Agrarian Transitions in Aquarian Contexts:
Fisheries Transitions in Vietnam's Tam Giang Lagoon

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Abstract

This thesis investigates agrarian transitions within aquarian contexts by investigating livelihood transitions in a small rural fishing village in central Vietnam. Examined are powers at play that inform livelihood transitions as fishers and fish farmers respond by moving in and out of different production systems in order to maintain their fishing and fish farming livelihoods. This research reveals that aquarian transitions in Vietnam could follow a similar trajectory of agrarian transitions whereby smaller, *less efficient* production systems make room for more efficient economies of scale. In conducting a thorough and detailed empirical analysis of production systems, the socio-economic relations that shape production systems, and natural resource governance within the Vietnamese context, this research contributes to a better understanding of the knowledge surrounding fishery resources and livelihood options

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Contents

Introduction

Small scale fisheries in Vietnam

This thesis investigates livelihood transitions within small-scale fisheries in Vietnam. In Vietnam, fisheries play an important role. The sector contributes significantly to the portion of global human consumption of fish and supports *millions* of jobs in the areas of fish processing (almost half of which are performed by women), as well as providing rural dwellers with occasional and seasonal fishing employment (FAO, 2010). According to Vietnam's Ministry of Agriculture and Rural Development Fisheries Informatics Centre (FIC), the country's fisheries sector was reported to provide jobs for approximately four million people in 2008 (Pomeroy, Nguyen & Thong, 2009). Fish is also the primary source of dietary protein in the country providing approximately 40 per cent of the animal protein in the Vietnamese diet (Pomeroy et al, 2009).

The increase in Vietnam's aquaculture production has served its economy well with 227,000 jobs created between 1997 and 2003 *alone* (WWF, 2006). Aquaculture also offers the potential for high returns even at the household producer level (Armitage, Marschke & Tuyen, 2011). Currently, Vietnam is the largest aquaculture producer in Southeast Asia, and the third largest producer in the world[1] (FAO, 2012). Even with the intensification of aquaculture, however, Vietnam produces comparable total production between both capture fishing and aquaculture in recent years (FAO, 2010). Vietnam is unique in this respect since there are few other countries where both fishing and fish farming are practiced at a small producer level.

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1 China produces 61.35% of the world's aquaculture, India produces 7.76% and Vietnam follows at 4.46%.

However, inshore fisheries in Vietnam are considered over-exploited, and close to a decade ago the Vietnamese Ministry of Fisheries along with the World Bank were emphasizing this over-exploitation and the need for intervention to improve management, and performance in productivity and biodiversity conservation (Ministry of Fisheries & World Bank, 2005). In addition to concerns with respect to the sustainability of Vietnam's capture fisheries, the country's increasing aquaculture production also raises issues of concern. These issues include seed and feed supply, disease control, management and environmental impacts, as well as understanding carrying capacity of sea and inland water (Ministry of Fisheries, 2005, Bush, Khiem & Xuan, 2009; Hishamunda, Ridler, Bueno & Yap, 2009). Depending on the species, aquaculture can also be prone to boom and bust cycles, which is particularly exemplified in shrimp aquaculture (WWF, 2006; Hall, 2009). In general, booms can have detrimental consequences for tenure security as states, agribusinesses and migrants stake a claim to land already farmed (Hall, 2009). In the absence of clear government regulations in Vietnam, the country's aquaculture boom has led to land grabs and *defacto* privatization that has reduced communal fishing areas (Tuyen, Armitage & Marschke, 2010). Shrimp farming, for example, increased in area by *80 per cent* within the *three-year period* 1999 and 2002 (WWF, 2006).

Furthermore, boom and bust cycles can incur great losses due to depressed farm gate prices, inflation on feed, high mortality rates, and delays in finding buyers. Therefore, farmers need to diversify in order to cushion these busts (Belton et al, 2008). To diversify however farmers need capital––something poor farmers cannot always access. Hence, aquaculture can sometimes bring more income to rich groups because they have the capacity to survive after a lost harvest, and they often have larger land holdings (WWF, 2006). This land size gap may be increasing as the

wealthiest obtain even more land while the poor have to sell land to pay debts and transition to wage labour (WWF, 2006; Little et al, 2010).

Vietnam's increased aquaculture production and the over-exploitation of inland fisheries has drawn attention to the need for resource management in order to ensure sustainability of the sector. The inability of the state to enforce regulation successfully has caused local users to respond by developing their own resource management systems (Boonstra & Nhung, 2011). This has taken shape through fisheries co-management in the form of Fishing Associations (FAs), whereby the state and community are responsible for formulating and implementing regulation (Tuyen et al, 2010; Boonstra & Nhung, 2011). Historically however, Vietnam's state intervention in resource management has been inconsistent creating an unpredictable and uncertain context for local resource users. This unpredictability has impacted social relations within and across production systems with a tendency of strengthening the relations within the same production group, while relations across different production groups have weakened (Boonstra & Nhung, 2011). Moreover, there is the potential of newly installed Fishing Associations to reinforce existing conflicts and inequity between different production systems (Boonstra & Nhung, 2011).

Along with the increased focus on sustainability of Vietnam's fisheries sector is the increased interplay between different fisheries livelihoods. The expansion of aquaculture along with the intensification of capture fishing has led to more difficult livelihoods over time (Armitage & Marschke, 2013). As a diversification strategy, fishers and fish farmers often practice a combination of different fisheries activities in an attempt to stabilize their income. Recently, it has been suggested that to understand better the impacts of aquaculture on poverty a *relations of production* approach is needed (Little et al, 2010). Rather than assessing, for example aquaculture

based on scale[2], labour as a unit of interpretation[3] offers better insight into motivations and outcomes and how aquaculture fits into complex livelihoods (Little et al, 2010). It is therefore worth examining who wins and who loses from the expansion of aquaculture markets.

For this thesis, *relations of production* are investigated within the context of rural fishing village life. Coulthard, Johnson and McGregor (2011) underscore the interconnectedness between fish and people by arguing that fishing is perceived not just as a livelihood but a way of life. With this in mind, intimate rural settings such as small fishing villages consist of households living and working side by side, and therefore, social relations are closely linked with production. Moreover, the expansion of aquaculture markets presents only some fishers with the ability to transition into aquaculture while others lack the capacity to do so. Therefore, these transitions have consequences for how fishers interact with each other within and across these new production systems. In light of the complexities surrounding the interplay between fishing and fish farming in Vietnam then, this thesis will focus on a lagoon ecosystem to answer the following questions:

1. *What are the types of aquatic based production systems operating in Vietnam's rural lagoon communities, and how do these systems interact?*
2. *How are people marginalized within and across different production systems?*
3. *How does fisheries governance in the lagoon work towards social ecological sustainability?*

What unfolds on the following pages is a story of one village's complex fisheries production systems and how governance of these systems promises to change irrevocably the lives of fishers and fish farmers living in this village.

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[2] Scale here refers to size.
[3] Labour as a unit of interpretation refers of type of labour: wage labour or working for oneself. Through an agrarian transition lens this could speak to agency.

Rationale and Significance

This thesis links to ongoing research conducted by M. Marschke on "Fisheries Transitions in Southeast Asia" (SSHRC SRG grant), and contributes to current theory and practice in that most agrarian scholars focus primarily on agricultural transitions (Rigg, 2006; Akram-Lodhi and Kay, 2009; Araghi, 2009; Hall, 2009; Ploeg, 2009; Bernstein, 2010a). Thus, I will extend the scholarly and practical debate on agrarian transitions to aquarian transitions, centered on fisheries livelihoods in Vietnam. Moreover, scholars to date have researched *either* capture fishing *or* aquaculture but have not taken a simultaneous look at both. Therefore, this research is innovative in its focus on both capture fisheries and small-scale aquaculture producers. In conducting a thorough and detailed empirical analysis of production systems, the socio-economic relations that shape production systems, and natural resource governance within the Vietnamese context, this research contributes to a better understanding of the knowledge surrounding fishery resources and livelihood options.

Chapter 1: Review of the literature

The chapter consists of three sections. The first section discusses the elements of Agrarian Political Economy and other agrarian transition theories that will be most useful in its adaption to aquarian contexts, specifically that of the productive peasantry in relation to poverty alleviation and economic development. The second section discusses agrarian/aquarian livelihood transitions and the role capture fishing plays in challenging the assumed linear progression, typical in transitions literature, from small inefficient productive systems to more efficient economies of scale. The third section draws on literature that investigates resource users as agents in governance of natural resources, considering that over exploitation of natural resources is catalyzed by broader economic forces.

1.1. Transitions Theory

For the overarching framework of this research I am adapting Agrarian Political Economy, (APE), to analyze agrarian changes in aquarian contexts. Rooted in Marxist theory, agrarian transformation theory investigates how expansions of agricultural markets and the consequences of strengthened commodity relations and divisions of labour affect *social relations of production*–– characterized by all the relations between people that shape how production is organized (Bernstein, 2010a). Within agrarian transformation theory the subject of Bernstein's analysis is the peasant. Akram-Lodhi and Kay define the peasant as "an agricultural worker whose livelihood is based primarily on having access to land that is either owned or rented, and who uses principally their own labour and the labour of other family members to work that land" (2009, p. 3). Peasants are subordinate to wider social and economic forces that are beyond their control due to their need for capital (Akram-Lodhi & Kay, 2009). This subordinate position affects the complex

network of social relations in which they are involved, and these relationships determine the conditions in which peasants may or may not produce the surplus that can allow them to prosper (Akram-Lodhi & Kay, 2009; Kerkvliet, 2009; Belton et al, 2011).

The transition from peasant farming (small-scale or primarily subsistence farming) to agriculture (economies of scale) is argued to promote economic development, poverty alleviation and food security (Rigg, 2006; WDR, 2007). However, as globalizing agricultural trends have demonstrated, agrarian transformations can result in the exclusion of poor farming households and large-scale consolidation of agricultural farms (Akram-Lodhi and Kay, 2009; Hatanaka, 2009; Bernstein, 2010a). Aquarian transitions could potentially mirror this process of exclusion (Belton et al, 2011). Keeping the exclusion of poor farming households in mind then, Bernstein questions if current globalizing trends of agrarian transformation suggest a process of peasant elimination or what he terms *de*peasantization (2010a). With its focus on power and inequality––specifically in respect to social relations, and power in agrarian formations (Bernstein 2010a)––agrarian transformation theory will be particularly useful for framing my discussion on aquarian transitions in Vietnam.

Although providing a strong framework in which to investigate aquarian transitions Agrarian Political Economy lacks in its neglect of issues pertaining to ecological change in relation to productive forces (Bernstein, 2010b). In this regard, Bernstein acknowledges an intellectual deficit in this body of thought (Bernstein, 2010b). Since development of the productive forces in aquaculture, issues of ecological change, and the relations between them are critical factors contributing to my analysis of aquarian transitions, I will draw on aspects of Political Ecology to account for this deficit. Bernstein refers to Political Ecology rather broadly as the study of nature-

society interactions that encompass relations of inequality and power (Bernstein, 2010b). Bernstein's emphasis here is on society (Bernstein, 2010b). Robbins (2012) more specifically acknowledges that the cost and benefits associated with ecological change are distributed among actors unequally, which serves to strengthen or weaken existing social and economic inequalities. These changing relations, he continues, hold political implications in terms of the altered power of actors in relation to one another (Robbins, 2012).

Along with Robbins, other political ecologists like R. Peet and M. J. Watts discuss two distinct *models* that explain the purpose of production—what I refer here to as *Model A* and *Model B. Model A*, they call (with a little help from Gramsci (1971)) *domination*, whereby production is necessary to live. This model encompasses the "armies of the poor" (Peet, Robbins & Watts, 2011, p. 15). Alternatively, *Model B* explains production as *hegemony*—the compulsion to consume—and is in reference to more advanced societies (Peet, Robbins & Watts, 2011). What is interesting about these two models is their distinct environmental ethics. Since *Model A* links production to necessity, the realization of environmental crisis is masked by the drive for development, as opposed to *Model B* which reveals that environmental crisis is masked by the pleasure principle (Peet, Robbins & Watts, 2011). In terms of *Model A* then, this raises challenges in acquiring equilibrium between environmental sustainability and poverty reduction.

The notion of degradation and marginalization constitutes one of Political Ecology's dominating narratives and will also be beneficial in supporting my analysis. Degradation and marginalization within Political Ecology refers to production systems that experience transition to overexploitation of natural resources on which they depend (Robbins, 2012). This overexploitation is in response to state development intervention and/or increasing integration in regional and

global markets (Robbins, 2012). This resonates with Bernstein's discussion on the commodification of subsistence, whereby previously self-sufficient farmers become more reliant on markets for their reproduction, or what he refers to as the second industrial revolution––the reliance on chemicals, electricity and petroleum (2010a). Peet, Robbins and Watts (2011) explain that commodification shapes the imperative of producers—in the face of scarcity the rural poor must, in *some* cases, maximize the exploitation of their land as prices fall. Political Ecology also addresses the socialized aspect of environmental problems when powerful groups secure control of collective resources at the expense of others through management interventions (Robbins, 2012). This links to Peet, Robbins and Watts' explanation of increased exploitation of land in times of scarcity—exploitation of natural resources on the part of the poor is typically in response to "excruciatingly forceful" global market pressures (2011, p. 25). Political Ecology will thus offer a nice framework in which to answer my third research question regarding the impact of resource governance on Vietnam's aquarian transitions.

Another gap in Agrarian Political Ecology is that the powerful interests that shape agrarian change reveal a much wider range of interests and agents than those identified by what Bernstein refers to as the *classic agrarian question*––that of transitions to capitalism with a focus on *classes* of land property, capital and labour in rural areas (Bernstein, 2010b). Indeed, in addition to local actors, the growth of aquaculture has expanded the range of actors involved to include smallholders and large estates (Hall, Hirsch & Li, 2011). These actors' shared and widespread aspirations for access to water and landscapes simultaneously include the desire for a degree of exclusionary power (Hall et al, 2011).

With a focus on exclusion, Hall et al (2011) offer a framework well suited to understanding power relations that impact transitions in aquarian landscapes. The authors see exclusion as a much more complex phenomenon. Rather than something that can be alleviated and replaced with inclusive relations, exclusion is an inevitable and changing process. In this light exclusion is thus defined as "the ways in which people are *prevented* from benefiting from things" (Hall et al, 2011, p. 7). Within livelihood transitions then, exclusion refers to the wider range of powers that prevent people from benefiting from access to water and land.

Specifically, the authors refer to four main powers of exclusion at work in *agrarian* transitions in Southeast Asia: *force*, the *market*, *regulation* and *legitimation*. *Force*, they assert, is "at the heart of regulation" (2011, p. 16). Within the context of Southeast Asia, force has quite often been used as a tool for widespread land grabbing by way of authorities acting outside their official responsibilities (Hall et al, 2011). The authors refer to *regulation* as the formal and informal rules that determine access and exclusion. *Regulation* encompasses: the demarcation of boundaries between pieces of land (*or water*); the prescription of land *or water* use deemed appropriate for this demarcated land (for example conservation/eco-tourism); and the kinds of ownership of this land. *Legitimation* is the justifications of exclusion that appeal to moral values (Hall et al, 2011) and, situated within the framework of the *common good,* often times comes at the expense of smallholder exclusion from land and resource use. The *market*, as another exclusionary force at play, hinges on the other exclusionary powers of *force*, *regulation* and *legitimation* as states typically intervene in markets to manipulate economic activity and favour specific groups (Hall et al, 2011).

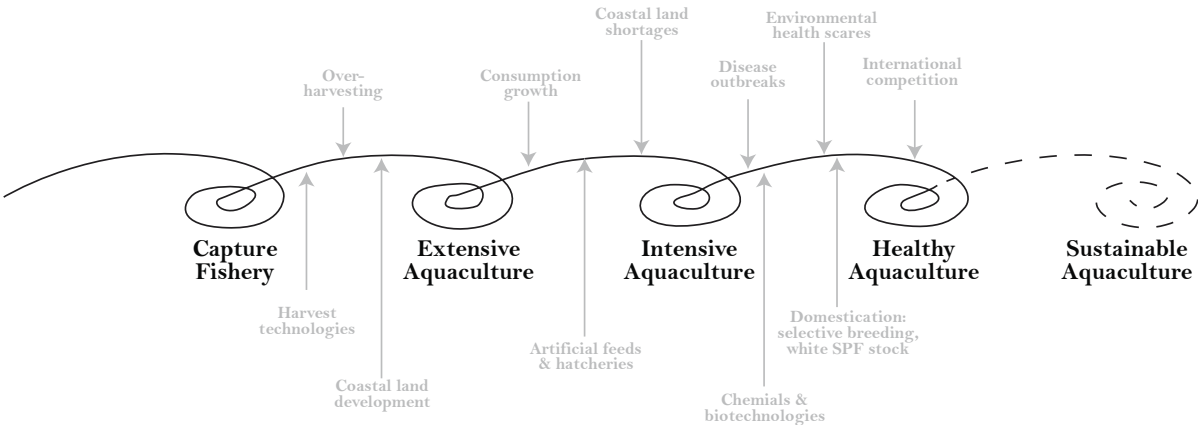
Thus, complimenting Political Ecology and supplementing for the more narrowed focus on interests and actors in Agrarian Political Economy, Hall et al's (2011) analysis of the processes and

actors that inform powers of exclusion will be beneficial in identifying winners and losers in aquarian transitions in Vietnam.

1.2. Agrarian / Aquarian Transitions

A notable gap in much of the agrarian transitions literature is the lack of consideration for heterogeneity. The peasantry is sweepingly generalized into one class of people––a fallacy in light of capitalism's complication of social relations of production (Bernstein, 2010a). Accordingly, scholars and analysts have the tendency to oversimplify livelihood transitions in order to avoid messy and hard to understand complexities (Ostrom, 2009). Lebel et al's (2010) diagram (*Fig. 1*) on the transition of shrimp production from capture fishing to aquaculture is incorporated here to exemplify my point. These authors rightfully argue that a strong commercial rationale for the industrialization of shrimp aquaculture in Thailand stems from declining wild harvests and accessibility of remaining stocks alongside increasing global demand (Lebel et al, 2010). Their focus is on technical innovations that made the transition to intensive aquaculture possible (dimmed text); however, my focus, using the same illustration, is on the assumed *linear movement* highlighting a transition *away from* capture fishing to aquaculture. This linear movement is typical of agrarian transformation discourse assuming the *replacement* of small-scale *inefficient* production systems with more *efficient* economies of scale. Although this is quite often the preferred trajectory it is not always the case, as is exemplified by the significant role capture fishing continues to play for livelihoods in Vietnam's rural lagoon fishery communities.

Fig. 1. An example of the assumed linear transition from capture fishing to aquaculture (Lebel et al, 2010)



This assumed linear transition is evident in a number of arguments. If we look at the Marxist underpinning of agrarian transformation theory, Marx believed that the creation of the new entails the destruction of the old (Bernstein, 2010a). Accordingly, Bernstein asks whether globalization is the climax to the historical process of *peasant elimination* that up until this point has proceeded at varying speeds across different times and places in response to capitalism (Bernstein, 2010a). The World Bank's 2008 *Agriculture for Development Report* (2007) further exemplifies this assumption by stipulating that those unable to compete in the increasing consolidation of economies of scale typical of agrarian transitions should move from the farm to agricultural wage labour or migrant labour. Subsequently, land should be transferred to the most *productive* users as farmers age, economies diversify and migration precipitates––a *linear progression* resulting in an eventual *de*peasantization.

Further contributing to the *inevitable* progression *from* capture fishing *to* aquaculture is the *fishing equals poverty* assumption typical in development discourse (Béné & Friend, 2011). Although this is quite often the case, this assumption serves to enforce fisheries trade-off for regional

economic development, while ignoring the role capture fishing can sometimes play as a livelihood buffer for poor fish farmers. Poverty in fishing communities also occurs from a number of external forces such as state policy and development projects that can obstruct flow-control infrastructure (Béné & Friend, 2011). Accordingly, the FAO (2010) notes that the critical factors contributing to poverty in small-scale fishing communities include insecure access to resources, lack of health, education, and social safety nets, as well as the exclusion from wider development processes. To this, Little et al (2010) consider the impacts of aquaculture on human well-being. Specifically, and interestingly, the authors argue for a deeper understanding of how aquaculture can improve people's well-being *while they remain poor*, rather than analyzing aquaculture as a process that *removes people from poverty* (2010).

1.3. Governance–Fisheries Co-management

Another gap in agrarian transformations literature is the little consideration given to small-scale farmers' agencies (Hall, 2009; Kerkvliet, 2009; Veltmeyer, 2009). Rather than viewing these farmers as polycentric, adaptive and conscious of ecological sustainability, they are studied through the contemporary textbook lens of resource economics: "trapped in a tragedy of their own making" (Ostrom, 1999, p. 494). Consequently, natural resource governance has historically taken shape in a top-down, *command and control* approach (Marschke, 2012). These top-down approaches often led to unpredictable consequences such as overexploitation of resources, loss of biodiversity, and social and economic conflict (Kerkvliet, 2009; Marschke, 2012). In general however, effective management of natural resources, particularly common pool resources, is a particular challenge facing policy makers because of the high cost associated with exclusion from these resources

(Andersson & Ostrom, 2008). Since responses to issues surrounding *collective-action* problems are typically flawed on the part of governance institutions, complementary back-up institutions, either at a higher or lower level than that of government, are viewed as beneficial in offsetting some of these imperfections (Andersson & Ostrom, 2008).

Political Ecology argues that local communities have sustainably harvested resources for generations (Robbins, 2012). Over exploitation of natural resources is quite often catalyzed by broader economic forces (such as the market), which suggests that explanations of over exploitation lie in the problem of how rules work and the ability to adapt to socio-economic change (Robbins, 2012). Coercive states and new market results can lead to the appropriation of common pool resources from disenfranchised local users to those who hold more power. Disguising and supporting this outcome is accomplished by labeling local resource users as the cause of degradation (Robbins, 2012). With this in mind, the response to "the tragedy of the commons" is in empirical proof that when local communities are provided the opportunity to negotiate, and operate under a proper structure of rules, collectivity does not inevitably lead to degradation (Robbins, 2012).

Research has shown that community groups do have the capacity to successfully manage natural resources and such management can happen without government intervention; however, the need for government involvement has become more and more recognized as an essential factor in managing common pool resources (Marschke, 2012). In recent years, donor agencies and NGOs have emphasized resource governance within the local context premised on the understanding that local resource users are best able to understand local conditions and ecosystems (Marschke, 2012).

In this respect collaboration and learning are key in working toward effective resource management that involves multi-stakeholder arrangements (Armitage, Marschke, Plummer, 2008).

Co-management is a term predominantly used within the fisheries sector (Béné et al, 2009), and is one such form of natural resource governance that incorporates the learning and linking functions of vertical and horizontal[4] forms of governance (Armitage et al, 2008). Specifically, Olsson, Folke & Berkes (2004) define co-management as, "Flexible, community-based systems of resource management tailored to specific places and situations, and supported by and working with, various organizations at different scales" (2004, p. 75). Decentralized natural resource governance models, such as co-management, are argued to enhance public accountability, contribute to empowerment of the poor and marginalized, and improve environmental sustainability (Béné et al, 2009). Moreover, co-management is particularly effective in countries where government agencies lack the capacity and resources to ensure compliance with regulation (Béné et al, 2009).

Decentralized resource governance is thus considered by some to improve rural livelihoods and contribute to poverty reduction by acting as a bridge between the government and those governed (Béné et al, 2009). Although, the inconsistent accounts of co-management *actually* contributing to poverty reduction and empowering marginalized groups tends to counter this argument (Berkes, 2009). However, Andersson and Ostrom reminds us that, "no perfect governance arrangement exists" (2008, p. 73). Failures exist in forms of decentralized resource management just as in their centralized counterparts, but the cost incurred of large-scale

[4] Vertical form of governance refers to different levels of government and horizontal form of governance refers to local user groups (Tuyen, 2010).

centralized failure is greatly reduced in decentralized resource management, whereby success of some groups offsets the failure of others (Andersson & Ostrom, 2008). When compared to past top-down governance approaches, co-management presents a more flexible approach that is adaptive to specific local conditions (Marschke, 2012).

Chapter 2: Research Methods

Chapter two is comprised of seven sections. The first section discusses the reasons for selecting the the Tam Giang lagoon area for this study, and sheds light on the challenges surrounding user rights in the region by way of a brief history of the lagoon in section two. The third part follows through on the first chapter's discussion on natural resource governance with a brief examination of fisheries co-management in the lagoon. The criteria met by Thuy Dien in order to be selected as the village for this study constitutes section four, and methodology used to carry out this research follows in section five. An explanation of the sample size used to carry out the research is discussed in section six and section seven concludes with a candid discussion on the limitations to data analysis.

2.1 Case

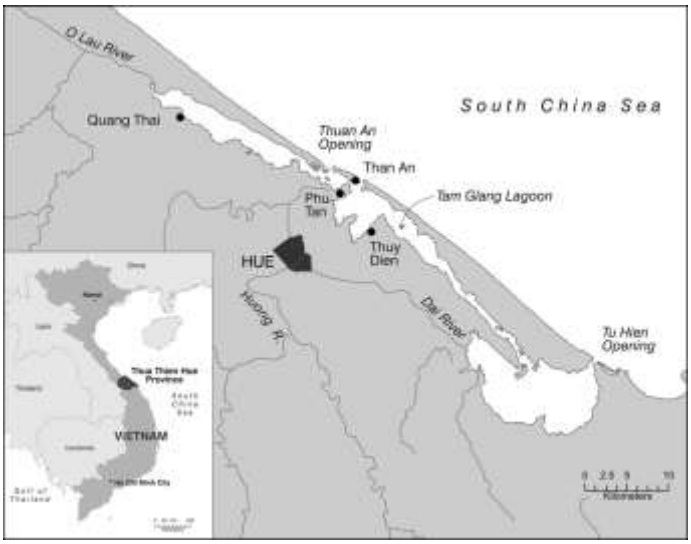
An example of an area that is conducive to multiple fishing activities is the Tam Giang lagoon in Thua Thien Hue Province, Central Vietnam (Fig. 2). The lagoon supports direct and indirect livelihood opportunities for approximately 300,000 people, and in the past has been a habitat for close to 42 inshore and offshore aquatic species (Armitage et al, 2011). Characteristic of the Tam Giang lagoon is the tidal inflow of seawater that contributes to the fluctuation of salinity in the lagoon water. The salinity rises in the dry season and falls in the rainy season creating a highly productive and complex nursery for inshore and offshore aquatic species (Boonstra & Nhung, 2011).

Over the past two decades, the lagoon has undergone an intensification of capture fisheries as well as a rapid expansion of aquaculture (Armitage et al, 2011). This transition has led to boom and bust cycles of livelihood opportunities. Exemplifying this is the lagoon's rapid intensification of shrimp aquaculture that accounted for half of provincial GDP in the end of the 1990s, followed by an onset of aquatic disease that dropped GDP to just over 22 per cent during 2000-2005

(Armitage et al, 2011). Amplification of the lagoon's resource use has generated issues surrounding access to resources, land allocation, and coastal management (Armitage et al, 2011).

As such, the Tam Giang Lagoon is an excellent area in which to investigate aquarian transitions. This thesis represents a four-month detailed study of the fishing activities in one local village in the Tam Giang Lagoon from September to December 2012.

Fig 2. Tam Giang Lagoon, Central Vietnam (Armitage et al, 2011)



2.2. The Tam Giang Lagoon—A brief history…

In coastal areas such as the Tam Giang Lagoon in Central Vietnam, the local people were responsible for the origins of fishery exploitation in the region (Brzeski & Newkirk, 2000). As families established certain fishing areas, and as their families grew over generations, organizations called *vans* were organized to regulate fishing in these claimed areas. At this time individual ownership of production was banned by the state and all means of production were collectivized (Boonstra & Nhung, 2012). The *Doi Moi* economic reform period (1985 on) saw the expansion of

fish farming in the lagoon, and the 1987 Land and Fisheries Laws presented households with the ability to have long-term user rights over natural resources (Boonstra & Nhung, 2012). Over the years people acquired rights to their own fishing grounds (Brezeski & Newkirk, 2000; DaCosta & Turner, 2007). The Vietnamese government continues to *honour* these rights by charging fees according to potential production (Brezeski & Newkirk, 2000). However, there is no *legality* associated with these user rights and the government maintains national ownership of all natural resources (Boonstra & Nhung, 2012). Coulthard et al (2011) note that a lack of clear regulations in asset holdings gives rise to complexities that can either enable or restrict the capacity of productive households to adapt to shifting economic and biological circumstances, as well as to comply with corresponding responsive policy and management regimes. This is evident within the Vietnamese context.

2.3. Vietnam's fishing co-management–a brief overview…

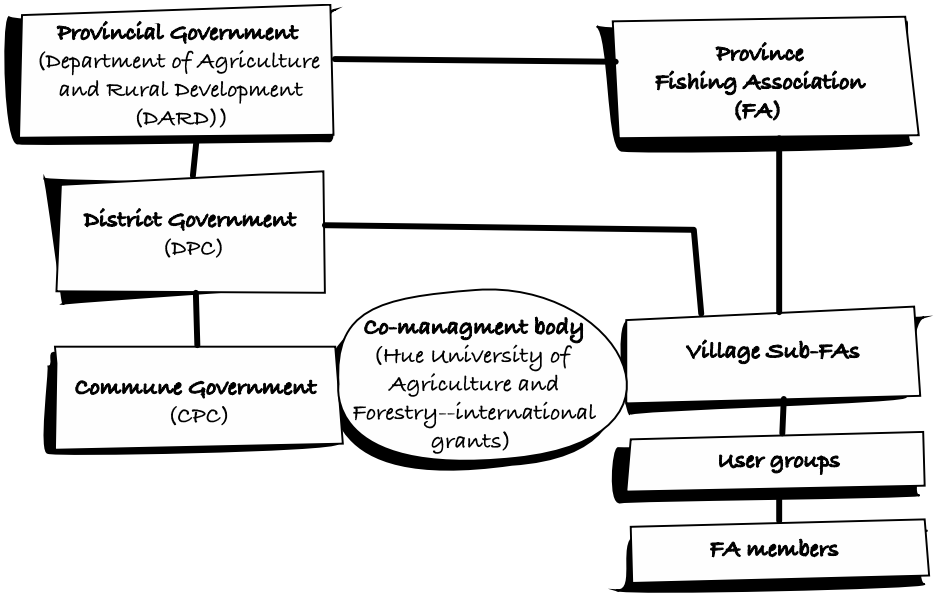
Contributing to the challenges surrounding Vietnam's asset holdings is the clear indication of the limits to growth in Vietnam's coastal resources such as in the Tam Giang Lagoon (Tuyen, IMOLA review of CBCRM/comanagement, nd). The introduction of intensive[5] shrimp aquaculture (2001-2002) that utilized new technologies resulted in shifts in socio-economic development, and created the need for natural resource governance and management of this complex coastal resource (ibid). In an attempt at alleviating the unsustainable exploitation of natural resources, and promote more equitable access to these resources, fisheries co-management in the form of Fishing Associations (FAs) have been established by co-management bodies, local

[5] This is also known as *industrial shrimp*. The practice involves only one species (shrimp) farmed at high intensity.

groups and government to facilitate the sharing of power and authority between local resource users and government (Tuyen, IMOLA review of CBCRM, n.d.; Tuyen et al, 2010). Fishing Associations are part of the Vietnam Fishery Society (VINAFIS), which is a socio-cultural entity legally capable of holding formal resource rights (Tuyen et al, 2010). The key institutions and stakeholders involved in this co-management process involve local resource users at the village level—the *Sub-FA*, the government at the commune level—the *Common People's Committee (CPC)*, the government at the district level—the *District People's Committee (DPC)*, as well as the government at provincial level—the *Provincial FA*.

Acting as co-management bodies in helping to strengthen Vietnam's Sub-FAs, Hue University of Agriculture and Forestry (through funding by various international donors) play(ed) significant roles in facilitating learning, capacity building, negotiation and fostering consensus building among stakeholders (Tuyen, Review of CBCRM/comanagement, nd). Once consensus for participatory planning and community based management regulations is achieved the co-management process is then institutionalized, which involves formal allocation of fishing rights by the CPC to the Sub-FA (Interview with Truong Van Tuyen, 2012). The Sub-FA, or village FA, is then responsible for managing the rights and implementing the plan and regulations in the village (Fig. 3).

Fig. 3. Co-management architecture in Tam Giang lagoon



Recognition of customary rights and full engagement of local stakeholders are key elements to this Community-Based Natural Resource Management (CBCRM) approach (Tuyen, Review of CBCRM/comanagement, nd). Some Tam Giang Lagoon Sub-FAs work effectively where full rights allocation has been successful in resolving conflict among local resource users and restricting access rights to mobile capture fishers outside the village. Other Sub-FAs, however, have not received support from the CPC and remain weak, lacking the capacity to reinforce regulations and the budget[6] to operate. This is the current situation for the case study in this thesis.

2.4. Village selection

Based on my initial general criterion of the presence of both capture fishing and aquaculture livelihoods operating in one village, the faculty of Hue University of Agriculture and Forestry proposed interviewing four distinct villages in the Tam Giang

[6] Collection of fees for fishing and aquaculture from FA members so the FA has the budget to operate (Interview with Truong Van Tuyen, 2012).

lagoon that best met this criterion. Interviews commenced with the village chiefs of Phu My, Thuy Dien, Thuan An and Van Quat Dong villages. All four villages consisted of 100–200 households practicing a number of fishing and fish farming activities. However, through my interviews it was revealed that Phu My practiced no pond aquaculture and had little to no interaction amongst production groups. Phu My was, however, the only village interviewed that had a Fishing Association with full rights allocation. In Thuan An, a high majority of households (200 out of 220) practiced only capture fishing and net enclosed aquaculture, and fishing was done inside the net enclosures; although the village does have an FA the regulations are currently not enforced. Van Quat Dong village was the smallest village with 100 households. No net enclosed aquaculture was practiced in the village and the majority of villagers practiced only mobile capture fishing. Fishing Association rules and regulations were in place but, again, the FA had no power to enforce them.

