Farming and Flooding

Comparing participatory approaches in flood mitigation projects in the Dutch Delta and the Mekong Delta

MSc Thesis International Development Studies

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Abstract

This thesis explores citizen participation in flood mitigation projects within the Dutch Delta and the Vietnamese Mekong Delta. The main objective is to understand how farmers have adapted to and influenced flood mitigation initiatives in these regions. Semi-structured interviews were conducted with local farmers and experts to gather data and insights. As climate change intensifies flood risks, finding alternative solutions is crucial. In flood management, there has been a paradigm shift from 'the fight against floods' towards 'letting water in sometimes'. This research uses the hydrosocial cycle as a theoretical lens and analyses society and water as interconnective. The results of this research suggest that differences in context explain the different ways of dealing with floods, flood mitigation projects and participation.

In the Vietnamese context, farmers do not implement the 3-3-2 cycle, a flood mitigation project, in large numbers. The 3-3-2 cycle fails to understand the little benefits that rainwater provides soil for the farmers. Farmers in this delta also receive little to no financial compensation in case of damage. Farmers in this area thus have to create and use their own flood protection measures, such as low dykes, floating rice cultivation and stilt houses. The solutions used in the Vietnamese Mekong Delta are characterised by being low-cost, quick and flexible.

In the Dutch context, farmers have been part of a participatory program that left them with little choice but to work together. Farmers have created their own solution for flood mitigation, the so-called terp plan. This solution was long-stretched and high-cost. The polder is estimated to flood once every 25 years. Therefore, the effect on the ecology is minimal. This research underscores the importance of citizen participation and need for local knowledge in order to create better and more inclusive policies, which might ultimately lead to greater resilience in the future of flooding challenges.

Keywords: citizen participation, flood mitigation, hydrosocial cycle, Dutch Delta, Vietnamese Mekong Delta, farmer adaptation, soft approaches, ecological turn.

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Abbreviations

LWF	Living with Floods
MPD	My Phu Dong
NL	Netherlands
OP	Overdiepse Polder
PH	Phu Huu
RftR	Room for the River
VMD	Vietnamese Mekong Delta
VP	Vinh Phuoc

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1. Introduction

Record-breaking precipitation caused more than 200 deaths, collapsed buildings and bridges and widespread (economic) loss in Western European countries in the summer of 2021 (Copernicus Climate Change Service, 2021; UNRIC, 2022). In Limburg, floods caused damages that were even greater than the devastating and, until then, unparalleled floods of 1993 that damaged 5580 homes (Jonkman, 2021; Wind, Nierop, de Blois & de Kok, 1999). The damages to farmers and their land were also substantial due to ruined crops, especially farmers that are located within the floodplains in the south of the Netherlands (Hendriks, 2021). In Vietnam, devastating floods occurred in 2000, causing great loss of human lives and extensive damage to at least houses, from which 500.000 households had to be evacuated (Dinh et al., 2012; Nguyen & James, 2013). It is estimated that, due to climate change, extreme floods are bound to happen more and more often, especially in deltaic areas where people live in close contact with water. With more than 500 million people living in deltas globally, the topic of adaptation to climate change is in constant need of research and conversation (Giosan et al., 2014). It is vital that we learn to prepare for these situations and create a future-proof water-system, in order to limit damage in the future (Jonkman, 2021; UNRIC, 2022).

In 2020, The Dutch minister of infrastructure and water management, Cora van Nieuwenhuizen, demonstrated her understanding of this serious development during the Environment Agency's Flood & Coast Conference, where van Nieuwenhuizen stated that *'During the ongoing COVID-19 pandemic, it's even more important that we combine forces and learn from each other. We need to build back better and create a more resilient future!'* (Rijksoverheid, 2020). Van Nieuwenhuizen's statement to 'build back better' echoes the ecological turn in Dutch water management, where there is a shift from 'the fight against floods' towards a more natural and flexible approach to water management, including the new aim of 'letting water in sometimes'. The ecological turn recognises the damage that has been done on nature with technological solutions for floods and aims to minimise that damage. Before this ecological turn there was a focus on maximisation of agriculture in deltas. This is visible in the contents of the 1973 Mekong Delta Plan, which was created with the influence of the Dutch government. This plan presented the use of low dykes to optimise rice-production in the VMD, since then known as the 'rice-bowl' of Vietnam. In 1986, the *Doi Moi* economic reforms followed in Vietnam, which are characterised by decentralisation and more autonomy for farmers. Farmers got more freedom in deciding which crops to plant and consumers gained better access to markets, leading to greater financial benefits (UNESCO, 2001). Building high dykes is seen as a priority by local farmers and residents (Tran, Pittock & Tran, 2020).

'Building with nature' and other soft approaches have been more and more popular solutions to limit harmful effects. Flooding contributes to sustaining agricultural practices for rural societies (Käkönen, 2008). The idea of 'living with floods' has been practised in many other delta areas. One example of such a delta is the Vietnamese Mekong Delta, where floods are a yearly occurrence and residents and farmers have always known how to live with floods. In general, more creative ways are

needed to deal with floods. The shift from a more traditional and technocratic way of water management, often characterised by central and 'rigid' bureaucracies, towards an adaptive approach has been recognized as a strategic alternative (Tran, Pittock & Tran, 2020).

1.1 Problem Statement

Deltas are becoming more and more vulnerable areas. This is due to the growing problems that are caused by the effects of climate change, such as a change in precipitation, saline intrusion and other more extreme weather conditions (Giosan, 2014). The amount of deltaic areas that are at risk of flooding will grow by 50% by the next century (Giosan et al., 2014). Deltas are areas that are highly populated and play a large role in global food security. For example, Vietnam is the second largest rice producer in the world with 40 percent of its employment dedicated to agriculture (Nguyen, Nguyen & Grote, 2023). Vietnam is among the top-ten most vulnerable countries to climate change (Eckstein et al., 2018). In order to adapt to these changes, flood management is needed. In the past, flood management has been dominated by technical and infrastructural solutions and choices, such as dams, dykes and sluice-gates (Wesselink, 2007). Under the influence of, first, colonial rule and later Dutch water managers, the Vietnamese Mekong Delta was changed from a wetland area to an area suited for agriculture. Polders were built to be able to optimise agriculture and rice-production. However, the high-dyke system that allows triple rice cropping is recognised to have detrimental effects on the local environment and the ability to protect urban downstream areas such as Cần Thơ city (Seijger et al., 2019). The Vietnamese Mekong Delta now seems to be at a crossroads between continuing with infrastructure-intensive approaches or going more 'soft' and using a more adaptive approach (Käkönen, 2008). The most recent Mekong Delta Plan [MDP] from 2013, which was created in a cooperation between the Netherlands and Vietnam, suggests the reintroduction or continuation of traditional systems such as the 'living with floods' paradigm. The MDP shows this reintroduction as a realistic possibility, where farmers step away from triple rice cropping and experience more controlled flooding seasons, as well as favour semi-high dykes again (Wesselink et al., 2015).

The Dutch delta system has consisted of polders for centuries and is seen as one of the icons of Dutch water management (Zegwaard et al. 2019). Swampy wetlands were turned into polders in order to sustain human life, but also to create more agricultural land and profit. The Dutch government presents its country as a *safe and liveable delta* (Hasan et al., 2019). The vision of the Netherlands that the delta is safe and liveable indicates content about the flood safety and confidence about flood safety and liveability in the delta in the future. This confidence seems to be the effect of centuries of fighting floods with dykes and dams (Hasan et al., 2019). However, the country is dealing with the effects of the technological solutions that have always been the first choice in the delta. The Netherlands is, for example, dealing with a technological lock-in where more investment into hydraulic infrastructure inevitably leads to the need for more investment and more infrastructure. In the last decades, more adaptive approaches such as Building with Nature and Room for the River are

used as a response to floods. In order to become resilient towards floods and create liveability in the delta, it is important to remain critical of one's flood control system. For the Netherlands, this means there is a need for critical analysis of current systems and processes, such as participation. This research dives into the experiences of farmers with flood mitigation projects in the Dutch Delta, as well as it focuses on the collaboration of government and locals in order to be able to learn and adapt. The future of Vietnam's rice production is threatened by the effects of climate change and rural farmers are most vulnerable to the unexpected and extra costs and threats. Local stakeholders, or rural farmers are often the ones now impacted most by (the effects of) floods. Therefore, it is important to include these actors in flood management strategies. Participatory approaches have been used in the past in multiple projects in the Netherlands and Vietnam. Relative little research has been conducted in Vietnam specifically on how poor households are differently affected by floods. It is important to understand the extent of effects of flood control measures on different types of farmers. In order to understand who is affected in what way and to pay attention to those affected most. Specifically in terms of exposure and sensitivity, and how floods impact 'experienced by households influence local adaptation choices' (Birkmann et al., 2012). Detailed literature on the physical aspect of living with floods is limited (Liao, Le & Nguyen, 2016). However, flood mitigation is recognized as fundamental for the development and prosperity of Vietnam (Pilarczyk & Nuoi, 2005). Within flood risk management [FRM], issues of why some groups are more vulnerable than others, are often ignored (Lebel et al., 2009).

1.2 Objective and relevance

In order to look at how local farmers in the context of the Dutch delta and the Vietnamese Mekong delta deal with farming and floods and in which way farmers are able to participate with new policies and projects, is discussed in the research question;

How have farmers adapted to and influenced flood mitigation projects in the Dutch Delta and the Vietnamese Mekong Delta?

In order to answer the research question, qualitative research and a literature review have been combined. This combination is used to gain in depth knowledge about farmers' experiences of floods, farming with and without floods and their experiences with participation in flood mitigation projects. This method is meant to lay bare that information. By using three main concepts, the gathered information can be better analysed and understood. The concepts that are central in answering this research question are the hydrosocial cycle, citizen participation and flood mitigation. In order to look at what different contexts can learn from each other, a comparative study is carried out. Comparative case studies can be selected when there is a need to understand and explain how features within the context influence the success of programme or policy initiatives (Goodrick, 2014). In this research,

comparing two cases highlights the differences and similarities of different approaches and adaptations of the two cases. This comparison allows for context to be evaluated and put forward in analysing the success or failure of certain policies. Without a comparison, it would be difficult to dissect the contextual influences on the policies and subsequently the responses of local farmers to these policies. Though the two different contexts show many geographical, hydrological and climatic differences, the aim is to identify which flood control approaches can portray similar achievements in both delta's. The experiences in participation from farmers are also subject to social or cultural differences.

1.3 Outline

First, important concepts such as the hydrosocial relations, citizen participation and flood control and theories are discussed in Chapter 2: Theoretical Framework. This chapter finishes with a conceptual model in which all concepts will be linked to each other. Next, Chapter 3: Methodology explains the research approach and provides more information about methods of data collection and analysis. Chapter 4: Analysing Flood Mitigation Projects is centred around presenting the projects researched in this thesis. Chapter 5: Analysis of Case Studies focuses on introducing the case study areas and the geographical characteristics of the cases. Chapter 6: Experiencing Floods and Coping with Change presents the data in which the results of farmer experiences of floods and flood mitigation policy. Chapter 7: Farmers' Participation centres on the data about the experiences of farmers with participation. Chapter 8: Discussion provides a linkage between the collected data and existing literature. The hydrosocial relations, participation and flood control in the cases are put into context of existing literature. Chapter 9: Conclusion and limitations concludes the findings of this research and shows the limitations of this research. This is followed up with recommendations for further research. Lastly, Chapter 10: Bibliography includes all literature used. Appendices are added lastly and show the interview guides and the codebook.

2. Theoretical Framework

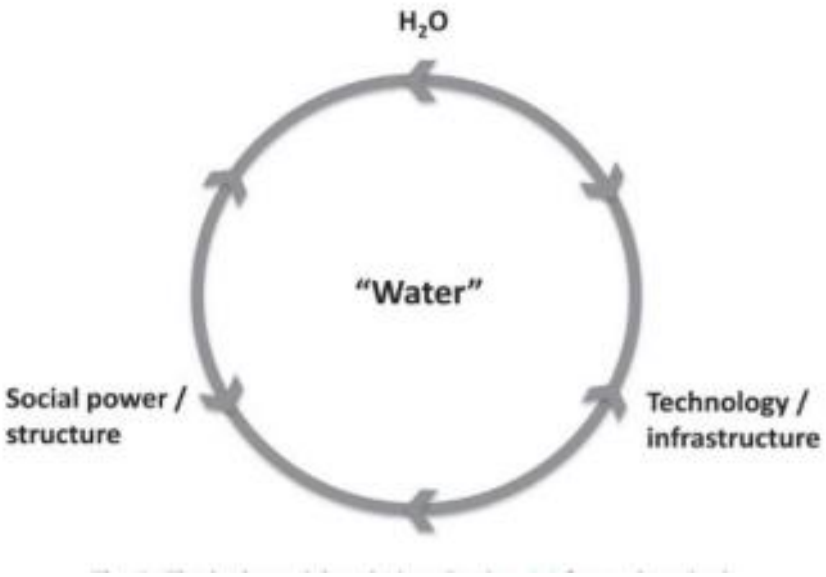
In this chapter the central concepts of this thesis; hydrosocial relations, citizen participation and flood mitigation, are explained. Hydrosocial relations and the hydrosocial cycle are discussed first, as they form a central concept to this research and provide a conceptual lens though which the findings can be analysed. The history of flood control is discussed briefly and flood mitigation policies in the case studies of this research are presented next. Lastly, participation and the participatory approach are discussed.

2.1 The Hydrosocial Cycle

The hydrosocial cycle highlights the complex nature of (the meaning of) water and the social implications it has in our societies. According to Swyngedouw (2004), the hydrosocial cycle is a paradigm that suggests that there is a correlation between hydrological transformations at local, regional and global level on one hand and relations of social, political, economic and cultural power on the other. The idea of a linkage between hydrological changes and social relations was not always a widely accepted idea. It was once accepted that water management was first and foremost a technical activity focused on hydrological science and engineering. However, this idea has shifted towards the understanding that water also has social and political dimensions that call for the intervention of multiple stakeholders, as well as social sciences (Budds, Linton & McDonnell, 2014). Water, 'as small as a sidewalk puddle or as large as the Great Lakes', has the potential to restructure social relations (Linton & Budds, 2014). The relationship between water and social- and political dimensions is seen in the rise in interest in the effects of water policies and the roles of different water users in decision-making (Budds, Linton & McDonnell, 2014). One reason for this rise in interest might be because the usage of the hydrosocial cycle creates more depth to the data by acting as an analytical tool that compels us to look for relations and patterns that we might otherwise ignore (Linton & Budds, 2014).

The hydrosocial cycle captures the intersection of water flows and power relations and sheds light on the political nature of water management (Budds, Linton & McDonnell, 2014). The hydrosocial cycle is not concerned with water, but with hydro-social relations. Hydro-social relations include social organisation that is created in response to water (issues). Water '*shapes and is shaped by social relations, structures and subjectivities'* (Budds, Linton & McDonnell, 2014). People generate their environments, environmental knowledge systems, and territory by using and inhabiting these environments and influencing them using their knowledge and skills. These skills are highly dependent on the user's ideologies, socio-economic power and political power (Boelens et al., 2016). Linton & Budds (2014) describe the hydrosocial cycle and how it consists of three elements; H_2O, technology/infrastructure and social power/structure, as seen in figure 1 below. These different elements are all influenced by and influencing the other elements.

Figure 1. The Hydrosocial Cycle



Source: Linton & Budds (2014)

2.1.1 H_2O

The meaning of water (or H_2O) is influenced by the context in which water flows. Instead of seeing water as a homogeneous entity, the hydrosocial cycle points at the hybrid nature of different water states, forms and qualities. This gives water different meanings. For example, water can be seen as dangerous when it comes suddenly or leaves destruction, this is seen for example in the floods of Vietnam in 2000 and the Netherlands in 1993/1995. Water can also be viewed as a waste, an irrigation or drinking source. The different meanings of water are a result of the geographical location and thus highly influenced by culture or context (Linton & Budds, 2014). Water is described by Linton (2010) as 'what we make of it'. Camargo and Cortesi (2019) add a critical note and describe water as 'everything we cannot make of it'. With this statement they highlight the fact that the role of society in water management has its limitations. Water cannot be created, it is precisely what we cannot manufacture, or for that matter, remove or destroy (Camargo & Cortesi, 2019). Another critical note is added by Camargo and Camacho (2019); that of H_2O as materiality as it is described by Linton and Budds (2014). Floods show that water is not only a chemical compound, but it is also a habitat, an ecosystem and a means of transportation and connection.

2.1.2 Technology/ Infrastructure

Technology and infrastructure are designed to 'deal with' the presence of water. The materiality of water can have different effects. For example, unruly water can provoke action from a society. Water that is 'safely stored' behind a dam or used in an irrigation system can create a stabilising influence on

a society. Technology and infrastructure are thus a great influence on the social effects (Linton & Budds, 2014). Technology and infrastructure are used to manipulate or seize flows of water. When altering the flows of water, the landscape is often redesigned (Laituri, 2020).

