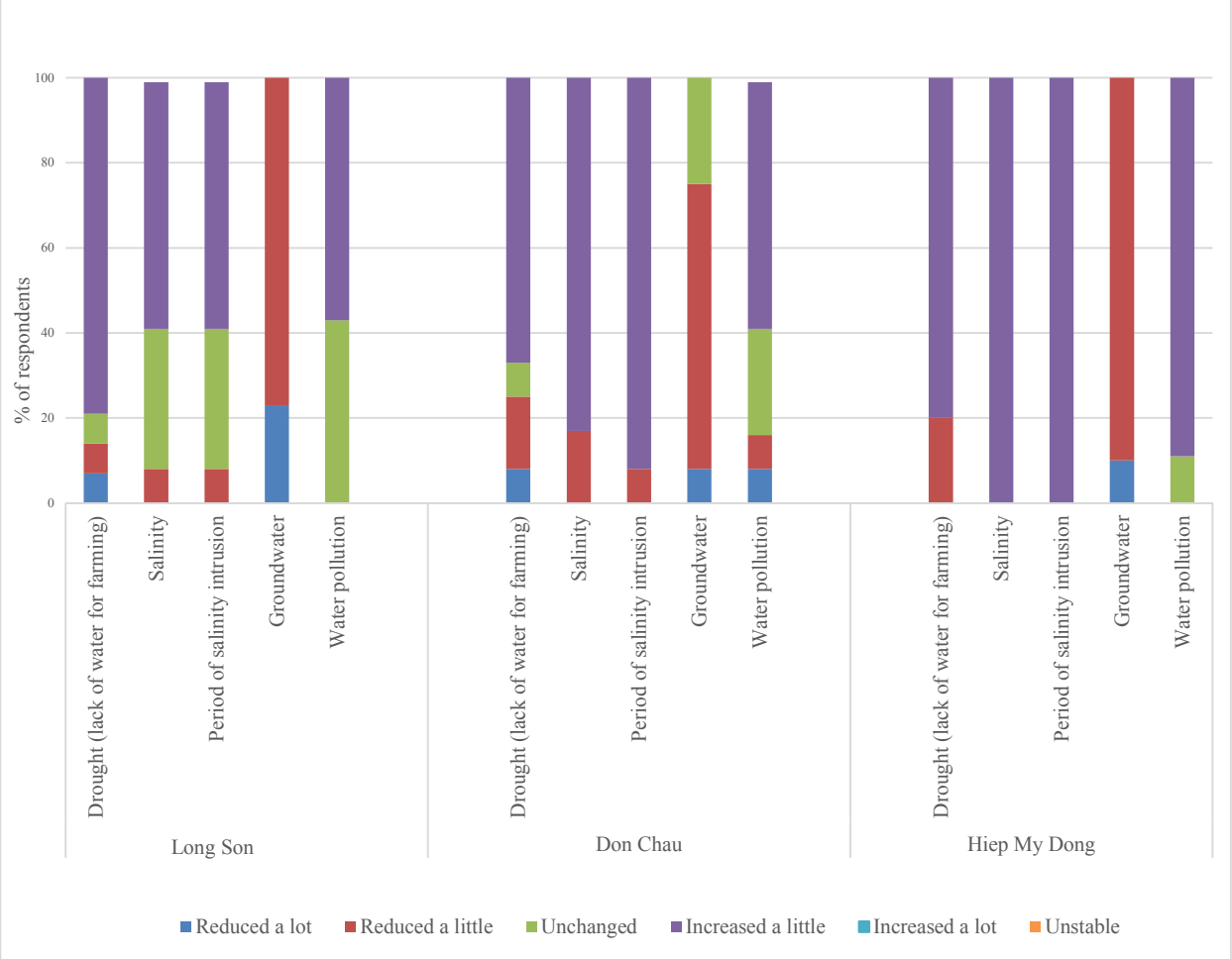

Figure 5.5 Perceptions of water resources changes in the past 10 years for three focal communes.

Increasing salinity and failure of rice were consistently given as the primary reasons many farmers were switching to raising shrimp. Much like the destabilized seasonal pattern of rainfall, farmers along the brackish water transition zone described an area that used to be "six months fresh, six months salty," but where now the salinity was coming earlier, and the water saltier, than in the past, a shift which many also attributed to climate change. Just outside the freshwater project zone in Đôn Châu, a farmer described how a long time ago, the area was all swamp forest thick with mangrove and nipa palm. After independence (reunification), they cleared land and started to grow rice in the rainy season. But now, even in rainy season water in the creeks and canals has become brackish again, and in the dry season it's even saltier. He attributed this to the encroaching sea. In Long Sơn, the story was similar. 10 or 15 years ago, everyone could grow rice, but it has become increasingly difficult. Outside the freshwater zone, saline water infiltrates the irrigation canals year-round. Over the years, more and more farmers have shifted to farming shrimp, gradually intensifying production. Now even in the part of the commune zoned for freshwater, there is no longer enough freshwater available for a winter-spring rice crop, which matures during the dry season, because saltwater seeps through at the sluice gate. No one can grow more than two crops per year, and some are only able to get one. When farmers try to irrigate their fields, the rice grows bent, the stalks fall over, the crop destroyed.

This has encouraged those with enough access to saline water to shift to shrimp, but the water resources challenges do not stop there. For one thing, higher temperatures increase rates of evaporation, and shrimp farmers now must modulate the salinity levels of their ponds. For that they use groundwater sourced from increasingly deep bore-wells—drilling 100, 120 m down to access freshwater—which must also be shared with domestic uses. Water pollution is another

major challenge, where contamination from upstream sources can spoil a whole batch of shrimp. In Đôn Châu, farmers are increasingly concerned that fly ash from a newly built coal-fired thermal power plant on the coast is having adverse effects on local water quality and explains why so many shrimp and fish end up diseased or dead. But the biggest water management issue cited by shrimp farmers was that of coordination among neighbors. Using infrastructure originally intended for irrigating rice, most areas do not have separate canals for in-flow and out-flow, so one farmer's effluent is another's water supply. Water released with diseased and dead shrimp from one pond, plus the high chemical loads often used, contaminates others downstream. For this reason, some farmers are adamant that they and their neighbors must keep a secondary, reserve pond for processing and sterilizing water before it is passed on to their neighbors and to minimize environmental pollution, but this is only possible for those with enough land and resources. Many cannot spare an extra pond for this purpose.

Livelihoods decision-making

Table 5.4 shows survey respondents' assessments of how their livelihood status has changed in recent years, and the proportion of those who desire to change to a different strategy. "Livelihood status compared to 10 ya" shows the number of farmers who assessed their economic situation as "better off," "same as," or "worse off" than 10 years ago. The final column, "Want to change?", shows the percentage of respondents from each commune who answered "yes" to the question of whether they were interested in changing to a different type of farming. This data shows that although a greater number of farmers said their economic status had improved, consistent across all communes surveyed, 17% of respondents reported being worse off than before (20 out of 118), and 39% overall expressed interest in changing to a

different farming strategy. This last quantity perhaps reflects the mismatch between official land-use plans, available water resources, and current farming practices noted above.

Figure 5.6 shows the aggregate results across all communes for a follow-up question about farmers' interest in changing to a different type of farming. If they answered yes to the first question, respondents were then asked, "If so, which factors are most important in making that decision?" They could choose up to five factors. Interviewers were provided with a list of 12 categories that could be used as prompts but were urged to let farmers speak first and assign their responses to the categories listed. The figure below aggregates the number of times each factor

Table 5.4 Farmer assessment of changing livelihood status.

Location		Livelihood status compared to 10 ya (# farmers)			Want to change?
Commune	Total respondents	Better off	Same as before	Worse off	%
Vĩnh Kim	12	9	0	3	25%
Kim Hoà	10	10	0	0	50%
Long Sơn	14	7	4	3	21%
Hiệp Mỹ Tây	10	7	0	2	30%
Hiệp Mỹ Đông	10	6	0	4	30%
Mỹ Long Nam	10	8	0	2	30%
Đôn Châu	12	9	2	1	25%
Nhị Trường	9	6	3	0	55%
Trường Thọ	11	9	2	0	64%
Hiệp Thạnh	10	6	1	3	50%
Trường Long Hoà	10	7	1	2	50%
Total	118	84	13	20	39% (avg)

was mentioned. In order of frequency, market price (43), financial ability/access to capital (35), technical ability (34), and seed source/quality (32) were the top four factors named as important for decision-making about changing farming strategies. However, if water source (14) and irrigation system (22) are combined, which seems reasonable given the significance farmers placed on changing water resources and increasing salinity discussed above, it would be the second-highest ranked factor (36) after market price. As one can see, land use plan (7) is a quite

low-ranked factor; available water resources is clearly more important, as are other material factors such as seed quality and other inputs. Technical ability is a somewhat ambiguous category regarding whether it refers to knowledge and skills, or to physical implements. As will be discussed below, in in-depth interviews farmers often discussed the need for both.