The decision to work in Thuy Dien was easy in light of its multiple fishing activities that included all four main production systems ((1) lowland pond aquaculture, (2) highland pond aquaculture, (3) net enclosed aquaculture and (4) capture fishing), as well the interactions that existed between these systems. Although the majority of villagers practiced net enclosed aquaculture there were enough other fishing activities to provide economic variances and social dynamics between households (see Appendix I: Factors determining village selection). The lack of full rights allocated to Thuy Dien's Fishing Association added to the complex story of fisheries production in the village.

2.5. *Methodology*

A mix of qualitative research methods was used in this study. I conducted six household-level focus groups (see Appendix IX and X for focus group questionnaires), three government interviews, one at the commune level (CPC) and two at the district level (DPD) (see Appendix III, V, and VI for interview questions), three non-government interviews, one with IMOLA, an NGO working in Vietnam for a number of years focused specifically on natural resource governance as a co-management body, one interview with the faculty at Hue University of Agriculture and Forestry, and a series of key informant interviews(see Appendix IV, XI and XII for questionnaires), three Fishing Association interviews, two at the village level and one at the provincial level (see Appendix VII and VIII for questionnaires), one fish collector interview with a local fish collector in Thuy Dien (see Appendix XIII for questionnaire) and 61 households survey with small-scale fishers and aquaculturalists (see Appendix II: survey questionnaire).

Focus groups consisted of between six and eight people and comprised primarily of male heads of fishing/aquaculture households in order to gain insight into group dynamics and production systems operating within the village. In these focus groups I investigated the types of fishing and aquaculture practices of the participants, and the benefits and risks associated with these activities. I also probed the interplay between different production systems, the types of fishing governance in the lagoon, as well as local perceptions of poverty, ecology, and socio-economic standing in the village. Following an interview conducted with the village chief to sketch out the main livelihood activities in the village, I conducted initial focus groups targeting the four main production systems. Using the answers provided in these initial focus groups, I refined the household level survey questions accordingly.

Government interviews were conducted to get a sense of the government's intention with respect to the net enclosed zoning policy as well as regulation for other production systems. Investigation into their assessment of the future of fisheries livelihoods in the lagoon was also of focus. Interviews occurred at both the commune and district level to ensure consistency. The interview with IMOLA offered a somewhat middle view between that of government and that of Thuy Dien villagers, as IMOLA has been working with rural villages in the lagoon, at times alongside- and other times in friction with- government priorities. The interview provided insight into the processes involved in establishing Fishing Associations and spoke to the unique nature of fisheries villages operating in Tam Giang Lagoon with respect to their ecological conditions and subsequent production systems. The interview with the faculty at Hue University of Agriculture and Forestry informed the status of Thuy Dien village in terms of its Fishing Association, which was further supported by interviews at the village Sub-FA level as well as at the Provincial FA level.

The final focus groups were conducted at the end of the study to examine pond farmers' willingness to work as wage labourers on larger farms. Key informant interviews also occurred at the close of the study with villagers who had been zoned previously to discuss how they adapted to a loss of income. Key informant interviews were also conducted with net enclosed farmers who were expecting to have their net enclosures zoned this time around (either knowingly or speculatively) to investigate their views on this government policy and how they planned to accommodate for this likely loss of income.

The household level survey took place primarily with male heads of households (all households interviewed had male heads). On two occasions I interviewed their wives. These interviews enabled me to glimpse into the dynamics of village family life and socio-economic

relations within and across production systems. The survey focused on household fishing activities, incomes, types of boats and equipment used, whether or not land and equipment is owned or rented, as well as household market activities. Additional interviews with members of Fishing Associations and government officials offered insight into the future of fishing and aquaculture in the village.

Highly qualified researchers from the local university were engaged as research assistants and interpreters in my data collection activities. Members of Hue University's research team have studied extensively in the Tam Giang lagoon region––their knowledge and experience was a valuable contribution to my research.

2.6. *Sample Size*

The total number of households surveyed was 61[7]. There are a total of 196 households in Thuy Dien village (Interview with Ha Xuan Vach, 2012). Of these 196 households 177 practice fisheries livelihoods, the other 19 households practice livelihoods outside the fisheries sector. Within these 177 households, 120 practice only net enclosed aquaculture[8] (68%) and 38 households (22%) practice pond aquaculture (see Fig. 4 below for breakdown of types and combinations of pond aquaculture practiced). There are also 14 households that practice mobile capture fishing *in addition* to net enclosed aquaculture, and five households that practice *only* mobile capture fishing.

To determine the sample size of each production group, I began with the net enclosed only group, which is the largest production group consisting of 120 households. Since the survey was originally intended for 60 households, it was decided that 50 per cent of this number should consist of the net enclosed only group. Consequently, 30 net enclosed only households were surveyed. I then divided each subsequent production group by 50 per cent. Since mobile capture fishing is the smallest production group with only 5 households, I surveyed 100 per cent of this group to illustrate the reality of the situation. This selection process was preferred over a random selection to ensure that voices from all production groups and their combinations were heard. Fig. 5 shows the resulting sample sizes for each production group surveyed.

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7. The initial number of households surveyed was 60; however, near to the end of the survey I discovered that there were actually a total of five mobile capture fishing households rather than four. Since it had been decided to interview 100% of these households because they represented the smallest production group, I also surveyed the fifth mobile capture household bringing the total number of households surveyed to 61.
8. See chapter 3 for an explanation of these production systems

Fig 4. Types and combinations of fisheries productions systems practiced in Thuy Dien village by household.

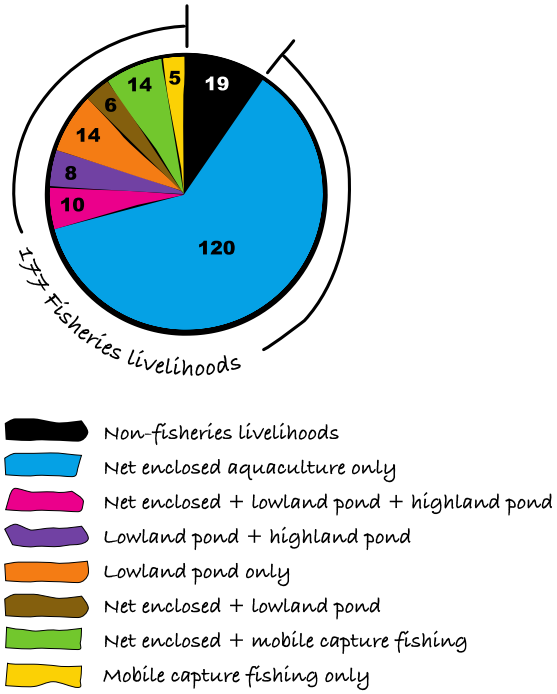


Fig 5. Sample of production systems and their combinations for village household level survey

2.7. *Limitations to data analysis*

Scott, Miller and Lloyd (2005) discuss the challenges they faced as foreign researchers conducting fieldwork in Vietnam—some of which resonate with my own experience. Generally, they explain, pre-established contacts with a host institution are a criterion in receiving authorization to conduct field research in Vietnam. In this respect, I was fortunate to have been put in contact with the faculty of Hue's University of Agriculture and Forestry through Professor Melissa Marschke who has established these contacts over the years of conducting her own research in the area. Authorization went smoothly and quickly (thanks to faculty at the University) as all documents were completed and approved within the first week of my arrival.

Before conducting any focus groups, interviews, or surveys, my research companion would explain[9] in Vietnamese who I am and the purpose of my study; however, on my very last day in the village I discovered that many villagers believed I was with the government because we were meeting every morning at the home of the FA chairperson. Often times the FA chairperson would show us to the participant's home or have participants come to his home, reinforcing the perceived connection between him as a government affiliate (through his dealings with government) and myself. Upon learning this, I realized that the degree of accuracy to certain answers I was provided would in turn be questionable. Some comments that had been made during my key informant interviews—comments of which I had originally not thought much—became suddenly and glaringly indicative of this misconception:

[9] In order to be approved by University of Ottawa's Ethics Board, I was required to create and have translated into Vietnamese a letter of introduction to provide to each participant; however, in some cases villagers were illiterate and more comfortable with introductions being done orally.

Fish farmer, 3 January 2013

Also important to note here is that Thuy Dien's FA chairperson selected the households within each production group with which I wished to speak. As Scott, Miller and Lloyd (2005) further explain independent social organizations are weak entities in Vietnam leading researchers to work through official channels, which can proportionately weigh in favour of closely affiliated and favoured village members. DaCosta and Turner (2007) also make note of similar restrictions in their study explaining that the village chief handpicked their interviewees just as the FA chairperson handpicked mine. The concern here is that some voices in the village are silenced. At the same time, the FA chairperson was essential for setting up interviews and coordinating household schedules, a task that would have been difficult to impossible without him. This *gatekeeper scenario* however, should be considered as a potential factor impacting the accurate representation of the village (DaCosta & Turner, 2007).

Vietnam's *culture of harmony* often makes it difficult to delve into underlying conflicts between social groups (Scott, Miller & Lloyd, 2005). Part of my research involved investigating social relations between production groups and whether or not the expansion of aquaculture in the area has strengthened or weakened these relations. Some answers were surprising and rather candid as in the case of the focus group conducted with farmers that practice both net enclosed aquaculture and mobile capture fishing. It took some prodding but they eventually admitted that

they resent the group that practices only net enclosed aquaculture because their enclosures are larger and therefore their incomes higher. Initially however, when my research companion asked this group about social relations with the net enclosed only group, the participants skirted the issue. Survey participants, on the other hand, were not prodded in the same way and so it is possible that some participants were aware of issues between production groups but failed to mention them. That said, however, similar to Scott, Miller and Lloyd's experience, some participants saw my study as an opportunity to express their criticisms, which significantly (for which I am grateful) contributed to the narrowing of my focus as my research progressed (2005).

Moreover, most all of the interviews I conducted were with *male* heads of households. This was not by any means a requirement; it just so happened that the male heads presented themselves for the interviews. Quite often the wives were also present for the interviews but it was the male heads who provided the answers. In a handful of interviews the wives did most of the speaking with the husbands present, who, at times, were asked for confirmation. Only one interview was conducted solely with the wife of the household head (I interviewed two wives of heads of households but in one interview the husband was present). This presents a predominantly male perspective to the study, and, therefore, presents limits to representing overall views on social relations of production within the village.

It is also worth noting the degree of accuracy in the income data collected. Although, it is likely that fishers and farmers are fully knowledgeable in terms of how much income each production system provides, many villagers interviewed were extremely busy and the survey interrupted their daily livelihood activities. It is likely that at times information provided was a rough estimate in an effort to complete the survey quickly so as to continue with their daily

activities. That said however, these reported incomes provide a general picture, even if only a rough sketch, of incomes across production systems in Thuy Dien village.

One last thing to note in respect to the accuracy of data collected was the initial information collected from Thuy Dien's village chief (Mr. Tran Van Kham) during my village selection interviews. Information regarding the numbers of households per production group changed significantly once the study was underway (see Appendix I: Factors determining village selection). The breakdown the village chief provided was based on his own estimates since he had no household information with him at that time. The variance in production group breakdown originally provided by the village chief with the actual number provided once the study was underway did not however impact my village selection decision.

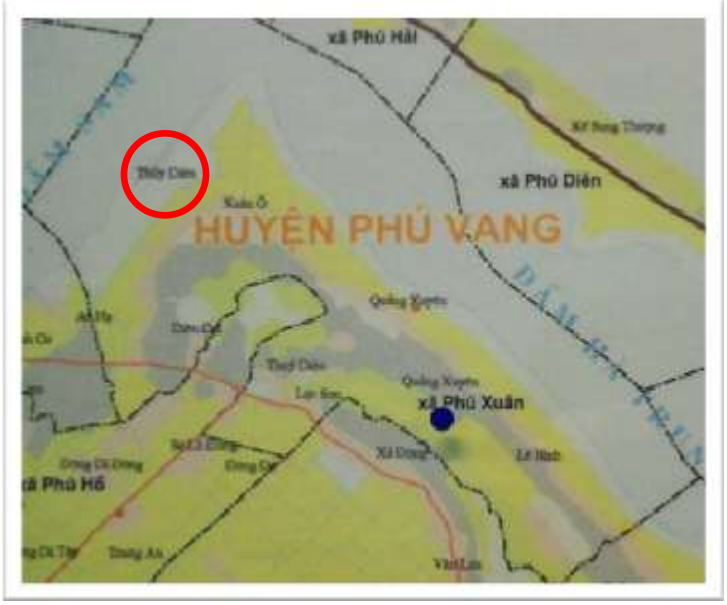
Important to mention here also is that this was the very first time I had formulated and carried out a survey. I had originally planned to do a random sample survey, but once in the field it made sense to do a random, stratified sample as I felt it pertinent to have equal input from each production group. However, this may have complicated things and a random sample would have simplified the process. In light of my lack of statistical training, I drew on frequency tables to help tell my story. Moreover some of my survey questions contributed very little to informing my discussion, while others proved to have been more influential had I followed through in more detail. It was a learning experience for which I am most grateful, and although my lack of experience may have prohibited a more robust examination of an important subject matter, at the end of the day I am able to tell a story; a story I believe contributes to the issues surrounding small-scale aquaculture production in Vietnam.

Chapter 3: Thuy Dien

This chapter aims to identify the winners and losers in Vietnam's rural lagoon community livelihood transitions. The chapter begins with a brief history of Thuy Dien to illustrate the evolution of fisheries production systems operating in the village. Section two provides a general overview of the village. An explanation of the four main fisheries production systems operating in the village then ensues. The economic standing of each group follows to cast light on social relations within and across each production groups, questioning whether the types of livelihood practiced and/or income impacts the degree of representation or agency each group has within the village as well as within broader governing forces.

3.1. *Village Background*

Fig. 6. Phu Vang district, Phu Xuan commune, Thuy Dien village



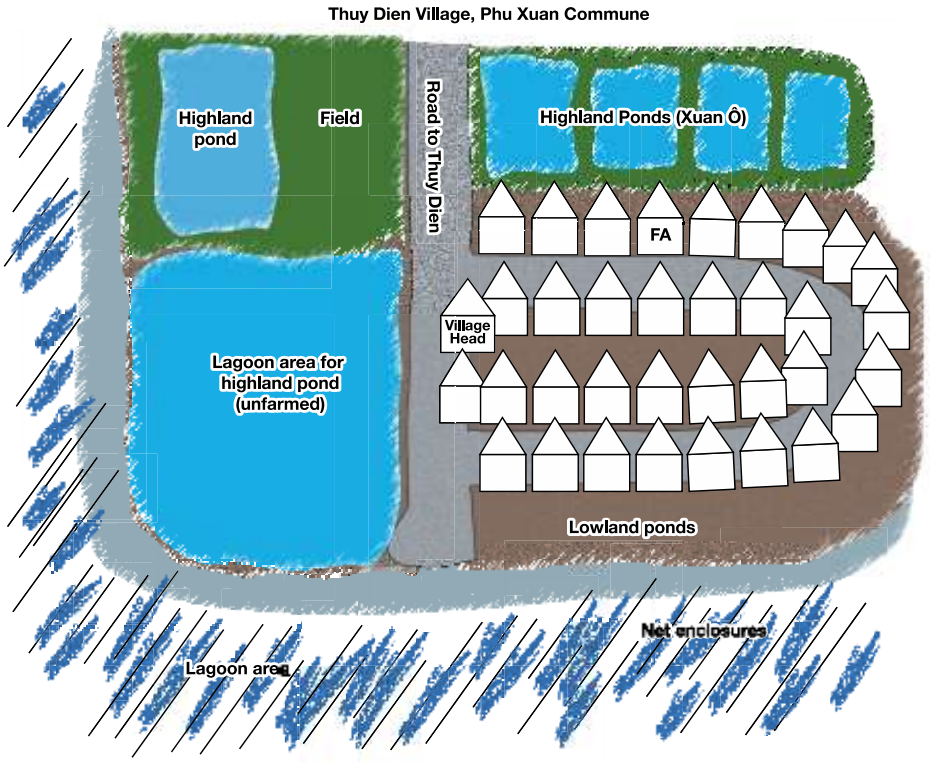
Thuy Dien is a resettlement village[10] and is one of seven villages[11] that make up Phu Xuân coastal commune (IMOLA, 2006). After the big storm of 1985, the government, in an effort to reduce poverty, established the village of Thuy Dien so that Sampan dwellers could resettle on land (DaCosta & Turner, 2007). This 1985 resettlement established a group of farmers who practice only net enclosed aquaculture in the village today (Interview with village chief, 2012). The name *Thuy Dien* applies to all villages allocated for Sampan dweller relocation—there are a few Thuy Dien villages in the lagoon (Interview with IMOLA, 2012). The second resettlement was in 1999 in response to a large flood. This resettlement established a group of farmers that practice a combination of both mobile capture fishing and net enclosed aquaculture in the village today. The 1999 farmers have smaller aquaculture nets than the original 1985 resettlement group, and, therefore, must also practice mobile capture fishing to supplement their income (Interview with village chief, 2012).

During our village selection site visits, the village chief provided a brief history of Thuy Dien village. He told us that aquaculture began in 1988 with one cooperative[12] consisting of only a few households farming shrimp and wild crabs (crabs enter the nets and remain in the nets to be fattened, rather than buying or catching juvenile crabs). By 1995 separate cooperatives disappeared and approximately forty individual households were practicing net enclosed aquaculture[13].

10. Resettlement village here refers to the resettlement of Sampan dwellers onto land.
11. The other villages in Phu Xuan commune are Quang Xuyen, Xuan Ô, Dien Dai, An Ha, Loc Son, and Le Binh
12. Cooperatives were clusters of national common property (DaCosta & Turner, 2997).
13. See chapter 3 for description and image of net enclosed aquaculture.

Pond aquaculture began in 2001-2002 with intensive shrimp aquaculture. There are two kinds of pond aquaculture—lowland and highland[14]; however, Thuy Dien has only lowland ponds because aquaculture was practiced in the lowland near to the lagoon due to the villagers' history of living on the water in *Sampans*. The highland ponds are in Xuan Ô, which is in very close proximity to Thuy Dien village (see Fig. 6). Some of these ponds are rented and owned by Thuy Dien farmers. In 2007, the village began to switch from intensive shrimp aquaculture to mixed aquaculture (crab, shrimp and fish). This switch came about from the negative impacts of intensive

Fig 7. Thuy Dien village in Phu Xuan commune (Wilkings, 2012)
(the positioning of the houses are an approximate representation)



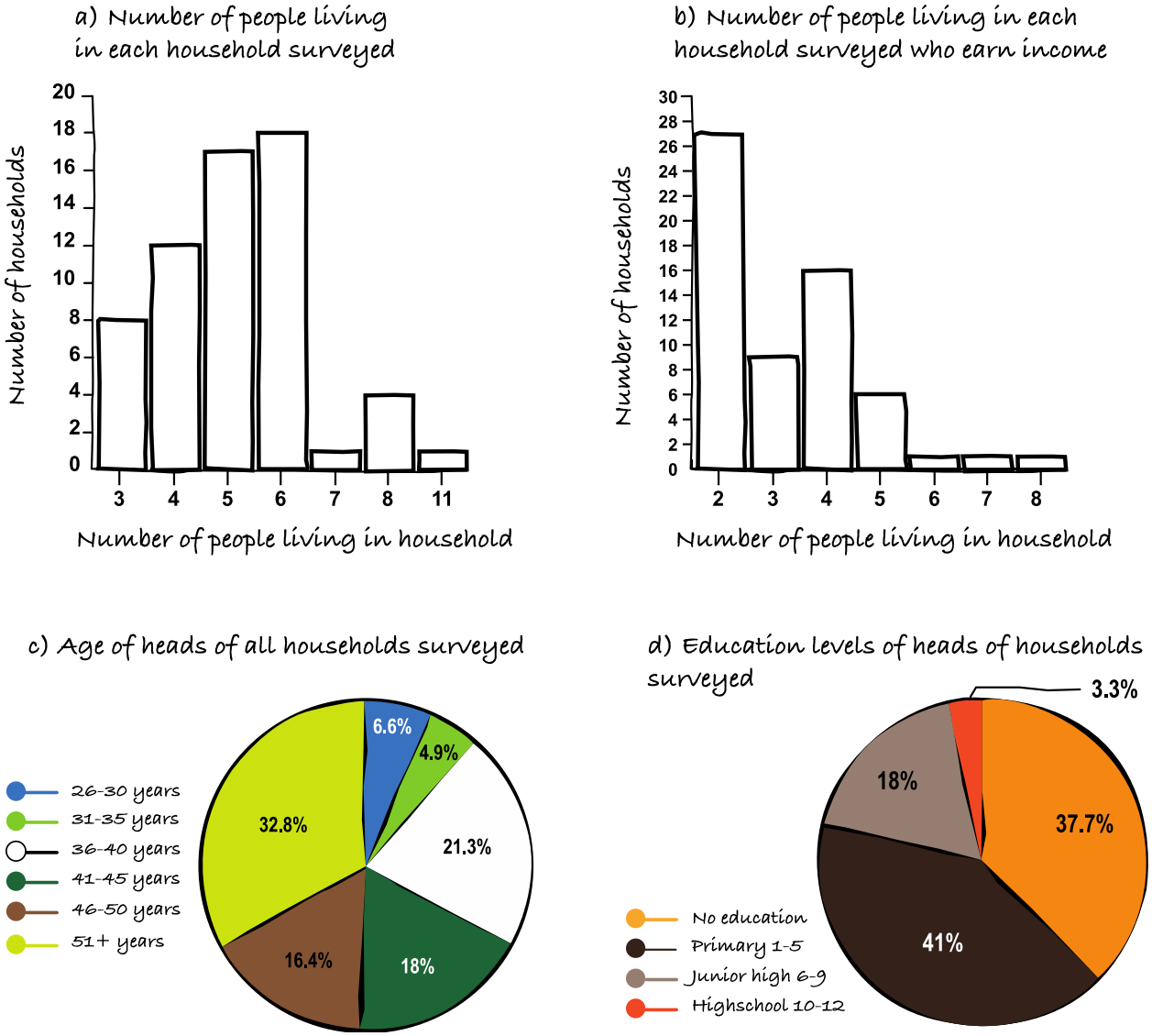
14. See chapter 3 for descriptions and images of lowland and highland pond aquaculture.

fish farming —the overcrowded breeding and chemical waste polluted the bottom of the ponds and the water in the lagoon, and the inevitable bust from the boom left many farmers in debt and unable to continue farming their ponds. 95 per cent (21 out of 22) of the households surveyed in the village that had practiced intensive shrimp aquaculture said that they lost a lot of money doing so. Consequently, some highland ponds were left abandoned as farmers worked at recuperating their losses.

3.2. *General overview of Thuy Dien*

This section provides a general overview of Thuy Dien village. Fig. 8 provides information on the households surveyed, such as the average number of people living in each household surveyed, how many of those people generate income, as well as the average age and level of education of the heads of households surveyed. This information provides a backdrop for examining people's *capacity* to transition into other livelihoods based on age, education and dependents; as well as fishers and fish farmers' *willingness* to practice other livelihoods outside of the fisheries sector.

Fig 8. General information on households surveyed

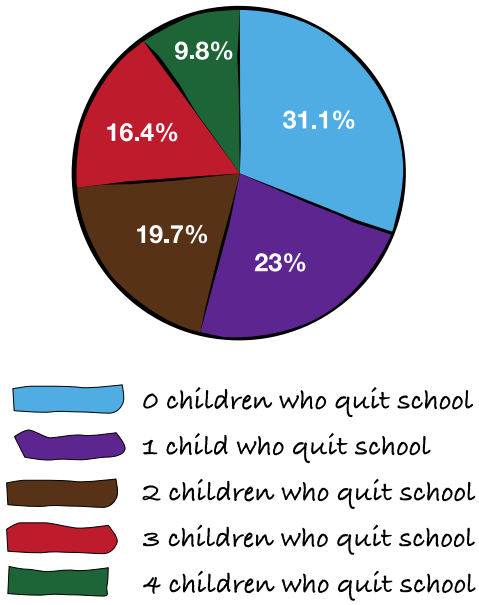


The average number of people living in the households surveyed is 8.7 with 18 of 61 households (29.5 per cent) having six people living in the home, followed by 17 of the 61 households (27.9 per cent) having five people living in the home (Fig. 8a); however, as Fig. 8b shows 27 of the 61 households surveyed (44.3 per cent) have only two people generating income in the household, which could suggest that farmers in Thuy Dien have very little, if any, extra time

and/or income. Fig. 8c shows that a large proportion of heads of households surveyed are 51 years and over (32.8 per cent), with the majority of respondents aged 36 and older (88.5 per cent). The average age of all 61 heads of households surveyed is 46 years. According to the UNDP, the life expectancy at birth in Vietnam for 2012 is 75.4 years (UNDP hdrstats, 2013), which is not far removed from Canada at 81.1 years. Only a small percentage of households surveyed (11.5 per cent) are between the ages of 26 and 35. This aging community alludes to the difficulty of transitioning into other livelihoods, particularly when practicing one livelihood for so long—40 per cent of all respondents who practice net enclosed aquaculture (the predominant livelihood) have done so for over 15 years. It is also worth noting that the majority of households surveyed have lived in Thuy Dien for over 20 years (68.9 per cent). Those surveyed who have mostly lived in the village between 10 and 20 years practice only mobile capture fishing or mobile capture fishing in addition to net enclosed aquaculture, which corresponds with the second land resettlement in 1999.

Although data from the General Statistics Office of Vietnam (GSO) reveals a substantial rural/urban discrepancy in education, whereby the percentage of workers who graduated university was almost seven times higher in urban than in rural areas (GSO, 2011), the levels of education of the households surveyed in Thuy Dien were still surprising (Fig. 8d). Almost half of the 61 heads of households surveyed have only primary education (41 per cent), and an alarming 37.7 per cent of respondents have no education at all. This percentage climbs to 47.5 per cent for the wives of heads of households. Overall, the wives in the households surveyed have less education than their husbands.

Fig 9. Number of households surveyed whose children did not stay in school[15]

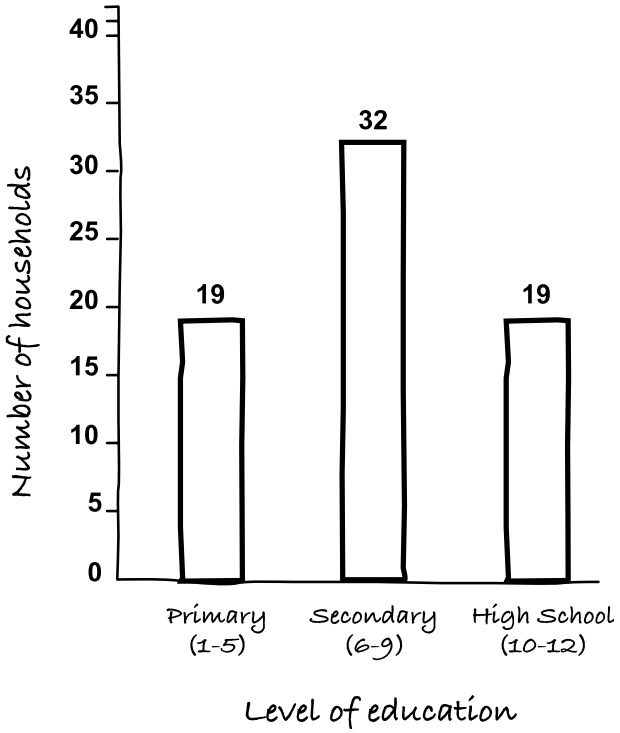


This lack of education seems to carry down to their children (Fig. 9) with almost one quarter of households surveyed (13 out of 61 households) having *one child* who did not complete school. Seven of these 13 children (one child for each of the 13 households) have only primary school education (class 1-5), five have some secondary education (class 6-9), and one has some high school. The percentage increases to 36.1 per cent for households that have *more than one child* who dropped out of school. The majority of households (32 out of 42) that have children who are no longer in school report having one or more children with *some* secondary education; however, almost half (19 of 42 households) report having one or more child out of school with only primary education (45%)—see figure 10. These findings are particularly interesting in light of a country that

15. For the purpose of this study, any child who does not finish high school (although admittedly this may not necessarily be the norm for rural Vietnam villages) is considered to have "quit school."

reported a 93.2 per cent adult literacy rate in 2010[16] (UNDP indicators, 2013). That said however, the same number of households (19) also report having one or more children with some high school education, albeit more households have boys rather than girls who have reached this level of education (15 households to 10 households respectively). Some households noted that the distance to the high school was too far for their children to go (approximately 5 km). Only 5 of the 61 households surveyed reported having children with college or university educations.

Fig 10. Number of households whose children quit school with primary, secondary and/or high school education



16. 2010 is the latest UN data available for Vietnam's adult literacy rate. There is currently no data for Vietnam on primary school drop out rates (UNDP Indicators, 2013).

3.3. *Fisheries production systems*

Following is an explanation of the four main production systems found in Thuy Dien village.

3.3.1. *Mobile capture fishing*

Fig. 11. Sampan boats used for mobile capture fishing (Wilkings, 2012)

Fig. 12. (Left): Chinese Lu (Wilkings, 2012);
Fig. 13. (Above): Bamboo and corrugated iron homes belonging to mobile capture fishers in Thuy Dien (Wilkings, 2012)

Mobile capture fishers make up the poorest production group in Thuy Dien with some fishers reporting a monthly income as low as between VND 100,000 and VND 499,000, which is approximately US$5 – US$25 (see Appendix III for total monthly seasonal income per group).

Table 1. Mobile capture fishing group general information

Mobile Capture fishers in Thuy Dien village

Fishing gear	Fishing locations** (in addition to Thuy Dien)	Species fished
Boats 75% own 1 boat 25% own 2 boats Lu* -between 20-100 -catches shrimp Nets A15-shrimp, fish A18-shrimp, fish A20-fish A25-fish A30-fish, crab A40-crab	Phu An Phu My*** Phy Than Phu Thuan Guan Ngan Quang Cong Choi Moi Vinh Thanh Vinh Giang Vinh Ha Cu Lac Phy Hai Phu Da Phu Dien	Cá Bông (fish) Cá Kinh (fish) Cá Hanh (fish) Cá dìa (fish) Tôm (shrimp) Cua (crab)

There are 12 houses in Thuy Dien that practice mobile capture fishing: 5 that do only mobile capture and 7 that practice mobile capture in addition to net enclosed.
* The group that practices only mobile capture fishing own more lu than the mobile capture fishers who also do net enclosed aquaculture, with some mobile capture only households owning upwards to 100 Lu.
**None of these locations listed belong to Phu Xuan commune.
*** Mobile capture fishers outside Phu My are not legally permitted to fish in Phu My because the village has full FA Rights Allocation; however, fishers admitted that they still go there to fish at night when they cannot be seen.

These data coincide with previous *truisms,* albeit contested, contrasting aquaculture as representative of the resource rich and mobile capture fishing as signifying the marginalized poor (Little et al, 2010). Thuy Dien's mobile capture fishers' level of poverty is indicative of their homes, which sit interspersed in sharp contrast to the concrete homes of fish farmers in the village. Mobile capture fishers also constitute the smallest production group in the village and have no representation on Thuy Dien's Fishing Association Board. Only four out of the 12 households that practice mobile capture fishing either alone or in combination with aquaculture are members of the Fishing Association, which, as noted previously, means very little without the Fishing

Association having power to enforce fishing/aquaculture regulations. Four out of the five households that practice only mobile capture fishing in the village also fish outside of Thuy Dien's fishing areas—one household surveyed fishes in four additional locales.

Table 1 provides some general information with respect to fishing gear, locales and species fished for mobile capture fishing in Thuy Dien. Mobile capture fishers in the village use *Chinese Lu* (Fig. 12) and a range of different sized fishing nets (the letters and numbers are in reference to hole size). Table 1 also alludes to the degree of poverty among mobile capture fishers in the village. Most households only own one boat, and the extensive list of outside fishing areas is indicative of an insufficient daily catch when fishing only in Thuy Dien.