2.1.3 Social Power/Structure

Structures of social power can be disrupted by the materiality of water. Water can be a public good or a commodity, depending on the (inclusivity of) availability. In order to organise and manage water, social relations are created. Connections are made between people and meetups are organised in order to 'deal with water'. Water management has always operated in a social context (Sharp, 2017). Something that is very relevant in delta areas such as the Dutch Delta and the VMD, where water is everywhere and unpredictable sometimes (Linton & Budds, 2014). This interaction between water, politics and many actors can be complex and extensive. Linton and Budds (2014) describe four types of stakeholders. Farmers are viewed as a large group of well-organised stakeholders. The first stakeholder group described are farmers. Farmers are usually concerned with water sufficiency and preventing floods. Next, there are politicians (or decision-makers). Politicians often want to avoid (political) backlash from large groups, such as farmers, and can sometimes allocate water based on social benefit. The next stakeholders are water managers (often scientists or experts). Water managers are interested in remaining balance in the abstraction and recharging of water. The last stakeholder is the general electorate, who view water as a subject of national safety. These four stakeholders create a complex system of water management. More so now than in the late-twentieth century, water managers are looking to reconnect the public with water, creating hydrosocial water management (Sharp, 2017).

2.2 Flood Control

Floods and flood control are experienced and dealt with in context-specific and different ways. This section aims to compare the types of floods and flood control approaches. It aims to give an overview of (the past of) flood control practices, policy and measures, especially the shift from 'hard' structural engineering with the aim of land reclamation towards a 'soft' and adaptive approach that aims to not only mitigate floods, but at the same time optimise the use of land in the surrounding areas. In order to understand contemporary flood control choices it is important to take a dive in the history of flood management. Often, engineers and policymakers, even when having the opportunity to start fresh and abandon troubled or failing projects, often choose to rebuild and patch up the old structures (Biggs, 2011).

2.2.1 Flood Control Practices

The different types of flood control measures in deltas can be divided into 5 categories. The 5 categories that Wesselink et al. (2015) describe are *flood risk prevention,* where the risk of potential

flooding is reduced by smart land use planning. *Flood protection,* whereby 'hard' or structural engineering systems such as dikes and dams protect existing assets. *Flood mitigation,* which means that there is a focus on diminishing the volume and timing of the flood through reduced urban drainage, rural land management practices and upland retention. *Flood preparation,* which includes warning systems and disaster planning and *flood recovery,* which is focused on rebuilding after floods occur and insurance systems and compensation for damages. Usually, a selection of these flood control measures are used in combination with each other in order to protect people and harvest. This thesis focuses mostly on the shift from *flood protection* to *flood mitigation* (but is not limited to those), or the shift from 'hard' measures to 'soft' measures and *flood recovery* and compensation.

These 5 types of flood control measures can be further subdivided into two groups; hard and soft measures. All types of flood control measures, except flood protection, can be described as soft measures. Hard measures or structural engineering refers to large-scale defences, such as dikes, dams, and flood control reservoirs, diversions, floodways. These structural defences have a long history, as dams and dikes have been built for at least four thousand years (Kundzewicz, 2002; Wesselink et al., 2015). 'Soft' or 'non-structural' measures refer to measures such as source control, laws and regulations, zoning, economic instruments, an efficient flood forecast-warning system, a system of flood risk assessment, awareness raising and improving information and flood-related databases (Kundzewicz, 2002). The 'soft' approach is deemed more flexible, as it still allows for 'hard' intervention in the future if still needed. In Chapter 2.2.2, the switch towards a 'soft path' is further elaborated on.

Flood mitigation is thus an approach of flood control that uses both hard and soft measures when dealing with floods. Flood mitigation includes deciding when or where floods happen in order to alleviate larger floods downstream. It also focuses on reducing the peaks of the floods, by (temporarily) storing water in basins. Flood mitigation is mainly focused on damage reduction, whereby a trade-off exists between the costs of construction of infrastructure and the expected damage (Heidari, 2009). Flood mitigation measures can be structural or non-structural. Non-structural measures include; flood forecasting and warning, preservation of retention ponds, land use planning, flood zoning, emergency services, shelters, flood proofing, flood fighting and post-flood rehabilitation measures. Land use planning deals with optimising the use of land based on its characteristics (e.g. geographics, soil and climatic). This includes allocating land suitable for water storage as retention basins, in order to alleviate other areas (urban or agricultural land) from floods (Faisal, Kabir & Nishat, 1999). Damage reduction during floods is also described by Liao, Le & Nguyen (2016) as the adaptive flood paradigm. In this paradigm, the capacity to remain undamaged and functional during floods is important. To do so, it is important to be flood tolerant. Flood adaptation is discussed in contrast to flood control, where the aim is to control and change the flood regime or flow. Gleick (2003) describes the adaptive approach to water management as a 'soft path' in which there ought to be more attention

to flexibility in building in order to deal with global uncertainties and climate change. Adaptive water management should be focused on learning, instead of controlling (Post-Wahl et al., 2005).

2.2.2 Ecological turn and 'Building with Nature'

In general, there is a shift from hard measures and 'the fight against water' to soft measures and 'letting water in sometimes' or 'accommodating' water (Wesselink, 2007). In Dutch water management, Disco (2002) described this as the 'ecological turn'. More attention was given to ecology and especially the effects human activities (such as agriculture) have on nature. The idea that nature was intrinsically valuable and that 'civilization' had been incurring heavy ecological debts came (Disco, 2002). The ecological turn in water management describes the shift from a technocratic paradigm, where managers opt for technological or structural solutions, to a more holistic and ecological approach, where there is more focus on soft or non-structural measures and solutions, undoing as much ecological damage as possible and political responsiveness towards the environment (Disco, 2002). In European policy there is a growing interest in nature-based solutions for water management (Collentine & Futter, 2018). Nature-based green infrastructure solutions usually combine several ecosystem services, such as biodiversity, recreational opportunities and aesthetics and flood (or drought) control. Additionally, infrastructure that is designed with no consideration of surroundings are no longer viewed as acceptable (de Vriend et al., 2015). Building with Nature [BwN] is an innovative approach to hydraulic engineering and flood management. In BwN, sustainability and adaptability stand central. BwN attempts to meet safety needs for society, while also trying to create room for nature development. This is usually achieved by including natural components in the infrastructure and creating flexible solutions that can be easily adapted to the environment. One example of a BnW project is Room for the River in the Netherlands (de Vriend et al., 2015).

2.3 Participation / Citizen Engagement

Floods are not only managed by 'water managers' or politicians, but also by farmers and other locals who deal with water on a daily basis. These so-called 'domestic water managers' are active actors in water managing, policy making and implementation (Nguyen & Guevara, 2019). However, it is important to understand that participation of individuals is highly dependent on social and cultural factors (Nguyen & Guevara, 2019). It is argued that only by moving away from top-down management, the diversity of interests in water storage areas or retention basins can be identified and more ethically sound management strategies can be employed (Carr, 2015). Rowe and Frewer (2005) define participation as '*the practice of involving members of the public in the agenda setting, decision-making, and policy-forming activities of organisations/ institutions responsible for policy development.'* Participatory approaches have gained prominence over the recent decades. This is partly due to the realisation that engineering-based management alone is limited in managing water resources in a sustainable way (Carr, 2015). Cleaver (1999) explains the role of participation in projects as ensuring greater efficiency

and effectiveness of investment, better outcomes in resource management and contributing to increasing democracy and feelings of empowerment. Public participation is mainly used because it can increase support from societal actors towards government plans, it improves the quality of decision-making due to the added knowledge and solutions and it creates more democratic legitimacy. Participatory approaches are also critiqued. Cleaver (1999) argues that there is little evidence of long-term effectiveness on improving the conditions of the most vulnerable people. In reality the act of participation in itself is (too) often viewed as empowering, regardless of the outcome of the programme.

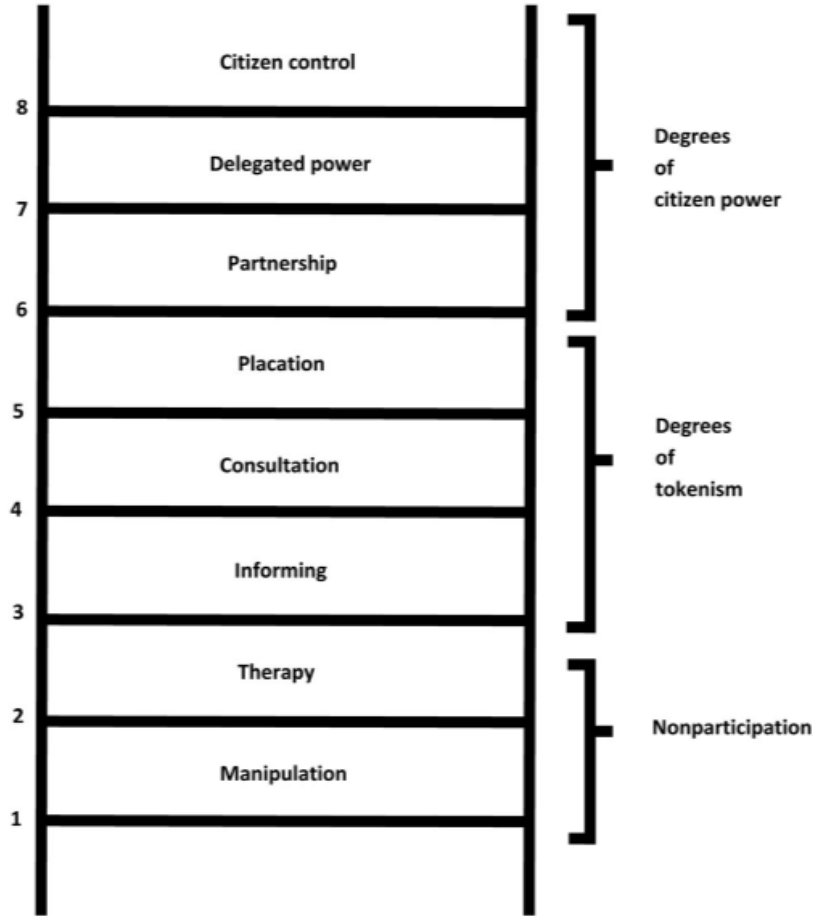
The success or effectiveness of public engagement is highly dependent on the governmental reaction and willingness to work together (Edelenbos, van Buuren, Roth & Winnubst, 2017). There are usually several barriers, such as lack of institutional support, closed cultures, time, power and inequalities, that prevent the public from participating (Tseng & Penning-Rowsell, 2012). Local stakeholders often experience frustration when their input is not considered or listened to. Participation in that case can be experienced as a double-edged sword.

2.3.1 Ladder of Citizen Participation

The Ladder of Citizen Participation by Arnstein was published in 1969 and is a renowned framework for citizen participation. The ladder of citizen participation focuses on showing that *have-not citizens* (those who have limited access to decision making power) need to be enabled by participation (Lauria & Slotterback, 2020). As seen in figure 2 below, the ladder of participation consists of eight rungs. The first two rungs are *manipulation* and *therapy*, both described as forms of non-participation. Within non-participation, the goal is not to enable have-nots in participating in projects, but rather to 'educate' them or 'cure' participants from their problems. This approach is problematic, because it creates the narrative that the participants are the problem, instead of maybe the situation they have been put in (Carpentier, 2016). The next three rungs consist of *information, consultation* and *placation*, all degrees of tokenism. Information is described by Arnstein as a form of a one-way flow of information, allowing citizens a small opportunity to influence decisions. In consultation, citizens are invited to provide feedback or share ideas. However, there is no assurance that this feedback and these ideas will be taken into account, making this form of participation still a sham (Arnstein, 1969). Within placation, citizens are entitled to give advice to power holders, though they still have the power to decide whether or not to utilise that advice. Placation is presented by Arnstein as a step higher from consultation. The last three rungs are *partnership, delegated power* and *citizen control,* all described as forms of citizen power. In a partnership there are shared responsibilities between citizens and power holders. Delegated power allows citizens to achieve a feeling of dominance, by creating decision-making authority. Citizen control is supposed to be the rung where citizens have most power. Still, Arnstein warns that in some scenarios, this is still not a situation of full control (Carpentier, 2016). According to Arnstein, the most important means of citizen power or 'real' participation is the delegation of power.

In the ladder of participation, delegation of power happens only in the upper three rungs. There is a shift required from power in the hands of those who have always had it to those who have not (Krumholz, 1982).

Figure 2. Ladder of Citizen Participation



Source: Arnstein (1969) in Carpentier (2016).

Arnstein's ladder has been met with several critiques. The first point of critique is that, in reality, there are no easy cut-off points between dichotomised positions (Carpentier, 2016). The ladder suggests the existence of cut-off points between different steps. Even though Arnstein tries to create distinguished steps, the categorisations are still pretty stark. This is also acknowledged by Arnstein herself. Arnstein states that, in real life, instead of eight rungs, the ladder could easily consist of 150 to cover the range of actual citizen involvement (Connor, 1988). Arnstein herself admitted that, if she had known the popularity of the ladder she would have written it differently, especially because the rungs of the ladder do not really follow a logical progression. Another critique of the model is that it suggests that higher rungs on the model are better than lower rungs. It fails to acknowledge that different situations

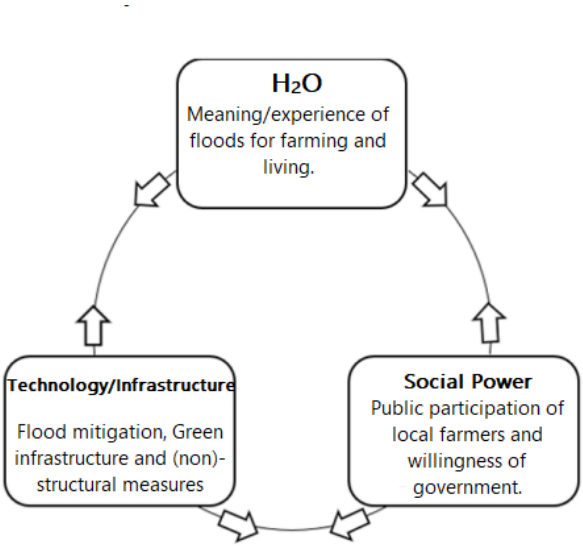
might call for different types of citizen participation and different goals might benefit more using citizen participation in different forms. Hurlbert & Gupta (2015) argue that the presumption that higher rungs of the ladder are favourable or better is too simplistic. Different levels of engagement are, according to them, likely appropriate in different contexts depending on the objectives and the capacity of the stakeholders (Hurlbert & Gupta, 2015).

Participatory processes are, in reality, more complex than any model or ladder could ever try to structure. It is however good to attempt to create a model based on real life. Therefore, the ladder of Arnstein is used in this research, but it is used critically. Using the ladder of Arnstein can be useful in understanding the different ways of participation. It differentiates between one-way flows of information and types of participation where there is a reallocation of power. It can also help explain differences in successful and unsuccessful attempts of the participatory approach in projects, such as flood control measures.

2.4 Combining the Concepts

The three concepts of this theoretical chapter and research are the hydrosocial cycle, flood mitigation and citizen participation. As seen figure 3, the conceptual model below, the hydrosocial cycle is used as a conceptual basis for this research.

Figure 3. Conceptual Model, based on the Hydrosocial Cycle.



Source: Author. Adapted from Linton & Budds (2014).

The meaning of floods experienced by farmers can be related to the meaning of water in general. The meaning of water can be expressed or experienced in various ways. Water can be a particular representation or performance of H_2O and have a different meaning or importance, depending on the

materiality and context. How floods are experienced by farmers is dependent on the role these floods play in farmers' lives, and how and when they appear. Therefore, water is mostly experienced as scarce, abundant or excessive. Around water, (hydro)social relations form. Especially when there is a need to manage water flows. Different types of relations form depending on the role of water. For example, farmers usually deal with an excess or shortage of water in order to grow crops. Preventing floods is one of the main concerns that farmers experience. This means that farmers need to be organised and involved in actions that are meant to prevent floods. Farmers often have a (complex) network of different actors, leading to more social power. Participation leads to different hydrosocial relations than when only professionals work on flood mitigation. Relations between professionals and the public form, but also other actors such as academic or political relations. To mitigate floods, (hydraulic) infrastructure is used as a tool to manipulate water flows. For example, hard measures are used to change the waterscape's infrastructure in a rigorous manner. Soft measures are described as more flexible solutions. The combination of hard and soft measures create a system of flood control or flood protection. Building with Nature, or adaptive flood management, often uses a combination of both types of measures but always focuses on many different ecosystem services and prioritises sustainability and adaptability. Flood mitigation projects can use participation as a tool in order to better the outcome of the project or to create a greater sense of empowerment for locals. However, flood protection measures are usually focused on doing what is safest. Social power from different actors usually means that those with the most power create the agenda. This friction, who decides what is best, is prominent when looking at hydrosocial relations.

3. Methodology

In this section, the methods used for the research are explained and possible risks and limitations of research are presented. The research is executed using the research cycle of Hennink, Hutter and Bailey (2020). This cycle includes three stages of research. The first that will be discussed is the design cycle. In this section, the design of the research is discussed. After this, the data collection cycle is discussed and presented. Lastly, the analytical cycle is presented. This research started and took place partly during a global pandemic. The consequences this inevitably has had for the research, which mostly means that a large amount of research and reflection has to be done online, are also discussed in detail in this chapter. In addition, a detailed explanation of how the research cases are selected is given.