Based on the ranking of these factors, an economic calculus is clearly central to farmers' decision-making about whether and how to change livelihood strategies. Deciding which crop to plant, farmers look to see what is likely to fetch a good price and consider the input costs and

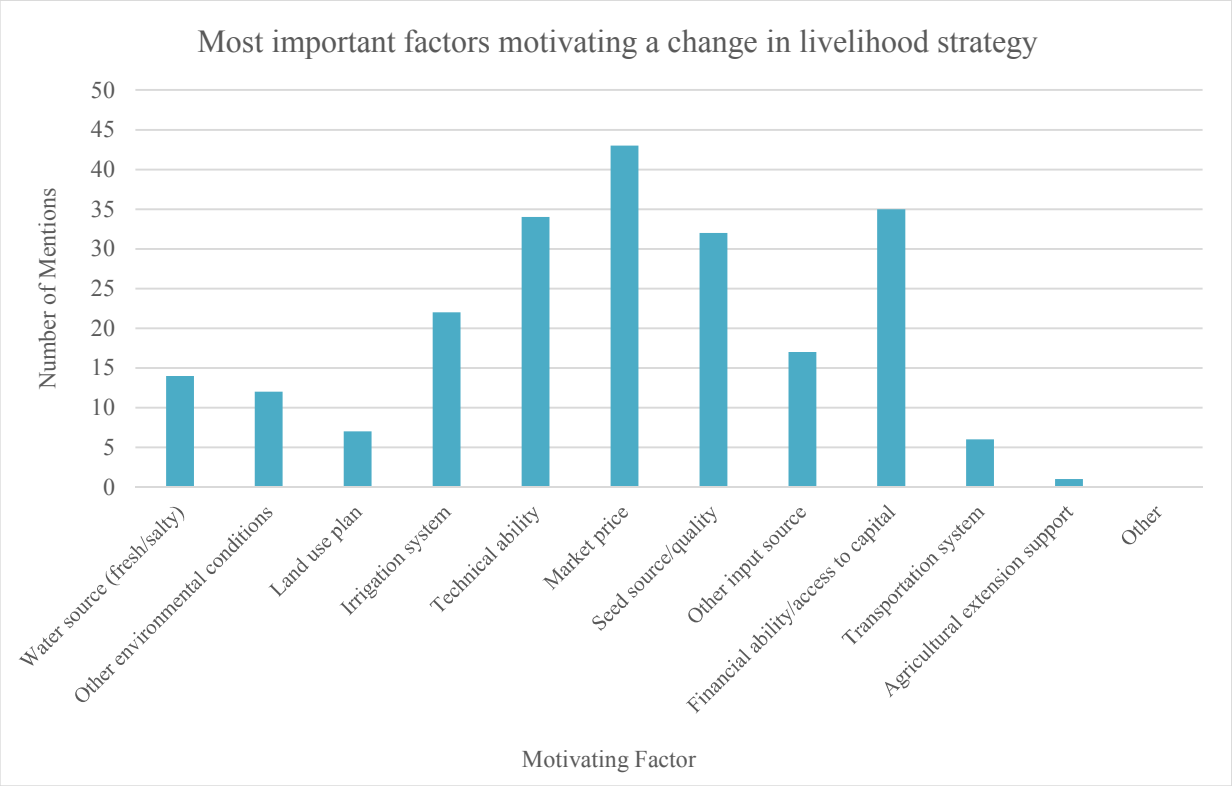

Figure 5.6 Most important factors in deciding to change livelihood strategy.

risks involved. A young farmer in Kim Hoà described his calculus when considering whether to switch from growing rice to other crops:

> If changing from planting rice to planting vegetable crops, the influential factors include: One, the weather, climate change, if it is too extreme; and the cost of inputs, like herbicides, is uncertain. Two, if the ratio of supply exceeds demand. Any models where supply cannot meet demand, we can convert to those models. Or if this area is affected by saltwater intrusion and climate change, our rice cannot adapt, so we should change to other new varieties with better adaptability, or grow other vegetable crops, or coconuts… however I can respond in a way to make a profit.

Frustrations with rising input costs, fluctuating market prices, and unpredictable weather or water resources also deterred many farmers from investing additional money into improving their farming systems (such as using plastic groundcover or water-saving drip irrigation technology for upland crops) for fear it would all end in a loss and just put them further into debt.

When I spoke to shrimp farmers, many said they had changed from growing rice simply because shrimp seemed "more successful." Rice farming is a lot of hard work for little reward. Growing rice, they would have to hire outside labor to help with the harvest, which would not bring much profit anyway. But a couple of shrimp ponds can more easily be a family-run operation. Still, some emphasized that any crop depends a lot on luck. One year you might have a successful harvest, another year a loss. With shrimp farming, the possible reward is far greater. Almost invariably, shrimp farmers also expressed a desire to intensify production; it was only a matter of being able and willing to take on the risks involved. And that requires access to capital. Raising shrimp requires a lot of upfront investment, especially so for more intensive forms of production—for digging and preparing the pond, hooking up electricity and running the aerators, putting in precautionary measures like lines overhead to keep birds out, and all the inputs needed in terms of seed, feed, and chemicals. Digging a single pond can cost upwards of 20 million

VND ($880), and all the costs of preparing a pond for semi-intensive or intensive production 300 million ($13,194). Yet with that kind of investment, farmers can hope for hundreds of millions, even billions, of VND in profit. But they must be willing to suffer losses more often than not.

After financial considerations and water resources, in conversation farmers frequently referenced other material factors as important for decision-making about livelihood options. Consistently cited as among the most important was seed source and quality, regardless of crop type. Some farmers described how in the past, the state would select seed varieties for them to use, but these often were not suitable for given local conditions. In recent years, rice and vegetable farmers have become more knowledgeable about appropriate and opportune varieties for planting, both because of local technical training and from their own experience. Shrimp farmers were especially concerned about the quality of "seed," or shrimp larvae, which are typically spawned in central Vietnam before being shipped southward, and often vary highly in quality according to the price farmers are willing to spend. As one farmer put it, "with raising shrimp it doesn't matter if it's dry season or whatever season, what matters is whether the shrimp seed is successful. If the seed is not good, then it won't be successful. Rainy season, dry season, whatever, the seed is the most important." While several rice farmers complained about not having access to a mechanical plow or combine harvester and wished the local government would invest in one for them to share, shrimp farmers were more concerned with adequate transportation and, especially, electricity infrastructure. In many areas, roads had been freshly paved in recent years, and concrete motorbike paths and bridges built among the fields, canals, and ponds for easier transport of goods, but farmers still lacked electrical lines for running aerators, a necessity for intensifying shrimp production. For the time being, many used gasoline-powered generators or hooked up to lines drawn from nearby houses. What became clear in these

conversations, however, was that the official land-use plan matters much less to farmers than the material conditions available—water, soil, weather, infrastructure, seeds and other inputs—and only when the official plan corresponds to state support for enhancing these conditions did it become relevant.

As noted above, survey respondents' mention of technical ability as an important factor in decision-making may have referred to either physical implements, such as technology or equipment—giving added weight to the importance of material means in farmers' calculus—or to more abstract knowledge and skills. The wording (*khả năng kỹ thuật*) leaves this rather ambiguous. In in-depth interviews, farmers often expressed a need for further technical training to adopt new and improved livelihood models or emphasized their familiarity with current practices as a reason for not changing. Indeed, both material affordances and new information are essential when making decisions about livelihood adjustments. Tables 5.5 and 5.6 list sources of information cited by respondents as relevant to livelihoods decision-making. Given a list of topics, respondents were asked, "When you need to access information for each of the following topics, who or what source do you typically consult?" Table 5.5 lists these information sources in order of those most cited by respondents, with formal information channels such as radio or TV cited most frequently, followed by various social contacts, including relatives and neighbors, local officials, private-sector merchants, and friends. After these, the next most-cited source of information (not provided as an available prompt but only filled in as "other") was simply "personal experience" ("*kinh nghiệm*" or "*tự biết*"). Notably, agricultural extension agents were ranked relatively low on the scale of importance for farmers as a source of information, as were several other state-affiliated actors. Table 5.6 lists the single most-commonly cited source of information for each of the topics presented.

As reflected in the tables below, for forecasting environmental changes, farmers most often turn to formal information channels like TV or radio, whereas for most other kinds of information they turn to people with whom they have established prior relationships and trust. Indeed, many farmers described looking to their neighbors and relatives to see what was successful when deciding which new livelihood strategy to pursue and learning how to go about it. For most, this was part of an experimental approach, based on seeing what worked for others

Table 5.5 Most frequently cited sources of information.

Information source	**Number of times cited**
TV/Radio	421
Relatives / Neighbors	394
Local/commune officials	294
Agricultural input merchants/ distributors	289
Friends	215
Personal experience	123
Loudspeaker system	119
Bank	82
Buyers of agricultural products	72
Newspaper	59
Irrigation management board	58
Hamlet leader	43
District officials	32
Internet	31
Provincial extension agents	24
Farmers' Union	6
Women's Union	4
Technician from TVU	1
Temple/church representative	1
Youth Union	0
Religion	0
AMD Project representative	0

Table 5.6 Most cited sources of information by topic.