3.3.2. *Net enclosed aquaculture*

Fig. 14. Net enclosures with guard huts in Thuy Dien village (Wilkings, 2012)

Net enclosed aquaculture consists of rectangular areas in the lagoon enclosed by nets. These nets are secured with bamboo poles that are spaced a meter or so apart from one another. Net enclosed aquaculture in Thuy Dien is very densely exploited. There is very little space between each enclosure, which results in poor water flow. Each enclosure has a bamboo guard hut to protect the enclosure from theft (Fig. 14). Net enclosed aquaculture was noted to be the most *economically beneficial* production system in Thuy Dien for a number of reasons: it provides stable

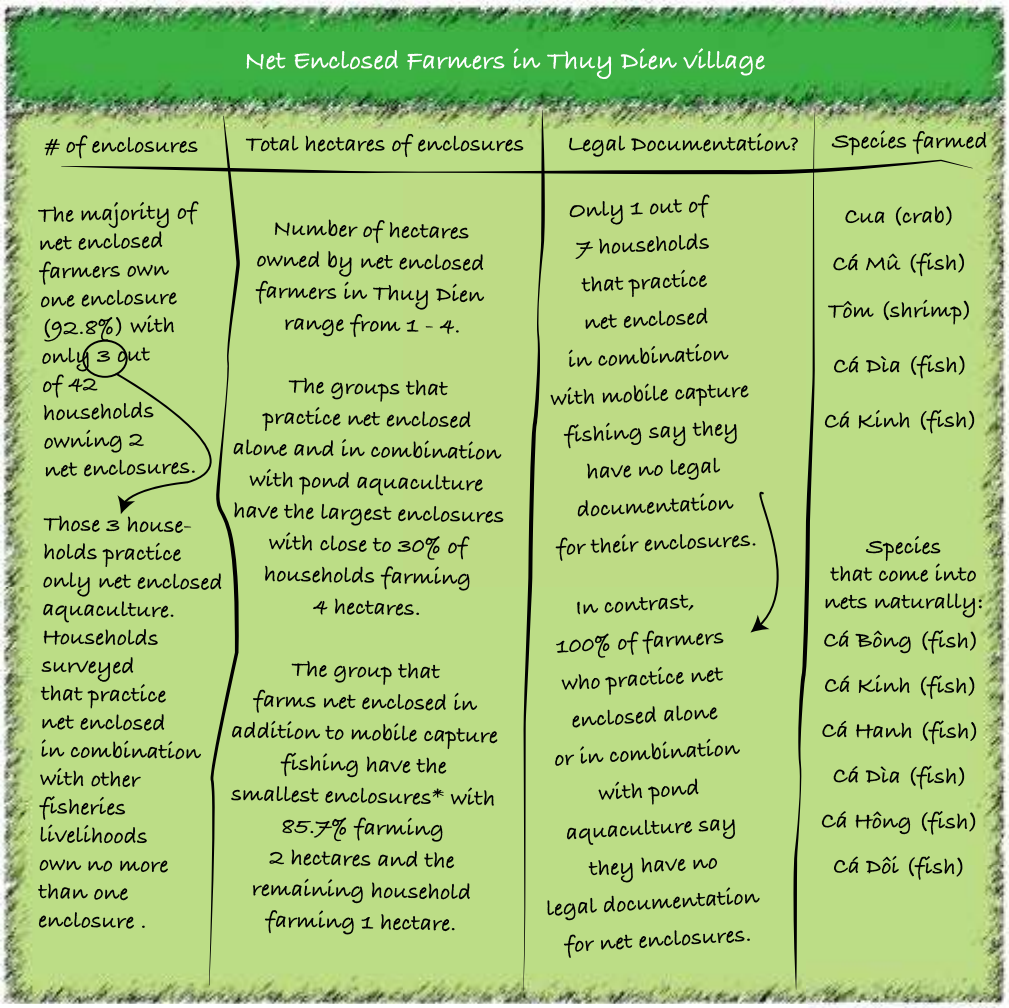
Fig. 15. A net enclosed farmer's home on the left faces a mobile capture fisher's home on the right (Wilkings, 2012)

income, requires very little investment; the enclosures rely on natural feed; nets are relatively cheap; and there are no input costs for chemicals and labour since chemicals are not used and farmers do not hire help. Net enclosed aquaculture, constituting the largest production group in the village, is the most *socially beneficial* livelihood because of strong social capital between farmers. There is also a high level of trust between most net enclosed farmers because many constitute the initial land resettlement group of 1985—this was reported by the village chief and reinforced during the initial focus groups isolating each production group. And finally, because net enclosed aquaculture relies on the lagoon's natural tide, water salinity is replenished naturally (Interview with village chief, 2012). These benefits were also noted in focus groups and the survey.

The survey indicated that the group that practices mobile capture fishing in addition to net enclosed aquaculture (the second land resettlement group) own the smallest enclosures (Table 2). These farmers said that most of them farm approximately 1½ hectares of net enclosure (data collected from the village survey reveals that the average size of the net enclosures of this group is 1.857 hectares), which provides insufficient income leaving them no choice but to practice capture fishing as well. They also have no money to expand their enclosures, and there is no more water

surface area available. Although farmers have informal rights to their net enclosures (supported by the village.

Table 2. Net enclosed aquaculture group general information



There were 42 houses surveyed in Thuy Dien that practice net enclosed aquaculture: 30 that do only net enclosed, 7 that practice mobile capture in addition to net enclosed, and 5 that farm lowland and highland pond in addition to net enclosed aquaculture.
*This is in line with Mr. Tran Van Kham's historical account, where the group that practices net enclosed aquaculture in addition to mobile capture fishing constitutes the second land resettlement group of 1995, and thus own the smallest net enclosures, fishing to supplement their income.

chief and indicative of the annual fees they pay), legally exclusive rights to land use in Vietnam do not apply, which is evident in the lack of legal documentation farmers have for net enclosures.[17]

Net enclosed is the most densely operated form of aquaculture in the village with very little space between each net enclosure. In light of this, the Department of Agriculture and Rural Development (DPC) has implemented a zoning plan to decrease *all* net enclosed areas by 30-50 per cent. A DPC official explained that the government plans to have the current 809 hectares of net enclosed aquaculture within Phu Vang district (which includes the only three communes that practice net enclosed aquaculture—Phu An, Phu My, Phu Xuan[18]) reduced to a little more than 400 hectares by 2015.

3.3.3. *Lowland pond aquaculture*

Fig. 16. Lowland pond aquaculture in Tam Giang Lagoon (Wilkings, 2012)

17. 85.7 per cent of the group that practices mobile capture fishing in combination with net enclosed aquaculture (6/7 households) say they have legal documentation compared with 100 per cent of all other net enclosed farmers surveyed in the village (38 households) say they have no legal documentation.

[18] Thuy Dien village is in Phu Xuan commune.

Lowland pond aquaculture is also part of the lagoon but, unlike net enclosed aquaculture, the ponds are built up with, and separated by, rock and soil (Fig. 16). With little separating the ponds from the rest of the lagoon, harvest can escape at high tide. This generally results in a significantly higher income during the dry season than in the rainy season. Although lowland pond aquaculture is *in the lagoon,* farmers interviewed did say they have legal rights to use. One lowland pond farmer I surveyed obtained his lowland pond from the government with legal documentation. In one of the focus groups pond farmers explained that a few years ago the government, with support from NAV (Nordic Assistance for Vietnam), implemented a policy to encourage people who practiced net enclosed aquaculture to transition to lowland pond aquaculture by providing some farmers with lowland ponds to farm. These legal rights to use are fully recognized by the government as explained by two focus group participants who were given highland ponds in exchange for their lowland ponds by the government.

Lowland ponds are used for both breeding and raising aquatic species. Farmers breed shrimp and crab by raising the juveniles for one month after which time they sell some and keep the rest for breeding. They raise *Dìa* fish for five months and then sell some of the fingerlings to the net enclosed farmers in the village and keep the remaining for breeding. Breeding is typically done in lowland ponds because the ponds are level with the water in the lagoon; the water level of highland ponds is too low during the dry season requiring a machine (and fuel) to pump the water from the lagoon into the ponds. The cost of feed for lowland pond aquaculture is relatively low since most of the time the farmers say they use natural feed courtesy of the tide.

3.3.4. *Highland pond aquaculture*

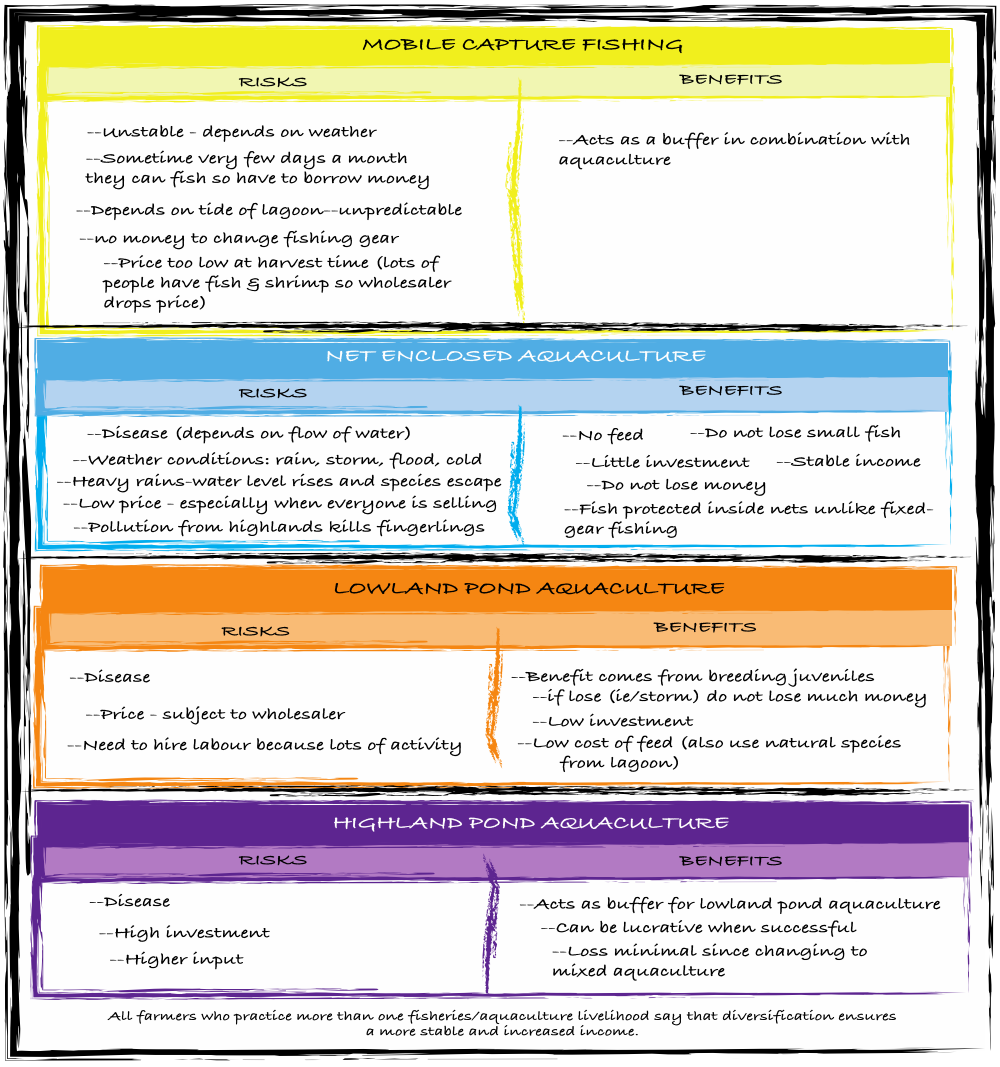
Fig. 17. Highland pond aquaculture in Xuan Ô (Wilkings, 2012)
(Thuy Dien can be seen on the horizon. To the right, and out of view, is the road entering Thuy Dien village).

Highland ponds are created in land (Fig. 17). The ponds are much further away from the lagoon and rely on machinery to pump the water into the ponds. Because highland ponds are in land this form of aquaculture takes more initial investment (fuel, pump), input (seed, feed, chemicals) and labour. Therefore, income from highland pond aquaculture depends on input. Typically, the more money invested in seed, labour and machinery, the greater the output. When highland pond aquaculture is successful it is very lucrative. Thuy Dien pond farmers used to practice high-density (industrial shrimp) aquaculture, but as mentioned previously, many highland farmers lost a substantial amount of money through boom and bust cycles—typical of high intensity aquaculture. Now the farmers practice mixed aquaculture with less density and loss is now minimal. The highland pond farmers interviewed said that they farm 20 per cent crab, 70 per cent shrimp, and 10 per cent *Dià* (fish). They grow *Dià* to sell and use for feed. Farmers who practice both lowland and highland pond aquaculture initially put fingerlings in the highland ponds and wait one month for them to grow. They then transfer them to lowland ponds where they are raised big enough to sell. Highland pond aquaculture can act as a livelihood buffer in the wintertime when heavy rains and high water levels can wash aquatic species away in lowland ponds (Focus

group with net and pond farmers, 2012). Therefore, highland ponds are considered assets when integrated within diversified livelihoods (Little et al, 2010). Highland ponds are also less vulnerable to weather (flood and storm) and the spread of disease than is net enclosed and lowland pond aquaculture.

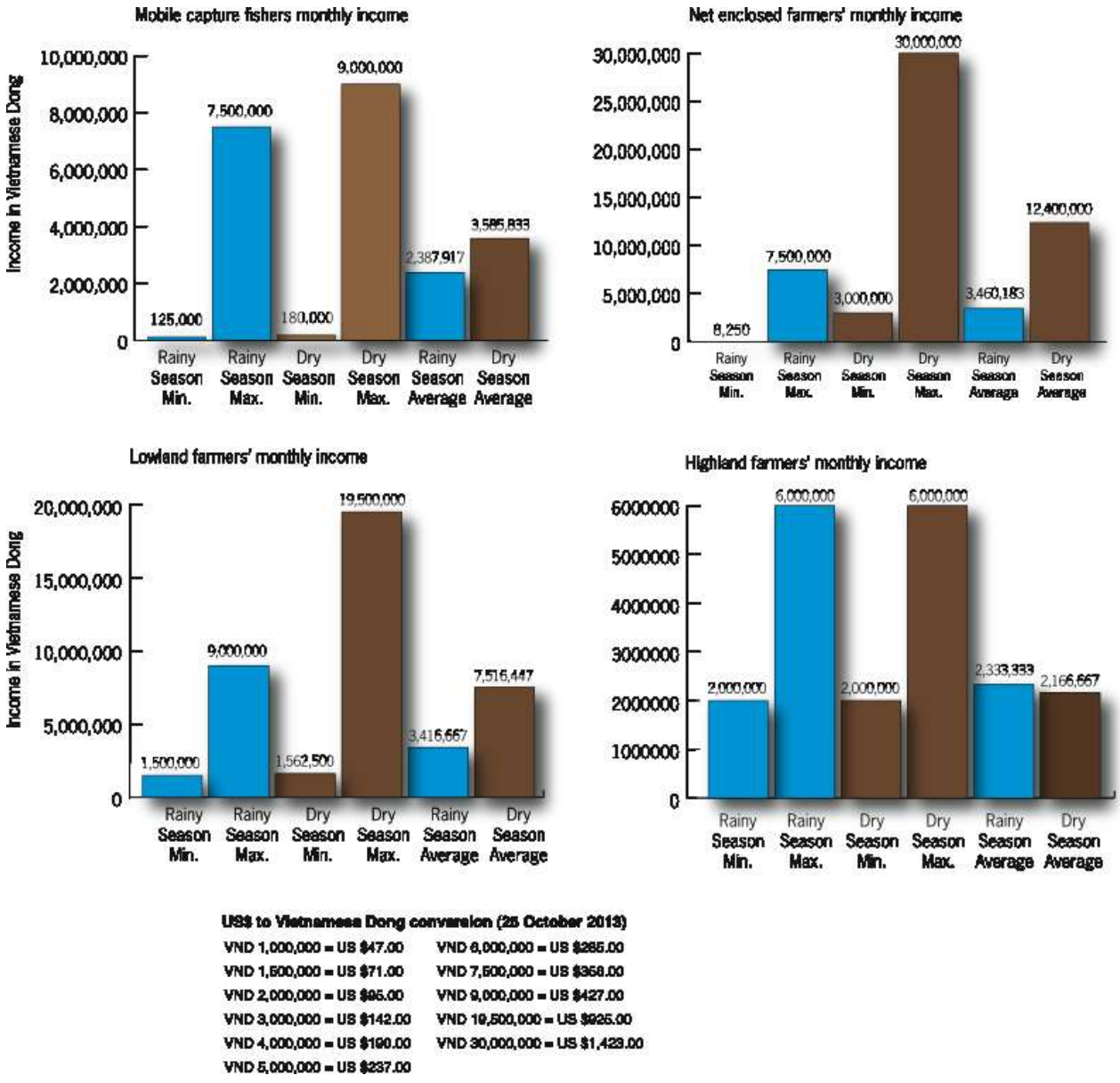
Fig. 18 shows a general comparison of risks and benefits between each of the four production groups discussed above. These risks and comparisons were shared in focus groups and key informant interviews.

Fig. 18. Risks and benefits associated with all four production systems~as noted by Thuy Dien's fishers and farmers



3.4. Income compared across production systems

Fig. 19. Average monthly income per production group showing the range between minimum and maximum monthly income as well as the average monthly income for both rainy and dry seasons as reported by households surveyed[19].



19. Rainy season is approximately from September to March and the dry season is roughly from March to August (during this study they had no flood expected at the end of my stay, which speaks to the increase in unpredictability of weather). For each production group, the minimum and maximum income is presented and then monthly incomes for each season are averaged.

Fig. 19 shows the range and average monthly income of households surveyed within each production group. It should be kept in mind that fishers and farmers were busy during the surveys so some reported incomes are likely rough approximations; nonetheless, these reported figures offer a sketch of incomes derived from each production system in the village.

All households surveyed noted that they make more income in the dry season[20] than in the rainy season, except for highland pond farmers who tend to use their ponds for breeding in the dry season. The mobile capture fishing households reported making the least amount of money per month, albeit the average monthly income for mobile capture fishers is higher than that of highland pond farmers. This is likely due to the fact that the majority of highland pond farmers surveyed practice other fisheries livelihoods in combination with highland pond (55% of which practice a combination of three fisheries livelihoods—net enclosed, lowland and highland).The household that reported the highest income in the dry season (VND 9,000,000 / US $427.00)[21] practiced only mobile capture fishing, and the household that reported the lowest monthly income in the dry season (VND 180,000 / US $8.50) practices net enclosed aquaculture in addition to mobile capture fishing.

The production group that reported the highest monthly income, as well as the highest average income in the dry season is net enclosed aquaculture (30,000,000 VND / US $1,423.00 and 12,400,000 VND / US $588.00[22] respectively), but again it is important to note that the majority of net enclosed farmers surveyed practice *only* net enclosed aquaculture. If farmers

20. Dry season is from February to September. During the rainy season lagoon levels rise, flooding occurs, and fish can escape from nets and lowland ponds.
[21] October 25, 2013 conversion rate (http://www.xe.com/currencyconverter/)
22. October 23, 2013 exchange rate.

diversified it is likely their reported income for net enclosed aquaculture would fall as they would be focused on more than one production system; yet, their income would most likely be more stable with less of a gap between the average monthly income reported in the rainy season compared with that in the dry season overall. Although only three households surveyed noted making more than VND 16,000,000 /US $759.00[23] these numbers illustrate the income potential of net enclosed aquaculture. When interviewing an official from the CPC, he confirmed that Thuy Dien village has moved out of poverty but poverty has decreased mainly for the net enclosed farmers because the practice relies on very little investment.

The average monthly income in the rainy season for lowland pond farmers is on par with that of net enclosed farmers, which makes sense due to both practices occurring in the lagoon water. High water levels threaten to wash species away during the rainy season. However, during the dry season, net enclosed farmers still report higher incomes than lowland pond farmers. Important to note here is that of the 19 households interviewed that practice lowland pond aquaculture, only seven households practice lowland pond farming in isolation, compared with the 30 out of 45 net enclosed households that practice net enclosed aquaculture only.

These findings suggest that these reported incomes are influenced significantly by fishers and farmers' movement in and out of other production systems. Diversification may lower average monthly incomes within production groups but bring higher overall monthly incomes across multiple production groups. For example, one household that practiced net enclosed aquaculture in combination with lowland and highland pond aquaculture reported a monthly income of VND

23. October 23, 2013 exchange rate.

10,800,000 (US $512.00) in the rainy season, which is higher than any maximum reported monthly income within any one production group in the rainy season. However, income across multiple production systems vary considerably as some households, for example, use their highland ponds only for breeding for all or part of the year.

Most importantly perhaps is that diversification, specifically into highland pond aquaculture but also other fisheries livelihoods, provides more stable incomes that compensate for the loss of production brought about not only in the rainy season but also in times of unforeseeable natural or economic occurrences.

3.5. Access to credit

All survey participants in the village said they had access to credit. However, four of the five mobile capture fishing households borrow from informal means because of a lack of collateral. The only mobile capture fishing household that borrows from both formal and informal means noted the Vietnam Bank for Social Policy as the source of formal credit. This institution lends only to poor households. The maximum loan amount is VND 30,000,000 (approximately US$1500.00) for 1-5 year loans. Formal sources for villagers also include the Farmer's Union, Women's Union and the Bank. Most participants interviewed borrow from both formal and informal means. Informal sources are used because they are faster, providing smaller amounts borrowed over shorter periods of time, and are the answer to a lack of collateral.

3.6. The poor and the near poor

Comparing all four main production groups, mobile capture fishers clearly are the least economically enriched group. The Vietnamese government's *Decision on the issuance of standard of*

poor households, near poor households in the period 2011-2015[24] classifies *poor households* in rural areas as having an income of VND 400,000/person/month (from VND 4,800,000/person/year) or less, which is approximately US$20/person/month (from US$230/person/year); or, in other words, approximately US$0.66/person/day. *Near poor* households in rural areas are classified with having an average income from VND 401,000 to VND 520,000/person/month—from US$20 to approximately US$25/person/month). According to Thuy Dien's village chief there are only three households surveyed that are classified as *near poor* and only one with *poor* classification[25]. The *near poor* classifications of the households surveyed constitute two households that practice mobile capture fishing and one household that practices a combination of mobile capture fishing and net enclosed aquaculture. The one household surveyed in the village that is classified as *poor* practices only mobile capture fishing.

3.7. Social relations of production

Although fishing and fish farming, like agricultural farming, concern technical conditions such as the condition of water, seed and feed quality, and effective management, fishing and fish farming also involve social conditions (Bernstein, 2010a). There are social divisions of labour between different production systems where the exchange of products involve activities that complement and are related to one another (Bernstein, 2010a). Thuy Dien exemplifies these divisions of labour. As noted previously capture fishers, when their catch is sufficient, sell their

24. The Vietnamese government's *Decision on the issuance of standard of poor households, near poor households in the period 2011-2015* provides classifications for only *near poor* and *poor*.
[25] Data collected did not determine the total number of poor or near poor households in Thuy Dien village.

small fish to fish farmers for feed, pond farmers sell their fingerlings to net enclosed farmers, and highland farmers sell their breed to lowland pond farmers. There are also a number of household members in the village who work as local collectors for the wholesalers or who sell at the local market. These divisions of labour represent *social organization*, or what Bernstein refers to as *agency*—the capacity of fishers and fish farmers to organize and make decisions about production, to carry out these decisions and to innovate (2010). Although economics largely drives this response, these divisions of labour resonate with fishers and fish farmers' *capacity* to innovate. Little et al (2011) argue that rural small-scale aquaculture production involves increasing forms of social organization in part due to the increase in demand for access to resources.

There are also interesting dynamics at play within and across production systems in Thuy Dien. In a focus group conducted with net enclosed farmers, the farmers said that they are fearful that mobile capture fishers will steal from their enclosures, although they added that most theft occurs by mobile capture fishers *outside* the village. These farmers further explained that when net enclosed aquaculture used to be fixed gear fishing[26] (which included mobile fishing) people were so busy struggling to make a livelihood that they were more separated from one another than they are now. Since net enclosed aquaculture replaced fixed gear fishing, farmers have more money and they associate with one another more. One focus group participant rhetorically asked:

> "How can you steal from someone you just had dinner with?"

Fish farmer, 28 September 2012

26 . This method uses bamboo sticks to entrap aquatic species but no nets were used so often times fish, crab and shrimp would escape.

In this sense, the transition into net enclosed aquaculture has tightened the relationships within and across different production systems.

Data from the household level survey reveals that relationships are strongest *within* each production group and across *similar* production groups (Appendix II: Frequency table 25 Social relations of production). A focus group with the net enclosed only group revealed that highland pond aquaculture stems from agriculture, and is therefore viewed as a "different culture" by way of having a very different background than aquaculture. Moreover, highland ponds, although close by, are not located in Thuy Dien village so highland pond farmers do not work in close proximity to one another as do net enclosed farmers. That said however, all farmers surveyed in Thuy Dien that farm highland ponds do so in combination with other production systems so social relations with other production systems do exist. The village chief noted that relationships in the village are more about blood than livelihoods and this does seem to be the case: mostly all groups have blood or marriage relations in other groups. Overall, relationships exist across all production groups in various forms (business, meeting at community functions, blood relatives, marriage relatives and/or close friendships), which is not surprising considering the small size of the village and the duration of the time most people have lived there.

The mobile capture fishing group seems to be the most excluded. They are a much smaller group, have the lowest level of education, are the least economically well off (Chapter 4, Section 4.4.1), and are generally mistrusted amongst net enclosed farmers in the village. They also have the least amount of FA membership, indicating little to no representation.

3.8. Thuy Dien's FA

Currently Thuy Dien village has little to no effective resource management (Interview with village chief, 2012). However, according to the faculty at Hue University of Agriculture and Forestry, the process is underway to form Fishing Associations in Phu Xuan commune but the process has been slow and Thuy Dien's FA remains weak. The process involving other Fishing Associations has been considered much faster and more effective because it involved both IDRC and IMOLA. Although IDRC provided support to Phu Xuan commune in 2005 support was discontinued resulting in a much slower process (Hue University of Agriculture and Forestry faculty, from here on in "the University"). For the past four years IMOLA has been working to strengthen FAs in Phu Xuan commune (Interview with IMOLA, 2012), but unfortunately the IMOLA project ended in December 2012. When I spoke with the Director of the IMOLA project in early December 2012 he said that he expected the project to be continued, but since then the office has closed and the IMOLA website has been dismantled. Whether it will be continued remains to be seen. It is worth noting here that when interviewing Thuy Dien's Fishing Association chairperson, he made no indication that he was aware of the project ending.

Focus groups with a number of fish farmers from various production groups in the village also emphasized the lack of Fishing Association regulation, stating that current regulation involves following the seasonal calendar as outlined by the CPC. Farmers are not impacted by any rules or regulations, with the exception that expansion of net enclosures is not permitted (Focus group with net enclosed farmers in Thuy Dien, 2012). Although certain types of capture fishing have been banned by the government, such as the use of explosives, Thuy Dien's Fishing Association

lacks the power to reinforce this regulation. Without effective monitoring and enforcement, the ban is essentially moot. According to the faculty at the University without Fishing Association capacity the CPC must make regular visits to the village to oversee things, collect money and deal with conflict; however, the CPC has very little resources and there are few people to undertake these tasks.

Thuy Dien's Fishing Association Board consists of seven people, three of whom are pond farmers and four who farm net enclosures. No members of the board are mobile capture fishers. At the time of this survey there were 83 households in the village who were members of the Fishing Association, which makes up approximately 50 per cent of fisheries households in the village (Interview with Thuy Dien FA Chairperson, 2012). In order to achieve rights allocation, Thuy Dien Fishing Association members must occupy at least 70 per cent of the community (Interview with faculty at the University, 2012). Therefore, along with the need for adequate planning, as well as consensus and agreement between the district, commune and Thuy Dien's Sub-FA in respect to planning, the Sub-FA must also develop its capacity by way of community representation.

Chapter 4: Resource Management

This chapter begins by investigating the perceived ecological and environmental impacts of fishing and aquaculture in the region through a discussion of survey participants' responses. This sets up the context in which to discuss the government's current policy on the zoning of net enclosed aquaculture. How this policy is communicated to and perceived by fishers and fish farmers as well as how villagers adapted to previous zoning policies follows. This chapter argues that although zoning of net enclosed aquaculture is necessary for sustainability of lagoon resources, heavy-handed zoning of only one production system may be side-stepping the root of the problem and ultimately do very little in the name of sustainability, as a majority of Thuy Dien's fish farmers struggle to compensate for a loss of income. Other, more GDP favourable, production systems operating in the village should also be addressed if sustainability of lagoon resources is to be successfully addressed. The chapter concludes by identifying the winners and losers in response to this new resource management policy.

To get a sense of the ecological and environmental impacts from fishing and aquaculture in the lagoon, survey participants, along with government officials and IMOLA, were asked if they thought fishing and aquaculture practices were indeed impacting the lagoon ecosystem. The information they provided (Appendix XIV: Frequency table 18: Household survey opinions regarding each main production system's impact on environment) are their perceptions since there is limited baseline data for biophysical factors within the lagoon.

Catching too many aquatic species not only reduces populations but also reduces the amount of breeding adults resulting in the inability for aquatic species to reproduce fast enough to replenish populations (Mansfield, 2011). Overfishing also destroys specific populations of aquatic

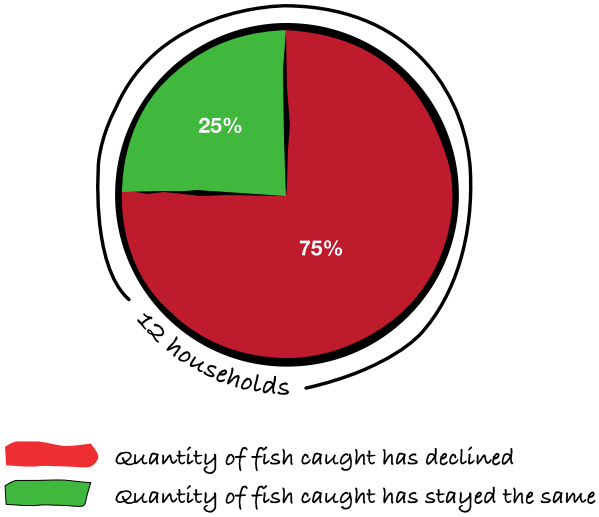
species, such as predatory species, resulting in an imbalance in the entire food chain making recovery of the lost species unlikely. Aquatic biodiversity can also be destroyed, which threatens marine ecosystem resilience. These ecological and biological changes can have socio-economic consequences on a local region, such as fishers needing more time and effort to catch the same harvest, increases in the price of aquatic species in the region, or the sudden unavailability of certain desired species (Mansfield, 2011).

4.1. Perceived change in quantity of aquatic species

Another local government interview indicated that the number of species caught in the lagoon is declining, attributing the decline to mobile capture fishers catching *everything* they can (including small species). Mobile capture fishers in Thuy Dien were asked if they thought the quantity of species *caught* has declined over the past five years. Nine of the 12 households surveyed (75 per cent) that practice mobile capture fishing alone or in combination with net enclosed aquaculture said that the quantity of fish caught *has* declined over the past five years (Fig. 20). Specifically, they noted that five years ago they were able to catch 10 kg of fish per day but now they catch only 4-5 kg per day. Information provided by fishers in Thuy Dien supports Boonstra and Nhung's (2011) discussion on stock depletion in the area. They argue that "individual catches for all the major types of fishing in the lagoon [have diminished]", with some fishers reporting three times less catch than 7-10 years ago (p. 10). Farmers in the Thuy Dien village attributed the decline in catch to explosive fishing and pollution from aquaculture ponds and agriculture land. The use of *Lu* was also blamed in contributing to the decline in catch. In line with these

observations over half (57.7 per cent) of all net enclosed farmers surveyed agreed that the quantity of natural species that come into the nets from the sea has declined.

Fig. 20. Mobile fishers' perception of the change in quantity of fish caught over the past five years



4.2. Perceived environmental impacts

From the interviews and survey conducted there were direct or indirect environmental concerns noted in respect to all four main production systems (see Appendix III, V and VI for CPC and DPC interviews).

4.2.1. Mobile capture fishing

Mr. Tran Van Viet from the CPC noted that mobile capture fishers in Thuy Dien represent a small number of resource users so the livelihood does not impact the environment directly. Mr. Vo Xuan Huong from the Department of Agriculture and Rural Development (DPC) agreed, saying that capture fishing impacts fish stock but does not degrade the environment *per se*. The impact from mobile capture fishing is more in line with Mansfield's (2011) discussion on biological, ecological and socio-economic dimensions. For example, pond farmers noted in a focus

group that the fish species *Ca Dià* has disappeared from Thuy Dien and they now have to buy it elsewhere to farm. *Ca Nau* is another species of fish that farmers noted is low in quantity and subsequently high in price. These reductions in numbers could be a consequence of overfishing or pollution or a combination of both.

Lu (tubular net that rests at the bottom of the lagoon bed) is of particular concern because it catches *everything*—even the smallest species—making it difficult for fish to grow and breed and for populations to replenish. Of all households surveyed, 55.7 per cent believe that mobile capture fishing produces negative impacts on the environment[27] because of the use of *Lu* and explosive fishing. Boonstra and Nhung (2011) explain that the use of electricity by mobile capture fishers is in response to the lagoon's 1993-2000 aquaculture boom that lead mobile capture fishers to use more effective and harmful fishing gear including electricity and explosives to keep up. The use of electricity and explosives kill the fish in the nets and ponds of aquaculture farmers (Boonstra & Nhung, 2011). Just as the state has banned the use of electricity in the lagoon (Boonstra & Nhung, 2011), albeit ineffectively, the Vietnamese government is now limiting the number of *Lu* each household can use.[28] In the future, according to Mr. Vo Xuan Huong from DPC, the government plans to completely ban the use of *Lu*. However, the director at IMOLA explained that there is no effective monitoring for the use of *Lu* because it is invisible underwater (Interview with IMOLA, 2012).

27. The term 'environment' here is used to refer to the lagoon ecosystem more broadly.
28 The limitation of the number of Lu per household could have influenced the number reported by households in respect to the number of Lu owned.

4.2.2. Net enclosed aquaculture

Net enclosed aquaculture indirectly impacts the environment because the practice does not involve chemicals or manufactured feed (Interview with Thuy Dien's Village Chief, 2012). The issue surrounding net enclosed aquaculture is that the nets are too close together and the holes are too small so the water cannot replenish along with the natural flow of the lagoon. Consequently, waste is inadequately eliminated (Interview with CPC, 2013). A DPC official supported the CPC's view by noting that net enclosures prevent the flow of water but *do not make* pollution. Indicative of the accumulation of waste, net enclosed farmers interviewed said that 5-7 years ago shrimp had a survival rate of 50 per cent but now they only have a 10-20 per cent survival rate. However, the majority of fishers and fish farmers surveyed believe that net enclosed aquaculture does not negatively impact the environment (Fig. 22).

Fig. 21. Waste and debris build-up on nets of enclosures (Wilkings, 2012)

Most of the waste and pollution that is accumulated in the net enclosures come from agricultural land and highland ponds because medicine and waste from feed flows directly into the lagoon (Interview with CPC). Little et al (2010) add weight to this assumption by noting that the

majority of environmental impacts resulting from aquaculture are derived from feed production and use. Pumping systems are also important factors (Little et al, 2010). The pollution from agriculture and aquaculture is thus left to the natural flow of the water. The CPC recognizes that this is a problem and a CPC official said in the future they will think of a *better way to have the waste taken out to sea*[29] but there is no immediate plan to control the problem.

4.2.3. Lowland pond aquaculture

Lowland pond aquaculture does not seem to be of concern with respect to negative impacts on the environment. A CPC official noted that there is no environmental impact because lowland ponds exercise mixed aquaculture now instead of farming high intensity industrial shrimp. With intensive shrimp aquaculture all the waste was eliminated at once due to intensity and the farming of only one species. Moreover, because the lowland ponds are near to water level any waste is carried out [to sea] during heavy rains. What was not mentioned however was the use of medicine and manufactured feed in lowland ponds that is said to contribute to pollution and waste—although only a small percentage (15.7 per cent) of lowland pond farmers say they use medicine in their lowland ponds. A larger percentage, however, use manufactured feed in their lowland ponds—63 per cent (12 of the 19 households). Alternatively, one DPC representative did acknowledge that lowland pond aquaculture *does* negatively impact the environment through its use of medicine and manufactured feed. However, in support of the CPC, he too emphasized the environmental improvements resulting from the restrictions placed on the practice of industrial

29. No issues were raised in respect to contaminating the oceans.

shrimp. The majority of fishers and fish farmers surveyed in the village believe that lowland pond aquaculture does not impact the environment (Fig. 22).