3.1 The Design Cycle: Research Questions

The first steps in designing a research are formulating qualitative research questions, developing a conceptual framework, selecting qualitative research methods and evaluating quality (Hennink, Hutter & Bailey, 2020). The design of this research started with a literature review of relevant articles about life and floods in delta's, flood management and participation. After thorough research and

identifying a topic worth researching, research questions were formulated. Subsequently: this research attempts to answer the research question:

How have farmers adapted to and influenced flood mitigation projects in the Netherlands and Vietnam?

The research question has seen many changes during the process of writing and data-collection. Depending on practicality (or feasibility) and focus, different concepts or cases were considered. Ultimately, this research is a comparative study of two cases. The comparative nature of the research question is an interesting one, and also suited for research during the pandemic (with many travel and mobility restrictions). As it allows for fieldwork combined with research online due to the two different locations. Why these specific cases were selected is discussed in more detail in Chapter 3.2.1. In order to answer the research question, sub-questions are formulated. The sub-questions to answer are:

- *What do flood mitigation projects in the Netherlands and Vietnam entail and how have they developed since their implementation?*

- *How are farmers experiencing farming and floods before and after the flood mitigation projects and coping with its effects?*

- *In what ways are farmers included in the creation and implementation of flood mitigation projects?*

Using these research sub-questions and the central concepts in this research a conceptual model was formed. In order to obtain the required data for this research, a literature-study has been carried out. After this, in-depth semi-structured interviews have been conducted with the goal of obtaining in-depth information. According to Hennink, Hutter & Bailey (2020), qualitative research is suited to understanding how people's (cultural) context and settings influence their perspective and experiences. Inclusion in decision-making and the experience of flooding and its effects are highly personal and individual experiences. Doing semi-structured interviews is thus an appropriate way to research the in-depth experiences of the individuals and is able to describe in detail the ways in which local actors are included or perceive their inclusion (Silverman, 2013). Hennink, Hutter & Bailey (2020) describe the idea that reality consists of meanings and perceptions. This interpretive paradigm is in line with the idea of this research. Whereas in positivism it is understood that data-collection is a mere case of finding facts in reality, in interpretivism it is highlighted that data-collection is influenced by the background and beliefs of a researcher (Hennink, Hutter & Bailey, 2020). A reflection of the positionality of the researcher is discussed in Chapter 3.4.

3.2 The Data Collection Cycle: Semi-Structured Interviews

For this research, semi-structured in-depth interviews were selected as the most suitable research method. Semi-structured interviews are described as a process of human interaction. The goal of interviewing is to construct meaning mutually (Smith & Elger, 2012). Before this is possible, the researcher has to create a degree of trust and form a relationship with the interviewee. Cross-cultural interviewing could be a factor that makes this process of establishing a relationship more difficult (Squires, 2009). Within this research, in the case of the Netherlands, this is less the case than in the context of Vietnam. This is because, when the interviewer and interviewee do not speak a common language, problems can arise (Marschan-Piekkari & Reis, 2004).

This research consists of two parts of data collection. The first part of data-collection was done in collaboration with a Vietnamese research team, consisting of in total 4 researchers that are connected to different universities in Vietnam (An Giang University) and Australia. Before the data-collection process started a collaboration was launched between the Vietnamese researchers and the Dutch team, consisting of Dr. Andres Verzijl, Ms. Rosie and me. During this research collaboration multiple meetings were organised to discuss the progress and interview guide. Relevant questions for the interview guide were added during this process and checked and translated by the Vietnamese team to fit the research. By adapting the interview guide to fit the context of the participants, more in-depth data could be gathered. The guide was translated in Vietnamese and the transcripts were translated back into English. The co-created interview guide (See appendix 1) was then approved by both the Dutch and Vietnamese teams. The meetings can be seen as a vital part for the research, as much knowledge was gained and it provided a real insight into the VMD and the farmers who live there. During the interviews, the Vietnamese team provided the Dutch team with videos and photos, to add to the experience that was lost due to the COVID-19 pandemic. The communication between the research team (mostly Mr. Thai Van Nguyen) and the local governments of the communes (My Phu Dong, Phu Huu and Vinh Phuoc) was done via Zalo, a communication app popular in Vietnam. The interviews lasted about an hour each.

As mentioned before, the interviews were done in Vietnamese. This has benefits when it comes to earning trust and mutual understanding between the interviewer and participant. In this case, the researchers are also the translators. The role of a translator is not only to translate words from one language to another but also to translate the meaning of a word conceptually in a context (Gee, 1990 in; Squires, 2009). Translation is also an interpretive act where meaning may be lost during the process. Due to the fact that the researchers in this research are also translating, this may be kept to a minimum, as the researchers understand the context of both the participants and the research.

3.2.1 Case Selection

The research area of the Vietnam case was delta villages in which farmers have dealt with hard measures for a long time, and more recently have experienced the shift towards a more ‘soft’ path.

Communes in the province of An Giang fit this description as high-dyke construction has been a priority in the last decades. Only recently, more attention to the ecological effects in this area has been considered. Due to the effects of climate change, the VMD has to find new (or old) ways to adapt to chasing flood patterns. This is similar in the Dutch Delta, where high-dyke construction has always been the norm. Now, since a few decades there has been a change towards a soft approach using the room for the River project. Additionally, due to the effects of climate change the Dutch Delta is in need of alternative solutions and approaches in dealing with floods. To do so, the Dutch Delta could benefit from a comparison to an area which has a long history of living with floods, such as the Vietnamese Mekong Delta. Interviews were done in three communes in An Giang, My Phu Dong, Phu Huu and Vinh Phuoc, which will be presented in depth in Chapter 5.1. Due to COVID-19 regulations, it was difficult to visit the area for the Vietnamese researchers. Chances of approval from the local government were therefore spread over three communes in the province. The interviews were part of a bigger research that I got to be part of, which is important to keep in mind. Due to this, I mostly got to add questions or suggestions, but did not get the final say in some decisions. When selecting communes or cases, several geographical aspects of the communes were considered. Vinh Phuoc was selected due to the presence of an interesting group of farmers who are protected by semi-dykes and don't want to be protected by high dykes. These farmers grow floating rice, which is fairly rare in this area. Phu Huu was selected as a case because it is close to the Cambodian borders which could provide interesting information about dealing with early floods. Water rises early in this area and there are no high-dykes to protect farmers from it. My Phu Dong was selected because this commune was one of the first where a high-dyke system was built. Therefore farmers have had the most time to adapt to this system, which could potentially lead to different answers. Additionally, researchers from the Vietnamese research team had some social contacts in these communes. This made it more feasible to complete this research. Lastly, I added the project in North Vam Nao to this research, as this is a project that used the participatory approach. The North Vam Nao scheme is a project about the Vam Nao river in An Giang. Interviewers were not able to go there, so I did an interview with a Vietnamese researcher who had done research on North Vam Nao and also the 3-3-2 cycle that will be presented and discussed in Chapter 4.

After the Vietnamese research locations were set, a research location in the Netherlands had to be selected. The second part of the data is collected through in-depth interviews with experts and local actors in the Netherlands. Sample selection was done using the snowball method. First, looking at the available literature about the flood mitigation and the Building with Nature approach, the Room for the River policy was selected as an interesting project that fitted in well with the global trends in water management in delta's. Room for the River is a large-scale project which meant that an interesting case needed to be selected. In this research case, participation of local farmers was central. After interviewing two experts on flood management and the RftR policy from Wageningen- and Utrecht University, the Overdiepse Polder quickly came to the fore as a fitting case study. These

interviews, of about one hour each, were aimed at gaining more in-depth understanding of the central concepts such as participation and adaptive flood management within the Room for the River policy and gaining more understanding of the relevant cases within this policy. Both participants that were interviewed earlier pointed at the Overdiepse Polder as the project where participation had the most attention and effort out of the 30 sites of Room for the River. Also, the Overdiepse Polder could be compared to Vam Nao very well, as the participatory approach stands central and both research areas are islands surrounded by rivers. In order to research the Dutch case, a farmer from the Overdiepse Polder was contacted via LinkedIn as a result of the information from the first two interviews. This farmer was selected because they were approachable via an online account and responded back in a timely manner. Other farmers were also contacted via email or LinkedIn, but did not respond. In order to mitigate the effects of only being able to reach one farmer in this area, secondary literature from other farmers are also used in this research. Also, Dutch experts about Room for the River were specifically asked about the experiences of farmers that they had spoken to and researched. This created data that included information about different farmers in the OP, even though only one was interviewed directly. After this interview, an interview with a representative from the water board Brabantse Delta (in which the OP is located) was done, as well as an interview with one water-expert that had both knowledge about the Netherlands and Vietnam. All interviews conducted in the Netherlands lasted between 45 minutes and one hour. These interviews were done in Dutch and mostly online using Microsoft Teams. In total 6 interviews were conducted, 1 (female) farmer and 5 experts, from which 1 was female and 4 were male.

Table 1. Overview of all conducted interviews and sampling methods

Participants	**Data Collection period**	**Language**	**Data Topic**	**Sampling method**
1 Dutch Farmer	September 2022	Dutch	Experiences RftR, participation, floods and farming.	Purposeful sampling & Convenience

				sampling
4 Dutch Water Experts	July 2021 - January 2023	Dutch	RftR implementation, experiences of participation local farmers, governmental willingness, comparison NL and V.	Purposeful sampling & Snowballing
1 Vietnamese Water Expert	June 2022	English	North Vam Nao scheme and 3-3-2 farming system. Participation and governmental willingness	Purposeful sampling & Snowballing
10 Vietnamese Farmers	October 2021	Vietnamese (translated to English)	Experiences floods and farming, participation and 3-3-2 farming system.	Purposeful sampling

Source: Author.

3.3 The Analytical Cycle: Coding

After finishing the data collection of the interviews and the translating and transcribing. Coding is a necessary tool used to create structure to the data, which makes analysis more clear and the data more fruitful. Analysis includes the creation of codes, categorisation, describing and comparing and finally the development of theory (Hennink, Hutter & Bailey, 2020). All interviews that were conducted in this research were recorded and transcribed verbatim. This eliminates as much as possible any bias or influence on the data. All words that are spoken are noted and the original meaning of the words is as close to reality as possible. The interviews with Vietnamese participants were translated to English. One interview was conducted in English and the other interviews that were conducted in Dutch were not translated, but coded with English codes. After all the transcripts were collected the coding process was started. The program NVivo was used to create codes and code all the transcripts. During the process of coding the transcripts, the inter-coder agreement (ICA) was kept in the back of the mind. This agreement is aimed at "consistency with which two codes can independently code data in the same way using the same coding instructions" (Hennink, Hutter & Bailey, 2020). The codebook (found in appendix 3) is a combination of both inductive and deductive code-creation. Beforehand a coding book was made, but during the process codes that were relevant were added to this. The codes were created mostly based on the central concepts in this research such as the hydrosocial cycle and participation. Codes are also created based on which questions were asked in the semi-structured interviews.

3.4 Reflexivity and Positionality

Qualitative research is often described as impressionistic and influenced by researcher's bias (Buckner, 2005). Therefore, it is important to understand and reflect on my positionality as a researcher. Reflexivity involves questioning our understanding of reality and the nature of knowledge and how alternative paradigms and perspectives can open up new ways of thinking about phenomena. It is generally understood as 'bending back' and 'turning inwards' to look at ourselves and our research practices. In this section, my position as a researcher is discussed and possible limitations and effects are reviewed. As a Dutch researcher the comparison between the Netherlands and Vietnam is subject to bias. First of all, when living in the Netherlands you are subject to national pride on water management. This was the reason I was motivated to show that the flood protection systems might not necessarily be as great as is often portrayed by Dutch water managers. It is important to note that while I was able to go into the field in the Netherlands, I did not experience Vietnam's context first-hand. My experience of Vietnam was limited to online meetings with Vietnamese researchers, videos and photos. This might have limited my understanding of the local context and caused me to miss certain important details. Seeing the landscape or waterscape helps in understanding in what ways floods happen. Deakin and Wakefield (2014, in; O'Connor & Madge, 2017) describe online interviewing as 'second choice' to face-to-face interviews, though still describing online interviewing as valid and legitimate. The comparison can never be neutral in that regard. I do not elaborate on certain practices on the Dutch side, as they might not occur to me as valuable, but rather as logical or 'the way it is'. This might have caused me to overlook certain things. This is the opposite for Vietnam. As my prior understanding of Vietnamese life was very limited (close to none), everything I have learned in this research is significant information to me. When researching water, local context is very important. For the Netherlands this understanding came more naturally than for Vietnam, that is a vital difference for this research. I have tried during this research, to the best of my ability, to be aware of this difference. Next to this, the co-creation that happened between me (and the rest of the Dutch team) and the Vietnamese research team is also in need of reflection. During the process of creating interview guides, I found it difficult sometimes to communicate effectively with our Vietnamese counterparts. Cultural differences and the language barrier sometimes led to different understandings of the expectations. Both for the process as well as the outcome and data.

4. Analysing Flood Mitigation Projects

This chapter discusses the results in relation to the first sub question: **What do flood mitigation projects in the Netherlands and Vietnam entail and how have they developed since their implementation?** This chapter combines data from interviews with existing literature to attempt to answer this research question. First, several aspects that shaped these projects are explained. After this, the reactions of local inhabitants and farmers towards the goals and effects of these policies are shown.

4.1 Introducing the 3-3-2 Cycle

In the Vietnamese Mekong Delta, local water infrastructures have been under stress due to climate change, rapidly changing hydrological conditions and upstream developments, such as the implementation of six hydropower dams in China (Tran, Huu, Hoang, Pham & Nguyen, 2021; Tran & Weger, 2018). a large part of the current landscape in the VMD has been dictated by the effects of the colonial rule of France (1887-1954). What was once a wetland was turned into an opened-up system of canals. By dredging, hydraulic engineering and the introduction of water pumps, the Mekong Delta was transformed into an area suited for agriculture (van Staveren, van Tatenhoven & Warner, 2018). During the economic reforms (*doi moi*) in 1986, which were aimed at creating better irrigation systems, transport, and agriculture in the delta, more dykes, dams and sluices were built in order to maximise agriculture (Biggs, 2011). Due to this intensification of rice production, which needs large amounts of fertilisers and pesticides, the land and soil quality ultimately degrades (Kien, 2014). After the particularly devastating flood in the year 2000, the building of high-dykes over semi-dykes was accelerated. Due to the construction of high-dykes, farmers were able to switch from floating rice, to high-yielding rice that they could harvest three times a year. This triple cropping ensured a larger and more secure income for farmers (Tran, Pittock & Tran, 2020). Before, annual floods flush away the chemicals and at the same time would deposit fresh sediments, leaving the soil naturally improved. Thus, to achieve the drainage of chemicals off of the fields again as well as provide the soil with some sediment to improve overall fertility, the Vietnamese government created the '3-3-2 policy' or '3 years, 8 crops policy'. Local governments aim to implement this cycle and try to do so in collaboration with local farmers. Not only was the 3-3-2 cycle implemented because of its benefits for the soil, the provincial government also recognised that flood water exclusion from floodplains (due to high-dykes) has a potential to exacerbate flooding downstream areas, such as (Chapman et al., 2016). The implementation of this cycle is further explained in Chapter 7.1. This policy entails the release of floods in the last cycle of rice of a three-year period. Due to the construction of the high-dykes, farmers were able to do triple-rice cropping. Now, with the 3-3-2 policy, farmers can harvest 8 crops in 3 years, and the last crop is changed for a period of water retention (Tran & Weger, 2018).

This water retention function is also an important role of these floodplains. High dikes subsequently decreased the flood retention capacity of the Long Xuyen Quadrangle, one of two flood storage areas in the upper part of the VMD. This means that flood risks are increased downstream (Kingdom of the Netherlands and the Socialist Republic of Vietnam, 2013). According to Nhan et al. (2007), using agricultural lands as floodplains attempts to maximise flood water retention, maintaining the storage capacity of the floodplain, will also help to enhance the agricultural resilience of the delta as a whole. The 3-3-2 policy has been met with some reluctance from farmers, who have voiced insecurities surrounding the continuity of their livelihoods, due to the loss of one rice crop in three years (Tran et al., 2021). Chapman et al. (2016) researched the usage of the 3-3-2 cycle in nine communes in An Giang province and found that out of these nine, farmers in only two communes

were following the 3-3-2 cycle. This meant that the farmers continued practising triple-rice cropping and the land was not flooded after three years. As mentioned by the Vietnamese water expert in the in-depth interviews, there are plans from the local government to expand the 3-3-2 cycle in the future to a 3-2 cycle, where a retention period is supposed to happen once every 5 years. In order to protect urban areas during floods, floodplains in the Mekong Delta villages that have been researched are flooded to lower water levels. The North Vam Nao scheme focuses specifically on citizen participation (Tran, Pittock & Tran, 2020).