Topic	**Most common information source**
Sourcing seed	Relatives/Neighbors
Farming materials	Agricultural input merchants/distributors
Aquaculture feed	Agricultural input merchants/distributors
Livestock, poultry feed	Agricultural input merchants/distributors
Lending capital/credit	Bank
Purchasing system	Relatives/Neighbors
Equipment	Relatives/Neighbors
Water quality	TV/Radio
Groundwater situation	TV/Radio
Irrigation system	Local officials
Technical advice	Local officials
Weather forecast	TV/Radio
Environment in general	TV/Radio
Market (price, demand)	Relatives / Neighbors

and trying it out, then learning by doing, and if that doesn't work then returning to what they know best: "I saw other people succeed at growing chili, then I follow them. I'll plant this crop and if it works again, I'll keep on planting. If it doesn't then I'll go back to rice again." But some expressed concern about the risks involved in this approach, particularly when it comes to shrimp farming: "People are profit hungry. They see others succeed and they just follow. But one person succeeds, 10 people fail. If you're driven by hunger for profit, you'll end up poor." For this reason, many farmers were eager to participate in training classes or workshops (*tập huấn*) to expand their technical skills and knowledge of new livelihood models and expressed a desire for the government to sponsor more of them. As one shrimp farmer argued: "The locality needs regular training for the farmers to grasp, to understand science and technology, which means having the time set aside for it. If there is no training, then farmers won't be able to adapt."

Asked to elaborate, he continued, “If we can’t adapt then how can we respond to international demand? If you want to import or export goods, then farmers won’t be able to get on board… Only through field training will farmers be able to understand.”

With time many of these farmers have become technical experts through experimentation and innovating new solutions and are eager to share their knowledge with others. Shrimp farmers, for example, carefully regulate their ponds’ water quality, salinity, and pH, and expertly described how to recognize the different kinds of shrimp disease, whether viral or bacterial, and how each can be managed. One recent convert to shrimp farming told me excitedly about an innovation he had applied. “The model I like best is to throw in tilapia,” he said. “They feed on toxic substances. I’ve done it for three years already. I’m telling you the truth; I’m learning from experience and then I’ll share my experience with everybody…. They don’t eat the shrimp, but they’ll eat anything that’s rotten. The idea is anything that’s dead—they don’t eat live bait… I learned it from some uncles who did it before, and now me too.” Another contrasted the expertise gained from hands-on experience to that of the professional “experts” who “come down here and just speak at us, about theory only, get paid, and leave.” He suggested imagining two “field doctors”: one sits in an office and makes money by “directing,” and the other: “I’m poor, but I dissect, I open up the intestines, cut out the liver. Those are both equal regarding theory, but in practice, I’m better. I’m better because I have practical experience. Shrimp farmers are like this. For example, each day I go to the pond a minimum of 10 times, so when I glance at the water, I instantly know the level of alkalinity, the pH, while the engineers only come down here and talk until the time is up, then they take the money and go home.”

"Adaptation" in local perspective

On a visit to a commune in the southeast of the province, my friend Minh, a hydraulic engineer for the province, offers me a lesson in stream geomorphology. Looking out across a muddy, winding canal at the nipa palms lining the other bank, he describes how one side of the canal (*bên lở*) will continue to erode and recede while the other (*bên bồi*) grows through the accretion of sediment. As time goes by, the water carves, the bend becomes sharper, and the channel drifts. The stream and its sediments shift on their own over time, complicating the plans of people who live along its banks, who must either adjust accordingly or do what they can to provide some added stability to the system. I've come with Minh and his colleagues from the provincial Irrigation Works Management Company of Trà Vinh to inspect local canals that need re-dredged and embankments that need repaired before peak flood season arrives. The work will be financed by the provincial government and a local construction company will carry it out. Already, a young man in an excavator is toppling nipa stalks and piling mud to rebuild an embankment just across the way.

"You know why people here are so poor?" Minh asks me. "Because the sugarcane has not gotten enough rain, then it gets inundated with saltwater, and the price is down." Sugarcane was the main crop in the area until recently but is gradually being replaced by coconut after saltwater flooded fields and cheaper foreign sugar flooded the market this year. Floods here are saline, coming with the tides from the direction of the sea, swelling creeks and canals and overflowing their banks. On one side, Minh explains, the sea is rising and on the other, China is building dams on the Mekong River upstream, reducing the flow of freshwater and restorative sediments. The people are stuck in the middle.

These are the twin drivers of saltwater intrusion (*xâm nhập mặn*) as local people often described it to me: sea-level rise due to climate change and dam-building by China. Both are seen as external threats, impossible to oppose. Sea-level rise is uncontrollable, a force of nature at this point. Upstream dam-building is more urgent and provides a specific target for blame. But both are complex, large-scale challenges, which feel basically intractable. People are thus stuck between a rock and a hard place: on a gradually sinking landmass between the effects of climate change on one side and those of upstream dams on the other. They have no choice but to accept them and adjust as best they can. This discourse of externalizing blame nonetheless places the onus on local people: adapt or perish.

Farmers in the Mekong Delta are often described as the victims of climate change, and in many ways, they are, forced to reckon with large-scale destructive forces not of their own making. On the other hand, they are not without agency; they draw on a repertoire of local knowledge based on intimate familiarity with the local environment to manipulate the muddy landscape and take advantage of natural hydro-ecological dynamics. Here, they re-dredge canals and raise and strengthen small earthen dikes running through their cropland to protect against floods, facilitate transportation, and enable cultivation of a new cash crop. Elsewhere, they overturn rice paddy and replace it with furrows of fruit or vegetables, or dig ponds for aquaculture, intentionally letting the saltwater in to take advantage of dry season conditions when freshwater is scarce. People's local modifications of the land and waterscape represent an active and ongoing engagement with the dynamic materiality of the delta, which in turn is shaped by forces of rain, floods, sedimentation, and tides, as well as countless plant and animal species and the previous work of human hands. The muddy delta landscape is a hybrid of land and water (Cortesi 2018; Lahiri-Dutt 2014), morphologically neither solid nor fluid but plastic. Local

hydraulic infrastructures such as canals and embankments are crafted out of this material, as people constantly mold the landscape to prepare spaces for residential and agricultural use. But these interventions are impermanent and will eventually be overtaken by the forces of nature, the ground shifting and vegetation quickly growing back, and the digging and building and remolding the pliable landscape will happen anew.

When I asked farmers how they thought environmental conditions would change in the future, they often responded in terms of the kinds of changes they would make to the landscape: upgrading shrimp ponds from extensive to intensive operations, for example, or improving infrastructure for water management. Many farmers explained shifts to new livelihood models as a response to hardship (*khó khăn*) caused by environmental changes that rendered previous livelihoods untenable or increasingly precarious, as rational choices to continue making a living, and strategies to improve their circumstances by profiting from the narrow opportunities available to them. Some defended their personal initiative and ingenuity in making the best of difficult situations and "improving" (*cải thiện)* the environment to make it more productive, stressing "I did this myself… *spontaneously*" (*tự phát*). One farmer and former cadre, speaking about increasing salinity in the area, said "I'll resist the change whatever way I can, just have to create the conditions." By this he did not mean going against the change, but rather accommodating and flexibly adjusting to it. He continued, if people's minds are already fixed to pursuing a freshwater direction, "then people will die."

Some farmers, especially hamlet leaders and those with personal connections to the bureaucratic apparatus, were confident about communicating their needs to the state: "Around here we also make suggestions, in meetings of the local people's council, we express our ideas to the state." However, "We should suggest to the state what we know, but we can only suggest,"

they insisted, saying "we don't have a way to make it happen." As noted previously, some emphasized the need for additional training sessions to impart new skills and technology, such as suitable crop varieties or techniques, to be able to "adapt" (*thích ứng*) by responding appropriately to demand in a global economy. But most of all, farmers said they needed financial assistance to support changing livelihoods under precarious conditions. Said one farmer, "Through interacting with people around here a lot, I see it like this: They need capital investment from the state. They have land, the state should provide capital so they can improve their land, dig ponds, build dikes, then stretch electrical lines over the dikes so people can drop a well and grow vegetables." Without this financial support, many families will not be able to afford the adaptive changes prescribed. The former cadre above put it bluntly: "there are some that can't do it. They'll just have to sell their land and go work in the city."

However, so long as the capital is available to make the continuous and ongoing changes people recognize as adaptation, they seem to believe this process can persist indefinitely. Asking one shrimp farmer whether he thought intensifying aquaculture in the brackish zone would be sustainable into the future, he responded, "If the situation is such that there is a model for it, then of course it can be relatively sustainable. If there's capital, if there's support from the state, then definitely. The state drip-drips, but to go all the way, it needs to pour everything on it." This was how most farmers interpreted the "sustainability" of a given activity: as limited primarily by economic considerations. Asked whether he thought several more years of intensive shrimp farming would damage the land, a young farmer who had been at it for five years already said: "Yes, of course. But how to avoid it? There are ponds that fail and ponds that win. You can't win every time." In other words, there is always a risk of loss, but if it still brings a good return at least some of the time, then it's working. He told me some people take additional measures to

treat the soil, like emptying the pond, letting the soil dry out, and treating it with lime to balance the pH. “I cultivate in one area then leave it and move to another and do it again. For example, I cultivate for 2 years, then I leave that pond and jump to a different one for two years, then I go to another and rotate back. It’ll never get polluted. Just let the land rest.”