4.2.4. Highland pond aquaculture

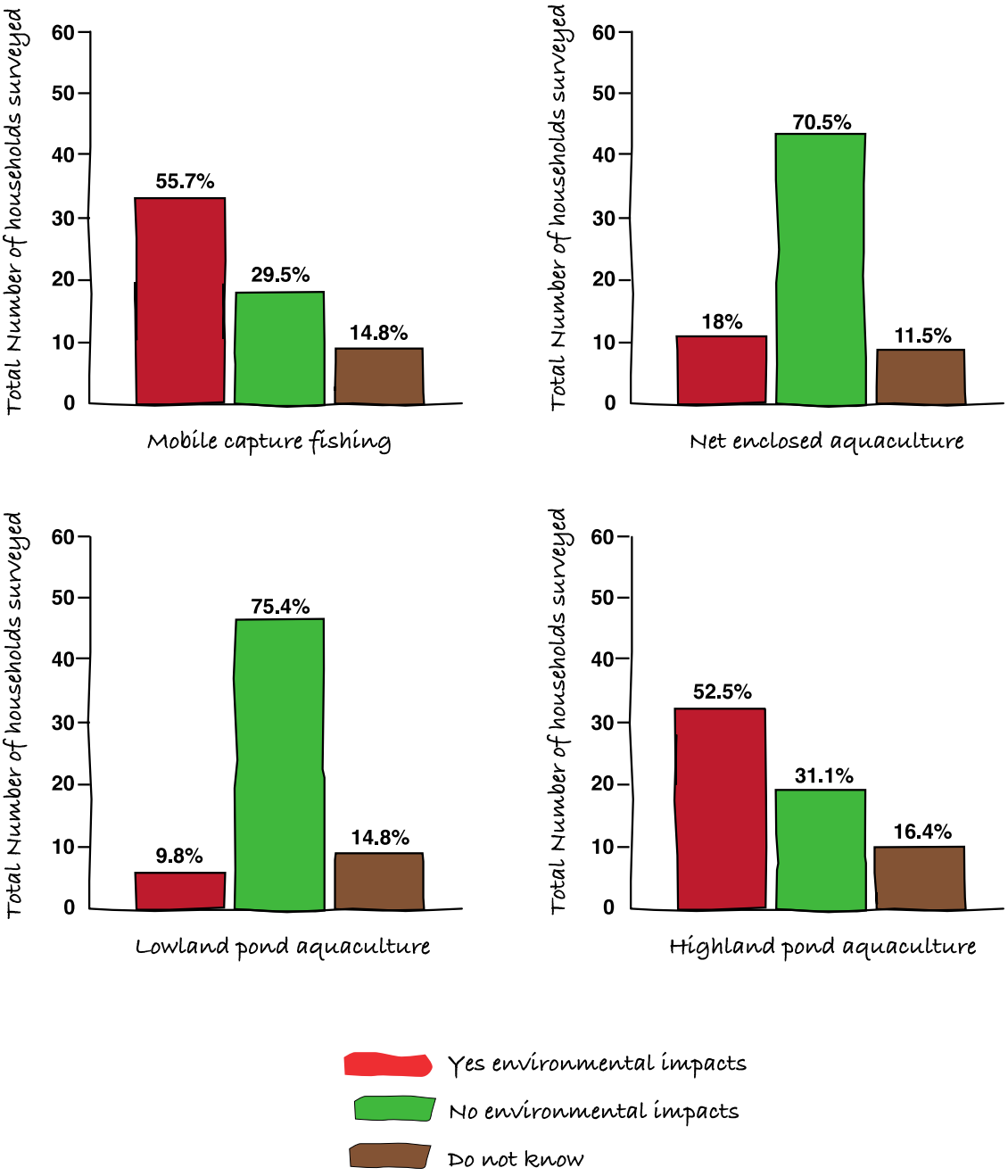
When asked if highland pond negatively impacts the environment, an official from the CPC said that it does, attributing the cause to the use of medicine and feed—the excrement of which flows directly into the lagoon. An interview with DPC however, revealed that the perception of environmental impacts from highland ponds was the same as that of lowland pond: levels of pollution have improved since mixed aquaculture has replaced industrial shrimp. In a focus group conducted with net enclosed farmers they noted that the water quality has become worse from the aquaculture pond and agriculture land waste. They said that the colour of the water at times changes from clear to pinky-brown. These farmers also noted a difference in land quality resulting from pond waste seeping into the land. Subsequently, they have observed not only a decline in the quantity of fish but also the quality of fish—the fish are becoming smaller. Pond farmers interviewed further attest to the change in the colour of water and they also agree that soil quality has decreased—attributing this to the pollution from agriculture land. Over half of the villagers surveyed believe that highland pond aquaculture negatively impacts the environment (Fig. 22).

When interviewed, an IMOLA representative said he believes that the lagoon, on the whole, is not very polluted. Chloroforms are concentrated along the sides of the lagoon where human waste can be found, but there are no heavy metals and the products used in the lagoon are quite natural (Interview with IMOLA, 2012). Most pollution, he continued, is organic. Some spots have fertilizer and these areas are visible, but for the most part he said there are virtually no

Persistent Organic Pollutants (POPs). Primarily, the pollution, the representative of IMOLA believes, comes from excess feed and waste from aquaculture, specifically shrimp farming.

Of the 12 households surveyed that practice mobile capture fishing alone or in combination with net enclosed aquaculture, half thought that mobile capture fishing negatively impacted the environment. The majority of those who believed mobile capture fishing was detrimental to the environment were the net and pond farmers since the use of explosive fishing directly impacts the species in their nets. These results are interesting in light of the livelihood buffering capacity that capture fishing can at times provide fish farmers. Of the 45 households surveyed that practice net enclosed aquaculture, only six households (13.3 per cent) believe that their livelihood negatively impacts the environment, which stands to reason when considering the current government's zoning plan. Highland pond aquaculture was a close second to mobile capture fishing in its perception of negative impacts to the environment. Interestingly, of the nine households that practice highland pond aquaculture surveyed in the village, the majority of those households (78 per cent) admitted that highland pond does negatively impact the environment.

Fig. 22. Perceptions of survey participants in Thuy Dien on environmental impacts per production system[30].



[30] See further Appendix III: Frequency table 18-'Household survey opinions regarding each main production system's impact on environment'

The practice of farming high intensity shrimp in the lagoon was in line with what Bernstein (2010a) refers to as a policy or program of modernization aimed at promoting a more productive aquaculture based in deepening commodity relations (greater integration of farmers in markets with more modern inputs). Increased productivity addresses, as Bernstein points out, the technical conditions of farming—improved varieties and cultivation methods, as well as greater fertilizer use (2010). However, high intensity industrial shrimp turned out to be more than the complex lagoon ecosystem, as well as the socio-economic[31] dynamics of the communities that rely on the lagoon, could handle. Fish farmers lost a lot of money, and pollution levels increased substantially from the farming of high intensive shrimp.

The shift to mixed aquaculture (diverse species, less intensity) in the region has done much to lessen pollution and subsequent conflict in the area, but there remains concern about the negative environmental impacts that are also caused by mixed pond aquaculture. Yet, pond aquaculture represents a more *productive* mode of fish farming. Little et al (2011) emphasize this with the parallel they denote between pond aquaculture and a "more asset-based understanding of aquaculture" (p. 30). Pond aquaculture, they argue, remains the central asset for small-scale rural aquaculture and globally integrated production systems (Little et al, 2011). And so, rather than targeting environmental impacts from the excretion of pond pollutants and waste, resource management is targeted at impediments to its progress—specifically the net enclosures that prevent the flow of waste from these ponds out to sea.

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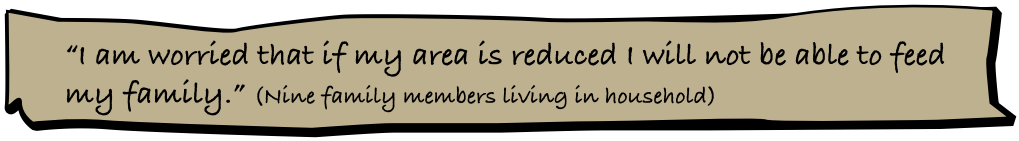
[31] Bernstein (2010) notes that the promotion of more modern farming sometimes results in overproduction that depresses price in international markets, which resonates with the focus of price when fish farmers discussed the risks involved in aquaculture.

4.3. Government zoning

4.3.1. The Current Zoning Plan

As noted in Chapter 3, the government plans to reduce the remaining 809 hectares of net enclosed aquaculture operating in Phy Vang district to half by 2015. The DPC informed us that up until this point the government has not have the funds to implement zoning and no strategy to help farmers transition into other livelihoods. Now, however, the government has the funds to compensate farmers and the resources necessary to provide vocational training for farmers to transition into other livelihoods. Worthy to note here is that Vietnam's General Statistics Office (GSO) reports that the portion of workers in Vietnam who have undergone vocational and/or professional training courses constituted less than one-fifth of the total labour force (2011).

Up until the time of this study the promise of compensation and training had not been fully received in Thuy Dien. Overall there are many questions surrounding the new zoning plan and net enclosed farmers in Thuy Dien expressed their concerns: 19 out of 45 (42 per cent) households surveyed that practice net enclosed aquaculture alone or in combination with other production systems expressed their concern about zoning and losing part or all of their net enclosures. 15 of these households practice only net enclosed aquaculture.



Fish farmer, 3 January 2013

The *reasons* for zoning also seem to be unclear for some net enclosed farmers. While some participants simply said they were unsure of the reasons, one participant told us that the government had said that zoning was to create a waterway for boats and for military purposes.

Moreover, there seems to be a degree of miscommunication *within* Thuy Dien about when the zoning is to take place. When speaking with Thuy Dien's FA chairperson, he said that the current zoning plan will begin in 2013 but the actual start date remains undecided. There has been no discussion to date, he continued, between the government, households and the Fishing Association. Compounding this unpredictability is the provincial government policy[32] adopted in 2001 proposing that all net-enclosed activities be phased out throughout the *entire lagoon* by 2010 (Tuyen et al, 2010). Further to this, an IMOLA representative noted that the government's initial plan was that by 2012 there were to be no more net enclosures and yet the enclosures remain. He went as far as to say:

> "Net enclosed zoning is a regulation put in place to clean up Sampan dwellers. The government does not really care about them, they are uneducated and have very little opportunity."

IMOLA representative, 3 December 2013

As harsh as this may seem, the comment made by the IMOLA representative is not so far removed from DaCosta and Turner's (2007) assessment of the Sampan dwellers as marginalized within Kinh society (ethnic lowland Vietnam). They note that a clear division exists between Sampan dwellers and Kinh people, whereby Sampan people tend to have low incomes, lack formal education, experience poor living conditions and are landless (2007)—since Thuy Dien, as a

32. Planning for aquaculture development in the lagoon areas of Thua Thien Hue province 2001-2010. The People's Committee of Thua Thien Hue Province; 2001.

resettlement village for Sampan dwellers, consists primarily of Sampan people[33] these factors are consistent with my own research findings.

4.3.2. Past Zoning in Thuy Dien

This is not the first time Thuy Dien's net enclosures have been zoned. One head of household interviewed told us that he had his net enclosure zoned in 2006 and that the government has assured him that the same areas zoned previously will not be zoned again. However, this knowledge is not shared amongst villagers as four net enclosed farmers who have been zoned previously all noted their concerns about being zoned again. Of these four farmers, two of them have already lost one hectare, one farmer lost two hectares, and the other farmer lost three. Another head of household informed us that he has been notified that he will be zoned again even though his area has been zoned previously adding that he expects to lose another hectare. One head of household interviewed said that there was a three year stretch of zoning whereby the government destroyed some net enclosures and the people rebuilt, then the following year the government came again and once again the people rebuilt, and then the next year it happened again. This particular interviewee lost 1.5 hectares during this time and received no compensation from the government.

All farmers interviewed who had either been zoned previously or who had expressed their concern about the new zoning plan noted that the government provided no compensation to farmers when Thuy Dien's enclosures had been zoned in the past:

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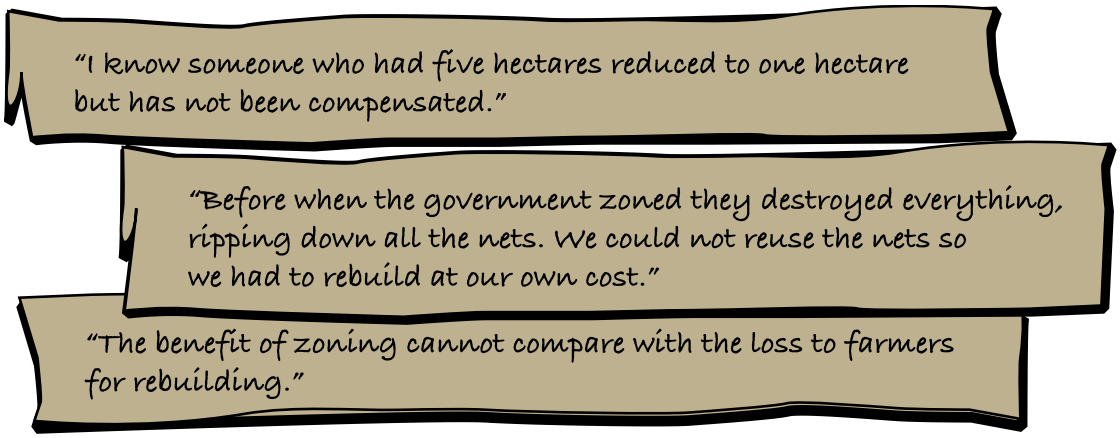
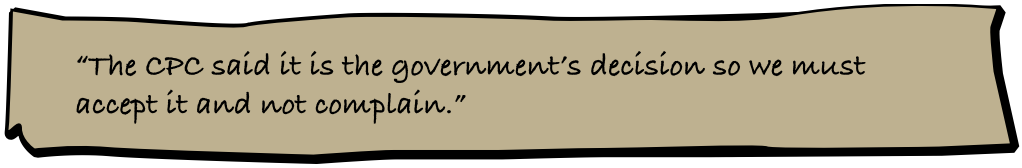
33. Although I did not ask in my survey if participants were Sampans, it was my understanding from speaking with the village chief about the two main resettlements in the village that mostly all residents of Thuy Dien are Sampans. Moreover, whenever the subject came up in interviews or discussions, it was always affirmed that participants were Sampan.



Fish farmers, 3 January 2013

Two participants informed us that twenty households had signed a document asking for compensation from the government but had been turned down:

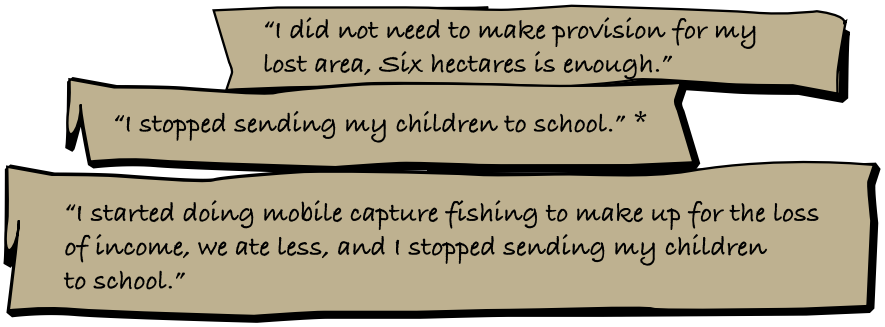


Fish farmer, 3 January 2013

Another participant told us that farmers were promised compensation during the previous zoning period in 2006 but they are still waiting. This participant noted that one day he went out to his net enclosure only to discover that the net had been torn down with no prior warning from the government. Stakes were placed in the water to indicate where he could rebuild his net, and he was responsible for the cost to rebuild. Another participant noted that the government announced the day before that they were zoning. When I spoke to Thuy Dien's FA chairperson about the lack of notice he told us that regulation stipulates that households should be notified five months before zoning is to occur; although, some households only know two months ahead of time. It is the responsibility of the village chief, not the Sub-FA, to notify the households. The village chief must obey the CPC and DPC, and sometimes the policy comes late resulting in a less-than-five-

months' notice. This however did not explain the villagers' claims of receiving little to no notice at all.

Interview participants who were zoned previously were asked how they adapted to the zoning of their net enclosures in the past. Some participants noted that their net enclosures were large enough that they could still make do; answers provided by other participants were on the other hand rather alarming.



* Participant noted that all four of his children stopped going to school; his elder son works with him in aquaculture and all others are now tailors.

Fish farmers, 3 January 2013

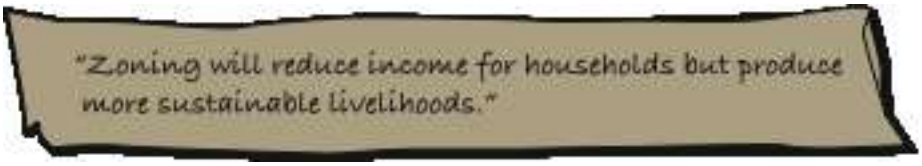
4.3.3. Enforced conservation

Participants were clearly angry about previous zoning methods and concerned about future zoning processes, but yet all those interviewed seemed subservient to the regulation. One participant said he disagrees with the policy arguing that it was unfair to farmers because of the additional cost incurred. Despite his qualms however, he further noted that:

Fish farmer, 3 January 2013

This apprehensiveness relates back to the comment made by one participant who, in thinking that I was affiliated with the government, recited his allegiance to government policy and

decisions. Robbins (2012), in his assessment of Political Ecology, discusses state coercion in respect to conservation. He argues that efforts to enforce *conservation* extend beyond the power of the state by causing individuals and social groups to internalize coercive aims of governments (2012). *Conservation* here is used to describe the zoning of net enclosures because zoning is being conducted in the name of sustainability—the preservation of lagoon resources; even though by restricting access to one group (net enclosed farmers) zoning [temporarily] increases access to another group (mobile capture fishers). Regulations will be put in place to restrict fishing gear at a later date. Although Robbins (2012) extends this theory to NGOs as counter movements, the compliance of villagers and village leaders in Thuy Dien is essentially an internalization of the government's coercive mission. This is evident in the full support of participants who are not expecting to be zoned, compliance on behalf of those who are, and support from the village leaders. The village's FA chairperson told us:

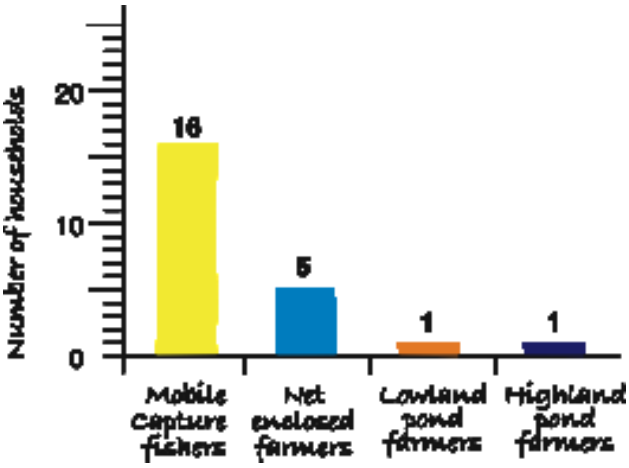


3 January 2013

Enforced conservation, Robbins continues, can lead to a disintegration of moral economy. As noted previously, Thuy Dien's village chief explained that there is a high degree of social capital amongst the group that does only net enclosed aquaculture. This social capital, Robbins explains, is invested in traditional management systems that regulate access to resources (2012). Although there are suggestions of an overburden on lagoon resources, data collected in the survey and interviews indicates a working interaction between community members with very little conflict (theft by capture fishers was said to be primarily by those living outside Thuy Dien). Fig. 23

illustrates the degree of conflict between production systems as well as within production systems reported by the 61 households surveyed.

Fig.23. Households reporting conflict with members of each production group in Thuy Dien (including their own).



Only 16 of the 61 households (26%) surveyed reported any type of conflict with mobile capture fishers *in* Thuy Dien. The number drops to only five of the 61 households surveyed reporting conflict with net enclosed farmers (less than 1%). Conflict with pond farmers was reported as almost non-existent with only one household reporting conflict with lowland pond farmers and only one with highland pond farmers. These numbers point to a high degree of social capital in the village. Robbins (2012) says that disruption of these systems of social capital, which is plausible when considering the number of households that practice net enclosed aquaculture, tends to lead to an increase in violation of resource use, as well as to a lack of accountability in regulating natural resource systems (2012). This scenario could be escalated by the lack of FA power in the village.

The zoning of Thuy Dien's net enclosures also enters the debate over environmental/ ecological rights versus local community rights (Hall, Hirsch & Li, 2012). Hall, Hirsch and Li

(2012) underscore the importance of *people* in nature conservation and the need for inequities in conservation-induced displacement to be addressed in order to ensure the success of future conservation by this means. If the net enclosures in Phu Vang district are reduced by 50 per cent, it is likely that many net enclosed farmers in Thuy Dien will be displaced since seeking out wage labour in cities may be their only recourse, thus echoing the notion of conservation-induced displacement. This significant decrease in net enclosures resonates with what Hall, Hirsch and Li (2012) refer to as "heavy-handed protected area demarcation" (p. 63) and may be sidestepping the root of the problem. Participants interviewed agreed. Although one participant noted that the waterways between net enclosures should be widened to enable the water to replenish, he believes the net enclosed areas are being reduced by too much. Another participant noted that any environmental concerns he sees come from highland pond aquaculture. He suggested that the focus should be on highland pond rather than on net enclosures in reducing waste. Another net enclosed farmer explained that:

> "People who practice net enclosed aquaculture should change the net more often. New nets would help the water to flow easier."

Fish farmer, 3 January 2013

Robbins (2012) argues that contemporary conservation marginalizes traditional residents and quite often fails to produce sustainable results. What tends to result, he continues, is the perpetuation of injustice and conflict.

4.4. Who wins, who loses?

4.4.1. Mobile capture fishers

An official at DPC informed me that a decrease in net enclosed areas opens up the fishing areas for mobile capture fishers; therefore, zoning is beneficial for this group. The DPC, he continued, will then identify which type of gear and the quantity of gear that is allowed per household, suggesting that mobile capture fishing is next in line for implementation in tighter regulation. The interview with DPC further informed me that explosive fishing will be banned, along with the implementation of a limitation for the number of Lu per household as well as restrictions on the size of hole. During the survey, two mobile capture fishing households noted their concern over the potential banning of mobile capture fishing altogether; however, the DPC official did note that because *mobile capture fishing is a predominant livelihood in other parts of the lagoon*, he does not see the practice ever being completely eliminated or banned. Although, the government does plan, he added, to completely ban the use of Lu in the future.

The mobile capture fishing group also seems to be the least informed with respect to regulation and planning in the village. Along with the mobile capture households' concern that the government will ban capture fishing entirely, one mobile capture household also mentioned a concern that net enclosed aquaculture will take over *all* water surface area. In a focus group with mobile capture fishers we were told that transfer of information only occurs between aquaculture and fishers in the case of business transactions like selling fish for breeding or feed. Inclusion of the mobile capture fishing group in Thuy Dien's Sub-FA would do much to improve social capital across *all* production groups.

Situating Thuy Dien's mobile capture fishers within the framework of Coulthard et al's (2011) *social wellbeing*, the conditions for achieving social wellbeing—human needs, freedoms/autonomy and quality of life—do not exist for this group. All mobile capture households said that they are concerned about having enough income with four out of the five households concerned about the future of their livelihood. Moreover, four of the five fishing households noted that they *would* accept a job elsewhere, three of which, *if given the choice*, would choose net enclosed aquaculture. The predominant choice to transition into net enclosed aquaculture rather than a livelihood outside fishing/aquaculture sheds light on Coulthard et al's notion of fishing as not just a livelihood but a way of life (2011). This is particularly evident when discussing net enclosed farmers' willingness to transition into other livelihoods in Chapter 5.

4.4.2. Net enclosed farmers

Along with the mobile capture fishing group, farmers who practice only net enclosed aquaculture in the village also lose in respect to the government's new resource management regulation. In addition to the zoning of net enclosures, the government has proposed a significant increase in the fee for net enclosed farmers from VND 200,000 per hectare per year to VND 1,500,000 per hectare per year (approximately US$10 to US$70)—a 600 per cent increase. The fee, according to the Provincial FA chairperson, is for management and protection of resources[34]. The Provincial FA chairperson added that the community must agree upon this fee or it will not work. When we last spoke with Thuy Dien's FA chairperson, he told us that he had heard unofficially that the fee will be reduced by 50 per cent (a *mere* 400 per cent increase) but he is still waiting for

[34] As noted by survey participants who practice net enclosed aquaculture, even though they are without legal user rights they all pay 'taxes'. The Provincial FA said it was not a tax but a fee.

an official decision. The zoning coupled with the significant increase in fees suggests that net enclosed farmers in the village face a substantial reduction in economic standing if they do not either diversify livelihoods or transition completely into more lucrative livelihoods.

4.4.3. Pond farmers

In contrast to the increase in fees for net enclosed farmers, an official from DPC informed us that the government is implementing a policy to support pond farmers for the oil needed to pump water into highland ponds. This policy, the DPC official explained, was similar to that for agriculture farmers because the government recognizes the need of investment for these activities. The loss from industrial shrimp has resulted in some barren ponds as farmers try to recoup their losses. As a consequence, the government is encouraging people to do mixed aquaculture and the number of unused ponds is decreasing in the lagoon in general (Interview with DPC, 14 November 2012). There is a model program offered by the government that offers training to farmers on mixed aquaculture. The training in addition to the support for oil will encourage people to reuse ponds, but if the ponds remain unused, the farmers receive no support.

However, Thuy Dien's FA chairperson, a highland pond farmer himself, did note that the subsidy for pond aquaculture has been declining every year. He told us that three years ago pond farmers received VND 3,000,000/hectare/year (approximately US$143/hectare/year); two years ago the subsidy dropped to VND 2,400,000/hectare/year (roughly US$115/hectare/year); and last year the subsidy was VND 2,100,000/hectare/year (about US$100/hectare/year). Regardless of the drop in oil subsidy it would appear that pond farmers who rent or own active highland ponds

serve to benefit from the lagoon's resource management initiatives. Moreover, it was noted by one net enclosed farmer that zoning of the net enclosures poses a benefit for highland pond farmers:

> "Pond aquaculture farmers will benefit from net enclosed zoning because the salty water will be more available for them to pump into their ponds once areas are opened up."

Fish farmer, 3 January 2013

4.4.4. The State

Along the same lines as the government's acknowledgment of the need for investment in pond aquaculture, as noted above, is the potential for increased revenue from exports through the promotion of these more productive systems. Vietnam's exports of fish and fish products increased from US$1.5 billion in 2000 to US$5.1 billion in 2010, at which time it became the fourth largest exporter in the world (behind China, Norway then Thailand) (FAO, 2012). The main exporting countries in the shrimp market are Thailand then China then Vietnam (FAO, 2012).

Vietnam's fisheries supply chain begins with local collectors or *middlemen* delivering the collected harvest to the wholesaler. The wholesaler then sells larger volumes to the processing industries, which then, after processing, sell the consumable products to local and export markets (Anh, Dieu, Mol, Kroeze & Bush, 2011). Vietnam's seafood processing plants used to be owned primarily by national or local governments. However, with the subsequent expansion of Vietnam's export markets arising from the country's 1986 economic reform, private ownership has emerged (Tran, Bailey, Wilson & Phillips, 2013). For example, one of the country's largest processing plants, AGIFISH, was originally publicly owned but became a joint-stock company in 2002, and is now governed by multiple stakeholders (AGIFISH, 2013). Yet, even though Vietnam's *Doi Moi* has

brought about a decrease in state-sector ownership, Vietnam's socialist-oriented market economy has the State maintaining a dominant presence in the country's economy (VDR, 2012).

Vietnam's shrimp global value chain is regulated heavily by national agencies as well as by those of importers (Tran et al, 2013). Regulations presented by importing countries has led Vietnam's government to increase regulation on fisheries exports in order to maintain access to global markets. However, the ability of the government to enforce regulation is proving challenging in light of the multitude of small-scale fish farmers and traders in the country, making traceability along a lengthy value chain virtually impossible (Tran et al, 2013). Consequently, for Vietnam to reach its targeted growth the *Vietnam Fisheries Development Strategy Through 2020* indicates that there will be an emphasis on increased farm size to maximize aquaculture production (Prime Minister of the Socialist Republic of Vietnam 2010). This presents the opportunity for government to enforce tighter regulation along the value chain, increase production and ensure growth in exports to international markets.

The reduction in less efficient modes of production like net enclosed aquaculture and promotion of more productive systems like pond aquaculture is a step toward the government's objective of growth in export revenue through increased economies of scale that allow for tighter regulation and easier traceabilty along the value chain. Although the Tam Giang lagoon presents a shift from high intensity industrial shrimp to mixed aquaculture due to its inability to carry the weight of such an ecological burden, pond aquaculture remains the most productive aquaculture system in relation to net enclosed aquaculture in Thuy Dien. It is worth noting however, that high intensity industrial shrimp continues to be practiced in some areas of the lagoon, and it is this form of aquaculture that proves worthy of mass production and export. A DPC representative said

that in the future the government will think about how to invest in infrastructure for best practices of intensive shrimp aquaculture in the lagoon, suggesting that this form of aquaculture may make a comeback.

4.4.5. Discussion

When asked about his views on the future of aquaculture in Thuy Dien, the Provincial FA chairperson said that there is a plan to develop processed seafood in the lagoon (frozen seafood, sauces, fish oil, etc.) for exportation to regional and international markets. He also told us that in 2010 the government introduced a program to shift the focus from only fishing and aquaculture in the lagoon to include tourism in order to ensure future sustainability. Interestingly, no household interviewed or surveyed made mention of processing seafood or tourism as a livelihood option. IMOLA's director supported the Provincial FA Chairperson's comments saying that agri-tourism (also referred to as cultural-tourism and eco-tourism) is a priority of the province. The system, IMOLA's director explained, is aimed at supporting local activity so that the local community can benefit. The aim, he continued, is not for mass tourism but rather tourism hosted at the household level (Interview with IMOLA, 3 December 2012).

Coulthard et al (2011) argue that the pattern of winners and losers arising from decisions in resource management are not adequately taken into consideration. Fisheries policy, the authors argue, "has demonstrated a limited comprehension of the ways that policy and management measures can either reinforce existing patterns of 'winning' and 'losing' or create new 'winners' and 'losers'" (2011, p. 454). That said, however, the importance of sustainability and conservation of natural resources cannot and should not be ignored. With the government's new zoning plan

and agri-tourism prospects the lagoon ecosystem *could* see some reprieve from harmful fishing and aquaculture practices. Yet, results from this study suggest that the potential impact of these management decisions on the poorer households as well as the potential reversal impact on households that have been lifted out of poverty in Thuy Dien may not have been adequately addressed. Although the government has said that they now have a strategy in place to offer training to farmers to transition into other livelihoods, questions surrounding the legitimacy of this claim arise. This is further complicated by a potential lack of capacity and a lack of will on the part of farmers to transition (discussed in Chapter 5). In *aquarian* transitions, just as Akram-Lodhi notes in his assessment of Vietnam's *agrarian* transitions, a clear indicator in the success of resource management—like changes in land allocation and access to resources—should be "the impact on the absolute levels of living of the poor" (2010, p. 565).

Taking into account social wellbeing with respect to fisheries policy deliberation then, Coulthard et al (2011) underscore the importance of understanding fishing [*and I would add aquaculture*] as a way of life that involves strong issues of social identity and relationships. Most importantly however, is the fact, as we have seen from Thuy Dien's multiple fishing activities and economic standings, that different production systems involve varying social relations, motivations and rationales, which impact fishers and farmers' ability and willingness to respond to new resource management policies (Coulthard et al, 2011). All conservation polices involve a degree of trade-offs between concerns for livelihoods and concerns for conservation (Coulthard et al, 2011); most often, however, results weigh heavily in favour of conservation policies, which may not always have the best intentions behind its discourse.

Chapter 5: Livelihood transitions

In light of the lack of legal user rights for net enclosed farmers in Thuy Dien, this chapter investigates livelihood options and possible scenarios arising from the loss of net enclosed livelihoods for the majority of fish farmers in the village. The fact that livelihood transitions are not so clear cut is exposed through survey data collected that reveals the degree of Thuy Dien farmers' capacity and willingness to transition to alternative livelihoods as well as to wage labour on larger farms. The chapter concludes by illustrating that the likelihood of an initial transition back into mobile capture fishing for many of these farmers challenges the previously discussed assumed linear progression from less efficient systems of production to more productive economies of scale evident in much of the agrarian transformation literature. This also supports the importance of mobile capture fishing as a livelihood buffer for rural lagoon fishing communities.

5.1. Rights to water surface area

Force (tearing down of nets), the market (expansion of aquaculture), *Legitimacy* (moral duty) and *regulation* (state-led rules) are the main powers at work in exclusionary regimes that posit environmental rationales and conservation ideology (Hall, Hirsh & Li, 2011). The notion of exclusion here refers to the discourse surrounding the *common good*–the idea that preservation of natural resources brings benefits at the community, national and/or global levels. The *good* comes at the price of smallholder exclusion from land and resource use. Conservation-based exclusion activates its power primarily through zoning of *land* areas that become restricted from *agriculture* use (Hall, Hirsh & Li, 2011). Thus, the *common good* is the *legitimating device* providing the rationale

for the zoning of net enclosures. As noted by the chairperson of the Provincial FA, zoning of net enclosures is to reduce the burden on the lagoon for its future *Sustainability*. Therefore, sustainability here is the common good and legitimizes the exclusion of net enclosed farmers in the village. Agrarian change studies highlighting exclusions premised on conservation shifts the focus from a struggle arising from class differentiation, as is the focus of *Bernstein's Agrarian Transformation Theory*, to a struggle against the state as primary adversary (Hall, Hirsh & Li, 2011).