4.2 Introducing Room for the River

The 'Room for the River' [RftR] project was launched in 2000 as a reaction to the floods of 1993 and 1995 (van Buuren, Ellen & Warner, 2016). This policy was meant to create more flood safety by creating more space (or room) for river water, as well as play into the magnifying effects of climate change (Roth, Warner & Winnubst, 2006). The RftR project creates more room for river water at 30 locations in the Netherlands. All locations that were part of the RftR program are shown in figure 4 below.

Figure 4. All 30 Room for the River locations

Source: Nikologianni, Moore & Larkham (2019).

Giving more space to the river is done by several interventions, such as relocating dykes, constructing high-water channels and lowering floodplains. In short, creating areas that will be inundated during high-water periods eases the pressure on dykes temporarily (Rijkswaterstaat, n.d.). Most importantly, the retention function of the polder helps relieve pressure on urban areas (such as Den Bosch and Gorinchem) upstream or downstream during peak floods. The Room for the River project is an example of a Building with Nature project, meaning that there is focus on sustainable water management (van Rooy & Slootweg, 2003). Within the Room for the River project objectives included flood protection in combination with improving environmental quality and nature restoration of the waterscape (de Vriend, van Koningsveld & Aarninkhof, 2014). One of the best examples of this is the depoldering of the Noordwaard. In this polder, in the North of the Biesbosch, agricultural land has been given back to nature. This area has turned back into a natural wetland area again. This has led to a better ecological development, in which the return of the white-tailed eagle is a good example of increased biodiversity (Braat, Personal Communication during Field Trip Biesbosch, March 6th, 2023).

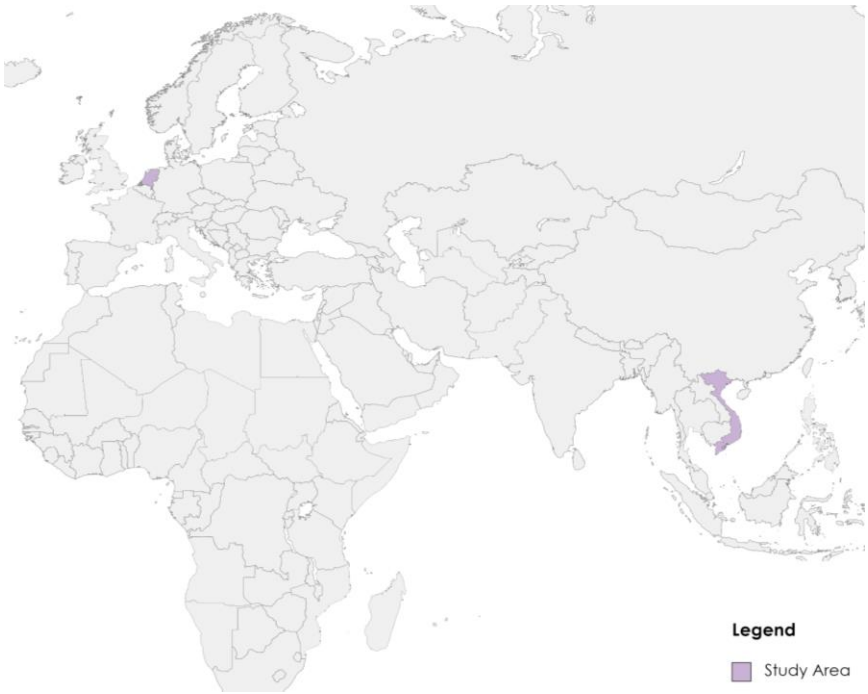
The Room for the River project and the 3-3-2 cycle are both projects that are a result of increased awareness of the environmental (and agricultural) benefits of floods and to mitigate floods in order to relieve pressure on upstream or downstream urban areas. In the Vietnamese Delta, high dike building to allow triple cropping of rice has been linked to higher river water levels in the downstream city of Cần Thơ (Tran et al., 2018). In order to create more retention areas and to achieve healthier agricultural land, flood mitigation projects with a softer approach are used. In the case of the Dutch Delta, continuing the building of high-dykes and having to deal with a technological lock-in created the need to approach flood control in a different, softer way. In this light, RftR was created. Both countries aim to combine agriculture with water retention capacities, by combining both functions on the same area of land. Temporary water retention on agricultural land allows farmers to keep farming while still providing temporary water storage for when water levels rise. By changing flood water distribution, flood risks are lowered in surrounding, downstream, and upstream areas. In addition to having goals in line with the global ecological turn in water management, these policies both influence the (daily) activities of farmers in deltas. Both projects mean that farmers have to adapt and experience change. Unsurprisingly, these projects have dealt with (or are dealing with) reluctance and scepticism from alarmed farmers. The Room for the River project and the 3-3-2 cycle are both

projects that aim to create a more holistic approach to water management by creating good soils, peak flow storage and simultaneously still giving room for agricultural activities.

5. Analysis of Case Studies

Both the Dutch and the Mekong delta deal with floods in various ways. In response to floods of the past, governments aim to mitigate floods that might occur in the future. In this chapter, both case studies are presented and discussed in detail. Attention is given to the geographical, climatic, ecological and cultural differences of these two cases. In figure 5 below, the two countries included in this study are shown. The study sites are around 10,000 kilometres apart, and the local farmers show similarities in many different ways.

Figure 5. Study areas shown on world map



Source: Author (2023)

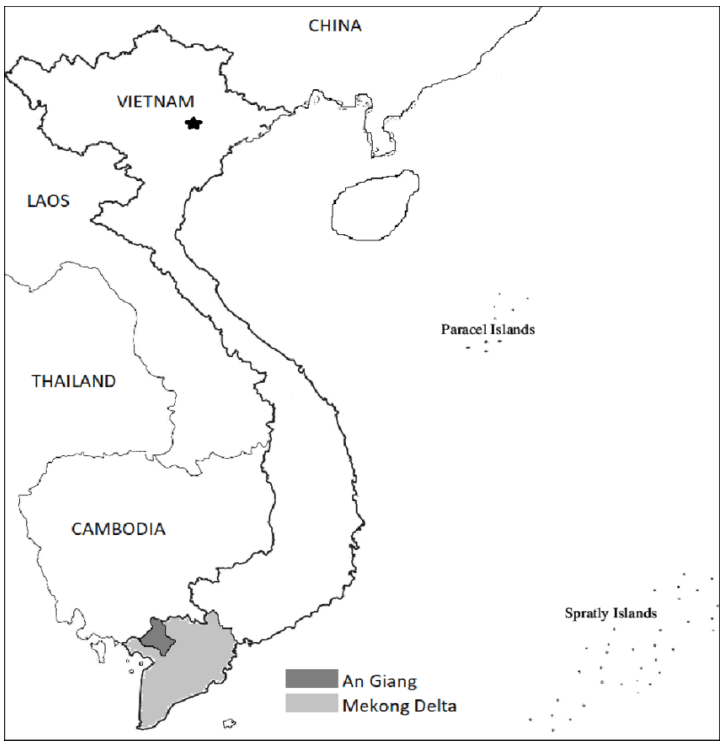
5.1 Introducing Mekong Delta Villages, Vietnam

The first delta described in this research is the Mekong Delta in Vietnam. As discussed in the previous chapter, most of the current dykes, canals and other hydraulic structures in the VMD are a result of the *doi moi* reforms (Benedikter, 2014). In Vietnam, state-society relations can be described as one where the role of the state government is dominant in water development (Koh, 2001: in Tran, Pittock & Tran, 2020). However, the *doi moi* reforms opened up the way for local governments and farmers to gain more autonomy and be more active in (local) water management.

The four study areas are located in An Giang province in the Mekong Delta in Vietnam. As seen in figure 6 below, An Giang is located in the North of the Mekong Delta. Due to its low-lying position,

this part of the Vietnamese Mekong Delta is a flood-prone area often severely affected by annual floods (Phu & De, 2019).

Figure 6. Location of An Giang in the Vietnamese Mekong Delta



Source: Ahn Le, Cottrell & King (2018).

As seen in figure 7 below, the Mekong Delta villages can be characterised by the presence of an extensive dyke system. This dyke system was constructed after the severe floods from before 2000 (Tran & Weger, 2018). Different communes in this area have different dyke systems in place, mostly it is a combination of high-dykes and semi-dykes or August dykes. These semi-dykes provide fields with some protection from rising floodwaters and allow farmers to ensure two crops before the flood waters flow over the fields (Tran et al., 2018). High-dike compartments are similar to closed polders in the Netherlands but smaller in size (Marinissen, 1994; in Tran & Weger, 2018). The three communes that have been researched have different characteristics when it comes to the dyke system, timing of flooding and what type of crops are grown. Agriculture is subsequently the most important economic activity in the three communes that were researched: Phu Huu [PH], My Phu Dong [MPD] and Vinh Phuoc [VP] and in North Vam Nao [NVN].

Figure 7. Mekong Delta villages in An Giang province

Source: Taken from Tran & Weger (2018). Communes were added by the Author.

Mekong Delta Villages

The three study sites are, as seen on figure 7 above, located in different corners of An Giang province. Located in the north of An Giang province in An Phu district is the upstream commune of **Phu Huu**. As seen in figure 7, the flood system of Phu Huu consists of a combination of semi-dykes and high-dyked areas. According to Can, Tu & Hoanh (2013), Phu Huu is located in a zone that deals with early floods. This means seasonal flooding occurs from early July to October. The commune is densely populated, with 4.460 households in 4 ha. The land is mostly used to grow rice, beans and groundnuts. In the south of An Giang province is **My Phu Dong** commune. This commune is less densely populated, with a total of 1,059 households (3,903 people). This commune is covered by a high-dyke system. The existing high-dyke system was constructed in 2000 (Nguyen, Personal communication, October 25, 2022). **Vinh Phuoc** commune is located downstream in the Tri Ton District. Vinh Phuoc commune is surrounded only partly by a high-dyke system. Some of the land in the commune is not within the dykes. Between July and December, the parts that are not within the dykes are expected to flood to depths of 1.2m-1.7m (Duc & Quang, 2018). In the areas that are not inside the dyke system, water enters the upstream area and lets farmers grow floating rice during the flood season (July–December). Cassava and other crops, such as tapioca, are grown during the dry season (January–June). **North Vam Nao** is located between the Tien and Hau rivers. It is a sort of island between the rivers, with a constructed dyke around the edge that is combined with sluice gates around the perimeter dyke. This system controls all flows of water in and out, thus creating year round protection from floods. The island houses around 300,000 people (Shanks, Millington & Buckley, 2007). As in the rest of An Giang province, the floods in North Vam Nao commence in July and peaks in September or October.

Table 2. Main characteristics of the Mekong Delta villages

Commune	Dyke system	Households	Rice production
Phu Huu	High-dykes & semi-dykes	4,460	Triple rice cropping
My Phu Dong	High-dykes	1,059	Triple rice cropping
Vinh Phuoc	High-dykes & semi-dykes		Triple rice cropping & floating rice

Source: Author

5.2 Introducing the Overdiepse Polder, The Netherlands

The second research area in this thesis is the Overdiepse Polder [OP], which is located in the south of the Netherlands, as seen in figure 8 below. The Dutch Delta consists of multiple rivers. The main rivers are (branches of the) Rhine [Rijn], Meuse [Maas], Waal, IJssel and Lek (Zevenbergen et al., 2013). The Overdiepse Polder is surrounded by two branches from the Maas, which carry water from Belgium and France to the sea. Being surrounded by rivers, the Overdiepse Polder is basically a small island, connected by dykes to the mainland.

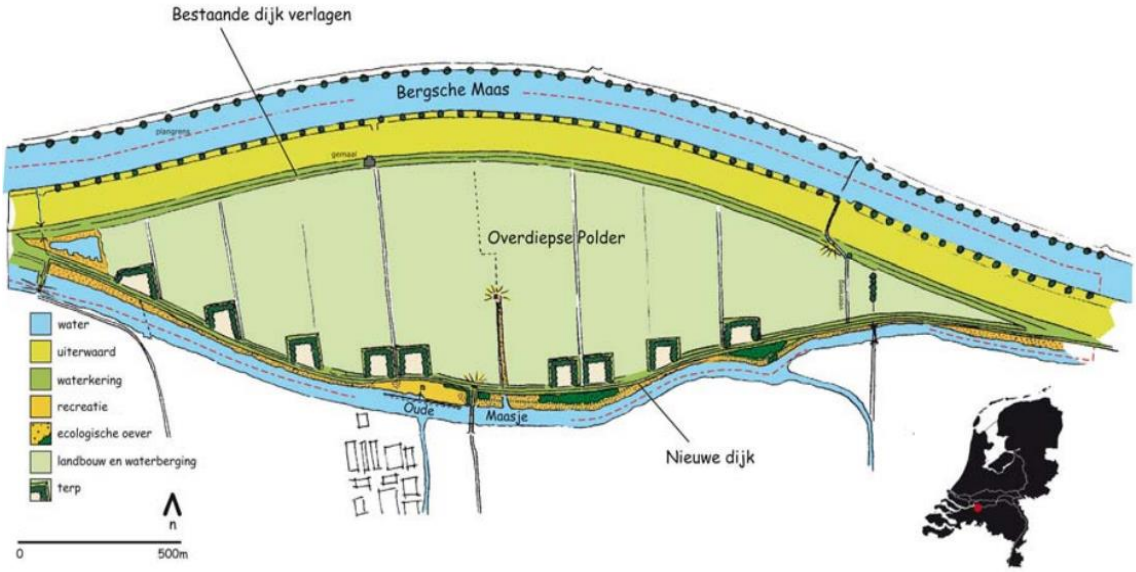
Figure 8. Map of the Netherlands and its rivers

Source: Taken from Kumar (2021). Polder was added by the Author.

Much of the territory of the present-day Netherlands is habitable only thanks to the creation and upkeep of a complex system of waterworks that keep the sea and rivers away (Disco, 2002). Most of the area in the delta is (or was once) a polder. The surrounding Biesbosch area was once an area that was a natural water wetland. Polders were mostly created for agriculture. One of these polders is the Overdiepse Polder. On the north side of the Overdiepse Polder flows the river Bergsche Maas. The polder is bordered by the smaller river 'het Oude Maasje' (the Old Meuse) on the south side, as seen in figure 9 below. In the 19th century, the whole area (including the Biesbosch) used to be a freshwater tidal area. The polders were often flooded during storms and high tides. This made the area too rough and unpredictable for agriculture. Instead, the polder was mostly used for peat extraction. The Overdiepse Polder took the first steps towards its current shape in the year 1900, when the Bergsche Maas was dug out (De Stem, 2017). The polder was flooded in 1953 during the devastating flood, often referred to as the 'watersnoodramp'. Ultimately, in 1975, the polder became an area suited for agriculture when high dikes were built to completely protect the area from water. Farmers in this area mostly keep dairy cattle and grow grasslands, farmers might additionally grow complementary crops such as silage maize (van Rooy & Slootweg, 2003). This gave room for around 20 families to start farming activities behind the dykes in the Overdiepse Polder (De Stem, 2017). After the floods of 1993 and 1995, the Room for the River project was introduced. The Overdiepse polder was allocated as a floodplain for the river Bergsche Maas in order to relieve Waspik and Den Bosch from high water levels. Between 2010 and 2016, 50 hectares of the Overdiepse Polder were turned into a water storage area. However, because the farmers did not want to leave the area, they created the 'Terpenplan' (Brabantse Delta, n.d.). Large terps have been built of around 2 - 2.5 hectares each. In the Terpenplan, the polder is calculated to flood once every 25 years. While houses stay dry, grasslands and agricultural lands flood. Farmers in the OP are mostly focused on dairy production. The fields are used as grasslands for the cows, but also sometimes for crops. The Terpenplan eventually took on the role of

a flagship project. The government wanted to use this project as a good example to show the rest of the world, as a sort of state-of-the-art product of Dutch water management (Clevers, 2015).

Figure 9. The Overdiepse Polder



Source: Provinciale Staten van Noord-Brabant (2009)

These two cases can both be described as low-lying delta areas. Flood control measures are highly associated with agricultural activity in these areas. Though floods naturally happen more often in the Mekong Delta, it is expected that both cases will be subject to storing river water on the floodplains that are usually used for agriculture. Additionally, in both areas, there is a system in place where the use of high dykes and lower dykes is combined. The Dutch Delta has been poldered for centuries, whereas polders and extensive land reclamation for agricultural purposes in the Mekong Delta has been around since the 1970's onwards. Currently, in both delta's, adaptive flood management approaches have been on the rise.

6. Experiencing Floods and Coping with Change

In this section, results are discussed that relate to the sub question: **how are affected farmers experiencing farming and floods before and after the flood mitigation projects and coping with its effects?** First, the experiences of farmers with floods are discussed in detail. Farmers living in the Mekong Delta villages and the Overdiepse Polder are affected in different ways and experience different changes. Not only because some farmers have benefits due to the implemented projects, while others experience change for the worse. In this section, the different experiences of farmers are presented and discussed.