Local agricultural officers seemed to agree that intensifying shrimp production was likely to be sustainable. Said one: “The people are conscious; they don’t completely discharge into the environment anymore. Now people limit the improvement of ponds, they’re not permitted to just pump out sludge and dump it straight into the canal. The local government strictly manages it, so the people are aware.” Another explained in greater detail:

> The Provincial People’s Committee has a policy for industrial shrimp farms… there’s a preferential interest rate policy [for lending money], but the state requires the construction and design of ponds according to regulations. A team will appraise the pond. When ponds meet standards, they will be supported with the preferential interest rate […] You must have a settling pond, or wastewater reservoir, where the water is treated before it is discharged. People must design their ponds according to such regulations to receive that amount of money. When that policy is no longer available [however], it will be difficult for the locality to manage shrimp farmers. When people’s shrimp are sick or dead, they discharge waste into the river late at night. That’s difficult to manage. If a neighboring household takes the water in, the pathogens will spread.

This points to the dual challenge of enforcement and coordination, as noted by several farmers above. The policy exists but people do not always follow it, nor are all able to do so. Yet such free-riding behavior is damaging to others and undermining of social-ecological resilience.

For now, at least, it is difficult for farmers to plan long-term for an increasingly uncertain future, but they pursue such livelihood changes motivated by a desire for the good life that is framed by the options and opportunities available to them (Wilcox, Rigg, and Nguyen 2021). In many cases, these reflect a pastoral ideal of peaceful countryside living filled with the short-term pleasures of shared food, drink, and social connection. A shrimp farmer in Long Sơn told me that, nowadays, "just like morality in the temple," the vicissitudes of farming are shared among people, exchanged back and forth. "If people to either side of me lose and I'm the only one who wins just a little, they'll hate me. So now if you win, then you invite them to drink together. With each win, then you can slap down some money to buy something to drink" (*nhậu*). More "wins" bring greater wealth, and with it the symbols of success: a new motorbike, a bigger house. Yet many of the younger generation are leaving the countryside to migrate to the city for work. Some aging farmers still hold out hope their children will return one day—some have spouses or children of their own still in the countryside—and take over family farming operations. For those suffering losses and barely making ends meet, with rising input costs and increasingly unpredictable environmental and economic conditions, this seems unlikely. On the other hand, those who have succeeded in "adapting" by converting to shrimp and intensifying production can offer a more promising future to their progeny, many of whom are already going into the shrimp business on their own, proud to announce that they work in "*thuỷ sản*" (aquaculture).

Discussion

This chapter set out to answer the question of how farmers in the coastal Mekong Delta draw on social and material relations to translate knowledge into livelihood decisions, to make sense of the way that local actors are adapting to climate change. Employing both "extensive"

survey methods and "intensive" ethnographic methods to collect data across a range of communes in Trà Vinh province, the research found that farmers translate a variety of signals, material characteristics, goals, and sources of information when making decisions about whether and how to adjust farming strategies to changing conditions, but potential economic reward and available material conditions remain most important. While the development of large-scale hydraulic infrastructure from the 1980s through early 2000s enabled rice farming to be carried out even in the historically brackish coastal zone, this did not last long and since then, brackish-water aquaculture has been expanding along the border of the freshwater project area. A changing policy landscape has encouraged the diversification of cropping away from low-profit rice farming as well as the intensification of production methods. As the incursion of saline water has become ever more unavoidable in recent years and weather patterns increasingly unpredictable, farmers are finding ways to change their livelihood strategies to re-adjust to hydrological dynamics and respond to market demand. While state policies may create conditions favorable to certain livelihood adjustments, more important in farmers' calculus are the potential economic benefits and risks involved, as well as the material constraints and affordances at their disposal. Learning primarily from each other and innovating through practical experience, farmers make the most of increasingly precarious conditions by continuously remolding the landscape to suit their needs.

These practices may be understood as everyday forms of resilience and resistance that at times align with, and other times against, top-down visions of climate-resilient agricultural development. State-sponsored plans increasingly accommodate and even encourage shifts to "adaptive" brackish-water aquaculture in the coastal zone (GoV 2017) and market-driven, technologically sophisticated intensification of production (Fortier and Trang 2013; Mekong

Delta Plan 2013). Yet farmers largely pursue these changes autonomously, and rather than adhering strictly to formally designated land-use zones, they flexibly and continuously adjust to and with dynamic conditions. With an understanding of contemporary environmental changes as driven mainly by powerful large-scale forces—climate change on one side and Chinese dam construction on the other—farmers have accepted the idea that they must adapt in order to survive. In this context, livelihood changes like adopting and intensifying aquacultural production, by enabling farmers to succeed in an otherwise oppressively challenging situation, might be understood as strategies of resistance to forces beyond their control (Michaelis, Webster, and Shaffer 2021) rather than as simply manifestations of power/knowledge imposed from above (Carr and McCusker 2006). Yet although farmers largely disregarded land-use plans unless they came with government investment in improved material conditions, farmers simultaneously accept a framing of adaptation success that is shaped by powerful state development discourses, with associated limitations on their own political power. Local adaptations are a form of resistance in this context but pursuing high productivity and profitability at the household level also furthers the development goals of the state. Such "adaptive" livelihood strategies as intensifying aquacultural production are reinforced by production quotas and incentives; a national discourse equating adaptation with economic development; and notions of what it means to be a successful farmer and "civilized" socialist subject (Carr 2013; Harms 2014; see Chapter 4).

Building on local knowledge and experience, farmers exercise their agency of resistance and resilience by actively manipulating the dynamic materiality of the delta environment to create and recreate viable livelihoods. Environmental conditions keep changing, and while people resist the forces of nature, they do not contain them, for such forces always push back.

There is a give-and-take, and nothing is permanent, everything is flux. Soft and pliable, the landscape is molded to their purposes, yet it too resists, following its own trajectory as much as it is sculpted to follow theirs. These manipulations are part of an ongoing process of coproduction of the lived environment by humans and natural forces (Taylor 2015) that mediates local experiences of climate change, sea-level rise, and the impacts of upstream developments.

In many ways, such small-scale, local modifications of the environment are indeed "works without end" (Biggs et al. 2009, 215), requiring capital investments that may not always be forthcoming. Yet unlike large-scale "hard" infrastructures made of concrete and steel that aim for total hydraulic control (Biggs et al. 2009; Käkönen 2008), such localized projects are more easily undone and remade. They perhaps offer less stability or return on investment, but are more adaptive to shifting terrain, hydrological dynamics, and market demand, allowing farmers to try new things, remodify the landscape, and start over. This constant transformation mirrors the breakneck pace of development seen in Vietnam in recent decades, and the attendant antisentimentality of people eager to embrace the new (Biggs 2010; Harms 2011). Adopting this perspective diverges from older conceptualizations of adaptation rooted in cultural-ecological models of adjustment to external stimuli, as it highlights people's active participation in the ongoing transformation of their lived environment (Taylor 2015). These muddy modifications suggest a form of dynamic resilience that may be more responsive to variability and change, as well as the needs of local people.

However, it is important to keep in mind that adaptation is not always positive and does not mean that human wellbeing or social-ecological resilience have improved; short-term coping does not necessarily equal long-term success (Ellis 2000; Michaelis, Webster, and Shaffer 2021; Nelson 2011). Such localized, individualistic approaches are often motivated by narrowly

defined needs and opportunities and can pose challenges due to lack of coordination at wider scales. For example, shrimp farming may be a promising local adaptation to increasing salinity, but it produces its own environmental risks, particularly in its more intensive forms as farmers seek increasingly higher levels of productivity. Expansion of shrimp ponds hastens the destruction of vital mangrove forests and intensive aquaculture produces large amounts of effluent that, when released without treatment, contaminate neighboring farms and ecosystems. And excessive use of groundwater to modulate salinity in ponds contributes to the accelerated subsidence of the delta plain, compounding the impacts of sea-level rise. Moreover, because intensive shrimp farming is such a high-cost, high-risk business, transitioning to such a model is generally only affordable to those that are already relatively well off. Market-driven adaptation to environmental and economic uncertainty becomes a sorting mechanism: those with greater resources and thus adaptive capacity are better able to take advantage of new opportunities, while those with fewer options at their disposal are forced into an ever more precarious position. The especially vulnerable may be made landless and forced to migrate. This reinforces the claim by many farmers that they need financial support to bolster adaptive capacity. Cash transfers, in the form of low-interest loans with favorable terms for borrowers, for example, may be one place to start in meeting the needs of the poorest and most marginal households. Infrastructural improvements, including providing adequate water management infrastructure such as separate inflow and outflow canals for shrimp farming so that those with smaller plots of land are not regularly contaminated by neighbors' effluent, is another.

Yet between these two poles—those with the greatest adaptive capacity and the most vulnerable—many will continue to make do with what limited resources they have—for the near-term at least—drawing on the information and material affordances available with

ingenuity, creativity, and familiarity with the dynamic materiality of the local environment. In an increasingly uncertain and precarious future, these skills will be all the more valuable.