Contributing to the *legitimacy* of this exclusion is the *lack of legitimacy* with respect to user rights for net enclosed farmers. The majority of net enclosed farmers surveyed in the village (84 per cent) have informal rights to water surface area evident through their lack of legal documentation but requirement to pay annual fees. Tuyen, Armitage and Marschke, (2010) note the lack of any *initial* formal zoning plan or program for the allocation of fishing rights to net enclosed farmers. Consequently, these farmers have no legal grounds on which to contest the forced removal of their net enclosures. With no *legality* associated with net enclosed farmers' user rights the government can effectively, and without recourse, restrict and limit access to the lagoon resources of which it maintains national ownership. In this respect, *heavy handed* zoning of net enclosures, whereby some farmers will lose a large portion or *all* of their net enclosed areas, is essentially stripping farmers of their agency—leaving them without the capacity to organize and make decisions about production (Bernstein, 2010a).

A common consequence of this *people versus state* scenario is competition between neighbouring villages for *land-based* resources (Hall, Hirsh & Li, 2011, p. 63). The restriction of water surface area in Thuy Dien could bring about competition between not only neighbouring villages for water-based resources but also within the village itself, as villagers, who may lack the

capacity or willingness to transition into other livelihoods, scramble to compensate for loss of income.

5.2. Capacity to transition to other livelihoods

Fig. 24. Top: villagers making new nets; Bottom: net repair (Wilkings, 2012).

In order to get a sense of people's capacity to transition into other livelihoods, I was interested in villager's additional skill sets and livelihood options. Therefore, one of the questions in my survey was whether or not households practiced other livelihoods in addition to fishing and aquaculture (see Appendix II for full survey questionnaire). Almost one third (31.3 per cent) of *all* households surveyed practice other livelihoods in addition to fishing and fish farming. Most of this additional income stems from activities like construction and net repair (Fig. 24). The highest

percentage of additional activities performed by the wives of heads of households is as local fish collectors (or middle[wo]men) at 36.4 per cent. That said however, only nine of the 30 households surveyed (30 per cent) that practice *only* net enclosed aquaculture practice additional livelihoods, which illustrates a high degree of dependence on their net enclosed aquaculture income. Moreover, close to half (40 per cent) of the net enclosed aquaculture group surveyed have practiced their livelihood for over 15 years; and over half (53.3 per cent) have practiced net enclosed aquaculture between 10-15 years. Along with their ripe average age of 46 years, the duration of time that these farmers have practiced net enclosed aquaculture, and a lack of livelihood diversification for most net enclosed households surveyed alludes to the potential lack of capacity to transition into other livelihoods—particularly when keeping in mind Coulthard et al's argument that fishing (and by extension aquaculture) is more than a livelihood but constitutes an *identity* (2011).

To further get a sense of villagers' capacity to transition into other livelihoods, I asked those net enclosed farmers who were facing potential zoning of their net enclosures if they *could* transition into other aquaculture production systems. Answers pointed to either a lack of money or a lack of available pond land. The initial investment for pond aquaculture, I was told, is over VND 100,000,000.00 (approximately US$5000). One participant said that he would like to do pond aquaculture but nobody is renting or selling their ponds, concluding:

Fish farmer, 3 January 2013

Similar responses were provided, with another participant noting that he has asked a lot of people in the area about purchasing a highland pond but no one wants to sell, with others emphasizing their lack of money to buy or rent a pond. DaCosta and Turner discovered in their study of Thuy Dien that resettled Sampan households needed on average ten years to save the initial capital to establish their own aquaculture pond (2007). The lack of money or available pond land contributes to net enclosed farmers' *lack of capacity* to transition into other aquaculture livelihoods. This led me to ponder their *willingness to transition* into wage labour, especially in light of the government's noted strategy to provide training for farmers to transition into other livelihoods.

5.3. Willingness to transition to wage labour

Alongside a potential lack of capacity for some farmers to transition into other aquaculture livelihoods, there is also a lack of willingness on the part of some farmers to transition. Only ten out of 30 households (33 per cent) in the net enclosed only group said they would be willing to transition into other livelihoods. Five of these 10 households, while choosing to remain in net enclosed aquaculture, would also like to expand into pond aquaculture; the other five households chose wage labour—construction or any kind of job. Overall, 40 out of 61 households surveyed (65.5 per cent) in the village said they would not want to transition into other livelihoods claiming that they were too old and/or fishing/aquaculture is all they know—it is all they have done for so long. Dung, my research companion for the close of my study, noted about one participant that:

4 January 2014

One participant unreceptive to the idea of transitioning to wage labour remarked:

> "Net enclosed aquaculture is a high income job and wage labour cannot bring more income."

Fish farmer, 3 January 2013

The issue of low wages for wage labour is raised in the 2007 WDR and reiterated by Li (2009) who further emphasizes the ineffectiveness of increased labour demand on raising wage levels. Li also argues that the World Bank's solution of upgrading education and skills, although providing the potential for increased opportunity, does not present a global solution (2009). Thuy Dien exemplifies this argument, where age and the lengthy duration that fisheries livelihoods have been practiced outweigh the willingness/capacity to transition. For example, one head of household said he was quite open to training offered by the government in order to transition into other livelihoods, but for his children rather than for himself, which stands to reason given the potential difficulty for people who have only fished to re-train. This participant told us that three years ago a company in Ho Chi Min City provided training for people in the village and he sent three of his children to attend. He told us that:

> "I think training is good. It provides opportunity to do other things."

Fish farmer, 3 January 2013

However, he noted that he did not do the training himself because he was too busy feeding his family. He added that he did not think himself suitable to be a tailor. This also stands to reason in

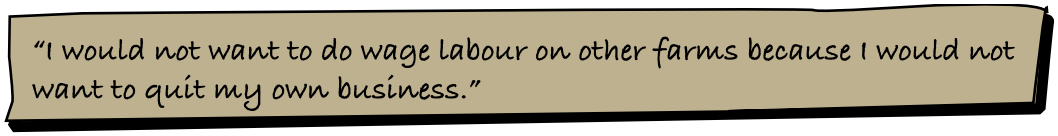
light of the dexterity necessary to be a tailor, not everyone, *anywhere*, would have the skills necessary for this livelihood.

During my final key informant interviews, I asked a number of households if they would consider working for wage labour on a large aquaculture farm rather than working their own net enclosures. The answers were more mixed. Households in favour of giving up their enclosures to do wage labour on larger farms considered wage labour to be less risky, less work, and a stable income:

Fish farmers, 3 January 2013

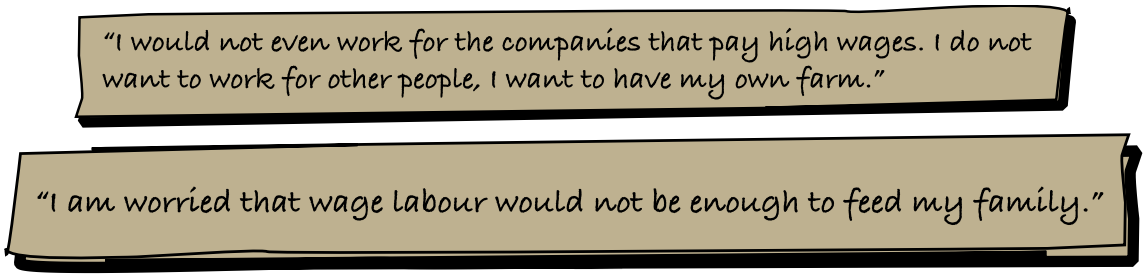
In light of the work involved in maintaining and guarding the enclosures, one other participant also said he would do wage labour on larger aquaculture farms, but he added that he would keep a couple of members of his family behind to look after his net enclosure because he does not want to lose it.

Some participants, on the other hand, were less open to the idea placing more value on controlling their own businesses:



Fish farmer, 3 January 2013

Another respondent agreed by asserting that he prefers to run his own business rather than work for someone else. One farmer remarked that he feels *more comfortable* with owning his own farm. Other participants provided similar responses:



Fish farmers, 3 January 2013

In light of the fact that net enclosed aquaculture in Thuy Dien has, in many cases, pulled farmers out of poverty as noted previously by the CPC, it is understandable that some farmers would associate the loss of their net enclosure with a lack of *agency*—the capacity to organize and make decisions about production (Bernstein, 2010a).

5.4. A transition into mobile capture fishing?

One potential consequence of the zoning of net enclosed aquaculture in Thuy Dien is the transitioning of net enclosed farmers into mobile capture fishing. This was not mentioned in my interviews with the DPC official who only emphasized the benefit that zoning would bring to the mobile capture fishers in the village by way of increased water surface area. However, the Chairperson of the Provincial FA noted the likelihood of some net enclosed farmers transitioning into mobile capture fishing. Thuy Dien's FA chairperson also noted a potential increase in mobile capture fishing in the village. A transition to mobile capture fishing not only poses its own set of

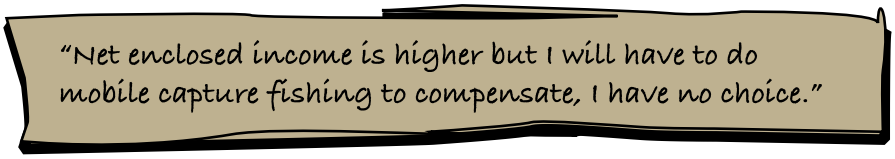
issues in terms of stock depletion and potential conflict over fishing areas, but it could likely counteract any benefit to the mobile capture fishers in terms of increased water surface area.

Furthermore, this transition could increase poverty levels in the village since 97 per cent of farmers surveyed who practice only net enclosed aquaculture said that their net enclosures provide more income than mobile capture fishing. Accordingly, 100 per cent of households surveyed that practice mobile capture fishing *in addition* to net enclosed aquaculture say that mobile capture fishing does not generate enough income on its own. The discussion on income across production groups in Chapter 3, Section 3.7 further supports the argument that net enclosed aquaculture does indeed provides higher incomes than mobile capture fishing in the village.

There was another concern about the possible transition into mobile capture fishing noted by the director at IMOLA who raised the issue of a potential increase in the use of Lu. Even though an official from DPC remarked that the government will place restrictions on the use of Lu, IMOLA's director emphasized (as noted previously) the difficulty in monitoring the use of Lu due to its invisibility. He further explained that the government tends to ignore this specific problem because of the difficulty in enforcing regulation (Interview with IMOLA, 3 December 2012), which further emphasizes the need for fully recognized FA rights in order to help shoulder this burden.

Transitioning into mobile capture fishing however may *initially* be the only option for some net enclosed farmers in Thuy Dien. With this in mind, I asked those net enclosed farmers who had previously expressed their concerns over zoning about their willingness to transition into mobile capture fishing if they were to lose part or all of their enclosures. Most participants

expressed a lack of willingness to transition but with an underlying tone of submission to its likely inevitability. One participant told us that:



Fish farmer, 3 January 2013

We were told by another farmer that:

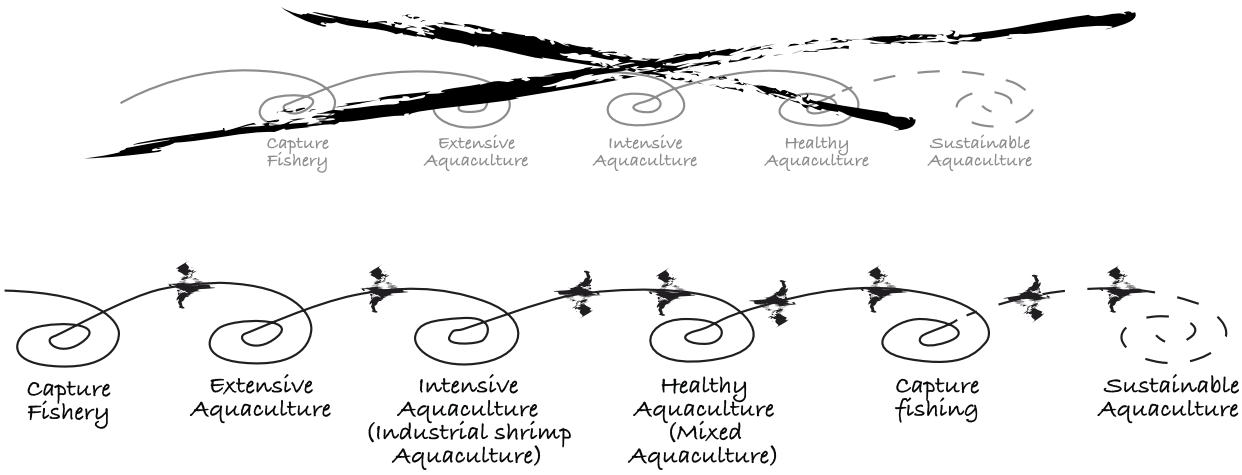
Fish farmer, 3 January 2013

Another participant said he would not want to do mobile capture fishing instead of or in addition to net enclosed aquaculture because it would not provide enough to feed his family, adding that the fish and shrimp are too small so the price is too low. He told us his net enclosure is necessary to raise shrimp and fish to bigger sizes in order to sell to the local collector. This farmer's comment speaks to the issues of stock depletion as well as the threat to the lagoon ecosystem, specifically the decrease in size of species naturally found in some areas of the lagoon. The transition into mobile capture fishing underscores the issue of sustainability in the lagoon and would therefore only be a short- to medium-term solution for these net enclosed farmers. Other livelihood strategies will need to be considered for the long-term.

Some net enclosed farmers in Thuy Dien have already taken up mobile capture fishing in response to previous government zoning. What is particularly interesting to note here is the transition from aquaculture to mobile capture fishing. This sort of reverse transition reinforces

Ostrom's argument of the typical oversimplification of livelihood transitions (2009). Returning to Lebel et al's (2010) linear movement highlighting a transition away from capture fishing to aquaculture, the aquarian transitions occurring in Thuy Dien demonstrate quite clearly the fallacy of this assumption (Fig. 25). Rather than a linear movement, Thuy Dien's fishers and farmers move in, out and back into different production systems, and as this discussion demonstrates there has not been, nor will there be any time soon, a movement *away from* capture fishing.

Fig. 25: Thuy Dien's complex and non-linear fishing and aquaculture livelihood transitions illustrating the fallacy of the assumed linear transition away from capture fishing to aquaculture (Lebel et al, 2010).



Chapter 6: Bernstein Revisited

This chapter revisits Agrarian Political Economy to discuss the applicability of depeasantization within the aquarian context, specifically in Thuy Dien village. First, the significance of Thuy Dien's net enclosed aquaculture is assessed in light of the Vietnamese government's goal of increased aquaculture production and export revenues. Then the chapter discusses findings with respect to children's occupations and the expectations for these children to continue their parents' aquaculture livelihoods in the future. These factors contribute to determining the likelihood of depeasantization in Thuy Dien village.

6.1. Depeasantization / repeasantization

Considering that net enclosed farmers do not have legal claim to their enclosures, these farmers may not have much choice but to transition into other livelihoods, which could suggest a significant decrease in small scale aquaculture in Thuy Dien village, or, seen through the lens of Agrarian Political Economy, a process of *de*peasantization (Bernstein, 2010a). Historically, small-scale farmers in the south have been exploited by the state, but now, Bernstein explains, these farmers are subject to *dispossession* or what he terms global *de*peasantization (2010). As noted by Bernstein, *dispossession* points to the fact that capital no longer needs small-scale farmers and the consequence is that their numbers are diminishing (2010).

The notion of *de*peasantization is particularly compelling when keeping in mind Akram-Lodhi and Kay's definition of an agrarian peasant, adapted here to encompass the *aquarian* peasant: "an [*aquacultural*] worker whose livelihood is based primarily on having access to land [*and*

water] that is either owned or rented[35], and who uses principally their own labour and the labour of their family members to work the land or [*water*]" (Akram-Lodhi & Kay, 2009, p. 3). Key in this definition is *access to land and water*, without which the peasantry are left to seek other livelihoods, specifically wage labour—ultimately removing them from the peasant condition.

6.2. Depeasantization in Thuy Dien?

While evidence shows that both forms of aquaculture can be quite lucrative, output from net enclosed aquaculture relies on the natural tide of the water, while output from pond aquaculture depends on input—the higher the investment and productivity, the higher the return. According to both the CPC and DPC, net enclosed aquaculture prevents the flow of water but *does not cause* pollution; therefore, net enclosed aquaculture, rather than a *source* of environmental and ecological degradation, exacerbates the negative impacts of the most productive aquaculture systems—the real sources of pollution. Even though the shift from intensive shrimp aquaculture to mixed aquaculture has lessened the negative environmental impacts of pond aquaculture, as pointed out in government interviews, regulations have yet to be put in place to address these *sources* of pollution.

Just as peasant producers typically do not fit into capitalist modes of production (Bernstein, 2010a), it would seem then that net enclosed aquaculture does not resonate with the Vietnamese government's goal of increased aquaculture production and export revenues. When framing the zoning of net enclosures in Thuy Dien village within Bernstein's notion of *de*peasantization (2010), it can be suggested that capital no longer needs these farmers and

[35] Although net enclosures or not rented per se, the farmer pays a fee to the government for use of the water surface area; therefore, for the purpose of this definition enclosures can be considered rented from the government.

consequently, their numbers are likely to diminish, which does suggest the likelihood of *de*peasantization. It is important to note here that although the potential transition from net enclosed aquaculture to mobile capture fishing as a consequence of zoning could be viewed as contradicting the possibility of *de*peasantization, this transition is likely only temporary. As noted in Chapter 4 of this thesis, 75 per cent of the twelve households surveyed that practice mobile capture fishing noted a decline of half their daily catch over the past five years, and the extent of additional fishing locales where mobile fishers fish outside the village further speaks to the current fragile state of fish stock in the area. Therefore, if the capacity of the lagoon area in Thuy Dien village is insufficient to support the currently small number of mobile capture fishers, it will certainly be insufficient to burden an influx of additional fishers. Wage labour in the cities or on larger aquaculture farms may inevitably be net enclosed farmers' only option. Therefore, Bernstein's *de*peasantization in reference to the peasant agricultural farmer is, by extension, also applicable to small-scale aquaculture farmers.

6.3. Wage labour in cities

The Vietnamese government's emphasis on increased farm size in order to maximize aquaculture production (Prime Minister of the Socialist Republic of Vietnam 2010) is interesting in light of the World Bank's 2008 *Agriculture for Development Report* that asserts that those who are unable to compete in the increasing consolidation of economies of scale should transition into wage labour or migrant labour. Section 5.3 of this thesis revealed that only 33 per cent of net enclosed farmers interviewed in Thuy Dien would be willing to transition into wage labour.

Another indicator contributing to the possibility of *de*peasantization is the livelihoods of these farmers' children, specifically whether or not they work in wage labour or in aquaculture as do their parents. Overall, households have slightly more daughters than sons working for wage labour in the cities (25 to 21 households respectively). As noted above it is only sons who work in fisheries livelihoods (11 out of 61 households). The number of households who have sons working in the same fisheries livelihood as themselves is significantly smaller than those working for wage labour in the cities (11 to 25 households respectively). Most children working for wage labour in the cities are working as tailors in Ho Chi Min city (17 households). Although there is a significant portion of households in Thuy Dien that have sons[36] working for wage labour, especially those from the net enclosed aquaculture group (nine households), there are also a number of heads of households who expect their *sons* to return to the village to continue on with their aquaculture practice once they become too old to work.

6.4. Keeping up the family tradition?

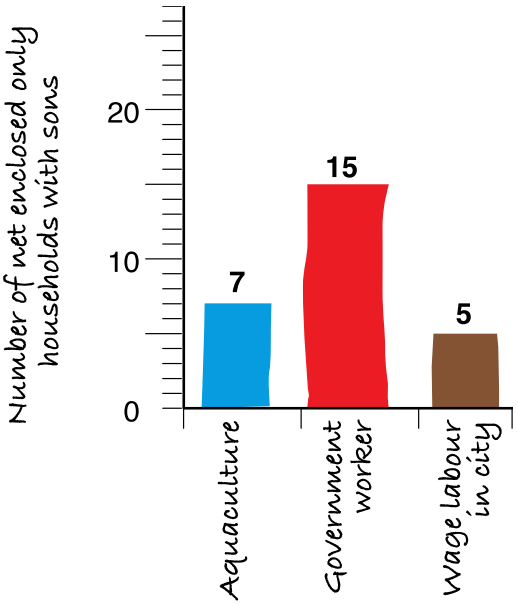
Of the 19 net enclosed only households with children out of school, only five households (26 per cent) have sons that practice net enclosed aquaculture. This is not a significant number if one were to argue for the intentions of farmers to have their children continue in their aquaculture footsteps. However, these numbers do not reveal the true intentions of farmers since some may expect their children to return to work their enclosures once the parents become too old to continue. One young head of household surveyed exemplified this scenario. He told us that he used to be a tailor in Ho Chi Min city until his father died recently. He had just returned home to

[36] Daughters do not practice fisheries livelihoods so the notion of continuing working in same aquaculture livelihood as parents only pertains to sons.

take over all three of his father's production systems: net enclosed, lowland and highland pond aquaculture. He admitted to us that he was inexperienced, which contributed to the uncertainty he felt about the future of his aquaculture livelihoods.

In my survey, households were asked what they would like their children to do if they could choose, with the options narrowed to either fishing, aquaculture, rice farmer, government

Fig.26. Preferred choice for occupation of sons—net enclosed only group



worker, or wage labourer in cities. Only seven out of the 27 net enclosed only households surveyed who have sons chose aquaculture as a preferred livelihood (26 per cent). The other 74 per cent said that they would prefer their sons to be government workers and/or wage labourers, with the majority choosing government worker (Fig. 26). Worthy to note here is that only two of the 12 households that practice *pond* aquaculture said that they would like their sons to do aquaculture, also choosing instead either government worker or wage labourer. No households chose aquaculture for their daughters, which is surprising since women are quite capable of doing the

work evident through *all but four* (out of 61) wives of heads of households working in the same fishing/aquaculture livelihood as their husbands. However, a number of households, when noting their preferred choices, added that aquaculture is hard work with an unpredictable future.

I followed through with this line of questioning during my final focus groups with pond farmers, and four out of six participants did say that they wanted their sons to come back to manage their ponds when they become too old. Their reason was because pond aquaculture brings in high income. The other two participants disagreed, however, saying that even if the income is good they know that aquaculture is not sustainable. Even though some pond farmers would like their sons to take over their ponds, only 16 per cent of the total number of pond farmers surveyed said they would like their sons to do pond aquaculture, which suggests that the zoning of net enclosed aquaculture is not the only factor that could contribute to *de*peasantization in the village. Overall, the low percentage of aquaculture farmers who have sons that also practice aquaculture, the high percentage with sons working as wage labourers, along with the lack of parents' will to have their children work in aquaculture all suggest that the notion of *dep*easantization in Thuy Dien is indeed feasible.

Chapter 7: Analysis and Discussion

Three questions were posed at the beginning of this thesis. This section systemically answers each of these questions based on the data and analysis provided in the previous sections.

Question one asked, "*What are the aquatic based production systems operating in Thuy Dien village, and how do these systems interact?*" As has been revealed, there are four main fisheries/aquaculture production systems operating in Thuy Dien: mobile capture fishing, net enclosed aquaculture, lowland pond and highland pond aquaculture. Fishers and farmers also practice combinations of these main systems resulting in a total of seven production systems found amongst small-scale fishers and fish farmers in the village.

Thuy Dien depicts a rural village setting where households live and work side by side; therefore, social relations are closely linked with production: when catch is sufficient, mobile capture fishers sell their small catch to farmers for feed (albeit catch is rarely sufficient); pond farmers sell their fingerlings to net enclosed farmers, and highland pond farmers sell their breed to lowland pond farmers. Contributing to this network of production are the households who build and repair nets as well as some heads of households and/or their wives who work as local collectors for wholesalers or who sell daily catch at the local market. Although some villagers (26%) noted conflict with mobile capture fishers in the village, there is very little overall conflict between production groups (see Fig. 20 on page 72), suggesting that these agents represent a fairly cohesive social organization (Bernstein, 2010a).

These livelihood combinations demonstrate the resilience and adaptive capabilities of local resource users. The interactions across these production groups speak to the high level of social capital and resourcefulness of small fishing/aquaculture communities.

With the current zoning plan for net enclosed aquaculture in mind then, there are powers at play that could potentially extend beyond the resilience, resourcefulness and adaptive capabilities of fishers and farmers in Thuy Dien. In turn, social-economic relations of production in the village could be dismantled along with the complex combinations of and interactions between production systems.

Question 2 asked, "*How are people marginalized within and across different production systems?*" The answer to this question is situated within the framework of Hall, Hirsch & Li's (2011) powers of exclusion–*force*, the *market*, *regulation* and *legitimation*. Of these four the authors underscore the latter two as the main powers at work in exclusionary regimes of environmental rationales and conservation ideology. These are evidently also the main powers at work in the exclusion of net enclosed farmers in Thuy Dien. However, *force,* in respect to government *enforced* zoning, and the *market,* in respect to the expansion of aquaculture markets and the government's desire for increased export revenues, are factors also at play. Although a conservation ideology is being invoked to justify the government's choice to enforce the zoning of net enclosures, the choice is in line with market options where pond aquaculture presents the most productive aquaculture practice and net enclosed aquaculture is essentially impeding this productivity.

In respect to the exclusionary power of *force* at play in agrarian transitions, Tuyen et al (2010) support this argument on a smaller aquarian scale in their discussion of previous net enclosed zoning in the lagoon, noting net enclosures were removed primarily through the use of force. Kerkvliet (2006) takes a lighter stance arguing that the Vietnamese state, although historically taking a slew of measures in an attempt to enforce prescribed agrarian production methods, fall short of *draconian, violent measures* and the peasant has emerged in shaping agrarian

adjustments by way of everyday subtle forms of modifications and resistance. However, from the interviews I conducted in Thuy Dien village, fish farmers, although discouraged with zoning regulations and the methods used to carry out these regulations, appeared fearful toward the government. Force, it must be noted, is not just exercised by the state, poor small holders also use it in desperate attempts to access territory (Hall, Hirsch & Li, 2011). This links to Boonstra and Nhung's analysis surmising that the interplay between different production groups, the Vietnamese state and the lagoon environment presents a recipe for future struggles (2011), and points to the potential of increase in resource exploitation resulting from heavy-handed zoning of net enclosures.

In respect to the *market* as an exclusionary power, price of land is the most obvious factor, which is emphasized in my discussion with Thuy Dien farmers in respect to their capacity to transition into highland pond aquaculture. Second only to the absence of available land, price was the predominant factor impeding this transition for net enclosed farmers. Fishers and farmers also mentioned the low price for species in the lagoon as a disadvantage present in all production systems as prices tend to be much lower during peak harvest times.

Regulation, as another defining power of exclusion, obtrusively rears itself through the zoning of Thuy Dien's net enclosures. Hall et al mention the "bewildering ranges of types of claims" of land in Southeast Asia (2011, p. 15)—all of which fall under the umbrella of *zoning*. The other node of regulation is the favouring of particular groups that possess legitimate (what the authors term "rule-backed) claims to land *or water* (2011, p. 16). This is exemplified in the user rights allocated to lowland pond farmers in Thuy Dien in contrast to the lack of user rights for net enclosed farmers even though both production systems operate *in* the lagoon water. Interesting to

highlight here is one particular point Hall et al make about regulation. They explain that land regulation (or zoning) is often carried out to incentivize certain types of productive behavior while discouraging others (2011). This could be viewed as somewhat evident in light of the state's promotional behavior toward pond aquaculture (fuel subsidy) versus net enclosed zoning and the high increase in fees for net enclosed farmers.

Along with *regulation*, *legitimation* is the other main power at work in Vietnam's agrarian transitions (Hall et al, 2011), and by extension legitimation is also a factor at play in aquarian transitions in Thuy Dien. As the justification that appeals to moral values, legitimation is often situated within the context of the *common good* (Hall et al, 2011), which is the legitimating device providing the rationale for zoning. The zoning of net enclosures in Thuy Dien is viewed as enhancing the sustainability of the lagoon by increasing water flow so as to enable pollution to be more easily carried out to sea rather than to fester in the lagoon. However this line of thought is contradictory. The common good here involves the communities that depend on the lagoon but ignores the larger issue of ocean contamination, which represents the *ultimate common good*. If ocean sustainability is realized as *the* common good then regulation implemented on *only* net enclosed aquaculture in Phu Vang district, could be viewed as detrimental as it is essentially accelerating contamination on a larger scale.

Zoning of net enclosures in Thuy Dien, although necessary[37], seems to compliment the development of more productive forms of aquaculture in the lagoon—specifically pond aquaculture. In line with Little et al's reference to recent life cycle assessments that have found

37. Boonstra and Nhung (2011) also argue that the density of permanent stationary gear blocks the routes for fish migrating to spawning areas and installation of this gear in shallow areas reduces the potential for spawning.

more *modern* forms of aquaculture to be environmentally damaging, specifically pond aquaculture (2010), and from my discussion with Thuy Dien farmers and government officials, these more productive systems seem to be the *sources* of environmental and ecological degradation of the lagoon rather than *catalysts*. Yet there are no regulations in place to lessen the impacts of these systems. On the contrary these production systems are promoted by the state in the form of training and subsidies. The market needs to be emphasized as a predominant power at play here, especially in light of the Vietnamese governments' open market, *post-socialist* reform (Boonstra & Nhung, 2011). This brings me back to Hall, Hirsch and Li's (2011) notion that land regulation (or zoning) is often a tool for incentivizing certain types of behavior—*productive behavior*—while discouraging others—*less productive behavior*—which does not seem to be too far removed from the current state regulation policy for net enclosed aquaculture in the village.

Underpinning these powers of exclusion then is the State. This exclusionary system of power impacts socio-economic relations within and across production systems by stripping farmers of their agency, or, in other words, removing the *productive forces* that constitute farmers' agency (Bernstein, 2010a). The degree of agency that a rural household possesses varies on the basis of their absolute or relative level of assets (Akram-Lodhi, 2010). Income and technology disparity in the village was revealed through the survey I conducted. Mobile capture fishers are the least economically well off in the village. Although this group says they have access to credit, it is generally informal forms of credit that provide small loan amounts—not enough to enable transitions into net or pond aquaculture (based on the assumption that water surface area and land are available). Low monthly incomes, numbers of fishing locales, and types and numbers of fishing gear further attest to the relatively low economic standing of this group. Moreover, the lack

of social capital shared between the mobile capture fishing group and aquaculture farmers points to an overall marginalization of fishers in the village.

Income disparities were further noted by net enclosed farmers who also practice mobile capture fishing. This group has smaller nets than the group that practice only net enclosed aquaculture, and therefore make less money having to fish in order to supplement their income. A degree of animosity was noted in response to this disparity in income and technology. That said however, mobile capture fishers in the village constitute the smallest production group; removing this group from the mix, technology and income disparity become less imbalanced since the majority of the villagers in Thuy Dien practice net enclosed aquaculture—excluding for a moment the benefit of livelihood diversification. Since the majority of people in the village practice aquaculture, primarily net enclosed aquaculture, and keeping in mind the small size of Thuy Dien, a fairly strong degree of social capital by way of interactions within and between these aquaculture production systems (mobile capture fishers aside) has developed over time.

State-led intervention has contributed to this relatively high degree of social capital. These interactions serve to strengthen the productivity of each production system and their combinations. DaCosta and Turner (2007), in their study of the same Thuy Dien village, argue that state-led relocation in Vietnam has expanded livelihood options for the Sampans and subsequently these livelihoods have become interweaved through social capital. Focus groups I conducted in the village support this argument. Section 3.6 of this thesis notes the benefit that the replacement of fixed gear fishing with net enclosed aquaculture has had on fish farmers in the village, whereby villagers are now less separated and have the time to associate with one another at community functions. This in turn has established a level of trust.

However, what state-led land resettlement policies shaped in the way of tighter cohesion among net enclosed farmers, state-led net enclosed zoning regulation could undo with struggles and competition for limited resources resulting from a transition either back to mobile capture fishing or into wage labour. This threatens to unravel the social capital developed over time in the village as well as dismantling social relations of production as livelihoods become more about survival in the face of scarcity. What the examination of question 2 shows is that the powers at work in aquarian transitions in Vietnam—namely *force*, the *market*, *regulation* and *legitimation*, all forces that heavily influenced by the State—has the potential to marginalize depending on the degree of agency these regulations afford small-scale farmers. Put another way, social processes are the result of unplanned and unintended interweaving of *intentional* human actions (Boonstra & Nhung, 2011).

The first land resettlement in Thuy Dien favoured fishers who had the capacity (*water surface area*) to transition into net enclosed aquaculture; however, the inability of most of these farmers to diversify into other forms of aquaculture makes them particularly vulnerable to current forms of state-backed regulations. The second land resettlement also favoured, albeit to a lesser degree, fishers who were able to convert the remaining lagoon areas into net enclosed aquaculture, but with less available water surface area mobile capture fishing has remained an important livelihood practice for income supplementation, which further attests to not only the significance of livelihood diversification but also to capture fishing as a livelihood buffer. Although net enclosed aquaculture lifted these groups out of poverty, a *mass* transition back into mobile capture fishing resulting from heavy handed zoning of net enclosures threatens the re-impoverishment and increased marginalization for a large percentage of Thuy Dien villagers.

I now turn to the third question posed at the beginning of this thesis: *How does fisheries governance in the lagoon work towards social ecological sustainability?* Co-management regimes in the form of Sub-FAs have been established in the lagoon in order to involve a level of autonomy on the part of local resource users in resource management, and have been highlighted as a portal for the decentralization of decision-making (Tuyen et al, 2010). FAs are beneficial in the sense that they help build social capital between different production groups as well as between the community and government (Boonstra & Nhung, 2011). The Sub-FA, as a tool for building social capital, is evident in Thuy Dien with 67.2 per cent (and growing) of villagers surveyed being members of the village FA. In this sense, SubFAs cultivate dialogue, shared understanding and learning, and invite a more participatory approach to governance of lagoon resources (Tuyen et al, 2011).