Experiencing floods

In the Mekong Delta villages, floods are described in many different ways, ranging from beneficial to harmful. When asked about flooding, farmers respond with various terms such as big, bad, serious or small, beautiful or creative floods. 51-year-old rice farmer *Mr. Hong* explained that in general, floods can be divided into a few warning levels: *"Warning level 1: 50 cm height" ; "Warning level 2: 100 cm height"; "Warning level 3: 180cm height"* Not only the height of the floods is mentioned. Also, the contents of the floods are mentioned as reasons why certain floods are considered beautiful. For example, the presence of (plenty of) fish or crabs is mentioned, as well as vegetables, water lilies, sesbania and climbing perch, as beneficial products brought in by the floods. The wife of a rice farmer, 61-year-old *Mrs. Lap* describes beautiful floods as *''There are small waves, mild winds, having a lot of fish. Fishers were happy. People drank tea on the field and enjoyed the flood.''* The essence of a good flood seems to be the amount of fish, the clear water, and the calm weather. The presence of fish is also mentioned by rice and lemon farmer *Mr. Dung*: *''beneficial floods are up to 1m providing a few fishes''*. Creative floods are helping people make a living, especially those who have no farming land, so-called landless people, but rely on fishing for their income. Beautiful floods are floods that are not too small or too big. When floods are too small, no one benefits. It is too small for landless people to fish. When floods are too big, many more people suffer. Rice farmer *Mr. Dung* states: *''The shrimp and fish farmers will be negatively impacted in case of a big/ bad flood. The big floods and storms will damage their shrimp and fish cage. Moreover, the water flow in the big floods erodes the soil as well."* Not only are big floods bad for the soil, but they also damage houses, boats, roads and harm people. Beautiful floods, on the other hand, provide fish and crabs, fight off rats and termites that otherwise impact the structure of the houses and provide the soil with sediment.

In the Dutch Delta, floods are (usually) not a yearly occurrence. Thus, floods are viewed differently and are less diverse. Floods are seen as something to fight against or avoid. This is a response embedded in Dutch water management history. The farmers in the OP only established themselves in the polder when high-dykes were built. These farmers have never experienced the threats or opportunities of floods before. Farmer *van Dijk* expresses that farmers feel uncertainty about when floods might occur: '*It might never happen, or it happens next year, we will never know'* (Bartol, 2021). As a Dutch water expert explains, '*In the Netherlands, the main objective is water safety, bringing down peak floods.'* Dutch farmer *Mrs. Jansen* did not mention the possible positive side effects of floods once. However, her husband *Mr. Jansen* claimed that if they were to experience floods '*all kinds of junk can drift along (with the stream of water)'* (van Hoof, 2021). Dutch farmers want to avoid flooding as much as possible because it can destroy crops and damage dykes and land. Not only that, but Dutch rivers contain a lot less beneficial sediment (such as sludge and other organic materials) that improves the soil. In addition to that, a lot of agricultural land in the OP is grassland used for grazing. Therefore, there is a lesser need for fresh sediment in these areas. The river water is even

seen as harmful by the farmers. Floods are seen in a positive light only in terms of ecosystem development.

6.1 Experiencing Farming and Flooding

The combination of agricultural activities and occasional flooding is experienced differently by farmers. In relation to *what* farmers are growing and *where*, their ideal flooding situation is described very differently. Most farmers in the Mekong Delta villages that were interviewed do not deal with floods like they used to in the past. Due to living behind a high-dyke system, farmers state that they never experience floods anymore. Some farmers with land behind August dykes do experience flooding from time to time, or even annually. When looking at all the responses from farmers in the communes, there is no common opinion on the role of floods in farming. In general, from the participants' point of view, farming behind high-dykes is preferable due to the security and predictability they provide. However, some high-dyke rice farmers state that water should be let in (every three years), to fertilise the soil. Farmers who own fruit gardens and cultivate vegetables and fruit do not want water to be let in, because it damages the trees, according to *Mr. Nhung*, a 65-year old rice farmer. Farmers in the Netherlands have been used to farming behind high-dykes and are currently experiencing the shift towards a more flood-prone system. According to the views of the farmers in the Overdiepse Polder, farming behind high-dykes is preferable. The fewer floods, the better, because there is no risk of dairy being rejected for quality, damage to the fields and dykes and livestock having to stay inside for days or weeks. However, according to the intermediary in this project, who acted as an information person for the farmers in the OP and works for Rijskwaterstaat, farmers do not mind if floods happen once in a while. In order to position themselves as flexible, the farmers accept the risk of flooding once in a while (Rasker, 2022)

Experiencing high-dykes

Farmers that live and farm behind a high-dyke system in the Mekong Delta villages all express contentment with the building of the dykes. The major difference seems to be the use of fertiliser in the fields. *Mr. Khiem* explains the challenges and benefits of high dykes. '*Floods are able to fertilise the land, less diseases in growing rice and apply less fertiliser; Farmers must use further fertiliser and pesticides resulting in more diseases for rice if there are no floods.*' In order to achieve a high yield, farmers must constantly apply (more and more) fertilisers to the land. The use of fertiliser is also dependent on the weather for some farmers. *Mr. Nhung* explains the use of fertilisers quite extensively. He expresses that he uses less pesticide when there are "greater weather results" in fewer diseases and vice versa. The absence of floods creates or makes space for diseases to grow on the fields, lowering the yield of rice. He explains that the use of fertilisers can be costly. *''Fertiliser's price has increased remarkably while price of rice has remained low.''* The price of fertilisers has also almost doubled in the last 4–5 years. For this problem, *Mr. Nhung* explains that he recommends farmers cultivate lúa chét, or ratoon rice. This

is the production of a second crop of rice from the stubble after the harvest of the main crop. Lúa chét is considered a green and resource-efficient rice production system. This production method can be beneficial if there are no floods and, consequently, the price of fertilisers is high. Not only the price of fertilisers can be a problem for farmers, but also their availability poses an issue. For example, during the pandemic, the transport of fertilisers was not possible. Farmers that live inside the dykes also experience damage to their crops by rats and cockchafers and damage to their houses due to termites. Due to the lack of floods, these animals are not 'washed away' or killed. Therefore, rice crops are affected. However, the problem of rats is relatively small, according to the farmers. For example, as *Mr. Nhung* explains, "*high-dykes have more positive than negative impacts. High dyke system benefits people by three-crop cultivation, catching and selling rats for consumption.''* Rats are not only destroying crops but are also eaten and sold. Some farmers express that even though rats cause some damage, the issue is not very alarming, and the benefits of the high dykes transcend the damage by far. Termites are also seen as a 'tiny issue', explains *Mrs. Lap, '…especially in comparison to the decrease in human death tolls after the construction of the high dykes'*. Lastly, fertilisers and pesticides can be harmful to farmers when sprayed on the fields. This counts for the farmers themselves, but also for the (landless) hired-labourers who work on the fields and are in close contact with these chemicals. This group of landless labourers experience a lot of downsides to the high-dykes. Before, the landless could turn to fishing during floods. Nowadays, there is a decrease in the amount of natural fish which, according to *Mr. Khiem,* has decreased to about 10% of what it used to be. *Mr. Dung* explains that this has led to the landless labourers having to leave rural areas to work in Ho Chi Minh City or Binh Duong. Subsequently, many houses remain empty. In general, farmers inside high-dykes experience a decrease in price due to high supply and an increase in the price of fertilisers. This makes profits lower. However, due to the ability to grow the third-crop, farmers are better off financially when farming inside the dykes. While the farmers do not mention their incomes, most farmers express that they can hire labourers due to more income, making life a little bit more comfortable.

High-dykes are especially appreciated by farmers in terms of safety and logistics. Since the dykes were built, farmers are less worried about their safety and that of their children and other families. In the past, during floods, farmers would be scared of drowning in storms, children falling out of the house into the water and children would have to go to school by boat. Currently, the high-dykes double as safe concrete roads. These roads are more convenient for transport, selling rice, or hospital visits. In the past, many people used bamboo bridges and small roads. During floods, boats would be used for transport. Farmers express that the benefits in terms of safety are most important to them, and due to that, they are happy with the high-dykes.

Experiencing the 3-3-2 system

Farmers in all three communes in An Giang are 'supposed' to farm according to the 3-3-2 cycle. However, not many areas in the area are implementing this cycle. Instead, the majority of the farmers

vote against it, and thus it does not get implemented. Farmers experience this cycle in different ways. The main difference in experience between farmers is between those who cultivate (solely) rice and those who cultivate fruits and vegetables. Farmers who cultivate high-yielding rice see the benefits of letting the floods come in once in a while. Rice farmers mostly describe the benefits for the fertility of the field as washing away the remnants of chemicals from fertilisers and pesticides and killing termites, rats and insects such as cockchafers. Releasing the floods in this cycle provides many benefits for rice farmers. Also, the price of the third rice crop is not as high as before, so more farmers are okay with losing the income from that crop. It is good to notice that this only counts for larger, richer rice farmers. These farmers usually have a good enough buffer to lose the income of the 9th crop. Smaller and poorer farmers, however, can usually not miss this period of income and therefore usually oppose the flood release. The effects of this one-flood season for landless day labourers are not discussed, but could be great. Fruit farmers do not experience the benefits of flood release but rather worry about the potentially harmful results of flood release. Floods can damage certain fruit and vegetable crops, especially if left on the fields for too long. Therefore, fruit farmers, who are often richer and have more means, try to make sure that their fields are not flooded by building additional low-dykes or by influencing the decision of the local government. Farmers also worry about the damage these floods can do to the existing dykes and infrastructure. Farmers are worried about the high-dykes breaking and landslides. This would be costly to repair. A Vietnamese water expert who has researched the 3-3-2 cycle states during the interview that: '*many farmers are happy with and respect the project'*. This is because farmers currently have to use a lot of fertilisers. However, in the last few years, the floods have consisted mostly of rainwater. Further, he states that *'rainwater contains little to no fresh sediments, giving no benefit to the soil, and farmers know that. And they protest, they bring like, hey, why do we need more flood coming into the field when that's just rainwater. That's just rainwater and how come? We need to have job, we need to have money for life, but we don't need flood come into the field without any benefits.'* Farmers do not want to lose money when there is no benefit to the soil.

Experiencing Room for the River

When talking about the experiences of farmers in the Overdiepse Polder, what is talked about most is how big of a project it has been in terms of length and energy input. *'Het heeft wel voeten in de aarde gehad (It took quite some effort to get there)'* is mentioned by multiple stakeholders. In general, farmers in the OP have had to make many changes, including moving areas and downsizing or enlarging their farms. The farmers have experienced many years of uncertainty about the future of their farms. Some farmers have had to move to another area to start a new farm. Other farmers have stopped their businesses. The farmers that are still present in the Overdiepse Polder have had to make changes to their farms as well. Experts express that most farmers experienced shock when hearing about the plans of the OP in the RftR program. Giving the agricultural land 'back to nature' created a lot of disbelief amongst farmers. The farmers also felt helpless in relation to these plans. They took it on

their own to create a new design for the polder. The farmers did not have to alter their farming activities much; all farmers remain dairy farmers in combination with some crop farming. However, due to the longevity of the project, the farmers experienced a lot of difficulty during the years of the building of the terps. A lot of worry about which farmers would be able to stay in the polder (only 8 out of 18), what was going to be the plot size and what was going to be the size of the terps determined a lot about the business and the finances that go along with it. Out of the 18 farmers, only 8 currently live on a terp. 10 farmers have either stopped and retired or moved away to another plot of land, selected with the help of the government. The farmers that retired, usually because they had no successor, sold their land to the other 8 farmers and the farmers who moved could either lease another piece of land for the same price from the government or sell their land and buy new land (Rasker, 2022).

The floodplains are estimated to flood about once every 25 years. If the fields were to flood, the water would have to be stored there for a maximum of six weeks. This means that livestock would have to be kept inside for six weeks as well. During this time, large transports of animal feed would not be possible. Therefore, there needed to be large silos on the terps, along with stalls for the animals. This needed to be accounted for in the size of the terps. The terps also needed to be built to a sustainable height. Therefore, the height of the terps should account for about a hundred years of water level rise. When the floods are let in the fields, farmers are still able to leave the terps over the high dyke that doubles as a road on the south side. However, when water levels rise, the ferry in the northeast of the polder, connecting the Overdiepse Polder to the town of Dussen, will be closed. This has happened multiple times in the past. When this ferry is out of service due to dangerous water levels, residents of the OP have to travel 17 kilometres instead of 6,5 kilometres to Dussen. This creates quite a detour, which is experienced as an inconvenience by the residents.

The Room for the River project also had a big impact on the farmers' life and the social relations in the local community. According to a representative from the water authority Brabantse Delta, who co-created the plans and manages the water-related infrastructure in the polder, the farmers in the polder were very close-knit. Their kids went to the same schools, and people helped each other on the land or with other chores. Due to their involvement in the plans, some conflicts arose among the farmers. Differences of opinion or different stakes were the cause of this. Some farmers that had no successor wanted the process to take as long as possible to avoid early retirement. Other farmers wanted to move as quickly as possible to be done with it. In the end it became clear that the farmers who already lived along the road that is now the road where the terps are built had a favourable position. According to an interviewed Dutch RftR expert: *'Yes that gave friction, because there were a few farmers who were very enthusiastic at the start, but they lived here -points to map, further away from the polder-. And then it turned out that the farmers that lived here -points to map, new south dyke- had priority in decision-making, as in they could decide first whether to stay or go. If they did not want to stay, they could go, one of them even moved to Canada. That created space because that ground became available*

again. However, the rest stayed and the others just had to leave, that was difficult.' This shows that most farmers had to leave. Those who were not ready to retire against their will. Many people have had to make a great sacrifice, their business.

This internal difference of opinion caused tension and strained the relationships in the community. According to one farmer in the OP, *Mrs. Jansen,* some people have quite literally been left with health issues. '' *We have all been left with heart issues; it's quite something''.* However, the farmers experience this as a temporary thing and that everyone is happy to have it over with (Rasker, 2022).

6.2 Adapting to Farming and Flooding

This section attempts to discuss what methods farmers use in order to deal with the changing waterscapes they are surrounded by. In general, farmers that follow the 3-3-2 system have a multitude of ways to deal with the cycle: aim to avoid the cycle, or resist the cycle in totality. Farmers in the OP have also dealt with a lot of uncertainty and have adapted to this new way of living in some way.

Adapting to the 3-3-2 system

The 3-3-2 system is experienced by farmers in different ways, as is shown above. During floods, daily practices are very different from those during non-floods. Farmers adapt the way they work, their transport and their living situation in accordance to the presence of water. In areas where the 3-3-2 cycle is followed, farmers adapt by creating a financial buffer for the one-flood season. This is not possible for every farmer, though. Especially those who have smaller farms express that they cannot afford to lose one crop. In hopes of being able to still get some income during the one-flood season, some farmers choose to sow the rice early. That way, some rice can be harvested before the flood comes. Rice that is harvested early is, however, a little lower yielding. However, early harvested rice can be sold for a better price. If rice is sowed and harvested late, it can only be sold for a low price. Sowing early is also used as a way of blocking the one-flood season. Vinh Phuoc rice-farmer *Mr. Nhung* explains that, ''*To date, 20% of farmers sow rice early in the third crop so that the government cannot release floods.''* Because the local government does not want farmers to lose the rice, they decide to not release the floods. In the 3-3-2 system, where farms are protected by a system of high- and low dykes, farmers are adapting to a life where floods don't happen naturally anymore. Whereas before this infrastructure was built, farmers or landless people would go fishing when there was a flood. This now happens less and less, due to the decreasing sizes of floods, meaning there are also less fish in the water. However, according to a Vietnamese water and 3-3-2 expert, people still use fishing as a source of income in case of floods. Also when floods are released in the fields for the one-flood season. The floods will remain on the fields for about 3 to 4 months and the farmers will fish. However, farmers do experience the decline of fish. As mentioned before, the last few years the floodwaters have consisted mainly of water from rainfall. This water contains little sediment and few wild fish. This means that fishing is less profitable for most. This impacts mostly landless people, who used fishing as a main source of income.

As mentioned before, landless labourers have to create different ways of creating income. This varies from working as day-labourers in farms, or migrating to urban areas to find industrial work there. In Vinh Phuoc, people used to move to the (foot off the) mountains for 2–3 months at a time during floods. Because this area is higher in elevation, they would stay dry.

Adapting to Room for the River

Farmers in the OP have been living on the terps for about 10 years now (Omroep Brabant, 2015). The Terp plan has made sure that (8 out of 18) farmers in this Overdiepse Polder are able to keep farming in the polder. All the farms have increased in size, says a Dutch water expert. Now that the farming live on the terps, *Mrs. Jansen* explains that the business carries on as normal. However, most farmers have had to upscale their farms. They have doubled the amount of cows, from 60 to 120, to make the farms profitable (Rasker, 2022). During the winter months between November 1st and April 1st, farmers are not allowed to grow crops higher than 30 centimetres because it lowers the retention capacity of the polder. It slows down the flow of water when the polder needs to be filled quickly, like a bathtub. Farmers feel that after the intense period of realisation of the project is finally over, they feel very confident about the future. OP farmer *Mr. Smit* expresses joy about being able to continue, after 7 or 8 years of not investing in the company due to everything going on and says that: '*my son is interested to take over the company, then we can take a step back'* (Omroep Brabant, 2015). In the daily lives of the farmers they don't often think about the possibility of a flood. *Mrs. Jansen* explains that '*it either happens or it doesn't, we don't have a button we can push*'. She expresses that the only thing she can worry about is the crops. The grass and maize might be ruined. But, all that damage will be compensated in case of a flood. So she does not worry too much.