CHAPTER 6

SUMMARY AND CONCLUSIONS

> *Here anthropology's business is to focus on the social relations underpinning thought work; to show how development's traveling rationalities are never free from social contexts, how they begin in social relations, in institutions and expert communities, travel with undisclosed baggage, get unraveled as they are unpacked into other social/institutional worlds—perhaps through the interest of local collaborators, official counterparts, or brokers—and are recolonized by politics in ways that generate complex and unintended effects*. (Mosse 2008, 120-121)

This dissertation has explored the multiscalar politics of translation at the heart of climate change adaptation governance in the Mekong Delta. Asking how knowledge is translated across sites and levels of governance to influence local livelihood decisions—and thus socio-ecological change—in a transnational climate adaptation initiative, it examined the actor-networks that make up climate adaptation governance in the delta, focusing on three levels of governance and the cross-scalar interactions and translations that take place between and among them. The actor groups representing these levels include *planners and policymakers* in the Netherlands and Vietnam, *intermediary actors* at the regional and provincial level in Vietnam, and *farmers* in Trà Vinh province. The dissertation is based on approximately 20 months of ethnographic fieldwork conducted primarily between 2016 and early 2018 at multiple sites in the Netherlands and Vietnam.

Chapter One introduced the research and provided a review of the relevant conceptual literature framing the project. Reviewing literature on climate change adaptation and the governance thereof, it argued that adaptation has become a new paradigm in international

development, giving way to transnational and multilevel governance arrangements that seek to reorder human-environment relations along "climate resilient" lines. Yet the external framing of climate change and ways these initiatives have typically been implemented tend to reinforce technocratic and neoliberal projects of rule that do little to transform the structures and processes undergirding patterns of vulnerability (Eriksen et al. 2021; Scoville-Simonds, Jamali, and Hufty 2020). While the climate adaptation discourse has become a new paradigm in development, it remains ambiguous, open to interpretation, and easily translated by different actors for diverse purposes and political ends. Chapter One then introduced a theoretical framework for analyzing the politics of translation, drawing primarily on science and technology studies (STS) and particularly actor-network theory and its extensions in political ecology and the anthropology of development. This framework guides the analysis throughout the other chapters, often in combination with related perspectives. Finally, the chapter described my methodological approach, including research timeline and issues of access and positionality.

Chapter Two situated the research historically and geographically, providing historical context for the emergence of the climate change adaptation paradigm in the Mekong Delta. It described human adaptations to the delta environment over time, from early settlement to the precolonial period, through wartime and postcolonial developments up to the present day. Focusing on infrastructural interventions for water management, land use changes, and agricultural modernization and development, it emphasized shifts and continuities in the ways humans have used and modified the delta landscape over time. The general trend has been one of increasing agricultural production, often driven by large-scale management schemes, but at various times throughout history these have been met by countervailing tendencies towards decentralization, vernacular forms of innovation, and local adaptation to the delta's naturally

variable “amphibious ecology” (Brocheux 1995). The chapter then turned to recent environmental challenges for delta inhabitants, including those pertaining to climate change, local sustainability challenges, and upstream dam construction.

Chapter Three shifted focus to the Netherlands to examine the history and production of Dutch delta management expertise and its export and translation to Vietnam. The country has received widespread attention for its technologically sophisticated, large-scale infrastructural approaches to water management, as well as recent innovations in nature-based solutions and long-term strategic planning, positioning it as a global leader in adapting to climate change and sea-level rise. Yet these developments have a specific history in the Netherlands, and are intertwined with the country’s unique political culture, dominant engineering-focused sociotechnical imaginary (Jasanoff and Kim 2015), and geostrategic interests abroad. Chapter Three traced this history from the territory’s settlement and early technological and institutional innovations in water management, through the export of Dutch technical expertise via colonial and trade relations, 20th century developments, and the construction in recent years of the so-called “Dutch Delta Approach” to climate adaptation planning in delta areas. It then considered its application to Vietnam via the Mekong Delta Plan, the first attempt at exporting this approach more-or-less in full, as part of wider efforts at branding and marketing Dutch expertise in delta regions around the world. While the approach was transformed in friction with the distinct socio-political context of Vietnam, particularly through its use of the scenario planning methodology, it nevertheless established the delta as a coherent object of governance subject to precisely the kinds of interventions it prescribes.

Chapter Four addressed the role of intermediary actors as brokers and translators in the multilevel governance of climate change adaptation within Vietnam. Based on research with

Vietnamese scientific experts, bureaucrats, researchers, rural development practitioners, and agricultural extension agents operating at the regional and provincial levels, the chapter demonstrated how the domain of climate adaptation has opened a space for these actors to have renewed voice or political agency by influencing the way that adaptation programming is carried out in practice. Yet this space is still constrained to a significant degree due to the hierarchical politics of implementation that prevail in Vietnam through a system of top-down planning and bottom-up reporting, as well as a political economy of development in which climate adaptation knowledge is valued primarily for its use in generating profit. As this chapter showed, while these actors exercise their translational agency in a way that allows them to further both personal material interests and visions of the collective good, these are still largely mediated by the development goals of the state. The latter draw on neoliberal development discourses to the extent that they advance capital accumulation and hence the legitimacy of the Communist Party, for the seemingly contradictory goal of "building socialism" through the moral and economic improvement of its citizens.

Chapter Five turned attention to adaptation at the local level in Trà Vinh province, examining how farmers themselves translate various sources of knowledge and information to make livelihood decisions that alter the course of land use and socio-ecological change in the delta. Employing both extensive survey and intensive ethnographic methods with a focus on the brackish water transition zone where farmers are confronted with changing water resources in addition to unstable weather patterns and economic uncertainty, the chapter considered the kinds of livelihood changes taking place, farmer perceptions of environmental change, various influences and priorities at stake in livelihoods decision-making, and local understandings of adaptation and sustainability. As noted in Chapter Four, the Mekong Delta Plan itself had little

purchase at the local level at the time of research. However, a livelihood and land use transition has been underway for several years already, which farmers often frame in terms of adaptation to climate change, or sometimes to changes brought about by both climate change and upstream dam developments. Local people have for the most part accepted individual responsibility for adjusting their livelihoods to changing conditions, though most also insist on the need for greater financial support from the state to do so. Emphasizing the small-scale and ongoing "muddy modifications" farmers make to the land and waterscape of the delta, the chapter argued that these represent a form of dynamic resilience and everyday resistance to forces beyond their control, responsive to both environmental variability and local agency. Yet questions remain about whether such adaptations will ultimately erode systemic resilience and force the most vulnerable into greater hardship and away from the delta.

Official adaptation planning and implementation as currently unfolding in the delta risks locking in an unsustainable development trajectory as much as it carries the potential seed of transformation towards sustainability. Applying the Dutch model as embedded in the MDP—rooted in a tradition reliant on large-scale technical interventions and an imaginary of total control (Chapter 3)—risks perpetuating a form of infrastructural and institutional path-dependency (Biggs et al. 2009) set in motion by the "civilizing mission" of the colonial era that sought to "tame" the delta environment for the sake of capital accumulation through export-oriented agricultural production (Biggs 2010; Benedikter 2014), but which undermines the very ecological dynamism on which it relies (Chapter 2). Elite-driven and technocratic, this approach has excluded local people from the planning process and denies all but the most well-connected or those with the most resources the agency of choice, participation, and local ownership over the delta's future. Meanwhile, from a place of similarly high modernist, technocratic ideals

(Benedikter and Nguyen 2018; MacLean 2013), the Vietnamese state uses Dutch engagement to further its own project of rule (McElwee 2016), mobilizing international funding and scientific expertise to entrench its development vision of "industrialization and modernization." A national discourse of civilization/*văn minh* (Bradley 2004; Harms 2014) further helps shape "ideal adaptation subjects" (Chapter 4) as entrepreneurial and technologically-savvy, motivated by a narrow focus on profit maximization. At the local level, livelihood strategies of agricultural and aquacultural intensification align "a project of rule with the self-guidance of the ruled" (Carr 2013, 102), as the individualistic pursuit of profit trumps longer-term and more equitable notions of sustainability and resilience (Chapter 5). However, the subjective, affective, and interpersonal dimensions of livelihoods decision-making—particularly as these relate to axes of difference such as gender, ethnicity, age, or socioeconomic status—and the ways these do or do not reproduce state-led visions and objectives, deserve greater attention than can be paid here.

As is, adaptation and development programming in the delta seems poised to act as a sorting mechanism, further deepening inequalities and separating the haves from the have-nots, the connected from the disconnected (Taylor 2004, 2016a). Those with resources and connections (i.e., adaptive capacity) are better able to navigate challenges and uncertainties, adapt their livelihoods, and take advantage of new opportunities, while others enter into cycles of poverty, debt, and landlessness, and continue to migrate out of the delta to increasingly stressed urban areas. Powerful private and state-supported interests—in agribusiness, the water sector, and industry—are likely to capture many of the benefits from mainstreaming climate adaptation in existing development programs. Yet vulnerability to climate change is not just about the risks posed by some external threat. It is socially (re)produced at multiple scales via political economic structures and processes that perpetuate social marginalization and inequality in access

to resources and social protections (Eriksen et al. 2021; O'Brien et al. 2004; Ribot 2014; Scoville-Simonds, Jamali, and Hufty 2020; Taylor 2015). The effect of those external threats is then experienced through a lived environment structured in myriad ways by both power relations and materiality, a confluence Taylor (2015) denotes as "material climates."