However, there are also concerns associated with the formation of Sub-FAs. Perhaps most importantly is the potential of Sub-FAs to reinforce unequal relations between fishers and farmers since these associations are built upon already existing networks (Boonstra & Nhung, 2011). This is evident in Thuy Dien with only one of five fishing households holding FA membership, and the group as a whole having no FA Board representation. The group that practices mobile capture fishing in addition to net enclosed aquaculture represents the second least represented group within the FA with less than half (43 per cent) membership among the seven households surveyed (see Appendix II Frequency Tables: FA membership, to get a sense of membership across all production groups). However, the Provincial FA, made note of the likelihood of a louder voice and representation of the mobile capture fishing group once zoned net enclosed farmers transition into mobile capture fishing, which will significantly expand this group's numbers. Yet, this can be

considered maintaining the status quo with respect to net enclosed farmers' current state of inclusion rather than including the currently marginalized mobile capture fishing group.

Another issue arising from the formation of Sub-FAs is funding. Reliance on external donors (such as IDRC and IMOLA) has enabled full allocation of rights for some Sub-FAs; however, once these donors are no longer able to continue in their role (as seems to be the current case with IMOLA and was the case with IDRC in Thuy Dien) does the Vietnamese government have the capacity to intervene? High levels of bureaucratization along with the government's track record of inconsistent policies, lack of clarity on responsibility and transparency all suggest otherwise (Boonstra & Nhung, 2011). To this, Thuy Dien's FA chairperson made note of the lack of financial resources currently needed to strengthen the village's Sub-FA. Moreover, if lack of funding does result in state intervention, the level of autonomy that these associations *may* experience could be severely compromised.

Even though Thuy Dien's Sub-FA lacks full allocation rights, the association is involved in the zoning plan of the net enclosures, specifically in providing opinions and knowledge in respect to the best timing to commence zoning (Interview with Sub-FA Chairperson, 2012). In this light, Thuy Dien's Sub-FA is essentially working to effectually implement the *forced regulation* of net enclosed aquaculture, even though the Sub-FA's involvement arguably contributes to a more fair and effective process. As noted earlier, Thuy Dien's FA chairperson trumped the inevitable loss of net enclosed livelihoods with the sustainability characteristic of net enclosed zoning—reinforcing the power of *legitimation*. The power of *the market* is also informed through the Sub-FAs assistance with net enclosed zoning since farmers who practice pond aquaculture (43 percent of which make

up the Sub-FA Board) will face less market competition for their aquatic species as well as improved salinity and subsequent increased production with the opening up of lagoon waterways.

These observations are not meant to negate the efforts of Thuy Dien's Sub-FA in negotiating the decrease in fees for net enclosed farmers, which the Provincial FA reminded us could only be implemented with community consensus. Nor is the intention to suggest that Thuy Dien's Sub-FA bends meekly to government will. Thuy Dien's FA chairperson demonstrated more than once the will to altruistically represent village members, noting:

Nevertheless, without full rights allocation by the government, Thuy Dien's Sub-FA lacks legitimacy. In this sense then, although Fishing Associations represent a decentralization of decision-making, their close affiliation and dependence on state authority, particularly when lacking legitimacy as in the case of Thuy Dien, gives a degree of substance to the powers of *force*, *market*, *legitimation* and *regulation* that shape *aquarian* transitions.

That said however, there are a number of co-management success stories in the lagoon where local Fishing Associations have received full rights allocation enabling them to work toward sustainable livelihood practices (Tuyen et al, 2010). In many sites Fishing Associations have empowered local resource users, including net enclosed farmers and mobile capture fishers, to be better organized to handle livelihood concerns and manage lagoon resources (Tuyen et al, 2010). Perhaps most importantly, co-management has given a voice to fishers and farmers in managing

their resources, and results point to value in collective organization (Armitage & Marschke, 2013). However, as noted by Armitage and Marschke, ecological decline is difficult to halt (2013).

The process of establishing Thuy Dien's FA has been unusually slow compared with the typical 2-3 years to establish an FA (Interview with director of IMOLA, 2012), with IMOLA working to strengthen FAs in Phu Xuan commune for the past four years (Interview with director of IMOLA, 2012). Although Thuy Dien's FA is expected to receive full rights by May 2013 (Interview with Provincial FA, 2012), the discontinuation of IMOLA leaves the situation precarious. Without legitimacy on the part of Thuy Dien's Sub-FA there is the potential of a slew of undesirable outcomes as was the case in past zoning experiences in the lagoon.

It bears noting here that this thesis is not in opposition to the defense of ambient ecological systems. Rather, in line with Robbins, this thesis argues that heavy handed targeting of *only* one production system in an attempt at improving lagoon sustainability points to policy failure primarily because this process of conservation disenfranchises the majority of local resource users and benefits more favoured groups (2012). In this light, processes of enforced conservation are often times ecologically and socially problematic, inadequately meeting ecological or livelihood sustainability goals (Robbins, 2012). This brings us back to Coulthard et al's assertion that many conservation policies fail to adequately consider the pattern of winners and losers arising from these decisions (2011).

Chapter 8: Conclusion

This thesis discusses the powers at work in *aquarian* transitions as powers of *exclusion, force,* the *market, legitimation and regulation* that marginalize villagers in Thuy Dien by excluding them from access to natural resources (Hall et al, 2011). These powers *cause* shifts in livelihood transitions as fishers and farmers respond by moving in and out of different production systems in order to maintain their fishing and fish farming livelihoods. However, as Hall et al, point out, exclusion is not something that can be *replaced* with inclusive relations (2011). Aquaculture presents the potential for some households to escape from poverty—such as in the transition from mobile capture fishing into net enclosed aquaculture, or from net enclosed to pond aquaculture—while threatening other households with the potential of falling into poverty, such as in the likelihood of a number of net enclosed farmers having to transition back into mobile capture fishing, albeit temporarily (Little et al, 2010). In other words, *Exclusion* of one group inevitably results in *access* for another group creating what Hall et al refer to as a *double edge* (2011). Hence, exclusion of net enclosed farmers from lagoon resources for aquaculture in Thuy Dien creates security for pond farmers in Thuy Dien as they have the potential for increased productivity.

Exclusion's double-edge presents a slew of undesirable and often unexpected outcomes (Hall et al, 2011). This is exemplified in Tuyen et al's discussion of previous zoning of net enclosures in the lagoon (2010). Intended as a pro-poor development policy, heavy handed zoning of net enclosures escalated into greater conflict between net enclosed farmers and fishers as well as increased uncertainty for fishers (2010). Co-management in the form of Fishing Associations have enabled local resource users in some areas of the Tam Giang lagoon to better deal with issues surrounding livelihoods as well as lagoon resource management (Tuyen et al, 2010). However, in

the case of Thuy Dien, the Sub-FA remains weak and currently lacks legitimacy, which could potentially lead to a repeat of past undesirable zoning outcomes.

Access to increased fishing areas for Thuy Dien's already marginalized mobile capture fishing group could result in a *squeezing out* of this group as net enclosed farmers transition, in the short term, into mobile capture fishing in response to loss of income from zoning; as mobile capture fishers come from outside the village to take advantage of these newly opened areas (unpreventable by the lack of FA power in the village); and as the government subsequently poses tighter regulations on fishing gear as noted by DPC. Furthermore, although wage labour is likely the long term solution, albeit unfavoured, for many net enclosed farmers, conflict is likely to escalate *initially* as fishers and farmers compete for limited fishing resources, further threatening fish stocks and ecological stability. Poverty levels are also likely to increase as the majority of net enclosed farmers in Thuy Dien lose some, most or all of their net enclosures—a livelihood noted to be responsible for lifting the majority of Thuy Dien's villagers out of poverty (Interview with CPC official, 2012). Unlike Coulthard et al (2011) who suggest that conservation policies are not adequately thought through, Hall et al (2011) argue that the lack of acknowledgement of the downside of conservation policies does not necessarily equate to a lack of awareness but rather the inability to identify a solution to the potential dilemma. This bears the question as to why the process of establishing Thuy Dien's Sub-FA has been so slow to receive full rights allocation.

Thuy Dien village is thus in flux, and by extension its peasant condition. As noted by Akram-Lodhi and Kay (2009), peasants are subordinate to wider social and economic forces that are beyond their control resulting from their need for capital. This subordinate position, indicative of net enclosed farmers in Thuy Dien, impacts the complex network of social relations of

production in which they belong, in turn inhibiting their ability to prosper (Akram-Lodhi & Kay 2009). The proposed transition from net enclosed aquaculture to wage labour by the Vietnamese government for farmers in Thuy Dien mirrors the World Bank's proposed transition from the farm to wage or migrant labour in order to make room for more *efficient* economies of scale (WDR, 2007).

What is revealed, however, through speaking with rural fish farmers in Thuy Dien village, is that the transition to non-fisheries wage labour is not clear cut and this transition may be painful for some. Aging farmers who *only know* aquaculture and fishing face exclusion not only from the resources that support their livelihood but also from their *way of life*. Fear of change and lack of education are additional factors impeding their willingness and capacity to transition into non-fisheries livelihoods. Moreover, wage labour is not the answer to security for these farmers. Although Vietnam's economy has improved significantly, parts of the country remain poor (Akram-Lodhi, 2010). In some cases insecure circumstances determine the working conditions experienced by rural villagers and migrant workers in the cities. The labour market in Vietnam is thus prone to uneven and unpredictable processes that generate exclusion and access simultaneously (Akram-Lodhi, 2010).

With the potential reintroduction of industrial shrimp farming in the lagoon as noted by a representative of DPC, large-scale farm consolidation is likely, especially when considering the extensive infrastructure needed to support this practice. This presents *fisheries* wage labour opportunities for Thuy Dien's farmers, although farmers noted their trepidation in losing their own farms, which essentially parallels a loss of agency (Bernstein, 2010a). Keeping in mind the multitude of small-scale aquaculture farms currently operating in Vietnam, the path of *aquarian*

transitions could mirror agrarian transitions with large-scale consolidation of aquaculture farms and subsequent exclusion of poor fishing households in the attempt at maximizing production.

*De*peasantization in Thuy Dien is thus underway. *De*peasantization is said to be countered by *re*peasantization that has, so far, prevented the *complete end* of the peasant condition (Ploeg, 2008). However, as Akram-Lodhi and Kay (2009) point out in their definition of the agrarian peasant, access to *land* is key. Access to water areas used for net enclosed aquaculture in the lagoon is to be restricted from aquaculture use in the name of sustainability, which prevents any sort of reconversion. Access to land is also restricted with no available highland ponds, which exist beyond the village boundaries. The capacity of the lagoon ecosystem is too fragile to burden an expanse of mobile capture fishing for long, which suggests that farmers transitioning into mobile capture fishing (which could temporarily counter a *de*peasantization) may have to seek better fishing grounds elsewhere or transition into wage labour. The heavy handed zoning of net enclosed aquaculture could likely then lay the ground work for the near *complete end* of small-scale peasant aquaculture farming in Thuy Dien without any likelihood of future *re*peasantization.

One thing evident in this analysis is that by taking a simultaneous look at both capture fishing and aquaculture, rather than looking at either one in isolation, capture fishing is shown to act as a buffer for aquaculture farmers. This confounds the assumed linear transition used in agrarian and aquarian studies of a move from less productive practices to more efficient economies of scale. As noted previously, there exists a tendency toward the oversimplification of livelihood transitions. However, livelihood transitions, as pointed out by Ostrom and evident in Thuy Dien village, are complex and often times messy (2009). In order to make successful policy decisions that take into account human well-being, decision makers need to grapple with these complexities.

8.1. Questions for future research

This thesis has investigated several questions around fisheries livelihood transitions and natural resource governance in rural Vietnam. At the same time, a number of other questions require further research. These include:

1. What is the significance of smallholder fish farmers in achieving sustainable aquacultural practices and, ultimately, a green economy?
2. What are the factors involved that enable some Sub-FAs to receive full rights allocation faster and more efficiently than other Sub-FAs?
3. Does the national certification scheme VietGAP, benchmarked against GlobalGAP, offer an alternative for natural resource governance of small-scale fish farms in Vietnam?

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APPENDIX I: Factors determining village selection

Village	Number of households	Activities practiced per household	Social dynamics within Village	Governance
Phu My	150 households	92 households = aquaculture (net enclosed) ONLY; 12 households net enclosed aquaculture AND capture fishing (6 = chuom + aquaculture; 6 = Lu + aquaculture); 46 households other business; No pond aquaculture--uneven distribution of fishing activities	Conflict between capture fishing and aquaculture net enclosed (mobile fishers no rights to fishing area); groups divided socially (social capital strongest within aquaculture groups) No interacting production systems	FA has power to enforce rules and regulations (with help from IDRC)
Phu Xuan (commune); Thuy Dien (village)	196 households	20 capture fishing (mobile) ONLY; 10-12 capture fishing (fixed) + net enclosed aquaculture; 27 net enclosed + aquaculture pond aquaculture AND pond only (5th production group--need to recalculate participants)[38] 130 net enclosed aquaculture ONLY Multiple fishing activities; even though majority of households are net enclosed aquaculture there is enough of other fishing activities to provide potential interesting economic differences and social dynamics between households	No conflict[39] between capture fishers and aquaculture net enclosed --fishers have enough fishing area; capture fishers sell feed to aquaculture group (social relations of production); aquaculture ponds no longer industrial aquaculture but used for breeding for net enclosed aquaculture; therefore no boom and bust (productions systems interact with one another)	One FA for Phu Xuan commune divided into five groups for better management: do not have power to properly manage; no resources to patrol

[38] Information regarding the numbers of HHs per production group changed significantly once the study was underway. These numbers were estimated for village selection interviews.
[39] This is something found to be inaccurate through focus groups and survey.

Thuan An	220 households	3 highland aquaculture ponds; 200 fishing and net enclosed aquaculture (fishing done inside net enclosed areas); 20 only capture fishing (lu, net) High majority of households do only one fishing activity	No connection or relationship between capture fishing and aquaculture groups~ level of distrust (no interaction among production systems)	FA does have regulations but not enforced Head of FA new in 2012, still new and currently does not know much
Huong Phong commune; Vân Quât Dông village	100 households	15 pond + mobile fishing; 20 fixed capture + mobile capture; 65 mobile (61 just mobile; 4 mobile + small box No net enclosed aquaculture	No conflict: mobile fishers fish here and in another commune so enough space; groups interact; Boom and bust has strained aquaculture pond activity	FA rules and regulations in place but no power to enforce;

APPENDIX II: Survey questionnaire

Thuy Dien village survey/interview questions

Mobile Capture = A	Net Enclosed = B	Lowland Pond = C	Highland Pond = D

Name of Household: **# of fishing activities:**

Production Group(s): ❒ (A) ❒ (B) ❒ (C) ❒ (D)

PART I: GENERAL QUESTIONS

1.1. Total number of people living in household?

1 2 3 4 5 6 7

1.2. How many people in your household generate income?

1 2 3 4 5 6 7

1.3. What is the sex of main earner in household?

❒ Male ❒ Female

1.4. Sex, age, livelihood and education of each family member:

Family member	Age	Fisheries livelihoods				Wage labour	Type of wage labour	Location of job	Level of Educ. *
		Mobile Capture (A)	Net Enclosed (B)	Lowland Pond (C)	Highland Pond (D)				

*Level of education: No education; Primary 1-5; Secondary 6-9; high school 10-12; University

1.5. How long have you and your family lived in Thuy Dien village? (circle one)

Less than 10 years ❒ Between 10-20 years ❒ 20+ years ❒

1.6. If you have any children who are not attending school, why?

_____

PART 2: LIVELIHOOD QUESTIONS

2.1. How long have you practiced your aquatic livelihood?

(✓)	< 5 years	Between 5-10 yrs	Between 10-15 years	15+ years
(A) **Mobile Capture**				
(B) **Net Enclosed**				
(C) **Lowland Pond**				
(D) **Highland Pond**				

2.2. In the past 5 years has the quantity of aquatic species you catch or farm changed?

(✓)	Declined	Stayed the same	Increased	By your estimates how much?
(A) **Caught**				
(B) **Net Enclosed**				
(C) **Lowland Pond**				
(D) **Highland Pond**				

(5) **Reasons (if provided):** _____

2.3. What best describes your reasons for practicing only one aquatic livelihood (✓ applicable):

(A) **Mobile capture**		(B) **Net enclosed**		(C) **Lowland pond**		(D) **Highland pond**	
(1) Provides sufficient income		(1) Provides sufficient income		(1) Provides sufficient income		(1) Provides sufficient income	
(2) Do not want to do anything else		(2) Do not want to do anything else		(2) Do not want to do anything else		(2) Do not want to do anything else	
(3) Can make extra income by selling small fish for feed		(3) Provides better income than mobile capture fishing		(3) Provides better income than net enclosed aquaculture		(4) Provides better income than net enclosed aquaculture	
(4) My family has always practiced capture fishing		(4) Provides better income than pond aquaculture		(4) Provides better income than highland pond aquaculture		(4) Provides better income than lowland pond aquaculture	
(5) It is all I know how to do		(5) Little initial investment or input		(5) No money to buy water surface area for net enclosed		(5) No money to buy water surface area for net enclosed	
(6) No money to buy water surface area for net enclosed		(6) Cannot get user rights (certified land rights) to buy ponds		(6) Have money but no available water surface area to buy		(6) Have money but no available water surface area to buy	
(7) Have money but no available water surface area to buy		(7) No money to buy buy/rent land		(7) No money to rent/buy highland pond		(7) No money to buy lowland pond	
(8) No money to buy/rent land		(8) Have money but no lowland for sale		(8) Have money but no highland for rent/sale		(8) Have money but no lowland for sale	
(9) Have money but no land for sale/rent		(9) Have money but no highland for rent/sale		(9) Good survival rate for aquatic species		(9) Good survival rate for aquatic species	

	(10) Less risk than lowland pond		(10) Less risk than net enclosed		(10) Less risk than net enclosed	
	(11) Less risk than highland pond		(11) Less risk than highland pond		(11) Less risk than lowland pond	

2.3. What best describes your reasons for practicing <u>two</u> aquatic livelihoods (✓applicable):

(A) (B) **Mobile capture fishing + net enclosed aquaculture**		(B) (C) **Net enclosed + lowland pond aquaculture**		(B) (D) **Net enclosed + highland pond aquaculture**		(C) (D) **Lowland + highland pond aquaculture**	
(1) Diversified production systems ensure stable income		(1) Diversified production systems ensure stable income		(1) Diversified production systems ensure stable income		(1) Diversified production systems ensure stable income	
(2) Net enclosure areas too small to provide sufficient income		(2) Net enclosure areas too small to provide sufficient income		(2) Breeding in highland ponds does not generate enough income on its own		(2) Breeding in highland ponds too unstable to be only source of income	
(3) Mobile capture fishing does not generate enough income on its own		(3) Lowland ponds do not generate enough income on their own		(3) Lowland ponds do not generate enough income on their own		(3) Raising in lowland ponds too unstable to be only source of income	
(4) No access to increased water surface area to expand net enclosures		(4) No access to increased water surface area to expand net enclosures		(4) No money to buy additional lowland ponds		(4) No money to buy additional lowland ponds	
(5) Can make additional income in capture fishing by selling small fish for feed		(5) No money to buy additional lowland ponds		(5) Have money to buy more lowland ponds but no one is selling		(5) Have money to buy more lowland ponds but no one is selling	
(6) My family has always done mobile capture fishing		(6) Have money to buy more lowland ponds but no one is selling		(6) No money to rent/buy additional highland ponds		(6) No money to rent/buy additional highland ponds	
(7) Capture fishing provides fresh caught fish for personal consumption		(7) Lowland higher survival rate for fish than net enclosed		(7) Have money but no highland ponds for rent		(7) Have money but no highland ponds for rent/sale	
				(8) Can breed own fingerlings for ponds so do not have to buy		(8) Can breed own fingerlings for ponds so do not have to buy	
						(9) Government switched one of my lowland ponds for a highland pond so that is why I do highland as well	

2.3.1. If you had a choice would you practice only one of your production systems? ❒ Yes ❒ No

If so, which one would you prefer? _____

2.3. What best describes your reasons for practicing <u>three</u> aquatic livelihoods (✓applicable):

(B) (C) (D) **Net enclosed + lowland pond aquaculture + highland pond aquaculture**	
(1) Diversified production systems ensure stable income	
(2) Net enclosure areas too small to provide sufficient income	
(3) Lowland ponds too unstable as only source of income	
(4) Breeding in highland ponds too unstable as only source of income	
(5) No access to increased water surface area to expand net enclosures	
(6) Cannot do just lowland aquaculture because no money to buy additional lowland ponds	
(7) Have money to buy more lowland ponds but no one is selling	
(8) Cannot do just highland aquaculture because no money to rent/buy additional highland ponds	
(9) Have money but no highland ponds for rent	
(10) Can save money by breeding own fingerlings for ponds so do not have to buy	
(11) Government switched one of my lowland ponds for highland pond so that is why I do highland as well	

2.3.1. If you had a choice would you practice only one of your production systems? ❒ Yes ❒ No

If so, which one would you prefer? _____

22.4. Distribution of caught and farmed species

Distribution of caught/farmed aquatic species (KG/VND/%) PER DAY	**Mobile Capture** (A)		**Net Enclosed** (B)		**Lowland Pond** (C)		**Highland Pond** (D)	
	Rainy season	Dry season	Rainy season	Dry season	Rainy season	Dry season	Rainy season	Dry season
TOTAL HARVEST								
Consumed by family								
Sell to local collector (middleman)								
Sell directly to wholesaler (trader)								
Sell directly to local market								
Sell for feed ❒ inside ❒ outside village								
Sell for breeding ❒ inside ❒ outside village								
Keep for own breeding (for later)								

Notes: _____

_____

2.5. To whom do you sell your aquatic species?

	Local Market	**Local collector--middleman (name)**		**Wholesaler—trader (provide name)**		**Net enclosed farmers in TD**	**Lowland Pond farmers in TD**	**Highland Pond farmers outside TD**
		Breeding	Raised	Breeding	Raised			
(A) **Caught species**								
(B) **net Enclosed**								
(C) **lowland Pond**								
(D) **highland Pond**								

TO BE ANSWERED BY AQUACULTURE LOWLAND AND HIGHLAND POND FARMERS ONLY

2.6. What type of feed do you use? (✓)

(C) **Lowland Ponds**	(D) **Highland Ponds**
❒ **Natural feed** (living plant or animal)	❒ **Natural feed** (living plant or animal)
❒ **Modified feed** (made from animal or plant) How is the feed modified?	❒ **Modified feed** (made from animal or plant) How is the feed modified?
❒ **Formulated** feed (manufactured feed)	❒ **Formulated** feed (manufactured feed)

2.7. Is your manufactured feed mixed with medicine? ❒ Yes ❒ No ❒ Do not know

2.8. From where/whom do you buy your feed?

	Capture fishers inside village	**Outside village (name of village)**	**Local market in village**
(C) **Lowland Pond**			
(D) **Highland Pond**			

2.9. Is your feed purchased from a licensed supplier? ❒ Yes ❒ No ❒ Do not know

2.10. From where/whom do you buy your seed? (Seller and location of seller)

	<u>Shrimp</u> ❒ Go to buy ❒ Seller comes to village	**<u>Crab</u> ❒ Go to buy ❒ Seller comes to village**	(3) **<u>Fish (Diā)</u> ❒ Go to buy ❒ Seller comes to village**
(C) **lowland Pond**			
(D) **Highland Pond**			

2.11. Is your seed purchased from a registered / certified supplier? ❒ Yes ❒ No ❒ Do not know

2.12. Do you use hormones to stimulate growth during breeding? ❒ Yes ❒ No

2.13. Do you use medicine to PREVENT disease during breeding? ❒ Yes ❒ No

PART 3: SOCIO-ECONOMIC QUESTIONS

	ASK ONLY Mobile Capture Fishers (A)			
3.1. Where are you allowed to fish within Thuy Dien? (✓)	**Anywhere outside net enclosed areas**		**Within specific zoned areas**	
3.2. Where are you allowed to fish outside Thuy Dien (NOTE NAME OF VILLAGE)? (✓)	**Anywhere outside net enclosed areas**		**Within specific zoned areas**	
3.2.1 Where outside of Thuy Dien do you fish (be specific):				

3.3. How many fishing boats do you own? (✓)	1	2	3	4	5	6	7
3.4 How many Lu do you own? (✓)	1-20	21-40	41-60	61-80	81-100	101-120	120+
3.5 How many fishing nets do you own? (✓)	**A40**						
	<10	10-20	21-30	31-40	41-50	50+	
	A30						
	<10	10-20	21-30	31-40	41-50	50+	
	A25						
	<10	10-20	21-30	31-40	41-50	50+	
	A20						
	<10	10-20	21-30	31-40	41-50	50+	
	A18						
	<10	10-20	21-30	31-40	41-50	50+	

(✓)	**ASK ONLY Net Enclosed Aquaculture Farmers (B)**						
3.1. How many net enclosures do you own?	1	2	3	4	5	6	7
3.2. How many hectares is/are your net enclosures?	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2
3.3. Did you buy or inherit your net enclosures?	Buy				Inherit		
3.4. How are your net enclosure areas determined?	Passed down in family WITH NO legal documentation		Passed down in family WITH legal documentation		Legal documentation from seller		Other (specify):
3.5. How any people do you employ?	0	1	2	3	4	5	6

(✓)	**ASK ONLY Lowland Pond Aquaculture Farmers (C)**						
3.1. How many lowland ponds do you farm?	1	2	3	4	5	6	7
3.2. How many hectares is/are your lowland ponds?	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2
3.3. How did you acquire your lowland ponds?	Buy		Inherit		Government		Rent
3.4. How are your lowland pond areas determined?	Passed down in family WITH NO legal documentation		Passed down in family WITH legal documentation		Legal documentation from seller		Other (specify):
3.5. How any people do you employ?	0	1	2	3	4	5	6

(✓)	ASK ONLY Highland Pond Aquaculture farmers (D)						
3.1. How many highland ponds do you farm?	1	2	3	4	5	6	7
3.2. How many hectares is/are your highland ponds?	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2
3.3. How did you acquire your highland ponds?	Buy	Inherit	Government	Rent			
3.4. How are your highland pond areas determined?	Passed down in family WITH NO legal documentation	Passed down in family WITH legal documentation	Legal documentation from seller	Other (specify):			
3.5. How any people do you employ?	0	1	2	3	4	5	6

3.6. How much monthly income does your fisheries livelihood(s) generate?

Mobile Capture (A)		**Net Enclosed** (B)		**Lowland Pond** (C)		**Highland Pond** (D)	
Rainy Season	**Dry Season**	**Rainy Season**	**Dry Season**	**Rainy Season**	**Dry Season**	**Rainy Season**	**Dry Season**
VND/DAY	**VND/DAY**	**VND/DAY**	**VND/DAY**	**VND/DAY**	**VND/DAY**	**VND/DAY**	**VND/DAY**

Comments: _____

3.7. What is your relationship with other fishers and farmers in the village? (✓)

Relationship to other production systems	(A) **Mobile Capture fishers**	(B) **Net enclosed farmers**	(C) **Lowland Pond farmers**	(D) **Highland Pond farmers**	***Ask only groups that practice both A B*** (A) (B) **Mobile capture + net enclosed**	***Ask only groups that practice B, C & D*** (B) (C) (D) **Net enclosed + pond farmers**
(1) No relationship						
(2) Business relationship (selling/buying)						
(3) Meet at community functions (weddings, meetings, festivals, etc.)						
(4) Close friendships						
(5) Blood relatives						
(6) Marriage relatives						

3.8. Are you able to borrow money when you need it? ❒ Yes ❒ No

If not, why not? _____

3.9. If yes, from where/whom do you borrow money?

❒ Formal (bank) ❒ Informal (relative, friend, middle person) ❒ Formal and informal

Why: _____

3.10. Do you have any debt? ❒ Yes ❒ No

3.11. If so, are you worried about paying back the money that you owe? ❒ Yes ❒ No

3.12. Did you ever practice industrial shrimp aquaculture? ❒ Yes ❒ No

3.13. If yes to above, did you ever lose a lot of money from industrial shrimp aquaculture?

❒ Yes ❒ No

3.14. If you could choose, what would you <u>like</u> your children to do for a living? (✓):

	Fishing	Aquaculture	Rice Farming	Government worker	Wage labour in city
Sons					
Daughters					

3.15 Are you concerned about the future of <u>YOUR</u> livelihood in Thuy Dien village? (✓):

(A) Mobile Capture	(B) Net Enclosed	(C) Lowland Pond	(D) Highland Pond
❒Yes ❒No	❒Yes ❒No	❒Yes ❒No	❒Yes ❒No

3.15.1 If yes, why? _____

_____

If not, why not? _____

_____

3.16. Are you happy practicing the fisheries livelihood(s) that you practice? ❒Yes ❒No

3.17. Are you <u>often</u> concerned about having enough income? ❒Yes ❒No

3.18. If you had other opportunities would you accept a job elsewhere? ❒Yes ❒No

If yes, where would you prefer to work? _____

If not, why? _____

PART 4: RESOURCE MANAGEMENT

4.1. In your opinion, which livelihood(s) negatively impact the environment? (✓):

	(A) **Mobile Capture Fishing**	(B) **Net Enclosed Aquaculture**	(C) **Lowland Pond Aquaculture**	(D) **Highland Pond Aquaculture**
Negative impact				
No impact				

If yes, briefly explain how:

(A) _____

(B) _____

(C) _____

(D) _____

4.2. What do you do if your farmed species get a disease? (✓):

	Report it to the CPC	Report it to the DPC	Report it to the FA	Leave the fish to die	Use medicine
(B) **Net Enclosed Species**					
(C) **Lowland Pond Species**					
(D) **Highland Pond Species**					

4.3. Do you experience conflict with other fishers/farmers in Thuy Dien?

Fishers & farmers in Thuy Dien	**Conflict? (✓ or X):**	**Briefly Explain**
(A) **Mobile capture fishers**		
(B) **Net enclosed farmers**		
(C) **Lowland pond farmers**		
(D) **Highland pond farmers**		

4.4. Are you a member of the FA? ❒Yes ❒No

If not, why?_____

4.5. What best describes the benefits of FA membership in Thuy Dien? (✓):

❒ (1) Conflict resolution
❒ (2) Protection from theft
❒ (3) Share knowledge & information
❒ (4) Easier to borrow money
❒ (5) Helps to identify and enforce user rights
❒ (6) Provides a link with government

4.6. What best describes any disadvantages of FA membership? (✓):

❒ (1) Pressured to join
❒ (2) Fees
❒ (3) Inadequate protection from theft
❒ (4) Too many rules and regulations
❒ (5) Not enough rules and regulations
❒ (6) Unequal treatment between members
❒ (7) No power to enforce rules and regulations
❒ (8) Difficult to get everyone together

PART 5: CERTIFICATION

	(A) **Mobile Capture**	(B) **Net Enclosed**	(C) **Lowland Pond**	(D) **Highland Pond**
5.1. Do you have official documentation for your water surface area?		❒Yes ❒No		
5.2. Is your pond land certified?			❒Yes ❒No	❒Yes ❒No
5.3. Is your land legally authorized for aquaculture development?			❒Yes ❒No	❒Yes ❒No

(✓ or X)	(C) **Net enclosed aquaculture**	(C) **Lowland**	(D) **Highland**
5.4. Do you keep written records of your aquaculture activities?			
	❒ (1) Production operations		
	❒ (2) Production costs		
	❒ (3) Hygienic conditions of food safety (FSH)		
	❒ (4) Harvesting and transportation (ie. pond to net)		
	❒ (5) Drugs, chemicals, biological products		
	❒ (6) Types of waste and sources of pollution		
	❒ (7) Sources and types of feed used		
	❒ (8) Sources and types of seed used		

	(A) **Mobile Capture**	(B) **Net Enclosed**	(C) **Lowland Pond**	(D) **Highland Pond**
5.5. Do you have a record of the geographical coordinates (địa lý tọa độ) of your net/pond areas?		❒Yes ❒No	❒Yes ❒No	❒Yes ❒No
5.6. Do you know the map location of your net/pond areas?		❒Yes ❒No	❒Yes ❒No	❒Yes ❒No
5.7. Have you ever registered your production activities with the gov't?	❒Yes ❒No	❒Yes ❒No	❒Yes ❒No	❒Yes ❒No
5.8. Do you comply with any food safety standards?	❒Yes ❒No	❒Yes ❒No	❒Yes ❒No	❒Yes ❒No
If so, whose standards (ie/ state, FAO)?				

5.9. What factors do you think are important to the sustainability of fishing and/or aquaculture in the lagoon? (✓):

❒ (1) Good management of production systems (FA or other)
❒ (2) Good water quality (no pollution)
❒ (3) Feed regulations
❒ (4) Food safety and quality
❒ (5) Medicine regulations
❒ (6) Ability to export fish
❒ (7) Worker's rights
❒ (8) Stable quantity of fish
❒ (9) Size and quality of fish

5.10. Have you ever heard of certification or VietGAP? ❒Yes ❒No

If yes, please explain: _____

_____

APPENDIX III: Interview CPC

October 3rd, 2012: CPC interview 1

1. According to the CPC, how many hectares constitute a small, medium, and large aquaculture net enclosure, and a small, medium, and large aquaculture pond?
2. There are only a few households left that practice mobile capture fishing in Thuy Dien. Does the CPC have any type of strategy to help these people transition into another livelihood? Please explain.
3. What has been the impact from the growth of aquaculture on poverty in Thuy Dien village **(are people moving out of poverty, or are the rich getting richer and the poor getting poorer because unable to transition into aquaculture)**
4. Is Thuy Dien village/lagoon experiencing any negative environmental impacts from the intensification of:
    a. capture fishing? Please explain.
    b. net enclosed aquaculture? Please explain.
    c. lowland pond aquaculture? Please explain.
    d. highland pond aquaculture? Please explain.
5. How does the CPC (Common People's Commune) control pollution and disease in the net enclosures and ponds in Thuy Dien?
6. We heard that the level of seawater is getting lower, which is preventing the fish from entering the lagoon because the gate between the lagoon and ocean is now too high. Can you explain to us why this is happening?
7. How many dykes are there in the area of Thuy Dien? How do these dykes benefit/impede production in the village/lagoon?
8. Are there any outside fisheries investors in Phu Xuan commune or in the lagoon **(if he says no to the commune I am interested in the lagoon in general [private companies])**?
9. When was the FA established in Thuy Dien?
10. Can you explain to us the role of the FA in managing a village's production systems? **(We want to know if they know)**
11. Does Thuy Dien - Phu Xuan FA currently have power to enforce fishing/aquaculture rules and regulations in Thuy Dien?
12. If the Thuy Dien - Phu Xuan FA currently has no power, what needs to be implemented in order for the FA to have the capacity to exercise its authority? **(Co-management body?)**
13. What sort of support does the CPC provide the FA?
14. How does the CPC implement fisheries policy and enforce regulation in the village if the FA is unable to exercise any power? **(management of each production system)**
15. Are there any coops in Phu Xuan commune?
16. Are fish from the lagoon exported to regional and international markets?
17. Have you ever heard of certification?
18. Can you explain to us what certification is? **(I want it to seem like we don't know and we are asking them)**

19. Have you heard of VietGAP?
20. Can you explain to us what VietGAP is? **(I want it to seem like we don't know and we are asking them)**
21. Do you think that farms in the lagoon will have the option to become VietGAP certified in the future?
22. Do you think that VietGAP certification can benefit farms in the lagoon?