7. Farmers' Participation

After discussing the experiences of farmers with the implementation of the 3-3-2 policy and the RftR project, this section will look at the sub question: **In what ways are farmers included in the creation and implementation of flood mitigation projects?** Within this question, the topic of public participation is central, and the distinction between the multiple levels of participation will be discussed.

First, when looking at the interviews, it is clear that there are different forms of participation present. This is partly due to the amount of power people have over the water in their area. As one expert explains, *''In the Netherlands, you only have to drive through a street and there is a channel and a water board busy with it, or cross a bridge and there is a water purification system, and you cannot do anything. ''* This concept is called hydraulic density. The hydraulic density in the Netherlands is much higher than in the VMD. There are many stakeholders concentrated in small areas. This is because the Netherlands is very densely populated, and areas often have multiple functions. As a different water expert stated, "*The country is too small for land not to have at least four functions''*. This is also the reason

these retention areas are also used for agriculture, living, and recreation. The areas are always under the control of institutions of (water) management, and people are largely dependent on the decisions that are made by those institutions. A Dutch water expert related to Wageningen University explains that, though there are some differences, people in the Dutch delta and the Vietnamese delta deal with similar issues. Even though The Netherlands has a democratic system that allows for water board members to be chosen, there are several actors at play that have not. For example, Rijkswaterstaat or provincial government members are not. These big institutes decide most of what will happen in the Delta. In Vietnam, this is similar. The central government decides or creates a new policy and these policies have to be carried out by more local governments, or commissions. This is a multi-layered system. When ideas come from the bottom-up, this means that it needs to be approved by several layers. This creates a lot of bureaucracy, which is also a key characteristic of management in The Netherlands. According to this water expert, the two cases are comparable in the sense that many decisions are made high up and locally there is little movement or playroom for new decisions.

7.1 Participation in the Mekong Delta villages

In the Mekong Delta villages that were researched, farmers usually deal with local government (or Communal People's Commission) figures when water issues or questions arise. Farmers describe that before the high-dykes were built in the area, they had multiple meetings to get informed, ask questions, voice concerns and vote. According to 38-year-old farmer *Mr. Duy*, the communal government held meetings 1-2 years before the building of the high dykes. During these meetings, the communal government presented plans, and people were able to voice concerns. In Vinh Phuoc commune, where *Mr. Duy* has his farm, there were concerns from other local farmers about rats in the third crop if high dykes were to be built. However, most farmers were in favour of the high dyke because the third rice crop ensures more income. Another farmer, *Mrs. Lien* from My Phu Dong, states that she agreed to the building of the high dykes because she found it a struggle to live with big floods because of house damage, human loss and poor infrastructure. This made her voice her opinion in favour of the high dykes. These meetings were held in all three communes. Most farmers state that they voted for the outcome of the meetings, whether to build high dykes or not, democratically. Some answers imply, however, that even though the farmers experience this as active participation, there is a strong influence from the government on these decisions. For example, 61-year-old *Mrs. Lap* from My Phu Dong states that *''...some district government staff came here and introduced the policy of building a permanent dyke. They tell how benefits the dykes are for local people.''* This quote illustrates that even though it is presented as something local farmers have a lot of influence on, it has been decided on a higher level even beforehand. The local government is making sure that the public is first informed about the plans, but also making sure that the public is able to directly give feedback, voice concerns and ask questions. The public feels understood and considered.

An important note in this discussion is that the role of women is different in participation than men. One respondent stated that either men or women participated, depending on who had free time. Many participants have explained their work dynamic as being that men go outside of the house to work, and women often work in the house and raise the children (mostly). When asked if men tell their wives about the contents of the meeting, the responses vary. *Mrs. Lap* explains "*Yes, men went to the meetings, then re-telling the content to the women and vice versa''.* Whereas another participant, for example, *Mr. Xuan, says, '' I rarely share meeting notes with my wife.''* It is important to keep in mind that not every individual has as much power as another. Especially women in these areas are often more easily 'left behind', despite their role as main domestic water managers. *Mr. Khiem* explains that only farmers were invited to meetings about dyke-construction and the 3-3-2 cycle. Landless labourers were not invited to any meetings and are left out of important decisions.

When it comes to participating in the implementation of the high dykes and the 3-3-2 system, the experiences of farmers were a bit different. This difference in opinion seems to be mostly between those who cultivate fruit trees and those who mostly cultivate rice. Fruit tree farmers are afraid of damage from flood releases, while rice farmers experience more benefits from flood releases. In Vinh Phuoc, for example, farmer *Nhung* explains that only about 20% of local farmers are opposed to the flood release. *Mr. Nhung* expresses that "*20% of farmers sow rice early in the third crop so that the government cannot release floods.''* He also insists that the government needs to have stronger intervention to ensure flood release. Most interviewed farmers do not want the 3-yearly flood release on their fields. Many express that flood releases cause landslides and damage to the land, houses, and fruit trees.

In terms of participation or influence on decision-making, there seem to be a few different scenarios. The first scenario is that of Phu Huu. According to *Mr. Xuan,* meetings are held every three years for local landowners in advance of the flood release. During these meetings, it will be decided whether the floods will be released. Locals could vote in a secret ballot in favour or against the flood release. The option with the most votes was to not release the floods, and the local government went with it. The reason for this is mostly the cultivation of fruit. Fruit trees will be damaged, and thus, according to *Mr. Xuan*, the government *cannot* allow flood releases. This response shows that farmers, and especially farmers with fruit trees, hold a lot of weight in the decision on flood release. The final decision is mostly based on the livelihood and opinions of these farmers in Phu Huu. The response of another Phu Huu farmer, *Mr. Dung,* confirms this again with the statement: *''They released floods 1-2 years after high dykes building. To date, more people grow fruits so they no longer release floods.''* Whether or not the floods are released comes down to the communal government. However, the communal government consults the opinions of local farmers and will decide what the majority wants. To this date, the decision has been to not release the floods.

In My Phu Dong commune, one participant describes that the local government was also not in favour of releasing the floods according to the 3-3-2 scheme. "*The local government convinced local people that*

flood releases may damage the high dyke, costing farmers and creating difficulties for the government to repair the dykes. And then local people agreed on no flood release.'' Most farmers in MPD were, however, already opposed to the release of the floods due to the loss of income. Rice farmer *Mr. Khiem* agrees with the flood releases. Even though he expects to have to contribute to any damage that might occur. This is in stark contrast to the Dutch case, where the government is obligated to compensate farmers for any damage or loss of income. The amount of the financial contribution, he says, will be decided by the communal government. In Vinh Phuoc, floods are periodically released. Farmers that have fruit trees have their own dykes in place to protect their fruit gardens from the floods.

In the future, the government wants to expand the 3-year, 8-crop system to a 2-year, 5-crop system in order to achieve even greater benefits for agriculture, according to the People Committee. This led to a farmer's protest. Most farmers do not want this new system of more floods and less crop cultivation. Most farmers (especially smaller farms) cannot afford to lose the income of a rice crop. When farmers cannot afford to lose that income, often the government will not release the floods, as their livelihood can be endangered. In some places, the local farmers are allowed to vote and thus make the final decision. In other cases, the communal government uses the opinion of the public as an essential factor in the decision.

Participation in the communes in An Giang seems to go relatively naturally when reviewing the interviews with farmers. By the responses of farmers, it seems that local officials listen to the ideas and needs of the local farmers as well as take into account the effect that projects will have on their livelihoods. Most decisions are made following at least one meeting, which is usually attended by all landowners. Often, local farmers can vote for the outcome. All contact with farmers goes through communal government officials or pumping contractors. However, these results are more tedious to analyse and we have to remain critical of what is told in interviews. In one of the interviews, one government official who helped to set up the camera interrupted during the interview and said: *you can interview him about growing rice only and other farmers about growing mango.'*. The interviewer then reassured the participant that they could answer every question if they wanted. This small example shows that the answers that are given should be analysed critically, as there were government officials present in the room. The presence of these government officials might have caused participants to feel uncomfortable with giving answers that do not put those figures in a positive light. Giving critical answers might have been something the participants have avoided in this situation.

7.2 Participation in the Overdiepse Polder

The Terpenplan is presented by the government as a flagship project of Dutch water management. However, the ways in which the local farmers have been able to participate have not been as smooth as is often presented. The redevelopment of the OP includes a few different actors. Firstly, Rijkswaterstaat was the main driver behind the project. The provincial government did the planning and also planned the first information moment for farmers. The waterboard of Brabantse Delta did

the realisation of the program and is also responsible for upkeep management for the dykes now. The farmers own the terps and land. The farmers created their own interest group together with the ZLTO (Zuidelijke Land- en Tuinbouworganisatie), an organisation for farmers.

When the plans for Room for the River in the Overdiepse Polder were presented, Rijkswaterstaat held an informative meeting for local inhabitants and farmers to attend. The plans for the polder, creating more area for water retention and removing stalls and agriculture from the land that would stop being protected by a high dyke, therefore basically giving the area 'back to nature', were not well-received by the farmers that joined the meeting. The farmers from the OP responded that they were concerned about the future of their families and businesses. In response, a few local farmers made a plan to build eight farms on terps that would be able to stay. This plan (and more so, this initiative) was not immediately met with enthusiasm from the government. According to a Dutch water expert, the government was not very willing to work together with farmers on this project. The government was more concerned with water safety than the farmers' stakes. In addition to these substantive concerns, RWS simply did not want to sit at the table to work together with farmers. In this case, the solution was to hire an advisor. An advisor can help because it is someone who is both familiar with the provincial government, RWS, waterboards and with the farmers. After all, RWS was looking for a successful participatory project in order to promote Dutch water management and the RftR plans in general, explains a Dutch water management expert that works for Utrecht University in an interview. *'RWS' opinion was that only they had enough expertise to create a plan. However, in the end, the plan that was created by the farmers created even more area for water retention than the initial plan. Because of this, RWS had to go along with it in the end.'* In this case, the role of the provincial government influenced the outcome quite a bit. The provincial government wanted to follow the larger regional vision, which was to give room for agricultural activities. According to the Dutch water expert, these own goals of the province worked in the favour of these farmers. The collaboration of RWS and the province was novel and was chosen as an approach to promote decentralised flood management (Rijkswaterstaat, 2012).

In this case, the different stakes of the different stakeholders are very clear. The central government wanted a flagship project of 'Dutch participatory water management." RWS was mostly concerned with water safety and not at all interested in a participatory process, and the farmers wanted to create a plan in which their farms could keep existing. RWS was not happy to hand over some control of the project. According to a Dutch water expert, RWS, "*it meant less work and less control of the process. It also meant a whole new way of working because, all of a sudden, you had to work with a province. The province says, "It has to go on my terms." Then you need an advisor, and they are not used to that at all.''* The willingness of the government to work together with local farmers was very low. However, when they finally realised that it had to be done, the farmers did have a lot of influence on the decision-making process.

When asking local farmer *Mrs. Jansen* about her experience of the participation process, her response is critical. *''You are dealing with professionals who know 'the tricks of the trade'. So yes, as a civilian, you always feel disadvantaged, to put it that way. That makes it quite difficult'.* This is one of the same critiques that a Dutch water and governance expert reiterates. Farmers do not 'speak the same language' as the government and water professionals. And vice versa. Slowly but surely, during the process, all parties start to understand each other's languages. The advisor was a huge help in this, acting as a sort of glue between these two parties. The complexity of the situation is also visible in the conflict between farmers. When the terp plan was made, it took a long time to figure out who was going to go and who was going to stay in the polder. This caused some conflicts within the community. *Mr. Jansen* states that *'' you also have to constantly justify everything towards each other. Some other farmers thought, "You are only doing this for your own good." You don't want that. We are happy and proud of what we have accomplished, but some of us are left with heart issues due to all of it.''* This quote illustrates the longevity and complexity of this project. There were many different stakes, and due to the difficulty of working together with large institutions such as RWS, farmers suffered immensely from this participatory project. The farms also suffered. A few farmers who acted as a driving force in this project spent large amounts of time driving back and forth to meetings, attending meetings, evaluating, communicating with other farmers, etc. All this time was valuable time that would otherwise be spent working at the farm. *''We had to keep going; you can't just put a plug in those cows and tell them to hold it.... That is why it was intense. The new farm had to be built, while the old one had to be operated. In between, we had all these meetings with the government; actually, it was a crazy situation.''* There was so much time and energy required from farmers in this participation process. However, in the end, the farmers feel that their effort has been worth it. It allowed them to stay in the area where they had been since 1975.

Now that the terps are built and life continues 'as normal', the farmers only have one yearly meeting to attend. However, this system is not yet ideal for farmers. *Mrs. Jansen* expresses that communication with the government is still very streamlined. The farmers have to take initiative, and they feel that that initiative should come from the ones in charge of the dykes. This discontent was most prevalent during the period when the area almost flooded in June 2021. The farmers expressed that they were not informed soon enough by the government of the rising water levels. Instead, they kept track of the news themselves. The phone list, which is activated in case of the possibility of a flood happening, was not correct. In addition, there is only a contract regarding flooding of the polder in the winter but not in the summer. According to *Mrs. Jansen*, it was communicated (and expected) by everyone that the floods would happen in the winter. Due to the effects of climate change, water experts forecast winters that are wetter due to more melting water in the Alps, thus creating higher water levels in the Meuse, Rhine and other rivers. As the lands of the farmers are usually (almost) empty during the winters, flooding and losing crops were never an issue. However, the times the land has almost flooded have always been in the summer months. The crops that grow during the summer

months could be harmed by floods. The farmers and the government have not made a contract regarding this scenario.

7.3 Community and Government Support

When projects like these are implemented, some people will probably suffer the consequences. Therefore, it is important to look at not only the type of support given to them by the government but also the community support that they experience. Support from the government comes in many forms and that is also visible in the different experiences that farmers in An Giang and the OP describe. Community support is also very important, as it determines the whole experience of the implementation of the project. It also shows in which ways the community is involved and how the community participates as a whole.

Community Support

Farmers and other locals in the Mekong Delta villages describe many forms of community support. Especially neighbours are mentioned helping each other out financially, by lending some money for repairs or farming activities. Additionally, farmers helped each other repair their houses or machinery after storms. However, multiple farmers mention that during times of floods, their family or neighbours were dealing with the floods themselves and thus were not able to help others. People were experiencing floods and damage themselves and were not able to help others out during this time. My Phu Dong rice-farmer, *Mrs. Lien,* expresses: *''Both my family and neighbours were in trouble during the flood, so they rarely received any assistance from neighbours.''*

Community support in the Overdiepse Polder was seen in various ways. First of all, the whole community came together during the whole process and worked together in order to advocate for the best results. The farmers in the OP were close and helped each other from time to time on the farm. During this process, this community went through some hard times. Currently, farmers communicate with each other to warn about high water levels. Using a phone list, people update each other if the water levels are higher than usual. Other than that, community support is not mentioned very often in the context of the OP.

Government Support

In the Mekong Delta villages, government support is experienced in various ways. As Vietnamese water and 3-3-2 cycle explains: *''Yeah, usually if the damage is there, government will come to the farmers and of course they ask for help and they can't support the farmers like (inaudible) they can get the loans from a bank and the farmer can get from that.....That is a form of 'compensation', but there is no compensation like the government will bring money to the farmer.''* It is seen as a natural disaster if there is a flood and thus farmers do not get compensation for their lost crops or damage to the land. However, receiving financial support is described by some farmers. First, Mr. Phong from Vinh Phuoc expresses: '' Yes,

sometimes with big floods, local authority support to people 15,000 VND/1000 m2 (US$ 0.7) due to low rice yield." Another farmer, Mr. Dung from Phu Huu, explains that the government gave rice seeds to those who had a failed harvest and also some money. Another farmer from Phu Huu, Mr. Xuan, stated: "Local government financially supported those people's damaged houses by storms." Farmers describe government support in various forms, such as giving out food like instant noodles and rice, 'necessities' or providing people with fishing rods and nets. This type of support is focused on short-term recovery from disasters.

In the Overdiepse Polder, farmers have signed a contract that ensures that they will get 100% financial compensation for any damage to the fields and all damage to crops and dairy quality as a result of water retention or fencing, for example. These details are described in an inundation contract. The farmers also have the possibility of selling their farm, or company, back to the government at an inside-dyke price level. Farmers from the OP who were not landowners but tenants had to move but were given the opportunity to become tenants at another location in the Netherlands from the government, or they were 'bought out'. Damage that happens as a result of floods is fully compensated. For example, when dairy is rejected from the 'milk union' because the cows have been inside for too long. However, floods are estimated to happen during the winter months. Farmers have not discussed compensation in case of a flood in the summer. Mrs. Jansen stated that: *''We do have a sort of inundation contract, but how or what (it entails) I don't exactly know right now. The damage will be compensated, but we don't know how. But if you look at Limburg, that is not very hopeful. We are a little scared of that. We do have something on paper, but it has never been elaborated on. So that is a little tense.''* The farmers in Limburg experienced floods in July 2021 and have yet to receive their compensation (Hendrink, 2021).