Any truly "transformative" approach to adaptation programming, then, must address the underlying drivers of vulnerability at multiple scales (Bassett and Fogelman 2013; Eriksen et al. 2021; Ribot 2014; Scoville-Simonds, Jamali, and Hufty 2020; Warner and Kuzdas 2017), rather than simply reproduce them. For example, when technical fixes are introduced for livelihoods at household level, the direct beneficiaries are likely to be landholders with adequate resources to take them up and apply them effectively. Without proactively providing opportunities for the poor and landless, such projects are likely to have a negative impact upon employment opportunities and contribute to increasing inequality. Adaptation programs must fundamentally alter or provide the conditions such that a wider spectrum of people are able to adjust their livelihoods and pursue new opportunities, rather than just displacing responsibility onto local people themselves to "adapt or perish," and must do so in a way that does not undermine the very base on which livelihoods and lives are built. Moreover, it must support and enhance local people's agency and practical forms of resilience that already exist, often developed over a long time from intimate knowledge of the local environment. For example, the "muddy modifications" discussed in Chapter 5 represent more localized, flexible alternatives to total control schemes of technological modernization, full-scale water management, or strictly enforced land-use zones, and as such may help to avoid unsustainable path dependencies that narrow adaptive options and result in unintended consequences.

Such an approach must start with a multiscalar analysis of the social and political-economic factors underlying vulnerability to climate change in specific places (Bassett and Fogelman 2013; Eriksen et al. 2021; Ribot 2014), rather than focusing on narrow risks and technological fixes. Only with such a detailed understanding of the complex causal mechanisms driving vulnerability in locally lived environments (Taylor 2015) can appropriate measures be designed and implemented for both targeted and structural approaches to reducing vulnerability. Targeted measures might include low-interest loans or other cash-transfers to marginalized households, conditional on adherence to environmental standards such as low-impact, extensive or polyculture farming methods. Similarly, subsidies, long-term land leases, or other support might be tied to such environmental protection efforts as mangrove conservation or landscape maintenance as a form of "green infrastructure" (Brown et al. 2017). Additionally, the government should provide improved access to social protections for marginalized and vulnerable households in the form of educational assistance (including support of traditional Khmer education for minority households), improved healthcare, and favorable terms on long-term land leases. Finally, as mentioned in Chapter Five, government investment in water management infrastructure specific to shrimp farming areas is sorely needed, which will help enhance the social-ecological resilience of those communities. Envisioning a long-term delta trajectory, this might also take the form of infrastructural and architectural adaptations to the delta's dynamic hydrology, such as constructing houses on stilts or returning to lifeways more oriented around watercourses rather than the land-based infrastructure that has become dominant in the modern era (Morita 2016; Taylor 2006).

Structural measures are also needed that enhance local people's adaptive capacity by means of political participation and empowerment. For such an equitable and sustainable

approach to adaptation to be successful, local populations need to be part of both planning and implementation stages (Eriksen et al. 2021), empowered to influence the political economy that structures patterns of vulnerability in the first place (Ribot 2014). Strategic planning for climate adaptation in the delta (including in both its Dutch and Vietnamese versions) tends to produce visions of the future that reflect the imaginaries of the powerful (Jasanoff and Kim 2015), including their notions of who or what is to be "resilient" (Yarina 2018), with little-to-no participation or buy-in from vulnerable local communities. This gap threatens to undo the commendable efforts already in place, for as many commentators have shown, effective and adaptive governance depends on knowledge exchange and local ownership to enable coordination, responsiveness to local concerns, and accountability to local populations (Agrawal and Ribot 1999; Earl, Carden, and Smutylo 2001; Folke et al. 2005; Pahl-Wostl 2009; Ribot 2004). As Ribot (2014, 669) puts it, "These are calls for democracy" (see also Ribot 2004). Given the current political system of Vietnam, such an ideal seems far off, but that does not mean there is nothing that can be done. Although the participatory muscles of a more democratic political culture have atrophied, there are plentiful opportunities for local cadres to engage citizens in visioning exercises through the extensive bureaucratic apparatus in the countryside, where face-to-face meetings between the two are a frequent occurrence (Benedikter 2016; MacLean 2013). Moreover, in recent years the government of Vietnam has aimed to developed so-called "new-style cooperatives" to allow farmers to take advantage of collective labor and economies of scale. There are many critiques of the management and operation of these in practice, but they represent a potential seat of local representation, collective action, and democratic decision-making, if only they are empowered to make decisions independent of the Communist Party. Calls for democracy might seem like a political nonstarter for Vietnam, but

"building socialism" that is responsive to the needs of the people? Much less so. Such an approach would be truly transformative.

A productive area for further inquiry would be to explore the potential for stimulating local ownership of adaptation programming by eliciting farmer imaginaries of sustainable futures through the methods of action research (Checkland and Holwell 1998; German et al. 2007; German et al. 2012; Hagmann and Chuma 2002) and in collaboration with local partners. The research here could also be deepened with greater attention to inter-ethnic differences in ecological knowledge, adaptive strategies, and capacities, and in the patterns and politics of knowledge exchange and translation between dominant Kinh and ethnic minority Khmer households or communities. Similarly, attention to the coping decisions of migrants and returnees to the delta would shed light on the needs, choices, and experiences of another particularly vulnerable group. In general, there is a need to better explore the relationships between the socio-demographic variables highlighted in Chapter Five (gender, ethnicity, age, etc.) and results in terms of livelihood strategies, resource access/adaptive capacity, and individual experiences. Indeed, future research deserves greater attention to the life history trajectories of the poor, landless, and those struggling to make ends meet under increasingly precarious conditions in the delta.

As mentioned in Chapter Two, further historicization of contemporary adaptation processes through archival study and life histories would add valuable context to the picture of livelihood and land use changes occurring today. Looking ahead, future research is needed that follows up on new developments in the governance of climate change adaptation in the delta since the time of fieldwork, such as the implementation of Resolution 120 on Sustainable and Climate Resilient Development of the Mekong Delta, issued in late 2017 (GoV 2017), and the

Mekong Delta Integrated Regional Plan (MDIRP), which was set to launch earlier this year (Brown 2020b) but may have been stalled due to COVID-19. Broadening out from the Mekong Delta, comparative study of the translation and application of the "Dutch Delta Approach" to other delta countries—such as Bangladesh, Myanmar, or Mozambique—would shed further light on the mobilization of expertise for geopolitical interests in the name of climate change adaptation, and on processes of adaptation planning and implementation in other highly vulnerable delta areas. This is especially the case as Dutch actors themselves claim to be interested in fostering more "horizontal" dialogue and mutual learning between delta countries facing similar unfamiliar risks.

Indeed, deltas such as the Mekong are just one example of places where people are vulnerable to the effects of climate change and sea-level rise; for adaptation efforts to be successful, societies will need to learn from one another, translating lessons from one location to the next, with all the challenges and incommensurabilites this involves. Still, deltas are significant for other reasons. They are some of the most populated areas of the planet, due to fertile alluvial soils and access to both the sea and hinterlands, and have long been heavily modified by humans, leading some scholars to consider them quintessential "Anthropocene" landscapes (Renaud et al. 2013). Yet these historical interventions have often created path dependencies (Biggs et al. 2009; van Staveren and van Tatenhove 2016; Wesselink et al. 2007) that amplify vulnerabilities, reduce resilience, and constrain the kinds of adaptation options available. Scholars should critically examine the ways that knowledge is translated into action in the name of climate change adaptation in the present, to avoid reinforcing these same trends and instead open up possibilities for transformation to more just and sustainable futures (Leach, Scoones, and Stirling 2010; Scoones et al. 2020).

This dissertation contributes to several of the literatures addressed herein. By developing an analytical lens for examining the politics of translation in transnational, multilevel governance endeavors, it contributes, on the one hand, to the political ecology of environmental governance and climate adaptation specifically, and on the other, an attention to politics of knowledge and expertise in the study of geopolitics. As a geographically situated and materially attuned ethnography of the Mekong Delta, it contributes to the newly emerging anthropology of delta life. With a focus on governance and development within Vietnam, it contributes to the area studies literature on Vietnam, environmental governance in the Mekong Region, and development politics in late-socialist Asia. Its focus on climate adaptation in delta regions also contributes directly to the literature on strategic delta planning and delta management in practice.

Coda

On a return visit to Trà Vinh in early May 2018, after a few months working at my host institute in Ho Chi Minh City, I met with several friends and colleagues for a farewell before flying back to the US. One of the things I asked them was about the kinds of changes they expected to see in the province in the coming years. The answers I received demonstrated a desire for economic development along with concerns about politics getting in the way. Trâm told me that progress would depend on the province's political leadership; if they didn't change, the province wouldn't either. According to her, provincial leaders practice too much "*gia đình chính trị*" ("family politics"): pursuing benefits for their family members and close allies; in other words, too much corruption and nepotism. She linked this critique to that of university colleagues who pursue private business deals—such as establishing a competing brand of wood apple wine—using university resources without distributing the benefits fairly. They play by

their own rules, she indicated, seeking profit only for themselves and those around them rather than for the improvement of the whole community. By contrast, Thành suggested that the province's economic woes were due to two factors: the substantial Khmer ethnic minority, who, he said, are "not good at business" and therefore "economically weak"; and, because of this, local leaders who play the political game too closely, strictly adhering to official rules and central government mandates in a way that hinders industry and commerce, rather than more flexibly finding ways to make money and generate revenue. These two statements reminded me of something my assistant Sang said to me at one point: "In this country, if you don't have money, you have to have relationships. If you have both, *that's* power."