APPENDIX IV: Interview Faculty at Hue University of Agriculture and Forestry

October 5th, 2012: Interview 1

1. If the Thuy Dien - Phu Xuan FA currently has no power, what needs to be implemented in order for the FA to have the capacity to exercise its authority (ie/ co-managment body)? Is something currently underway? What are the challenges with this?

2. What sort of support does the CPC provide the FA (the head of the fisheries department was unable to tell us the role of the FA)?

3. How does the CPC implement fisheries policy and enforce regulation in the village if the FA is unable to exercise any power? (management of each production system)

4. We were told there were two outside fisheries investors in Phu Xuan commune during industrial shrimp aquaculture but they left when unsuccessful. Do you know the names of these companies? Are there any other outside investors in the lagoon that you know of?

5. Just to clarify, you said mixed species in the lagoon are exported but ONLY to regional markets? Not international? Do you think the area will ever export internationally?

6. Do you have anything on the history of Thuy Dien and its transition into aquaculture and the introduction of the FA?

7. Phu Xuan commune has 5 different FAs—does that mean there are five different villages in the commune (one FA per village)?

8. Who do you think would be the best people to talk with regarding VietGAP?

9. Do I need additional documentation if I want to meet with the DPC, provincial FA, and Department of Aquaculture Protection?

APPENDIX V: DPC Interview 1

November 8, 2012: Sub-department for aquaculture, Thua Thien Hue province

1. We understand that VietGAP aquaculture certification has been introduced recently.
    a. What can you tell us about VietGAP certification, in particular:
        i. What types of aquaculture farms does VietGAP target (species farmed, farm size, location of farm, or any other criteria)
        ii. Is the intention to have VietGAP standards apply to all Vietnamese exported seafood (all species or only specific species)?
        iii. Is VietGAP certification expected to apply to seafood processed from the lagoon?
2. We have read that MARD expects VietGAP to have certified 30% of the intensive and semi-intensive aquaculture farms in Vietnam by 2015 and 80% certification by 2020 (Directorate of Fisheries 2012)[40]
    a. Could this goal of increasing Vietnam's fisheries exports potentially expand export production in the Tam Giang lagoon?
    b. Will small-scale producers in the lagoon have the ability to become VietGAP certified in the future if they choose?
3. How many seafood processing plants process and export seafood produced in the Tam Giang lagoon?
4. Can you provide us with:
    a. The names of these processing plants
    b. The species these companies process—
    c. The species these companies process specifically for international export—Whether these companies process only farmed fish or caught fish as well?
    d. To which international and regional markets these companies process—
    e. With what standards these processing plants comply (if any)? This
5. Are there any plans for the introduction of additional seafood processing plants in and around the lagoon?
6. Are there any regulations on formulated feed sold to farmers in the lagoon?
    a. If so, what are they? If not, why not?
    b. Does formulated feed contain medicine, antibiotics, or any sort of growth hormone?
7. Do you have to be a licensed supplier in order to sell seed or feed for aquaculture production in the lagoon?
    a. Why, why not?
8. Are there any certified feed/seed suppliers in Vietnam?
    a. If so, what types of farms do these suppliers service?

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[40] Directorate of Fisheries, Vietnam 2012. "Applying the fisheries sector VietGAP: Road into the sea." [Online]: URL: http://www.tongcucthuysan.gov.vn/vietgap-thuy-san/nganh-thuy-san-ap-dung-vietgap-111uong-ra-bien-lon/?searchterm=VietGAP (Accessed April, 2012).

9. Are there any plans to introduce any food safety and quality regulations for aquaculture production in the lagoon?
10. What do you see for the future of mobile capture fishing in Thuy Dien village and why?
11. What do you see for the future of aquaculture in the lagoon and why?
12. Can you tell us what type of environmental impacts are caused by practicing:
    a. Capture fishing?
    b. Net enclosed aquaculture?
    c. Lowland pond aquaculture?
    d. Highland pond aquaculture?
13. Does DARD have any strategy to address or prevent any further negative environmental impacts to the lagoon caused by the intensification of aquaculture? If so, what does this strategy look like?
14. Do you think that production for international markets under VietGAP certification is something that could benefit the lagoon in the future?
    a. Why? Why not?

APPENDIX VI: DPC Interview 2

November 14 interview with DPC in Phu Vang district (this interview was not village specific but rather in reference to lagoon in general)

1. VietGAP not started yet, need to improve infrastructure first.
2. In lagoon currently only regional exportation
3. In lagoon primarily small scale farms
4. In lagoon not big quantity of product for international markets--only few wholesalers that take fish for processing for international markets
5. When doing industrial shrimp there was thought for export, but it produced a negative environmental impact and boom & bust, which led to mixed aquaculture. But mixed aquaculture produces smaller quantity that is not good for export
6. Industrial shrimp: large farms, high density / mixed aquaculture: smaller farms (300 hectares), less density, so only think about regional markets now because mixed aquaculture is sustainable.
7. Future for lagoon in terms of exports once VietGAP is established: will think about semi-intensive and intensive farms; how to invest in infrastructure to ensure VietGAP standards; and how best to do intensive shrimp raising.
8. Currently investing in industrial shrimp in sandy areas (near to shore) but only small areas for white legged shrimp.
9. Only starting with shrimp for VietGAP
10. Need to talk to CPC re: increase in tax for net enclosed farmers
11. Zoning for net enclosed: goal is to reduce areas by 30-50 percent by widening channels so water can refresh. Before this they did not have the funds to implement zoning and no strategy to help farmers transition into other livelihoods, but now have funds to compensate farmers and resources to provide vocational training. There is a strategy in plan.
12. Policy to support lowland and highland farmers for oil for pumping water into ponds… Why? Policy similar to that of agriculture, gov's helps agriculture farms to take water; aquaculture very different--need more oil and more money to get water to highlands. Government recognizes the need like in agriculture so provides support.
Before gov't provided farmers with subsidy for oil but no longer does, so now gov't helps farmers to afford oil because they need it.
13. Loss from industrial shrimp--barren ponds: CPC and DPC are encouraging people to do mixed aquaculture, so people are beginning to reuse ponds. Number of unused ponds is decreasing and in future they will all be reused again.
There is a model program offering training to farmers on mixed aquaculture. The training in addition to the support for oil will encourage people to reuse ponds. If ponds unused farmers do not receive support.
14. The decrease in net enclosed areas will increase the fishing areas for mobile capture fishers so zoning is beneficial for mobile capture fishers; DPC will then identify which type of gear is allowed and the quantity of that gear.

15. Explosive fishing will be banned (already is in Thuy Dien is it not?!). Number of Lu and size of Lu hole will be limited.
16. Food quality and safety: only informs people on what type of medicine to use~depends on ministry of agriculture. Informs CPC and fisher but do not have resources to enforce this; sometimes someone from DPC checks but not very often.
17. He believes VietGAP could benefit the lagoon in future but depends on many factors: need high quality infrastructure, high investment, knowledge, technology (farmers in lagoon uneducated and very small producers so challenging). Will need training.

APPENDIX VII: Provincial FA Chairman

November 21, 2012

1. Please explain the role of the FA in managing a village's production systems.
    A) Does the FA act as a bridge between fishers / fish farmers and the government?
2. How many people make up the governing body of Thuy Dien's FA (those in charge of decision making)?
    - Of what production systems do these people comprise (this is to be followed up with FA head)?
4. What sort of support does the CPC provide the FA?
5. Will Thuy Dien's FA have the capacity to make certain decisions independent of the CPC?
A) If so, what type of decisions will these be?
6. Are mobile capture fishers expected to become members of Thuy Dien's FA?
7. Thuy Dien's FA is just now becoming truly established. Can you tell us when you expect the FA in Thuy Dien to have full power?
    A) What needs to take place in order for this to happen?
    B) Is there a co-management body (external support) mitigating the process?
8. We understand that zoning is now underway for net enclosed areas in Thuy Dien. What is the role, if any, of Thuy Dien's FA in this process?
9. With the new zoning and increased tax on Thuy Dien's net enclosures, what do you think is the likelihood that the village will experience a decrease in net enclosed aquaculture, an increase in mobile capture fishing and a degree of people returning to life in boats?
10. Do you know if species farmed in the lagoon are exported to international markets? If so, what species and to what markets?
11. What do you see for the future of aquaculture in Thuy Dien?
12. Have you heard of VietGAP? If so, can you explain to us what it is?
13. Do you think that VietGAP standards could reach small scale aquaculture farms in Thuy Dien in the future?

APPENDIX VIII: Thuy Dien FA Chairman Interview 1 & 2

December 2nd, 2012—interview with Thuy Dien's FA Chairman

1. Number of people and production group breakdown on FA board?
2. Number of FA members?
3. How were these people selected?
4. Types and sources of funding for FA
5. How long has IMOLA been involved with Thuy Dien village?
6. IMOLA's involvement in Thuy Dien?
7. Are lagoon products exported internationally?

January 3rd, 2013—Interview with Thuy Dien's FA Chairman

Final Questions for FA Head:

1. Is IMOLA planning to continue its work in Phu Xuan commune in 2013;
    a. What is the current status of IMOLA's involvement in FA allocation rights?
2. What is the current status of zoning for net enclosures?
    a. Has it already begun?
    b. Have the households who will be affected been notified?
    c. Regulation stipulates that HH's should be notified five months before zoning has occurred
3. Any news on the increase in fees for net enclosed farmers?
4. Any news on the money being provided for pond farmers?

APPENDIX IX: Pilot Focus Groups

Net aquaculture only Focus Group

1. What species do you farm? **(interactive)**
2. To whom do you sell your fish **(name of wholesaler or others (as specific as we can get here)**
3. Why do you only practice net enclosed aquaculture and no mobile/fixed gear fishing or pond aquaculture?
4. What are the benefits associated with practicing net enclosed aquaculture?
5. What are the disadvantages associated with practicing net enclosed aquaculture?
6. Is it getting harder or easier to earn a living doing net enclosed aquaculture?
7. Has the expansion of aquaculture changed how you interact with capture fishers and pond aquaculture lists? **(Do aquaculturalists associate with mobile fishers, are the groups close or are they divided, social capital, relations of production?)**
8. Is there any conflict between capture fishers and aquaculture in the village?

Governance

1. Is the quantity of fish farmed declining?
2. Have you noticed any changes in water and/or land quality as a result of the intensification of aquaculture?
3. What do you use to feed the fish in your enclosures?
4. Where do you get this feed?
5. Do you use medicine if the fish get sick?
6. Where do you get this medicine?
7. Where do you get your fingerlings? **(baby fish)**
8. Are you all members of the Thuy Dien~Phu Xuan FA?
9. Are there rules and regulations that AFFECT your aquaculture practices? **(rules and regulations may be in place but do they actually impact their day to day activities)**

Mobile capture only Focus Group

1. What types of fishing gear do you use?
2. Why do you not practice fixed gear fishing?
3. What species do you fish? **(interactive)**
4. To whom do you sell your fish? **(name of wholesaler)**
5. What do you do with the small fish you catch and cannot sell to the wholesaler?
6. What are the benefits associated with mobile capture fishing?
7. What are the risks associated with mobile capture fishing?
8. Is it becoming harder or easier to make a living fishing?
9. Has the expansion of aquaculture changed how mobile capture fishers interact with other production groups in the Thuy Dien? **(Do mobile fishers associate with aquaculturalists, are the groups close or are they divided, social capital, relations of production?)**
10. Is there any conflict between capture fishers and aquaculture in the village?

Governance
1. Is the quantity of fish caught declining?
2. Have you noticed any changes in water and/or land quality as a result of the intensification of capture fishing?
3. What factors determine where, how, and when you can fish?
4. Are you all members of Thuy Dien–Phu Xuan FA?
5. Are there official rules and regulations that AFFECT your fishing practices? **(rules and regulations may be in place but do they actually impact their day to day activities)**

Capture + net aquaculture Focus Group

1. Why do you practice both mobile capture fishing and net enclosed aquaculture?
2. What types of fishing gear do you use?
3. What species do you catch? **(interactive)**
4. What species do you farm? **(interactive)**
5. To whom do you sell your fish? **(answer as specific as possible)**
6. What are the benefits associated with practicing both mobile capture fishing and net enclosed aquaculture?
7. What are the risks associated with practicing both mobile capture fishing and net enclosed aquaculture?
8. Has the expansion of aquaculture changed how people interact with each other in the village? **(Do aquaculturalists associate with mobile fishers, are the groups close or are they divided, social capital, relations of production?)**
9. Is there any conflict between capture fishers and aquaculture in the village?

Governance
1. Is the quantity of fish caught declining?
2. Is the quantity of fish farmed declining?
3. Have you noticed any changes in the water and/or land in and around your nets and where you fish? **(I'm asking here about both capture fishing and net enclosed water/land area)**
4. What factors determine **where, how** and **when** you can fish?
5. What do you use to feed the fish in your net enclosures?
6. Do you use medicine if the fish in your net enclosure get sick?
7. Are you all members of the Thuy Dien–Phu Xuan FA?
8. Are there official rules and regulations that AFFECT your fishing practices? **(rules and regulations may be in place but do they actually impact their day to day activities)**

Aquaculture net + pond Focus Group

1. Why do you practice both net enclosed and pond aquaculture?
2. What species do you farm? **(interactive)**
3. To whom do you sell the fish farmed in ponds?

4. To whom do you sell the fish farmed in net enclosures?
5. What are the benefits associated with practicing both net enclosed and pond aquaculture?
6. What are the disadvantages associated with practicing both net enclosed and pond aquaculture?
7. Has the expansion of aquaculture changed how you interact with mobile capture fishers and other aquaculturalists in the village? **(Do aquaculturalists associate with mobile fishers, are the groups close or are they divided, do they respect one another, social capital, relations of production?)**
8. Is there any conflict between capture fishers and aquaculture in the village?

Governance

1. Is the quantity of fish farmed declining? **Please explain.**
2. Have you noticed any changes in water and/or land quality as a result of the intensification of aquaculture? **Please explain**.
3. What do you use as feed for the fish in your net enclosures?
4. What do you use for feed for the fish in your ponds?
5. Where does your seed come from? **(Fish eggs that grow to be fingerlings)**
6. Do you use medicine if your fish get sick?
7. Are you all members of the Thuy Dien~Phu Xuan FA?
8. Are there official rules and regulations that AFFECT your aquacultural practices? **(rules and regulations may be in place but do they actually impact their day to day activities)**

APPENDIX X: Final Focus Groups

January 3, 2013

Focus Group #1: five participants
Focus Group #2: five participants

Introduction: the purpose of these questions is to see if VietGAP certification is a good option for small-scale fish farmers. VietGAP is something that is very new and the possibility that it will be an option for small-scale farmers in the lagoon is uncertain in the near future. However, I wonder if it will be possible in the future. That is why I want to talk with you today. I am interested in your opinions and suggestions in respect to semi-intensive and intensive shrimp aquaculture for international markets in the lagoon; and if, given the opportunity, it would be something anyone here would ever be interested in.

1. Thinking back to when industrial shrimp was farmed in the village, what were the benefits that were associated with this semi-intensive and intensive aquaculture?
2. Can you tell me what contributed to its collapse (why did it not last—final bust)?
3. In your opinion, what could have been done differently to avoid these issues and help industrial shrimp become a successful livelihood?
4. In your opinion, what needs to be done to bring back industrial shrimp farming to the lagoon in a successful and sustainable way (or is it possible at all)?
5. If there were improvements made to infrastructure, and stricter rules and regulations applied to the practice of industrial shrimp aquaculture, would you like to try this type of farming, or for those who already have, would you be willing to try again?
    a. Why, why not?
6. Who here would be interested in exporting their farmed species to international markets, specifically Western markets such as Europe and North America?
7. It can be difficult for small scale fish farmers to compete for these markets due to strict guidelines and regulations
    a. Some small-scale farms join together to create one large aquaculture farm in order to increase their production power and improve their ability to comply with these strict rules and regulations
        1. Is this something anyone here would consider doing if given the opportunity to produce seafood for Europe and North American markets?
            a. Why, why not?
8. Some people think that large scale aquaculture farms provide jobs in the form of wage labour for some fish farmers whose small scale farms cannot compete with larger farms
            a. Do you agree with this?
                i. Why, why not?
    2. Given the opportunity, would anyone here prefer working for an hourly wage on a large aquaculture farm rather than owning and operating your own small farm?
        a. Why, why not?

9. Some of you have children that do wage labour in the cities. When you get too old to practice aquaculture do you want your children to return to Thuy Dien village to take over your ponds and make aquaculture their livelihood?
    1. Why, why not? Please explain
10. If you do want your children to return to take over your ponds, do they have the skills necessary to do this (did you teach your children aquaculture when they were young?)
11. What do you all see for the future of aquaculture in Thuy Dien village (do you see it as growing and expanding or slowly dying)?
    1. What are your reasons for thinking this?
12. What do you consider to be the most challenging aspects of aquaculture production in Thuy Dien village today?

APPENDIX XI: Key informant interviews

January 3, 2013

1. Can you begin by confirming your education level?
    a. If no education, are you illiterate?
2. Did you used to be a Sampan Dweller?
3. Has your net enclosed area been zoned before?
    a. If so, when?
    b. If so, by how much?
    c. Were you compensated by the government?
        i. If so, in what way? If monetarily, how much?
        ii. Did you feel that this compensation was fair?
    d. How did you adapt to the reduction in your water surface area?
        i. Did you seek alternative income?
        ii. Other ways you adapted?
4. You noted your concerns about your net enclosure(s) being zoned when we interviewed you earlier…
    a. Have you received word whether or not your area(s) is/are to be zoned yet?
        i. If so, by how much?
        ii. If so, when?
        iii. If not, when do you expect to find out?
        iv. Have you received any word about how the government plans to compensate you for any loss of water surface area?
    b. If your area is to be zoned…
        i. Would you consider turning to mobile capture fishing to compensate for any loss of income from the reduction of your water surface area?
            1. Why?
            2. Why not?
        ii. Would you consider turning to pond aquaculture to compensate for any loss of income from the reduction of your water surface area?
            1. Why?
            2. Why not?
            3. Is there pond land available in Xuan Ô or elsewhere?
            4. Can you afford pond land?
5. If given the opportunity, would you consider doing wage labour on larger aquaculture farms?
    a. Why?
    b. Why not?
6. If your net enclosed area(s) are significantly zoned, would you consider moving your family to the city in search of wage labour?
    a. Why?
    b. Why not?
7. If the government offers you training to transition into other livelihoods would you be open to this opportunity?
    a. Why?
    b. Why not?
8. Do you understand the reasons for the zoning of net enclosed aquaculture areas?

a. Do you agree or disagree with the reasons?
b. Do you think it is unfair/fair?
c. Do you have any suggestions for any alternatives to the reduction of net enclosed areas?

APPENDIX XII: IMOLA Interview

December 4th, 2012

1. He notes that they will probably extend project – although scheduled to end in December. He was vague about this. However, when I spoke to an administrative staff member she told me that IMOLA is very good about getting funding.
2. IMOLA works on communal plans and is in the process of formalizing the reorganization of net enclosures; he was unable to speak about Thuy Dien village in Phu Xuan commune specifically because they typically work at the commune level. He called a couple of associates in who had no input and were patient to leave so they could continue their work – they only confirmed that Thuy Dien village was a resettlement village
3. In the south (basin of the lagoon) one commune created criteria for adaptation to zoning which involved consolidating two households into one so relatives all joined forces (sort of like farm consolidation~~ I thought this was interesting and something worth following up somehow in TD)
4. When I asked about his thoughts on the possibility of net enclosed farmers turning to capture fishing if they lose their enclosures to zoning
    a. He thought maybe there would be a shift to Lu. This is of concern since it is highly destructive and invisible because it is under the water.
    b. Lu is practiced even if it is banned. He says there is no effective monitoring.
    c. Government continues to say that it is too difficult to handle and so ignores the problem, that is why IMOLA works with the FAs because they can establish good practice; there is no action on part of government
5. IMOLA's role in establishing FAs is to help establish an executive board, act as co-management body
    a. The commune level, he notes, is more sensitive and more active but not with any help (enforcement) from the government
6. Thuy Dien is actually the name for all villages allocated or Sampan Dweller relocation (there are a few Thuy Dien villages in the lagoon)
7. When asked about VietGAP in the lagoon he said:
    a. Too difficult, there will be no commitment by government
    b. Theory in the sky—law and regulation does not occur in real life
    c. He said that by 2012 there were to be no more net enclosures but they are still there
        i. This was a regulation put in place to clean up Sampan Dwellers
        ii. Government does not really care about them
        iii. Uneducated and very little opportunity

8. When I asked him about international exports and the ability for the area to expand business to this level he talked about:
    a. A pilot village in the south that are doing international exports in a sustainable manner
9. Which led me to ask about the government's plan to boost tourism in the lagoon
    a. He says it is the priority of the province—rural tourism
        i. Which Khanh explains is the umbrella term for cultural tourism, eco-tourism, green tourism, and *production tourism* (name not accurate of the latter but it is a model for production but unpopular when taking into account farming according to the seasonal calendar)
    b. This is a system that will support local activity so that the community can benefit
        i. He calls it agri-tourism—small ventures
        ii. Will host a limited number of people and done at the household level—not mass tourism
        iii. Niche tourism—potential target for tourism; needs to be done with proper structure in place; dependent on government; there is one company from Italy that is tackling this issue in eco-tourism
        iv. 5 star tourism not good because it does not put back into local community
10. It takes 2-3 years to establish an FA: mobilize, build awareness, build capacity
11. CPC and DPC do not allocate funds for FA: IMOLA supports with a salary until FA strong enough to survive on membership fees
12. Food safety: Massimo does not know what workshop I am talking about for Thuy Dien village since IMOLA conducts hundreds of workshops;
    a. Semi industrial venture in shrimp farming formed into a cooperative with enforcement of GAP system; IMOLA investigated their willingness for certification but farm no longer active because changed to fish production (rather than shrimp)—
    b. He noted that Sampan dwellers are the most unreactive
        i. Little money to invest
        ii. No access to credit
        iii. Act erratically—if it works it works, if it doesn't it doesn't – not concerned
        iv. He says that he goes to villages and asks them what they want to do if he gives them money, he says some just sit there and watch T.V. He gets no reaction or enthusiasm.
    c. One village IMOLA worked in had tradesmen, active market that shipped to Danang, they were concerned about quality and they were skillful people; yet even in this commercial venture safety and quality was very bad
        i. Unsafe, dirty water

    ii. IMOLA helping to prepare a small factory to produce in a clean and safe way but he says when they visited it there was no way it would meet any sort of quality and safety standards ("forget about it")

13. Lagoon is not very polluted
    a. Chloroforms concentrated along the side where there is human waste
    b. No heavy metals
    c. Products quite natural
    d. Most pollution is organic—some spots have fertilizer and can see these areas but for the most part virtually no POPs (Persistent Organic Pollutants)
    e. Most pollution comes from excess feed, organic material (waste) from shrimp

APPENDIX XIII: Local Collector Interview

Nov 13: local collector Thuy Dien village

~ Middleman for 10 years
~70 percent of farmers and fishers in village use this collector ~previously did net enclosed only, still has a net enclosure
~ five years ago he went to Danang city to buy feed but then made arrangements with lowland pond farmers to sell breed. Now he no longer does because children have grown and gone. He stopped selling breed five years ago.

Q. what makes him so popular?

Q. What is the process?

Q. Competitive in village to be a collector?

Q. How does he collect his breed debt?

Q. What wholesales do you use?

Q. How much does he sell to the wholesaler daily?

Q. Price he buys and sells species from lagoon?

Q. What happens to the product once it goes to wholesaler?

Q. What processing plant?

APPENDIX XIV: Frequency tables

General Questions

1. Number of people living in households surveyed

Number of people	Frequency	Total HHs	Frequency %
3	8	61	13.1%
4	12	61	19.7%
5	17	61	27.9%
6	18	61	29.5%
7	1	61	1.6%
8	4	61	6.6%
11	1	61	1.6%

2. Number of people living in households surveyed who generate income

Number of people	Frequency	Total HH	Frequency %
2	27	61	44.3%
3	9	61	14.8%
4	16	61	26.2%
5	6	61	9.8%
6	1	61	1.6%
7	1	61	1.6%
8	1	61	1.6%

3. Age of heads of households surveyed

(Overall village) Age	Total HHs	Frequency	Frequency %
26-30	61	4	6.6%
31-35	61	3	4.9%
36-40	61	13	21.3%
41-45	61	11	18.0%
46-50	61	10	16.4%
51+	61	20	32.8%

4. Education of heads of households and their wives

Overall Education Level (Heads of HHs)	Frequency	Total HH	Frequency %
No education	23	61	37.7%
Primary 1-5	25	61	41.0%
Secondary 6-9	11	61	18.0%
Highschool 10-12	2	61	3.3%
University	0	61	0.0%

Overall Education Level (*Wives* of HHs)	Frequency	Total HH	Frequency %
No education	29	61	47.5%
Primary 1-5	24	61	39.3%
Secondary 6-9	7	61	11.5%
Highschool 10-12	1	61	1.6%
University	0	61	0.0%

5. Number of children in household

Number of children	Frequency	Total HH	Frequency %
0	19	61	31.1%
1	14	61	23.0%
2	12	61	19.7%
3	10	61	16.4%
4	6	61	9.8%

5a. Levels of education for sons no longer in school per household surveyed—all production systems

No education	Total HH	Frequency %
0	61	0.0%
Primary 1-5		
7	61	11.5%
Secondary 6-9		
19	61	31.1%
High school		
12	61	19.7%
University		
2	61	3.3%

Note: Numbers represent HHs not children; therefore if one HH has two children out of school with primary education that is tallied as one; if 2 children in same HH out of school with two different levels of education that is tallied as two (one for each level of education)

5b. Levels of education for daughters no longer in school per household surveyed—all production systems

No education	Total HH	Frequency %
0	61	3.3%
Primary 1-5		
7	61	13.1%
Secondary 6-9		
19	61	27.9%
High school		
12	61	13.1%
University		
2	61	1.6%

Note: Numbers represent HHs not children; therefore if one HH has two children out of school with primary education that is tallied as one; if 2 children in same HH out of school with two different levels of education that is tallied as two (one for each level of education)

6. Heads of households that practice other livelihoods in addition to fisheries & aquaculture

HHs (additional work outside fisheries livelihood)–village	Frequency	Total HH	Frequency %
Heads of HHs	17	61	27.9%

Types of livelihoods practiced in addition to fishing/aquaculture (Heads of HH)	Frequency	Total HH	Frequency %
Construction	5	17	29.4%
Net repair	2	17	11.8%
Selling rice, candy, household goods	1	17	5.9%
Rents out highland pond	1	17	5.9%
Selling seafood at local market	1	17	5.9%
Other (includes FA head and village head)	7	17	41.2%

7. Occupation of children

Overall village	Frequency	Total HH	Frequency %
Wage labour in city (1 son)	15	61	24.6%
Wage labour in city (2 sons)	2	61	3.3%
Wage labour in city (3 sons)	0	61	0.0%
Wage labour in city (1 daughter)	17	61	27.9%
Wage labour in city (2 daughters)	4	61	6.6%
Wage labour in city (3 daughters)	3	61	4.9%
Practicing same fishing livelihood as parents (1 son)	9	61	14.8%
Practicing same fishing livelihood as parents (2 sons)	1	61	1.6%
Practicing same fishing livelihood as parents (3 sons)	1	61	1.6%
Student (1 son)	20	61	32.8%
Student (2 sons)	9	61	14.8%

Student (3 sons)	0	61	0.0%
Student (1 daughter)	15	61	24.6%
Student (2 daughters)	8	61	13.1%
Student (3 daughters)	0	61	0.0%

8. Duration living in village by production group and their combinations

Time mobile capture HHs living in village	Frequency	Total HH	Frequency %
< 10 years	2	5	40.0%
Between 10 - 20 years	2	5	40.0%
20+ years	1	5	20.0%

Time net + capture HHs living in village	Frequency	Total HH	Frequency %
< 10 years	2	7	28.6%
Between 10 - 20 years	4	7	57.1%
20+ years	1	7	14.3%

Time net enclosed HHs living in village	Frequency	Total HH	Frequency %
Between 10 - 20 years	9	30	30.0%
20+ years	21	30	70.0%

Time lowland HHs living in village	Frequency	Total HH	Frequency %
20+ years	7	7	100.0%

Time net + low + high HHs living in village	Frequency	Total HH	Frequency %
20+ years	5	5	100.0%

Time high + low HHs living in village	Frequency	Total HH	Frequency %
20+ years	4	4	100.0%

Time net + low HHs living in village	Frequency	Total HH	Frequency %
20+ years	3	3	100.0%

Livelihood question:

9. Duration practiced aquatic livelihood

Time mobile capture HHs living in village	Frequency	Total HH	Frequency %
< 5 years	1	5	20.0%
Between 5 - 10 years	0	5	0.0%
Between 10 - 15 years	2	5	40.0%
15+ years	2	5	40.0%

Time capture + net HHs living in village	Frequency - capture	Total HH	Frequency % - Capture	Frequency - Net	Total HH	Frequency % - Net
< 5 years	0	7	0.0%	0	7	0.0%
Between 5 - 10 years	0	7	0.0%	3	7	42.9%
Between 10 - 15 years	1	7	14.3%	1	7	14.3%
15+ years	6	7	85.7%	3	7	42.9%

Time net enclosed HHs living in village	Frequency	Total HH	Frequency %
< 5 years	0	30	0.0%
Between 5 - 10 years	2	30	6.7%
Between 10 - 15 years	16	30	53.3%
15+ years	12	30	40.0%

Time lowland HHs living in village	Frequency	Total HH	Frequency %
< 5 years	0	7	0.0%
Between 5 - 10 years	1	7	14.3%
Between 10 - 15 years	4	7	57.1%
15+ years	2	7	28.6%

Time net + low + high HHs living in village	**Frequency - Net**	**Total HH**	**Frequency % - Net**	**Frequency - Low**	**Frequency % - Low**	**Frequency - High**	**Frequency % - High**
< 5 years	1	5	20.0%	1	20.0%	4	80.0%
Between 5 - 10 years	0	5	0.0%	3	60.0%	0	0.0%
Between 10 - 15 years	2	5	40.0%	0	0.0%	0	0.0%
15+ years	2	5	40.0%	1	20.0%	1	20.0%

Time high + low HHs living in village	Frequency - High	Total HH	Frequency % - High	Frequency - Low	Total HH	Frequency % - Low
< 5 years	2	4	50.0%	0	4	0.0%
Between 5 - 10 years	2	4	50.0%	0	4	0.0%
Between 10 - 15 years	0	4	0.0%	1	4	25.0%
15+ years	0	4	0.0%	3	4	75.0%

Time net + low HHs living in village	Frequency - Net	Total HH	Frequency % - Net	Frequency - Low	Total HH	Frequency % - Low
< 5 years	0	3	0.0%	0	3	0.0%
Between 5 - 10 years	0	3	0.0%	0	3	0.0%
Between 10 - 15 years	0	3	0.0%	1	3	33.3%
15+ years	3	3	100.0%	2	3	66.7%

10a. Perceived changes in quantity of species caught

Mobile Capture Fishers	Frequency	Total HHs	Frequency %
Declined	3	5	60.0%
Stayed the same	2	5	40.0%

Mobile + Net	Frequency	Total HHs	Frequency %
Declined	6	7	85.7%
Stayed the same	1	7	14.3%

10a. Perceived changes in quantity of species farmed

Net enclosed farmers	Frequency	Total HHs	Frequency %
Declined	26	45	57.7%
Stayed the same	13	45	28.8%
Increased	5	45	11.1%
Depends on weather	2	45	4.4%

Lowland pond farmers	Frequency	Total HHs	Frequency %
Declined	7	19	36.8%
Stayed the same	6	19	31.5%
Increased	4	19	21.0%
Depends on input	1	19	5.26%
Depends on disease	1	19	5.26%

Highland pond farmers	Frequency	Total HHs	Frequency %
Declined	1	9	11.1%
Stayed the same	4	9	44.4%
Increased	1	9	11.1%

Depends on input*	2	9	22.2%
Depends on disease	1	9	11.1%

*If pond used for breeding then input determines quantity of species farmed
(1 participant noted breeding only so I classified under 'input')

11. Reasons for practicing livelihoods and their combinations

Reasons for practicing mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Provides sufficient income	2	5	40.0%
Family has always practiced capture fishing	4	5	80.0%
It is all I know how to do	3	5	60.0%
No money to buy water surface area for net enclosed	4	5	80.0%
No money to buy/rent land	4	5	80.0%

Reasons for practicing mobile + net	Frequency	Total HHs	Frequency %
Diversified production system provides stable income	7	7	100.0%
Net enclosed areas too small to provide sufficient income	5	7	71.4%
Fishing does not generate enough income on its own	7	7	100.0%
No access to water surface area to increase net enclosures	2	7	28.6%
My family has always done mobile capture fishing	6	7	85.7%
Fishing provides fresh caught fish for personal consumption	6	7	85.7%