8. Discussion

The objective of this research was to try to answer the research question: **How have farmers adapted to and influenced flood mitigation projects in the Netherlands and Vietnam?** The analysis of the results are linked to the concepts and theories that have been presented in Chapter 2. In this section, first (8.1) the flood mitigation projects are discussed, after that (8.2) the experiences of farming and floods before and after flood mitigation projects is discussed and lastly (8.3) the participation of local farmers in these projects is discussed.

8.1 Flood Mitigation Projects

The first sub question of this research is: *What do flood mitigation projects in the Netherlands and Vietnam entail and how have they developed since their implementation?* This section is dedicated to linking the gathered data to this research question. The hydrosocial cycle from Linton & Budds (2014) looks at hydraulic infrastructure or technology as an element that has great social effect. The ways of 'dealing

with' water influences the daily lives of local farmers and their responsibilities, challenges and opportunities. The systems of flood control in this case dictate who wins and who loses.

The 3-3-2 cycle in the Mekong Delta is described by farmers and experts in a way that resembles a (slight) change towards the 'soft path'. Experts describe the goal of the measure to create a healthier delta, by making floodplains more fertile. This is a step towards an adaptive approach. However, the interviewed farmers are critical when it comes to the one-flood season. Multiple farmers state that the water consists mainly of rainwater, which does not contain sediments and thus, does not benefit the soil. Therefore, most farmers do not want to implement this one-flood season. Farmers state often that because of this reluctance, the 3-3-2 cycle is not followed. The benefits for the soil are too little to justify the lack of income. One Vietnamese water expert states that mostly poorer farmers lose a lot of income during floods. They often have smaller farms and not a lot of reserves or budget to be resilient during flooded periods. Since the implementation, the government is wanting to expand the 3-3-2 cycle to a 3-2 cycle. Instead of a one-flood season every three years, it will be a one-flood season every two years. This is particularly impactful for poor farmers in this region. The choice to further expand this policy is interesting, considering the low adoption of this current cycle. This choice hints at the fact that provincial governments perhaps find the function of the 3-3-2 cycle to relieve flood risks downstream more important than the agricultural benefits for farmers and thus, want to expand this function of the floodplains in the Mekong villages. Contrary to the critical stance of farmers towards the 3-3-2 cycle, farmers express a lot of contentment with high-dykes. In most interviews, farmers claim that their lives are safer now and their livelihood has improved. Especially older farmers, who have seen the change with their own eyes express how much easier and safer their lives are behind dykes. Farmers view the usage of fertilisers and pesticides (and the rising costs these products bring with them) as something that might be a little annoying, but all worth it considering the chance to do triple-rice cropping.

In the Overdiepse Polder, the farmer expresses to be very happy with the protection of the dyke, and not very happy with the potential flooding. The terps that were built in the OP could be considered a hard measure, because of its structure and engineering. The terps are not necessarily described aqs a flexible flood control measure. However, due to the fact that the terps are not constraining the river water, this measure can also be deemed as a more soft approach to flood control. The use of flood control measures such as terps is in line with the ecological turn that is described by Disco (2002). The ecological turn describes the shift from technocratic solutions to flood control issues, to a holistic and ecological approach. There is a focus on soft measures and a focus on undoing as much ecological damage as possible. The terps make possible the shift from 'the fight against water' to 'letting water in sometimes', as described by Wesselink (2007), even by using engineering-based solutions. However, as farmers and experts mention, the polder is expected to flood once every 25 years. We have to be critical when reviewing this project and be critical about the ecological benefits

of this one. Flooding once every 25 years, in reality, does not change much in terms of reintroducing flood dynamics or creating wetlands for biodiversity or recreation.

In the VMD, some farmers also use stilt houses, which can be heightened during times of flooding. Terps are in some way comparable to these stilt houses, as you move your living area somewhere higher, instead of interfering with the floods. However, there is a large difference in safety between these two living options. Farmers describe that while there was a flood they would often be scared, or not able to sleep, because of the risk of someone falling into the water. The safety for kids was not good. The terps do not have risks, as they are very large. The farmers in the OP are able to leave the terps even during floods by car. Which also raises the question about if these constructions should be considered traditional terps. The terps in the Overdiepse Polder are described more as a bridge-like construction due to the connection to the dyke (and thus, road). One could argue that this would no longer be a terp, but rather a dyke with plateaus to live on. The Room for the River project is described as a Building with Nature approach by de Vriend et al (2015). A previous high-dyke was lowered to be a semi-dyke. This action fits into the description of BwN, or the soft approach as it allows for water to go into the floodplain. However, as experts and the farmer state, the floodplain was estimated to flood once every 25 years. The impact of this project will thus be limited for nature in this area. Furthermore, the idea of Building with Nature is that other aspects such as biodiversity or recreational opportunities are combined with flood control. However, in the OP the experts and the farmer do not mention any benefits for recreational activities of biodiversity.

In general, creating floodplains on agricultural lands in VMD and OP seem to be smaller steps towards adaptive flood control than governments seem to promote or communicate. In both areas, small steps on the 'soft path' have been made. The turn towards the soft path was spotted in the ecological turn earlier in the Dutch context (Disco, 2002). Even though the alterations in the OP are going towards a more adaptive flood system, in reality there is not a big difference to the old situation as the area is estimated to flood only once in 25 years to protect urban areas upstream. However, according to *Mrs. Janssen,* the area has already been almost-flooded 4 times. In the VMD, where this shift towards a more adaptive approach has been way more recent, there are also small steps visible towards a more flexible flood system. Floods are being let in more in order to better the soil quality and relieve stress on urban areas during floods. These flood mitigation measures are maybe not as effective as anticipated or hoped. However, it is an important development that, with the effects of climate change and unpredictable weather conditions in the future, there is the possibility to store water in these areas.

8.2 Experiencing Farming and Floods

This section centres on the second research question ; *How are affected farmers experiencing farming and floods before and after the flood mitigation projects and coping with its effects?*. As explained by Linton & Budds (2014), the hydrosocial cycle highlights that the meaning of water is dependent on its

performance or importance in a context. Furthermore, the meaning of water has social implications in our societies. Water has the power to reshape social relations (Linton & Budds, 2014). Farmers' experiences in the two cases displayed similarities and differences in flows of water.

First of all, farmers in the VMD used many words to describe floods. As seen in the data, words to describe floods vary from 'beautiful' to 'bad' and 'dangerous'. These words carry meaning that goes beyond the chemical compound of water and describes a (re)action. When floods are beautiful, it means that people (farmers and landless) prepare their boats and get ready to catch fish. Fish provides food and an alternative income for many. When farmers describe floods as bad, they prepare their houses, get cattle to safe grounds and take machinery inside (or to higher land). Subsequently when floods are bad, local governments provide people with boats or nets to catch fish. Interesting is the role of landless/ day labourers. In most cases, this group seems to be 'losing'. In case of big floods, landless people will lose their lives, because they try to go fishing. When there are small floods, landless cannot go fishing because there are too few fish. Due to the high-dykes, the amount of wild fish has decreased to about 10%, making it more difficult for those who have no land to create an income. During the one-flood season, landless people who work as day labourers on farms lose income. It is unsurprising that many landless people have left the Mekong Delta villages to look for work in neighbouring cities or industrial areas. This particular group of people seem to be losing one way or another.

Water in the Dutch context is described in a much more technical sense. Floods are not described in terms of 'beautiful' or 'bad'. When talked about floods, often the contents of those floods are seen as harmful. This is also related to the course of floods. In the Netherlands, floods occur in a different way than in the VMD. Slowly rising groundwater in the VMD is what creates these 'beautiful' floods. This phenomenon does not happen in the Dutch Delta. This contributes to the experience of floods, which mostly become severe in a few days of rain, and then disappear quickly again. Also, the lack of fresh sediments or the mess or rubbish that are the contents of the river and the effect floods have on the land are mostly explained as damaging. The meaning of floods in the Netherlands is one that is focused on (economical) loss or opportunity, and less so on nature, biodiversity or recreational opportunity. This can also be explained when looking at the history of the Dutch Delta. Since the large flood of 1953, Dutch water management was focused on '*this should never happen again*'. Years of construction of hard measures followed. Due to this long history of fighting floods, it might be difficult to view floods in a different light and see different ways of dealing with them that do not involve completely fighting off water. In contrast, in the VMD people have a history of 'living with floods'. Floods have been seen as part of life, whereas in the Netherlands floods have been seen as the largest threat. The way floods happen also change the way they are perceived. With the emergence of the Room for the River approach this perception of floods is changing in the Dutch Delta. When zooming out of the Overdiepse Polder, the benefits of reintroducing flood dynamics, such as now the presence

of the white-tailed eagle in the Biesbosch, are being seen and appreciated by the Dutch governments, but also farmers.

Camargo & Camacho (2019) describe water as a habitat, an ecosystem and a means of transportation and connection. Floods are described in the same dimensions by farmers in the VMD. Floods are described as habitat for animals in the VMD, as a place for fish, shrimp and crab to live during floods. During floods there arises an ecosystem of waterlilies, sesbania and other plants. During mild floods, boats are used as a form of transportation using waterways. And after floods farmers help each other repair houses or machinery, leading to more community connection. In the OP the water is already a form of transportation for the farmers. The nearby ferry is used all year round, except for when water levels are high. The OP is an area that is used for recreation. Around the polder is an area where people can cycle or walk. Due to the flagship role of the project, many tourists have visited the area. During the development of this project, there were several ideas for ecological development, such as a pool of water on the west-side of the polder that is dedicated to create biodiversity. The OP gives the opportunity for water to be seen in the same dimensions as described by Camargo & Camacho (2019).

When looking at the responses from participants of how they are coping with floods, or adapting to floods, most practices seem to be (inspired by) traditional practices. For example, moving yourself higher than the water can be seen in both cases, by stilt houses and terps. Both of these practices are traditional flood practices. Stilt houses being part of the living with floods paradigm, where traditional Vietnamese practices for flood protection are a part of. Living with floods practices are characterised by being low-cost, quick and effective measures to protect one-self and one's family from floods. By heightening your house, or rather, moving the living area of your house higher up on beams, houses are flexible during floods just in the same principle of floating rice. The level of the house (or rice) can move up with the water level. With terps, this is not the same, but the terps in the OP are described to have been built with a margin of 100 years of flood level rise. So the principle remains, only it is not low-cost and quick, but rather high-cost and future oriented. It is interesting that in the Netherlands, solutions such as floating homes are becoming more and more popular. These floating homes have emerged in the past decades, and shown a great option to combat the housing shortage and a great option for flood prone areas such as deltas. While the terps have been received well, it is interesting why such an invention was not considered in this scenario. Due the new challenges deltas are facing as a result of climate change, Dutch water managers are in need of new solutions. It seems that these new solutions have been inspired by the living with flood practices from the Vietnamese Mekong Delta and implement solutions that have a hint of their flexibility. This is especially interesting when we consider the role of the Dutch in the VMD. The Mekong Delta plans before 2013 show the Dutch influence in creating polders in the VMD with the goal of maximising rice production. Then, the Mekong Delta plan of 2013 shows similar ideas of Room for the River are

projected from the Dutch context to the Vietnamese context (Kingdom of the Netherlands and the Socialist Republic of Vietnam, 2013).

8.3 Roles of Participation

When examining the collected data it becomes clear that different forms of public participation have been described by participants. In this section, the data around the following subquestion is analysed and linked to the central theories and concepts; *In what ways are farmers included in the creation and implementation of flood mitigation projects?*

In the interviews, farmers described different actions and relations they experienced when participating in the local water infrastructure, or flood mitigation systems. The different levels of participation, as described by the Ladder of Arnstein (1969) can most importantly be subdivided in three forms of participation; non-participation, degrees of tokenism and degrees of citizen power. For farmers in the villages in the VMD, participation ranges from degrees of tokenism to degrees of citizen power. Farmers describe that on multiple occasions they can vote, or at least attend meetings that enable them to influence decision-making processes. Information meetings usually indicate a one-way flow of information and thus describe tokenism. Additionally, some statements indicate a 'false' sense of participation. An example of this is the statement *Mrs. Lap* from My Phu Dong "*…some district government staff came here and introduced the policy of building a permanent dyke. They tell how benefits the dykes are for local people.''* This quote shows that the decision has probably already been made by the government and citizens only need to be informed or persuaded to accept the information. This top-down oriented approach perfectly fits this description of a false sense of participation called counterfeit power by Arnstein (1969).

The farmers in the Overdiepse Polder seem to have changed their situation from degrees of tokenism to degrees of citizen power. When the plan of redevelopment in the OP started, the central government and RWS did not have the intention of working together with the local farmers, only an information event was organised. An informative event can be categorised as tokenism due to the one-way flow of information. Experts claim that even before such an information moment, decisions about the redevelopment of the Overdiepse Polder had already been made. The new function of the polder as a retention area was never up for debate. Farmers took over some power and made their own plans. However, had they really been able to make their own plans, it would be to change nothing about the way the polder is used. Using their citizen power, the local farmers were able to work with the government in a partnership, as they perceived it. It is important to note, however, that this partnership also provided some false sense of power. When we look into the decision-making power of the farmers in the OP, it is clear that the plans for RftR, and thus the goals of the government and RWS, were still carried out. The farmers were able to save their own businesses in the process, but the main message was still that as long as the polder could function as a retention area, the farmers could decide the rest. A lot of farmers (10 from 18) still have had to leave, because there was no room to build

18 terps in the small polder. For those farmers, it was not necessarily a process in which they experienced a lot of decision-making power. One might even argue that non-participation for those farmers might be a more suitable label. According to multiple Dutch water experts that were interviewed, the Overdiepse Polder was used as a flagship project for the Room for the River project. Due to this, more effort was put into this project to make it a successful one. This is one of the reasons that the collaboration was experienced as good. Still, many farmers state that they are left with a lot of emotions about the whole project. Placation is described by Arnstein (1969) as entirely tokenistic. Citizens are mostly involved in a project to demonstrate that they were involved.

As described by Edelenbos, van Buuren, Roth & Winnubst (2017), the success of public participation is highly dependent on the reaction of the government, including the willingness to work together with other actors. Participants describe the same barriers of working together that Tseng & Penning-Rowsell (2012) introduce in their article. Lack of institutional support, closed cultures, time, power and inequalities are the main barriers experienced by local stakeholders. Mostly in the Dutch context do the farmers and experts describe that the government is not willing to work together with local farmers in flood mitigation projects. The arrogance and stubbornness that is described fits this theory perfectly. The local farmer from the OP describes a struggle when dealing with RWS which resulted in a struggle between many actors and finally, even ending in health-problems for the local stakeholders. RWS did, initially, not take their input seriously. Participation as a double-edged sword which Tseng & Penning-Rowsell (2012) illustrate, fits perfectly with the description made by the local farmer from the Overdiepse Polder. The unwillingness of the government to work together initially affects the amount of active participation in this project.

Arnstein (1969) argues that citizen participation is about the reallocation of power. Without the reallocation of money or decision, there is no actual participation happening. Above is mentioned the reallocation of decision-making power. The reallocation of money is seen in various answers of participants. For example, in the VMD, farmers state that in some cases they get financial support or aid from the government. However mostly the support comes in the form of fishing gear or seeds. For farmers in the Mekong Delta, receiving financial compensation is not a possibility or option. It is therefore more likely that farmers resort to other solutions, such as *not* implementing policies such as the 3-3-2 cycle in order to (quite literally) keep their heads above water. Farmers have to come up with low-cost solutions themselves in order to keep their farms operating. In the OP, farmers will get full compensation whenever they have damage from floods and when they sell their farm they will receive compensation for the devaluation of their land. The government is obliged by law to compensate farmers in every way. This leads to farmers being more willing to work with the government, because they are not immediately risking their livelihoods and income.

It is important to analyse the experiences of farmers and understand that not all farmers are the same. In this research there were a few marginalised groups identified that seem to be 'losing' more often than winning. The first group that was identified through the data are landless people.

Farmers from the Mekong Delta villages identify this group as one that often experience livelihood struggles due to a lack of floods, but also when there are high floods. When there is a lack of floods, there is no possibility to fish and create an income that way. When there are high floods, other work activities are harder to carry out for those who have no land. Another group that was described in the data was women. Especially when it comes to participation meetings, farmers describe that often men of the household attend these meetings alone. This could lead to women being left out of policy creation and implementation and less able to influence their daily lives, surroundings and businesses. In the Overdiepse Polder, the female farmer that was interviewed also asked her husband for certain details and regulations. The sample is too small to make conclusions about this case, but it does illustrate a similar situation where this woman had less information than her husband.

The farmers in the Overdiepse Polder were not enthusiastic about the collaboration with the government. This relates to a bigger issue in the Netherlands around agriculture. Currently, due to a surplus of nitrogen, a lot of farmers face insecurity about the future of their farms. This means that in the future, more collaboration between farmers and the government is needed in order to address this nitrogen issue. In this light, the experiences of farmers show discontentment about the approach of the government, which, according to them, is filled with arrogance and a feeling of superiority. According to Dutch water experts, the Dutch government and local farmers do not speak the same language.