These conversations also reflected a particular pastoral ideal of the good life, albeit one mediated and improved by access to technology and money. Thành, for example, defended the "social sustainability" of intensive shrimp farming over the "environmental sustainability" of less intensive models such as integrated rice-shrimp. Based on research he and some colleagues had carried out on the topic, he explained that the short-term economic and social benefits of intensive shrimp farming (including for the power of women within the household) are greater, allowing people to raise their living standards and increase options, such as educating children, accessing bank loans, and expanding further economic opportunities that are less environmentally destructive in the future. These, he claimed, outweighed the short-erm environmental costs. Additionally, even if intensive farmers generate more debt on average, they and their children will likely end up better off, he said, better able to weather losses in the future, thereby reducing their vulnerability and enhancing social resilience. Extensive and polyculture techniques, he argued, generate less environmental degradation but provide people fewer options and therefore lessen their adaptive capacity. Later, he mentioned that he often sees people being

critical of the Communist Party on Facebook, expressing wishes such as that the country had remained separated in two, but that he could not agree with such a sentiment. If it were so, he observed, they would not be able to live in rural areas surrounded by such fresh, abundant local food. Instead, it would be "too much like South Korea," all fast-food and shopping malls. Sang expressed similar affection for rural lifeways, emphasizing, like many, that it is "peaceful" now (there is "no war") and can be quite pleasant. Even people who are relatively poor, he said, will still sit and have coffee together in the morning, and later play games or *nhậu*. If he got rich, he told me on numerous occasions, he would love to buy a nice place to live in the countryside and enjoy life.

My final day in Trà Vinh, I went with my friend Minh to visit his grandfather, who had been a former military captain and fought against the Americans during the war. On the way there, we were drenched by a downpour that seemed to come out of nowhere, the first major storm of the season. Minh's grandfather asked me if I knew why the French and Americans had never stood a chance in Vietnam. The reason, he explained, is you can never defeat a people on their own turf. A nation can never really be overtaken in its own territory, he insisted. Sure, he said, sometimes it happens for a while, as with colonialism and imperialism, but eventually the local people will prevail, for they know the terrain better, more intimately, and are deeply connected to local ways of life. As we said goodbye and Minh and I climbed back on our motorbikes during a brief pause in the rain, his grandfather glanced up at the sky and told us to be careful, noting that the rains seemed to be arriving early this year.

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APPENDIX A: SURVEY INSTRUMENT

BẢNG CÂU HỎI HỘ NÔNG DÂN VỀ SINH KẾ

STT:	Huy•n:	Xã:	•p:

PHẦN A: ĐẶC ĐIỂM KINH TẾ-XÃ HỘI, SẢN XUẤT CỦA HỘ GIA ĐÌNH

1- H• tên ng••i tr•l•i:	**2-** Tu•i:	**3-** Dân t•c:
4- Gi•i tính: ① nam ② n•	**5-** Trình đ• h•c v•n:	
6- Thành viên gia đình *(người)*:	**7-** S• lao đ•ng *(người)*:	
8- S• đi•n tho•i:		

9- Ti•n nghi (*có thể chọn nhiều câu trả lời*):

① Xe tay ga ② Xe s• ③ Xe đ•p ④ Tivi ⑤ T•l•nh ⑥ Máy l•nh ⑦ Máy gi•t ⑧ Máy phát đi•n
⑨ Nhà v• sinh t• ho•i (có ngăn x• lý phân) trong nhà ⑩ Xe h•i ⑪ Đi•n tho•i thông minh ⑫ Máy v•tính

10- Di•n tích đ•t:

1- Đ•t ••: _____ m^2
2- Đ•t canh tác_____ công, trong đó:

- Tr•ng tr•t + th•y s•n k ết h•p: _____ công
- Ch•tr•ng tr•t: _____ công
- Ch•nuôi th•y s•n: _____ công
- Khác: _____ công

11- S• h•u đ•t:

1- Đ•t c•a gia đình: _____ công 2- Đ•t khác (thuê, m••n): _____ công

12- Công c• s•n xu•t c• gi•i l•n (máy cày, g•t, x•i, máy phát đi•n,••):

① Có (ghi rõ) _____ (cho ng••i khác thuê? Có/Ko) ② Không (thuê c•a ng••i khác? Có/Ko)

13- Các lo•i v•t ch•t khác:

① Máy b•m n••c ② H• th•ng t••i ③ Máy qu•t ao ④ Ghe xu•ng ⑤ Khác (ghi rõ) _____

14- Ngu•n n••c s• d•ng: ① Sông/kênh/r•ch ② N••c máy ③ M•a ④ N••c ng•m

1- Sinh ho•t: _____
2- Tr•ng tr•t:_____
3- Th•y s•n: _____

15- Ngu•n đi•n s• d•ng:

① Đi•n nhà n••c, t• năm nào?_____ ② Máy phát đi•n, t• năm nào?_____ ③ Khác (ghi rõ):_____

16- Ông/Bà có đang canh tác quanh năm?

① Có , lý do_____
② Không, lý do_____

17- L•ch th•i v• năm 2016-2017

				Di•n tích (công)	Kinh nghi•m (năm)	L•ch th•i v•																	
						2016												2017					
						1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
CÂY TR•NG																							
1	Lúa																						
2	Rau màu (ghi rõ)_____																						
3	Khác (ghi rõ)_____																						
TH•Y S•N		(ng•t / m•n)																					
1	Tôm sú																						
2	Tôm th•																						
3	Tôm càng xanh																						
4	Cua																						
5	Khác (ghi rõ) _____																						

18- Hình th• c canh tác **thủy sản** và s• v• năm 2016-2017 (ghi theo **câu 17**)

1- Tôm càng xanh: _____

2- Tôm Th• (m•n/ng•t):_____

3- Tôm Sú (m•n/ng•t): _____

4- Cua: _____

5- Khác (ghi rõ):_____

① Qu•ng canh ② Qu•ng canh c•i ti ến ③ Bán thâm canh ④ Thâm canh

19- Thu ho•ch CÂY TR• NG năm 2016-2017 (*các loại cây/con > 2 tháng):*

Lo•i cây tr•ng *(Ghi theo câu 17)*		S•n l• •ng *(kg)*	Giá bán *(nghìn Đồng/kg)*	Ti ền l•i *(nghìn Đồng)*
LÚA				
1	Lúa ĐX			
2	Lúa HT			
3	Lúa TĐ			
RAU MÀU				
4	Lo•i 1:_____			
5	Lo•i 2:_____			
6	Lo•i 3:_____			
KHÁC				
7				

20- Thu ho•ch TH• Y S• N năm 2016-2017 (*các loại con > 2 tháng)*:

Lo•i Th•y s•n *(Ghi theo câu 17)*		S•n l• •ng *(kg)*	Giá bán *(nghìn Đồng/kg)*	Ti ền l•i *(nghìn Đồng)*
1	Tôm Sú v• 1 (ng•t/m•n)			
2	Tôm Sú v• 2 (ng•t/m•n)			
3	Tôm Th• v• 1 (ng•t/m•n)			
4	Tôm Th• v• 2 (ng•t/m•n)			
5	Tôm càng xanh			
6	Cua			
7	Khác_____			

21- • •c tính thu nh•p trung bình tháng **từ cây trồng và thủy sản** c•a h• gia đình *(triệu đồng/tháng)*: _____

22- Các ngu•n sinh k ết•o thu nh•p khác cho h• gia đình *(có thể chọn nhiều câu trả lời)*

① Chăn nuôi ② Lao đ•ng ph• thông ③ Công ch•c ④ Kinh doanh ⑤ Ti ền lãi

⑥ Nh•n ti ền t• ng• •i khác ⑦ Ti ền h•u/Tr• c•p ⑧ Khác (*ghi rõ):* _____

23- • •c tính **tổng thu nhập** trung bình tháng c•a h• gia đình *(triệu đồng/tháng)*: _____

24- Có đ• v•n đ• đ•u t• cho s•n xu•t không (nông nghi•p/th•y s•n)? ① Có ② Không

25- **Nếu có**, t• đâu? ① C•a nhà ② Vay m• •n (ghi rõ)_____

26- **Nếu không**, có vay ti ền đ• đ•u t• cho s•n xu•t không? ① Có ② Không

27- Có ai trong h• gia đình c•a ông/bà di chuy•n theo mùa đ• làm vi•c không? ① Có ② Không

28- Ông/Bà có th• •ng thuê m• •n lao đ•ng cho vi•c canh tác không? ① Có ② Không

29- So sánh hi•n t•i và 10 năm tr• •c, tình hình kinh t ếc•a h• gia đình nh• sao: ① T•t h•n ② Nh• nhau ③ T• h•n

(Nếu có ý kiến bổ sung liên quan chủ đề này (quan sát, lời trích), ghi chú đây):

PHẦN B: NHẬN THỨC VỀ SỰ THAY ĐỔI ĐIỀU KIỆN MÔI TRƯỜNG VÀ KINH TẾ-XÃ HỘI

30- Theo QUY HO•CH c•a nhà n• •c, khu đ•t canh tác c•a ông/bà thu•c vùng nào?

① Vùng ng•t ② Vùng m•n/l• ③ Vùng m•n ng•t theo mùa

31- Hi•n tr•ng ngu•n n• •c s• d•ng trong canh tác c•a gia đình là gì?: _____ , _____

① Ng•t ② M•n ③ M•n ng•t theo mùa

32- **Trong 10 năm gần đây**, các y ếu t• sau đây bi ến đ•i nh• th ếnào?

1- Nhi•t đ•…… 6- T•n s• m•a……
2- H•n hán (thi ếu n• •c canh tác) …… 7- N• •c ng•m.……:.
3- Đ• m•n..…… 8- Ô nhi•m ngu•n n• •c……:
4- Th•i gian xâm nh•p m•n……:. 9- Phù sa / ch•t l• •ng đ•t……:……:.
5- L• •ng m•a……: 10- Sâu b•nh.……:……:.

① Gi•m đi nhi ều ② H•i gi•m ③ Không thay đ•i ④ Tăng lên ⑤ Tăng lên nhi ều ⑥ Không •n đ ịnh

33- So sánh **hiện tại và 10 năm trước**, nh•n đ ịnh c•a ông/bà v ềcác y ếu t• sau đây là gì?:

1- Th•i ti ết……: 3- Đ• m•n..……:
2- M•a……: 4- Th•i gian xâm nh•p m•n……:..

① Khó khăn h•n ② Nh• nhau ③ Thu•n l•i h•n

34- So sánh **hiện tại và 10 năm trước**, ông/bà đánh giá các y ếu t• sau đây •nh h• •ng đ ến canh tác c•a gia đình nh• th ế nào?:

Y ếu t• •nh h• •ng	Tr•ng tr•t	Th•y s•n	Y ếu t• •nh h• •ng	Tr•ng tr•t	Th•y s•n
1 -Ngu•n v•n	_____	_____	7 -H• th•ng thu mua	_____	_____
2 -Ngu•n n• •c (th•y l•i)	_____	_____	8 -V•n chuy•n (giao thông)	_____	_____
3 -Ch•t l• •ng gi•ng	_____	_____	9 -Thuê m• •n lao đ•ng	_____	_____
4 -K• thu•t canh tác	_____	_____	10 -Giá th•tr• •ng	_____	_____
5 -V•t t•	_____	_____	11 -Chính sách vay v•n	_____	_____
6 -Máy móc	_____	_____	12 -H• tr• khuy ến nông	_____	_____

① Khó khăn h•n ② Nh• nhau ③ Thu•n l•i h•n

35- Ông/Bà nh•n đ ịnh các y ếu t• sau đây s• bi ến đ•i nh• th ếnào **TRONG TƯƠNG LAI**?

1- Nhi•t đ•…… 6- T•n s• m•a……
2- H•n hán (thi ếu n• •c canh tác) …… 7- N• •c ng•m ……:.
3- Đ• m•n..…… 8- Ô nhi•m ngu•n n• •c……:
4- Th•i gian xâm nh•p m•n……:. 9- Phù sa / ch•t l• •ng đ•t……:……:.
5- L• •ng m•a……: 10- Sâu b•nh……:.

① S• gi•m đi nhi ều ② S• gi•m ③ Không thay đ•i ④ S• tăng lên ⑤ S• tăng lên nhi ều ⑥ S• không •n đ ịnh h•n

36- Ông/Bà có QUAN TÂM đ ến vi•c chuy•n đ•i sang lo•i hình canh tác khác v•i hi•n t•i không? ① Có ② Không

37- N ếu có hay không, t•i sao? (*ghi rõ*)_____

38- **Nếu có:** M•c đ• mong mu•n c•a ông/bà v ềvi•c chuy•n đ•i lo•i hình canh tác là gì •?

① Th•p ② Trung bình ③ Cao

39- **Nếu có,** thì y ếu t• nào là quan tr•ng nh•t trong vi•c ra quy ết đ ịnh đó?

1- Ngu•n n• •c (m•n/ng•t)……:…… 7- Ngu•n/ch•t l• •ng gi•ng..…:.……:.
2- Đi ều ki•n môi tr• •ng khác (ghi rõ)……:. 8- Ngu•n đ•u vào khác (ghi rõ)……:
3- Quy ho•ch s• d•ng đ•t……: 9- Kh• năng tài chính/truy c•p v•n…:……
4- H• th•ng th•y l•i…… 10- H• th•ng giao thông……:…:.:……:.
5- Kh• năng k• thu•t..……:. 11- H• tr• khuy ến nông……
6- Giá th•tr• •ng……:. 12- Khác (ghi rõ)……:.…:……:

Có thể chọn tối đa 5 sự lựa chọn: ① ② ③ ④ ⑤

(Nếu có ý kiến bổ sung liên quan chủ đề này (quan sát, lời trích), ghi chú đây):

PHẦN C: CÁC MỐI QUAN HỆ VÀ CÁC NGUỒN THÔNG TIN

40- Ông/bà có quen biết ai trong số những người sau đây không? (*Chỉ bao gồm những người mà Ông/Bà quen biết là đủ để có cuộc trò chuyện và có thể liên hệ với họ nếu ông/bà muốn. Có thể chọn nhiều câu trả lời.*)

① Cán bộ nông nghiệp/thủy sản xã
② Cán bộ xã ngoài ngành nông nghiệp
③ Cán bộ huyện
④ Kỹ thuật viên/Nhà nghiên cứu (N2/TS) của ĐHTV
⑤ Nhà nghiên cứu của ĐH khác (ở Tp.CT, Tp.HCM, v.d.)
⑥ Đại lý giống, nông dược và thức ăn
⑦ Người thu mua sản phẩm nông nghiệp
⑧ Ban quản lý thủy lợi
⑨ Hội Nông dân
⑩ Hội Phụ nữ
⑪ Đoàn Thanh niên
⑫ Đại diện Dự án AMD

41- Ông/Bà có phải là một thành viên của các tổ chức sau đây không?

	Có	Không
1- Hội Nông dân		
2- Hội Phụ nữ		
3- Đoàn Thanh niên		
4- Hợp tác xã		
5- Tôn giáo		
6- Đảng Cộng sản		
7- Cấp văn hóa		
8- Dự án AMD		
9- Cán bộ/Công chức (hiện này hoặc cũ)		

42- Khi ông/bà c•n truy c•p các lo•i THÔNG TIN sau đây, ông/bà th• •ng xem ai/ngu•n nào?
v.d....

① Bà con / Hàng xóm	② B•n bè	③ Tr• •ng •p
④ Cán b• đ•a ph• •ng	⑤ Cán b• huy•n	⑥ Nhà khuy ến nông t•nh
⑦ Đ•i di•n chùa/nhà th•	⑧ K• thu•t viên c•a Đ•i h•c TV	⑨ Ban qu•n lý th•y l•i
⑩ Đ•i lý gi•ng, nông d• •c, th• c ăn	⑪ Ng• •i thu mua s•n ph•m nông nghi•p	⑫ Ngân hàng
⑬ H•i Nông dân	⑭ H•i Ph• n•	⑮ Đoàn Thanh niên
⑯ Tôn giáo	⑰ Đ•i di•n D• án AMD	⑱ T• báo (ghi rõ t• báo nào)
⑲ Tivi/radio (ghi rõ truy ền hình nào)	⑳ H• th•ng loa	㉑Internet

Nếu khác thì ghi rõ

	•u tiên: 1	2	(3)
1- Ngu•n gi•ng	_____	_____	_____
2- V•t t• nông nghi•p	_____	_____	_____
3- Th• c ăn nuôi tr•ng th•y s•n	_____	_____	_____
4- Th• c ăn gia súc, gia c•m	_____	_____	_____
5- Vay v•n	_____	_____	_____
6- H• th•ng thu mua	_____	_____	_____
7- Máy móc/Thi ết b•	_____	_____	_____
8- Ch•t l• •ng ngu•n n• •c	_____	_____	_____
9- Tình hình m•ch n• •c ng•m	_____	_____	_____
10-H• th•ng th•y l•i	_____	_____	_____
11-T• v•n k• thu•t	_____	_____	_____
12-D• báo th•i ti ết	_____	_____	_____
13-Môi tr• •ng chung	_____	_____	_____
14-Th•tr• •ng (giá bán/mua, nhu c•u)	_____	_____	_____

43- Ông/Bà có đ ềxu•t gì cho lĩnh v•c nông nghi•p cho đ•a ph• •ng không?

(Nếu có ý kiến bổ sung liên quan chủ đề này (quan sát, lời trích), ghi chú đây):

Cám •n đóng góp ý ý ki ến c•a Ông/Bà

Ngày ____ Tháng ____ Năm 2017

Đi ều tra viên ký và ghi rõ h• tên