9. Conclusion and Recommendations

This research was aimed at answering the research question: **How have farmers adapted to and influenced flood mitigation projects in the Netherlands and Vietnam?** The data has provided valuable insight when looking at the different ways of dealing with floods, adapting to flood mitigation projects and participation in the Dutch Delta and Vietnamese Mekong Delta. A comparison of these two cases provides a better understanding of the complexities of water management and the role of farmers in shaping flood resilient deltas in the future.

One key difference between the two cases is the level of governmental willingness and support (e.g. financial compensation) and hydraulic infrastructure development (e.g. low-cost or high-cost solutions). In the Dutch Delta, due to the long history of fighting floods and flood management, a multi-layered flood system with many stakeholders and a high hydraulic density create extensive coordination. In the Vietnamese Mekong Delta, due to the *doi moi* reforms, flood management is managed more and more locally. However, there is still a lot of bureaucracy due to the multi-layered management system. Though, in this delta there are less (financial) resources to support farmers when floods occur compared to the Dutch Delta. Due to this, farmers in the Vietnamese Mekong Delta often use traditional solutions that are low-cost and flexible, such as stilt houses, floating rice cultivation and aquaculture. The cultural and socio-economic dynamics of each region have shaped the farmers' adaptation pathways and their influence on flood mitigation projects.

One area in which the two cases portray similarities is when analysing citizen participation. Farmers in both areas struggle with the shift towards a more 'soft approach', because the shift creates (to a varying degree) a challenge to maintain their livelihood. Farmers in the Mekong Delta villages Phu Huu, My Phu Dong and Vinh Phuoc mostly struggle with losing income from one rice crop every three years. So much so that most of these farmers claim that the 3-3-2 cycle is not implemented regularly. The supposed benefits for the soil of the fields is contested by the farmers. Farmers claim that the floodwater is mostly rainwater, which contains almost no sediment. This example shows the need for better citizen participation, because it builds on local knowledge and therefore creates better policies. The 3-3-2 cycle has not taken into account local knowledge enough. Farmers in the Overdiepse Polder have influenced the redevelopment of the polder greatly. However, the general idea that this polder had to give room to the river, or fullfill a retention function was a decision pre-made.

This research was conducted using the hydrosocial cycle as a conceptual lens. Linton and Budds (2014) have explained that within the hydrosocial cycle water and society shape and reinforce each other over time. The first element, the meaning of water, differs in both cases and it also differs to the types of farmers within the researched areas. The meaning of water, or the meaning of floods is closely related to the second element, hydraulic infrastructure. This is because the type of hydraulic infrastructure (e.g. hard or soft measures) dictate how and when floods occur (e.g. full protection from high-dykes or semi protection from semi-dykes). The types of floods that occur do not only differ due to the hydraulic infrastructure but also per context. There are great differences between the two cases. In the Vietnamese Mekong Delta, floods happen yearly. In Phu Huu, My Phu Dong and Vinh Phuoc, most farmers operate their farms in a highly protected context with extensive flood protection. In the Overdiepse Polder, farmers also operate in a context with hard measures to keep out water. Both areas allow water in the floodplains when water levels are critically high, or in the case of the one-flood season, for agricultural benefit. The differences in context show different responses to floods and experiences of floods.

Hydraulic infrastructure is subsequently related to social relations. Local farmers have also influenced the hydraulic infrastructure or flood system, either by forms of protest (e.g. not following the 3-3-2 cycle or building their own semi-dykes for fruit trees) or by initiatives or ideas (e.g. the terp plan in the OP). Social relations can be viewed in the form of participation. Farmers have had many different experiences with participation. Most of the farmers seem to describe a form of tokenism as described by the ladder of Arnstein (1969). Tokenism is counterfeit power as opposed to actual power. Farmers in both contexts describe that they had influence in decision-making, to an extent. When looking at expert interviews, a lot of the perceived decision-making power seems to be restricted to details. In both the VMD and OP, governments have often made decisions about increasing retention capacities and informing local farmers of this. Informing is a one-way flow of information. However, farmers describe the opportunity to give feedback, ask questions or vote. This indicates a higher level of participation. Consultation is one sport of the ladder of participation that describes the process where citizens are seen as a statistic.

In order to learn from each other and explore different flood mitigation strategies to combat the effects of climate change and create resilient deltas, this study was focused on the two contexts of the Dutch Delta and the Vietnamese Mekong Delta. In conclusion, the ways in which farmers have adapted to flood mitigation projects and influenced these flood mitigations projects varies in the different contexts. Social-economic and ecological factors make room for different approaches by farmers in order to deal with floods. This research shows that different hydrosocial relations create different means of participation and a different system of flood mitigation creates different changes and challenges for farmers to adapt to changing floods.

9.1 Recommendations for Future Research

While this research has successfully analysed how farmers have different experiences with participation and different approaches to flood adaptation. However, there were also limitations to the research. For example, the variety and number of respondents creates limitations for the analysis. Especially the number of farmers that were interviewed in the Dutch Delta were limited, making a comparison of answers more difficult. This research is focused on two study areas that have a different scale level. For future research it would be sensible to do a comparison of two cases that are more similar in scale in order to compare these two on the same level.

In this study, the role of landless day labourers in the VMD came to the fore as an interesting finding. However, because this study focused on the role of farmers this could not be further researched. For future research, the topic of landless people living in the Vietnamese Mekong Delta could (and should) be explored. This would help to determine better who 'loses' and who 'wins'. The landless could be described as *have-nots* and are therefore an important topic of study to contribute to the field of international development. A study could be focused on determining other *have-nots* in this area, such as women or ethnic minorities such as Kinh.

Another result from this research was that the 3-3-2 cycle was not the beneficial policy that was expected. In order to work towards healthy deltas and sustainable agriculture, this policy should be further researched. Possible alterations to this policy should be explored and more experience and knowledge of farmers should be considered and collected in order to improve this policy.

This research laid bare the difficult participation process of farmers in the Overdiepse Polder. This topic has been studied in the past. However, there is limited research that shows if the government (or especially RWS) has learned from this process. It is important to learn about how, now after this project was finished, RWS approaches a new participatory project with citizens. It would be good to look critically at the position of RWS in other Room for the River projects, or other government-farmer projects for that matter. Especially during this time which is characterised by very difficult agro-issues in the Netherlands. The government will have many cases in which farmers have to move or stop farming, and it would be good to learn from the past in order to do better in the future.

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Appendices

Appendix 1: Interview guide Vietnamese Farmers

KEY QUESTIONS FOR HOUSEHOLDS IN-DEPTH INTERVIEWS

"Dealing with floods: village responses in An Giang Province"

Personal information

Name:.....

Date:.....

Age:.....

Sex:.....

Address:.....

Name of interviewer:.....

About Social Relations and Livelihood

[Important here to gather background information about their social-economic status, family info, life stories, education, ethnicities]

1. What is the household composition?
2. What do you do for your livelihoods – do you have off-farm jobs? Outside the commune? Do you stay at their home throughout the entire year or do you live temporarily somewhere else?
3. What is your ethnicity? Do other cultural or ethnic groups live in the commune/district?
    a. What differences are there with respect to farming and dealing with floods?
4. What social relations/social networks do you have on which you can rely during flood season (in case of big floods)? And for what are these used?
    a. Support in financial, social, health terms etc. within community/ outside: family, friends, neighbours?
    b. Support in financial, social, health terms etc. by government, outside actors, ngo, institutions, volunteers

About Commune and Environments

[Important here is to get an idea of history of the commune and the diversity of landscapes among and within the communes – that elsewhere are grouped as homogenous LX quadrangle for paddy]

1. How long have you lived in the commune; how has the commune changed over the last 30-40 years – in terms of livelihoods, agriculture fishing way of living, dwellings, What type of

livelihood do you have? (farmer, aquaculture, livestock, something else).

2. In case you moved to this commune, what connections do you maintain with your former community/homeland (in terms of family, land, customs, house)?

    a. Do people have houses outside their hamlet; for example do people from Vinh Phuoc have houses on the mountain apron? Where did they go in times of flooding?

3. Could you describe what the difference is between highland and lowland in your commune are– what are consequences for agriculture (e.g. vegetables, fruit trees), or impact of flooding *(My Phu Dong and Phu Huu*)?

    a. Important to have them talk about the different ecological niches in their commune (highland-lowland, high dyke, no dyke).

    b. But also: What happens on the dyke/canal bank and what happens in the flooded area in terms of agriculture, keeping cattle. How important are the dykes as place to live on (during high water)?

4. What is the function of the pumping company? Do they exist in all communes? Or at the level of compartments? *(My Phu Dong and Phu Huu).*
    a. Who do you turn to when you need to pump water out or in? Do you have your own pump? Do you have to ask permission to pump to the local government?
    b. Thai mentioned possible water conflict related to position towards sluice gate and pumping: what problems are there in relation to farming and pumping?
5. In Phu Huu, how do people think flooding is different in Cambodia? Are there dykes in Cambodia? What is the relation with Cambodian people (do the work in Vietnam)? What do Cambodians cultivate differently from them?

    a. A large world bank project is implemented in Phu Huu – what do people know of this project? -> we can ask what people know about the land use or agricultural activities proposed in the project?
    Five proposed development of livelihoods models: 1. giant freshwater shrimp and spring rice farming season, 2. floating rice and aquaculture, 3. growing of mushrooms, 4. flood release/fishing, winter-spring rice and crops for livestock farming 5. 1 crops season, winter-spring rice and flood release/fishing.

About Floods

[Important here is to have local knowledge and practices with emphasis on what happens during normal floods (so good/beautiful floods).

1. How do you define/describe floods (high water season or big water)?

2. What does it mean to live with floods (in V. Phuoc and Phu Huu)?; Could you describe (detailed) the onset of flooding, how it rises and goes away.
    In My Phu Dong: what happens in case of controlled flooding

a. For example ask: how do they notice that floods are coming, what do they do to prepare; how is coming into their fields; how fast; what do they do when floods are rising (e.g. fix boat, or perhaps go to other place); when do they know if floods are good or bad?

b. This should include a description of their practices

c. How does village life change during floods?

3. How have floods changed over time in the past 20-30-40 years?

a. For example: intensity/severity, damage and revitalization.

b. What (if this is the case) are the consequences for you when floods no longer occur (good and bad impacts)? (I.e. land fertility)

4. In case of big/bad floods: Who is affected (most) by floods) / Are there people that benefit from the floods who are they?

a. What are these affects? How do floods threaten personal security, income, health, village life etc.

About Local Governance towards Annual Floods

[Important here to have people's perceptions on the role of local governance and local/national policy]

1. How does the local government influence local households' livelihood practices in the flood season?

a. If at all, is there an annual meeting before every floodseason between local people (or local people and government)? How is this organized?

2. How does controlled flooding of high dyked compartments work? What is the role of the farmers/villagers and what does the government do? Or pumping company?

a. How often is your area controllably flooded?

b. In Vinh Phuoc: Do you know if the government is planning high dykes; why do you want to have high dykes or not?

3. How do these controlled flooding areas (periods) influence your daily life and practices? What are you (un)able to do during this period also in terms of social life/village life?

a. What are the advantages (benefits) and disadvantages of it? Do you engage in fishing activities or other aquaculture activities?

4. How does the local government coordinate with you in flood management? How do you participate?

5. What is your relation with organizations that manage water in the dyked area: water pumping companies, associations of water users? What water-use problems do you experience? Where is your land in relation to the sluice gates? How does the pumping system work?

6. How does the warning system work in case of approaching big floods?

About Gender and Flooding

[Important here to see what people's roles are (incl. tasks/responsibilities) depending on their gender (and age) within the household, how these roles shape their flood resilience practices and the effects on their livelihoods].

1. What are the impacts of floods on men and women's livelihood?
   a. How do men and women differently cope with floods? (in livelihood, food production, income etc.)

2. What are the roles of men and women during the flood season?
   a. What are the roles of women and men in general during the flood season?

3. What are your role, tasks and responsibilities during flood season?
   a. What are the effects (positive/negative)?

4. What are the roles, tasks and responsibilities of your members in the household?
   a. What are the effects of these roles, tasks, responsibilities on your family members (positive/negative)?
5. How do you experience your role (including the tasks, responsibilities and effects)?
   a. How do you perceive/experience the roles of your household members? Do they affect you? If so, how and why?

6. Do your roles during the flood season differ from your role outside the flood season?
   a. How does it differ?
   b. Why does it (not) differ?
   c. What is the effect of those differences?

About Dykes (dyke system) and Other Flood-related Technologies

[Important here: Hear how people experience their role (in relation to the local government within flood control systems and their participation within policy creation. As well as their role of the managing/reinforcement of the dykes.]

1. What is positive, negative about the high dykes (or being outside of the dykes) – if inside the dyke how do they feel about letting floods in once in three years; or every year?
2. How infrastructure/technology do you have to deal with (high) water? For example related to:
   - Infrastructure
   - Housing
   - Mobility
3. What dyke systems exist in the commune?
   a. How was this built, when and by whom? (e.g by what machines, manual labor, who was the contractor, what was the role of the local commune, local people labor investment, local government)?
   b. Was the dyke built from scratch or was it a gradual process from low dyke continuously reinforced? (also, local commune or local government? Or together?)

4. Were there meetings to discuss the building of the high dyke between local people and the (local) government on this/ if local people agree or not? Could you describe these meetings?
    a. Did you have a role in the decision-making of this project? What decisions did you have an influence on?
    b. Did you have a role in the building of this?
    - What actions did you take?(manual labour, lend out machines, use prior knowledge)
    - Compensation?
    - How much time did it take you?

5. How is the system managed (and by who)?

    a. Do you have a role in managing the dyke (or other system)?
    - Repairs and reinforcements
    - Who takes initiative?

    b. What is the compensation? (financial, help from government (e.g. machines to recover the land))

6. How does this dyke structure contribute to the (farming) activities in your village?
7. What are the significant changes (agricultural production and other livelihood activities) after the dyke was built?
8. How is your community transformed before and after the dyke system?

Future Plan for Flooding Management

1. What do you think about the future of annual floods? Why is this?
2. Can you explain if there will be more dykes or controlled flooding and why?

Appendix 2: Interview Guide for (online) Expert Interviews (conducted in Dutch)

Introductie

- Voorstellen + bedanken voor aanwezigheid en tijd
- Toestemming vragen voor opname
- Inleiden onderzoek en doel van interview
- Ik heb je/u benaderd omdat je/u kennis hebt over … en werkzaam bent bij …, kun(t) je/u toelichten wat de werkzaamheden zijn daar?
- Vragen Ruimte voor de Rivier
    - Wat kunt u vertellen over de rol van burgers in het RvdR project?
    - Was het van tevoren het plan om burgers hierbij te betrekken?
    - Wat waren de ervaringen van boeren uit de Overdiepse Polder met de overheden (RWS, provincie, waterschap)
    - Bij waterschap: Wat waren jullie ervaringen met de burgers in dit project?
    - Wat ging er wel goed/ niet goed
    - Is zo'n project (met participatie) speciaal in de NLse context? Zou het ook op andere plekken succesvol kunnen zijn?

- ➢ Wat maakt het dat het plan 'succesvol' kon zijn

❖ <u>Vragen Overstromingen/Retentie</u>

- ➢ Kunt u voordelen bedenken voor overstromingen in NL?
- ➢ Kunt u de nadelen bedenken?
- ➢ Wanneer moet je participatie een rol laten spelen in veiligheid? Wie maakt dan uiteindelijk de keuze?
- ➢ Hebben harde maatregelen negatieve invloeden?

❖ Is er nog iets wat u kwijt zou willen over dit onderwerp? Iets wat nog niet gezegd is?

❖ Heel erg bedankt voor de tijd!

Appendix 3: Codebook

Code	**Subcode**	**Type of code**	**How many times**
Floods	Affected by floods	Deductive	6
Floods	Affecting floods	Deductive	1
Floods	Flood change	Deductive	7
Floods	Flood info system	Inductive	14
Floods	Good-bad flood	Deductive	49
Floods	HD no flood	Inductive	14
Participation	Passive participation	Deductive	34
Participation	Active participation	Deductive	11
Participation	No participation	Deductive	11
Participation	Conflict-protest	Inductive	12
Participation	Unwilling govt	Inductive	10
Participation	Support govt	Deductive	22
Participation	Support philanthropy	Deductive	9
Participation	Support community	Deductive	10
3-3-2 cycle	3-3-2 pro	Deductive	9
3-3-2 cycle	3-3-2 con	Deductive	7

3-3-2 cycle	3-3-2 future	Inductive	3
Dyke system	Hard measures	Deductive	9
Dyke system	Soft measures	Deductive	4
Dyke system	Building with Nature	Inductive	3
Dyke system	Living with Floods	Inductive	11
Dyke system	High-dykes	Deductive	25
Dyke system	August Dykes	Deductive	5
Dyke system	Raised living	Inductive	9
Dyke system	1MD5R	Inductive	1
Extra		Deductive	3
Change lives		Inductive	5