Reasons for practicing net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Provides sufficient income	**25**	**30**	**83.3%**
Do not want to do anything else	**19**	**30**	**63.3%**
Provides better income than mobile capture fishing	**29**	**30**	**96.7%**
Provided better income than pond aquaculture	14	30	46.7%
Little initial investment or input	11	30	36.7%
No money to buy/rent land	18	30	60.0%
Have money but no lowland for sale	2	30	6.7%
Have money but no highland for sale/rent	3	30	10.0%
Less risk than lowland pond aquaculture	27	30	90.0%
Less risk than highland pond aquaculture	26	30	86.7%

Reasons for practicing lowland aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Provides sufficient income	4	7	57.1%
Do not want to do anything else	3	7	42.9%
Provides better income than net enclosed aquaculture	1	7	14.3%
Provided better income than highland pond aquaculture	3	7	42.9%
No money to buy water surface area for net enclosed	4	7	57.1%
Have money but no available water surface area to buy	1	7	14.3%
No money to buy/rent highland pond	3	7	42.9%
Good survival rate for aquatic species	2	7	28.6%

Less risk than highland pond aquaculture	4	7	57.1%
Reasons for practicing net + lowland + highland pond	**Frequency**	**Total HHs**	**Frequency %**
Diversified production system provides stable income	5	5	100.0%
Net enclosed areas too small to provide sufficient income	2	5	40.0%
Lowland ponds too unstable as only source of income	2	5	40.0%
Breeding in highland ponds too unstable as only income	1	5	20.0%
No access to water surface area to expand net enclosures	3	5	60.0%
Have money to buy more lowland ponds but no one selling	1	5	20.0%
No money to rent/buy more highland ponds	1	5	20.0%
Have money but no available highland ponds to rent/buy	1	5	20.0%
Breed own fingerlings for ponds so do not have to buy	3	5	60.0%
Gov't switched one of my lowland ponds for highland pond	1	5	20.0%
Reasons for practicing lowland + highland pond	**Frequency**	**Total HHs**	**Frequency %**
Diversified production system provides stable income	4	4	100.0%
Breeding in highland ponds too unstable as only income	1	4	25.0%
Raising in lowland ponds too unstable to be only income	1	4	25.0%
Have money to buy more lowland ponds but no one selling	3	4	75.0%
Can breed own fingerlings for ponds so do not have to buy	2	4	50.0%
Reasons for practicing net + low pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Diversified production system provides stable income	3	3	100.0%
Net enclosures too small to provide sufficient income	2	3	66.7%
Lowland ponds do not generate enough income on own	3	3	100.0%
No access to water surface area to expand net enclosures	3	3	100.0%
No money to buy additional lowland ponds	2	3	66.7%
Have money to buy moe lowland ponds but no one selling	1	3	33.3%
Lowland provides higher survival rate than net enclosed	2	3	66.7%

12. If you had a choice to practice only one fisheries livelihood would you? And what would that choice be?

Choice to practice only one livelihood	**Frequency**	**Total HHs**	**Frequency %**
Mobile + Net enclosed	2	7	28.6%
Net + high + low	2	5	40.0%
Net + low	0	3	0.0%
High + low	2	4	50.0%

Choice would be...	**Frequency**	**Total HHs**	**Frequency %**
Mobile + Net enclosed			
Net enclosed	2	2	100.0%
Net + high + low	**Frequency**	**Total HHs**	**Frequency %**
Net enclosed	2	2	100.0%

High + low	Frequency	Total HHs	Frequency %
Lowland pond	2	2	100.0%

13. Distribution of caught and farmed fish

Mobile capture fishing group:

Distribution of harvest RAINY SEASON			
Mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	5	80.0%
Sell majority to local collector	5	5	100.0%
Sell majority to local market*	1	5	20.0%
Sell some for feed inside village	1	5	20.0%
Sell some for breeding inside village	2	5	40.0%

Distribution of harvest DRY SEASON			
Mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	5	80.0%
Sell majority to local collector	5	5	100.0%
Sell majority to local market*	1	5	20.0%
Sell some for feed inside village	1	5	20.0%
Sell some for breeding inside village	2	5	40.0%

* HH notes that sells to local collector sometimes and other times sells to local market depending on price

Mobile capture fishing + net enclosed only group:

Distribution of harvest RAINY SEASON			
Mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	5	7	71.4%
Sell majority to local collector	6	7	85.7%
Sell majority to local market*	1	7	14.3%
Sell majority directly to wholesaler	1	7	14.3%
Keep some for own breeding for later	5	7	71.4%
Keep some for own feed	1	7	14.3%

Distribution of harvest DRY SEASON			
Mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	5	7	71.4%
Sell majority to local collector	5	7	71.4%
Sell majority to local market	1	7	14.3%
Sell majority directly to wholesaler	1	7	14.3%

Keep some for own breeding for later	5	7	71.4%
Keep some for own feed	1	7	14.3%
Distribution of harvest RAINY SEASON*			
Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	3	7	42.9%
Sell majority to local collector	3	7	42.9%
Sell majority directly to wholesaler	1	7	14.3%
Sell some for breeding inside village	0	7	0.0%
Keep some for own breeding for later	2	7	28.6%

Distribution of harvest DRY SEASON			
Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	3	7	42.9%
Sell majority to local collector	6	7	85.7%
Sell majority directly to wholesaler	1	7	14.3%
Sell some for breeding inside village	0	7	0.0%
Keep some for own breeding for later	2	7	28.6%

* HH notes that sells to local collector sometimes and other times sells to local market depending on price. One HH does not practice mobile capture fishing in the dry season.

Net enclosed only group:

Distribution of harvest RAINY SEASON			
Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	29	30	96.7%
Sell majority to local collector	23	30	76.7%
Sell majority to local market	6	30	20.0%
Sell majority directly to wholesaler	1	30	3.3%

Distribution of harvest DRY SEASON			
Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	29	30	96.7%
Sell majority to local collector	23	30	76.7%
Sell majority to local market	6	30	20.0%
Sell majoirty directly to wholesaler	1	30	3.3%

Almost all HHs use a small part of their daily harvest for human consumption. It has been noted that sea fish is cheaper than lagoon fish so a selected few buy their seafood rather than use their own harvest

Net enclosed + Lowland pond + highland pond group:

Distribution of harvest RAINY SEASON			
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	5	80.0%
Sell majority to local collector	4	5	80.0%
Sell majority directly to wholesaler	1	5	20.0%

Distribution of harvest DRY SEASON			
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	5	80.0%
Sell majority to local collector	4	5	80.0%
Sell majority directly to wholesaler	1	5	20.0%

Distribution of harvest RAINY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	2	5	40.0%
Sell majority to local collector	2	5	40.0%
Sell majority directly to wholesaler	1	5	20.0%
No production	1	5	20.0%

Distribution of harvest DRY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	1	5	20.0%
Sell majority to local collector	4	5	80.0%
Sell some for breeding inside village	1	5	20.0%
Keep some for own breeding for later	1	5	20.0%

Distribution of harvest RAINY SEASON			
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Sell majority to local collector	1	5	20.0%
Sell some for breeding inside village	2	5	40.0%
Sell some for breeding outside village	2	5	40.0%
Keep some for own breeding for later	3	5	60.0%
Breeding only	2	5	40.0%

Distribution of harvest DRY SEASON			
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
No production	3	5	60.0%
Breeding only	2	5	40.0%

Lowland + Highland pond group

Distribution of harvest RAINY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	4	100.0%
Sell majority to local collector	2	4	50.0%
Sell majority to local market	1	4	25.0%
Sell majority directly to wholesaler	1	4	25.0%
Keep some for own breeding for later	1	4	25.0%

Distribution of harvest DRY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	4	4	100.0%
Sell majority to local collector	3	4	75.0%
Sell majority to local market	1	4	25.0%
Sell majority directly to wholesaler	1	4	25.0%
Sell some for breeding inside village	1	4	25.0%
Keep some for own breeding for later	1	4	25.0%
Breeding only	1	4	25.0%

Distribution of harvest RAINY SEASON			
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	1	4	25.0%
Sell majority to local collector	1	4	25.0%
Sell majority directly to wholesaler	1	4	25.0%
Keep some for own breeding for later	2	4	50.0%
Breeding only	1	4	25.0%

Distribution of harvest DRY SEASON			
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	1	4	25.0%
Sell majority to local collector	2	4	50.0%
Sell majority directly to wholesaler	1	4	25.0%
Keep some for own breeding for later	1	4	25.0%
Breeding only	1	4	25.0%

Net enclosed + lowland pond aquaculture group

Distribution of harvest RAINY SEASON			
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	3	3	100.0%
Sell majority to local collector	2	3	66.7%
Sell majority to local market	1	3	33.3%

Distribution of harvest DRY SEASON			
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Consume small portion by family	3	3	100.0%
Sell majority to local collector	2	3	66.7%
Sell majority to local market	1	3	33.3%

Distribution of harvest RAINY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
No production	3	3	100.0%

Distribution of harvest DRY SEASON			
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Sell ALL to local collector	1	3	33.3%
Sell ALL to local market	1	3	33.3%
Breeding only	1	3	33.3%

Socio-economic Standing

14. Mobile capture fishers economic standing

Mobile Capture Fishers			
Places allowed to fish	**Frequency**	**Total HHs**	**Frequency %**
Within TD			
Anywhere outside net enclosures	5	5	100.0%
Outside TD			
Anywhere outside net enclosures	5	5	100.0%
Number of places outside TD you fish	**Frequency**	**Total HHs**	**Frequency %**
1	1	5	20.0%
2	2	5	40.0%
3	1	5	20.0%
4	1	5	20.0%
Number of fishing boats owned	**Frequency**	**Total HHs**	**Frequency %**
1	4	5	80.0%

2	1	5	20.0%
Number of Lu owned	**Frequency**	**Total HHs**	**Frequency %**
None	1	5	20.0%
Between 1-20	1	5	20.0%
21-40	1	5	20.0%
41-60	0	5	0.0%
61-80	1	5	20.0%
81-100	1	5	20.0%
Number of nets owned	**Frequency**	**Total HHs**	**Frequency %**
A15			
None	2	5	40.0%
< 5	3	5	60.0%
A18			
None	0	5	0.0%
< 5	5	5	100.0%
A20			
None	1	5	20.0%
< 5	4	5	80.0%
A25			
None	2	5	40.0%
< 5	3	5	60.0%
A30			
None	1	5	20.0%
< 5	4	5	80.0%
A40			
None	2	5	40.0%
< 5	3	5	60.0%

15. Mobile capture fishers & net enclosed farmers economic standing

Places allowed to fish	**Frequency**	**Total HHs**	**Frequency %**
Within TD			
Anywhere outside net enclosures	7	7	100.0%
Outside TD			
Anywhere outside net enclosures	7	7	100.0%
Number of places outside TD you fish	**Frequency**	**Total HHs**	**Frequency %**
1	2	7	28.6%
2	3	7	42.9%
3	1	7	14.3%
4	1	7	14.3%
Number of fishing boats owned	**Frequency**	**Total HHs**	**Frequency %**
1	5	7	71.4%
2	2	7	28.6%

Number of Lu owned	Frequency	Total HHs	Frequency %
None	4	7	57.1%
Between 1-20	2	7	28.6%
21-40	1	7	14.3%
Number of nets owned	**Frequency**	**Total HHs**	**Frequency %**
A15			
< 5	7	7	100.0%
A18			
< 5	7	7	100.0%
A20			
< 5	7	7	100.0%
A25			
< 5	7	7	100.0%
A30			
< 5	7	7	100.0%
A40			
< 5	7	7	100.0%

Number of net enclosures owned	Frequency	Total HHs	Frequency %
1	7	7	100.0%
2	0	7	0.0%
Total hectares of net enclosure(s)	**Frequency**	**Total HHs**	**Frequency %**
1	1	7	14.3%
2	6	7	85.7%
AVERAGE SIZE OF NET ENCLOSURES IN THIS GROUP			1.857 hectares
How net enclosures obtained	**Frequency**	**Total HHs**	**Frequency %**
Bought	5	7	71.4%
Inherited	1	7	14.3%
Government	1	7	14.3%
How net enclosures determined	**Frequency**	**Total HHs**	**Frequency %**
Passed down in family with NO legal documentation	1	7	14.3%
Passed down in family WITH legal documentation	0	7	0.0%
Legal documentation from seller	5	7	71.4%
Legal documentation from government	1	7	14.3%
Number of people employed	**Frequency**	**Total HHs**	**Frequency %**
No employees	7	7	100.0%

16. Net enclosed only farmers economic standing

Net Enclosed ONLY Farmers			
Number of net enclosures farmed	**Frequency**	**Total HHs**	**Frequency %**
1	27	30	90.0%
2	3	30	10.0%
Total hectares of net enclosure(s)	**Frequency**	**Total HHs**	**Frequency %**
< 1	2	30	6.7%
Between 1 - 2	5	30	16.7%
2	5	30	16.7%
Between 2 -3	1	30	3.3%
3	3	30	10.0%
Between 3 - 4	1	30	3.3%
4	8	30	26.7%
5	2	30	6.7%
6	2	30	6.7%
7	1	30	3.3%
AVERAGE SIZE OF NET ENCLOSURES IN THIS GROUP			**3.169 hectares**
How net enclosures obtained	**Frequency**	**Total HHs**	**Frequency %**
Bought	10	30	33.3%
Inherited	15	30	50.0%
Part inherited and the other purchased	3	30	10.0%
Self-constructed	2	30	6.7%
How net enclosures determined	**Frequency**	**Total HHs**	**Frequency %**
Passed down in family with NO legal documentation	17	30	56.7%
Passed down in family WITH legal documentation	0	30	0.0%
Legal documentation from seller	0	30	0.0%
Legal documentation from government	0	30	0.0%
Letter from seller that is not considered legal but pays taxes	7	30	23.3%
Self constructed without legal documentation	2	30	6.7%
Oral consent from seller	6	30	20.0%
Some HHs have two different answers because part of their enclosure is inherited and part is purchased			
Number of people employed	**Frequency**	**Total HHs**	**Frequency %**
No employees	30	30	100%

17. Income per production group

a. Mobile capture Fishers

Monthly Income RAINY Season (VND)				DRY Season (VND)	
Mobile capture fishing	Frequency	Total HHs	Frequency %	Frequency	Frequency %
100,000 - 499,000	1	5	20.0%	1	20.0%
500,000 - 999,000	1	5	20.0%	0	0.0%
1,500,000 - 1,499,000	0	5	0.0%	1	20.0%
1,500,000 - 199,000,000	1	5	20.0%	0	0.0%
2,000,000 - 2,499,000	1	5	20.0%	0	0.0%
3,000,000 - 3,499,000	1	5	20.0%	0	0.0%
3,500,000 - 3,999,000	0	5	0.0%	1	20.0%
5,000,000 - 5,499,000	0	5	0.0%	1	20.0%
9,000,000 - 9,999,000	0	5	0.0%	1	20.0%

b. Net enclosed only farmers

Monthly Income RAINY Season (VND)				Monthly Income DRY Season (VND)	
Net enclosed	Frequency	Total HHs	Frequency %	Frequency	Frequency %
1,000,000 - 1,499,000	4	30	13.3%	0	0.0%
1,500,000 - 1,999,000	2	30	6.7%	0	0.0%
2,000,000 - 2,499,000	2	30	6.7%	0	0.0%
2,500,000 - 2,999,000	1	30	3.3%	0	0.0%
3,000,000 - 3,499,000	6	30	20.0%	0	0.0%
3,500,000 - 3,999,000	3	30	10.0%	1	3.3%
4,500,000 - 4,999,000	3	30	10.0%	0	0.0%
5,000,000 - 5,499,000	1	30	3.3%	0	0.0%
6,000,000 - 6,499,000	5	30	16.7%	1	3.3%
7,000,000 - 7,999,000	3	30	10.0%	2	6.7%
9,000,000 - 9,999,000	0	30	0.0%	2	6.7%
10,000,000 - 10,999,000	0	30	0.0%	5	16.7%
12,000,000 - 12,999,000	0	30	0.0%	5	16.7%
13,000,000 - 13,999,000	0	30	0.0%	3	10.0%
15,000,000 - 15,999,000	0	30	0.0%	5	16.7%
16,000,000 - 19,999,000	0	30	0.0%	2	6.7%
20,000,000 - 29,999,000	0	30	0.0%	2	6.7%
30,000,000 +	0	30	0.0%	2	6.7%

c. Mobile capture + net enclosed farmers

Mobile Capture Fishing monthly Income RAINY Season (VND)				DRY Season (VND)	
Mobile	Frequency	Total HHs	Frequency %	Frequency	Frequency %
0	0	7	0.0%	1	14.3%
100,000 - 499,000	1	7	14.3%	1	14.3%
1,000,000 - 1,499,000	1	7	14.3%	1	14.3%
1,500,000 - 199,000,000	1	7	14.3%	0	0.0%
2,000,000 - 2,499,000	1	7	14.3%	0	0.0%
2,500,000 - 2,999,000	1	7	14.3%	0	0.0%
3,000,000 - 3,499,000	0	7	0.0%	1	14.3%
5,000,000 - 5,499,000	0	7	0.0%	1	14.3%
6,000,000 - 6,499,000	1	7	14.3%	1	14.3%
7,000,000 - 7,999,000	1	7	14.3%	1	14.3%

Net Enclosed monthly Income RAINY Season (VND)				DRY Season (VND)	
Net enclosed	Frequency	Total HHs	Frequency %	Frequency	Frequency %
0	2	7	28.6%	0	0.0%
1,000,000 - 1,499,000	1	7	14.3%	0	0.0%
1,500,000 - 1,499,000	1	7	14.3%	0	0.0%
3,000,000 - 3,499,000	1	7	14.3%	1	14.3%
3,500,000 - 3,999,000	0	7	0.0%	1	14.3%
5,000,000 - 5,499,000	1	7	14.3%	0	0.0%
6,000,000 - 6,499,000	0	7	0.0%	2	28.6%
8,000,000 - 8,999,000	1	7	14.3%	1	14.3%
13,000,000 - 13,999,000	0	7	0.0%	1	14.3%
15,000,000 +	0	7	0.0%	1	14.3%

d. Lowland pond farmers

Monthly Income RAINY Season (VND)				Monthly Income DRY Season (VND)	
Lowland pond	Frequency	Total HHs	Frequency %	Frequency	Frequency %
1,500,000 - 1,999,000	1	7	14.3%	0	0.0%
2,000,000 - 2,499,000	1	7	14.3%	0	0.0%
2,500,000 - 2,999,000	1	7	14.3%	0	0.0%
3,000,000 - 3,499,000	1	7	14.3%	0	0.0%
5,000,000 - 5,499,000	0	7	14.3%	1	14.3%
6,000,000 - 6,499,000	1	7	57.1%	3	42.9%
7,000,000 - 7,999,000	2	7	28.6%	1	14.3%
12,000,000 - 12,999,000	0	7	0.0%	1	14.3%
16,000,000 - 19,999,000	0	7	0.0%	1	14.3%

e. Net + low + high farmers

Net monthly Income RAINY Season (VND)				DRY Season (VND)	
Net	Frequency	Total HHs	Frequency %	Frequency	Frequency %
3,000,000 - 3,499,000	3	5	60.0%	0	0.0%
6,000,000 - 6,499,000	2	5	40.0%	0	0.0%
9,000,000 - 9,999,000	0	5	0.0%	3	60.0%
12,000,000 - 12,999,000	0	5	0.0%	1	20.0%
15,000,000 +	0	5	0.0%	1	20.0%

Lowland monthly Income RAINY Season (VND)				DRY Season (VND)	
Lowland	Frequency	Total HHs	Frequency %	Frequency	Frequency %
0	1	5	20.0%	1	20.0%
1,500,000 - 199,000,000	1	5	20.0%	0	0.0%
3,000,000 - 3,499,000	0	5	0.0%	1	20.0%
4,500,000 - 4,999,000	2	5	40.0%	0	0.0%
6,000,000 - 6,499,000	0	5	0.0%	1	20.0%
9,000,000 - 9,999,000	1	5	20.0%	1	20.0%
12,000,000 - 12,999,000	0	5	0.0%	1	20.0%

Highland monthly Income RAINY Season (VND)*				DRY Season (VND)*	
Highland	Frequency	Total HHs	Frequency %	Frequency	Frequency %
0	0	5	0.0%	2	40.0%
3,000,000 - 3,499,000	1	5	20.0%	0	0.0%
4,000,000 - 4,499,000	1	5	20.0%	0	0.0%
6,000,000 - 6,499,000	1	5	20.0%	1	20.0%
Breeding only	2	5	40.0%	2	40.0%

f. Low + high farmers

Lowland pond monthly Income RAINY Season (VND)				DRY Season (VND)	
Lowland	Frequency	Total HHs	Frequency %	Frequency	Frequency %
1,500,000 - 1,499,000	1	4	25.0%	0	0.0%
2,000,000 - 2,499,000	1	4	25.0%	0	0.0%
3,000,000 - 3,499,000	1	4	25.0%	0	0.0%
4,500,000 - 4,999,000	1	4	25.0%	0	0.0%
5,500,000 - 5,999,000	0	4	0.0%	1	25.0%
7,000,000 - 7,999,000	0	4	0.0%	1	25.0%
9,000,000 - 9,999,000	0	4	0.0%	2	50.0%

Highland pond monthly Income RAINY Season (VND)				DRY Season (VND)	
Highland	Frequency	Total HHs	Frequency %	Frequency	Frequency %
2,000,000 - 2,499,000	1	4	25.0%	1	25.0%
5,500,000 - 5,999,000	0	4	0.0%	1	25.0%
6,000,000 - 6,499,000	1	4	25.0%	1	25.0%
Breeding only	2	4	50.0%	1	25.0%

g. Net + low farmers

Net monthly Income RAINY Season (VND)				DRY Season (VND)	
Net	Frequency	Total HHs	Frequency %	Frequency	Frequency %
1,500,000 - 199,000,000	1	3	33.3%	0	0.0%
3,000,000 - 3,499,000	1	3	33.3%	0	0.0%
3,500,000 - 3,999,000	1	3	33.3%	0	0.0%

Lowland pond monthly Income RAINY Season (VND)				DRY Season (VND)	
Net	Frequency	Total HHs	Frequency %	Frequency	Frequency %
0	2	3	66.7%	0	0.0%
1,500,000 - 1,499,000	0	3	0.0%	1	33.3%
15,000,000 +	0	3	0.0%	1	33.3%
Breeding only	1	3	33.3%	1	33.3%

18. Household survey opinions regarding each main production system's impact on environment

Mobile capture fishing	Frequency	Total HHs	Frequency %
Yes	34	61	55.7%
No	18	61	29.5%
Don't know	9	61	14.8%
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Yes	11	61	18.0%
No	43	61	70.5%
Don't know	7	61	11.5%
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Yes	6	61	9.8%
No	46	61	75.4%
Don't know	9	61	14.8%
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Yes	32	61	52.5%
No	19	61	31.1%
Don't know	10	61	16.4%

19. Access to credit/sources of credit/debt

Ability to borrow money when needed	Frequency	Total HHs	Frequency %
Mobile capture fishers	5	5	100.0%
Mobile and net enclosed	7	7	100.0%
Mobile and net enclosed	30	30	100.0%
Lowland pond	7	7	100.0%
Net + Low + highland pond	5	5	100.0%
Lowland + highland pond	4	4	100.0%
Net + Lowland pond	3	3	100.0%

Debt?	Frequency	Total HHs	Frequency %
Mobile capture fishers	5	5	100.0%
Mobile and net enclosed	7	7	100.0%
Mobile and net enclosed	24	30	80.0%
Lowland pond	4	7	57.1%
Net + Low + highland pond	5	5	100.0%
Lowland + highland pond	4	4	100.0%
Net + Lowland pond	3	3	100.0%

Worried about paying back debt?	Frequency	Total HHs	Frequency %
Mobile capture fishers	5	5	100.0%
Mobile and net enclosed	7	7	100.0%
Mobile and net enclosed	18	24	75.0%
Lowland pond	3	4	75.0%
Net + Low + highland pond	5	5	100.0%
Lowland + highland pond	3	4	75.0%
Net + Lowland pond	2	3	66.7%

Reasons for not being worried about paying back debt include: stable income; manageable debt; children work.

From where money is borrowed	Frequency	Total HHs	Frequency %
Mobile capture fishers			
Informal (relative, friend, middle person)	4	5	80.0%
Formal and informal	1	5	20.0%

Borrow from informal sources primarily because no collateral or are afraid can't pay it back. The one HH who borrows formally borrows from the Vietnam Bank for Social Policy* (for poor households)~Maximum loan amount is 30,000,000 (1 yr to 5 yr loans); Group who has highest percentage of HHs who borrow informally are mobile capture fishers~more impoverished and no collateral.

Mobile and net enclosed			
Formal and informal	7	7	100.0%
Mobile and net enclosed			
Formal (bank)	6	30	20.0%
Informal (relative, friend, middle person)	6	30	20.0%
Formal and informal	18	30	60.0%

Lowland pond			
Formal (bank)	3	7	42.9%
Formal and informal	3	7	42.9%
Never borrowed money	1	7	14.3%
Net + Low + highland pond			
Formal (bank)	1	5	20.0%
Informal (relative, friend, middle person)	2	5	40.0%
Formal and informal	2	5	40.0%
Lowland + highland pond			
Formal (bank)	2	4	50.0%
Formal and informal	2	4	50.0%
Net + Lowland pond			
Formal (bank)	1	3	33.3%
Formal and informal	2	3	66.7%

All groups except mobile capture fishers borrow money from diverse sources; everyone in village has access to money

*Vietnam Bank for Social Policy Borrowing conditions:

- Being permanent residents or having registered long-term residence at location of the lender.
- Being in the list of poor households of local commune, district and town
- The borrower is not required for collateral and is exempted from borrowing fee but must be a member of savings and credit group, must be selected by the group and named in the list proposed to get loan with certification of local people's committee (http://www.vbsp.org.vn/evbsp/view_content.php?mamm=19)

20. Industrial shrimp

Ever practice industrial shrimp?	Frequency	Total HHs	Frequency %
Mobile capture fishers	**0**	5	0.0%
Mobile and net enclosed	**0**	7	0.0%
Mobile and net enclosed	6	30	20.0%
Lowland pond	**6**	**7**	**85.7%**
Net + Low + highland pond	3	5	60.0%
Lowland + highland pond	**4**	**4**	**100.0%**
Net + Lowland pond	**3**	**3**	**100.0%**

Interestingly, those who practiced industrial shrimp make up the highest percentage of those who are less concerned about paying back debt.

Did you lose a lot of money from industrial shrimp?	Frequency	Total HHs	Frequency %
Mobile and net enclosed	6	6	100.0%
Lowland pond	6	6	100.0%
Net + Low + highland pond	3	3	100.0%
Lowland + highland pond	4	4	100.0%
Net + Lowland pond	2	3	66.7%

21a. Would you accept a job elsewhere?

	Frequency	Total HHs	Frequency %
Mobile capture fishers	4	5	80.0%
Mobile + Net	1	7	14.3%
Net enclosed	10	30	33.3%
Lowland pond	3	7	42.9%
Net + Low + Highland	2	5	40.0%
Low + Highland pond	1	4	25.0%
Net + Lowland pond	0	3	0.0%

21b. If yes, doing what?

Mobile capture fishers	Frequency	Total HHs	Frequency %
Net enclosed	3	4	75.0%
Any kind of job	1	4	25.0%
Mobile + Net	**Frequency**	**Total HHs**	**Frequency %**
Net + Lowland pond	1	1	100.0%
Net enclosed	**Frequency**	**Total HHs**	**Frequency %**
Net + Lowland pond	3	10	30.0%
Net + Highland pond	1	10	10.0%
Net + Low OR Highland	1	10	10.0%
Construction	1	10	10.0%
Any kind of job	4	10	40.0%
Lowland pond	**Frequency**	**Total HHs**	**Frequency %**
Any kind of job	3	3	100.0%
Net + Low + Highland	**Frequency**	**Total HHs**	**Frequency %**
Business	1	2	50.0%
Any kind of job	1	2	50.0%
Low + Highland pond	**Frequency**	**Total HHs**	**Frequency %**
Any kind of job	1	1	100.0%

22. Choice for sons's occupation

Choice for children's occupation	Frequency	Total HHs	Frequency %
SONS of mobile capture fishers			
Government worker	2	5	40.0%
Wage labour in city	3	5	60.0%
SONS of mobile and net enclosed			
Fishing	1	7	14.3%
Aquaculture	1	7	14.3%
Government worker	3	7	42.9%
Wage labour in city	4	7	57.1%

SONS of net enclosed			
Aquaculture	7	27	25.9%
Government worker	15	27	55.6%
Wage labour in city	5	27	18.5%
Other	1	27	3.7%

"Other" pertains to Master of Ceremonies & musician

SONS of lowland pond			
Government worker	5	7	71.4%
Wage labour in city	2	7	28.6%
SONS of net + Low + highland pond			
Government worker	3	5	60.0%
Wage labour in city	2	5	40.0%
SONS of lowland + highland pond			
Aquaculture	1	4	25.0%
Government worker	3	4	75.0%
SONS of net + Lowland pond			
Aquaculture	1	3	33.3%
Wage labour in city	2	3	66.7%

Some HHs chose more than one occupation for children; total HH numbers are calculated based on number of HHs within each production group who have sons.
Note: No households chose fishing or aquaculture for their daughters with the choices as either government worker or wage labourer in city.
Many interviewees made note of their child's 'lack of capacity'.

Resource Management

23. Reasons provided for negative impacts to environment for each production group

Mobile capture fishing	**Frequency**	**Total HHs**	**Frequency %**
Lu and/or explosive fishing catches all small fish	32	34	94.1%
Reduces natural fish stock	2	34	5.9%
Net enclosed aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Impedes water flow to release waste	10	11	90.9%
Catches small fish so can not grow and breed	1	11	9.1%
Lowland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Feed and medicine creates waste/pollution	6	6	100.0%
Highland pond aquaculture	**Frequency**	**Total HHs**	**Frequency %**
Feed and medicine creates pollution	32	32	100.0%

24. Conflict in Thuy Dien

Conflict with Mobile Capture Fishers in Thuy Dien

Mobile Capture fishers	Frequency	Total HHs	Frequency %
Yes conflict	2	5	40.0%
Mobile + Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	1	7	14.3%
Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	11	30	36.7%
Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	7	0.0%
Net + Low + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	1	5	20.0%
Lowland + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	1	4	25.0%
Net + Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	3	0.0%

Conflict with Net Enclosed Farmers in Thuy Dien

Mobile Capture fishers	Frequency	Total HHs	Frequency %
Yes conflict	1	5	20.0%
Mobile + Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	1	7	14.3%
Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	1	30	3.3%
Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	1	7	14.3%
Net + Low + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	1	5	20.0%
Lowland + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	4	0.0%
Net + Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	3	0.0%

Conflict with Lowland Pond Farmers in Thuy Dien

Mobile Capture fishers	Frequency	Total HHs	Frequency %
Yes conflict	0	5	0.0%
Mobile + Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	0	7	0.0%
Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	0	30	0.0%
Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	1	7	14.3%
Net + Low + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	5	0.0%
Lowland + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	4	0.0%
Net + Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	3	0.0%

Conflict with Highland Pond Farmers in Thuy Dien

Mobile Capture fishers	Frequency	Total HHs	Frequency %
Yes conflict	0	5	0.0%
Mobile + Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	0	7	0.0%
Net enclosed	Frequency	Total HHs	Frequency %
Yes conflict	0	30	0.0%
Net + Low + Highland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	5	0.0%
Lowland + Highland pond	Frequency	Total HHs	Frequency %
Net + Lowland pond	Frequency	Total HHs	Frequency %
Yes conflict	0	3	0.0%

25. Social relations of production

Relationship with Mobile Capture Fishers IN VILLAGE			
Mobile Capture Fishers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	5	0.0%
Business relationship (selling/buying)	0	5	0.0%
Meeting at community functions (meetings, festivals, etc.)	5	5	100.0%
Close friendships	3	5	60.0%
Blood relatives	3	5	60.0%
Marriage relatives	1	5	20.0%
Mobile Capture + Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	7	0.0%
Business relationship (selling/buying)	1	7	14.3%
Meeting at community functions (meetings, festivals, etc.)	7	7	100.0%
Close friendships	5	7	71.4%
Blood relatives	6	7	85.7%
Marriage relatives	5	7	71.4%
Net Enclosed Farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	30	3.3%
Business relationship (selling/buying)	2	30	6.7%
Meeting at community functions (meetings, festivals, etc.)	29	30	96.7%
Close friendships	13	30	43.3%
Blood relatives	14	30	46.7%
Marriage relatives	9	30	30.0%
Lowland pond farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	2	7	28.6%
Business relationship (selling/buying)	0	7	0.0%
Meeting at community functions (meetings, festivals, etc.)	4	7	57.1%
Close friendships	1	7	14.3%
Blood relatives	2	7	28.6%
Marriage relatives	1	7	14.3%
Net + low + high	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	5	0.0%
Business relationship (selling/buying)	2	5	40.0%
Meeting at community functions (meetings, festivals, etc.)	4	5	80.0%
Close friendships	2	5	40.0%
Blood relatives	1	5	20.0%
Marriage relatives	1	5	20.0%
High + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	2	4	50.0%
Business relationship (selling/buying)	0	4	0.0%
Meeting at community functions (meetings, festivals, etc.)	1	4	25.0%
Close friendships	2	4	50.0%
Blood relatives	2	4	50.0%
Marriage relatives	1	4	25.0%
Net + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	3	33.3%
Business relationship (selling/buying)	1	3	33.3%
Meeting at community functions (meetings, festivals, etc.)	2	3	66.7%
Close friendships	0	3	0.0%
Blood relatives	0	3	0.0%
Marriage relatives	0	3	0.0%

Relationship with Net Enclosed Farmers IN VILLAGE			
Mobile Capture Fishers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	5	0.0%
Business relationship (selling/buying)	1	5	20.0%
Meeting at community functions (meetings, festivals, etc.)	5	5	100.0%
Close friendships	2	5	40.0%
Blood relatives	4	5	80.0%
Marriage relatives	1	5	20.0%
Mobile Capture + Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	7	0.0%
Business relationship (selling/buying)	2	7	28.6%
Meeting at community functions (meetings, festivals, etc.)	7	7	100.0%
Close friendships	5	7	71.4%
Blood relatives	6	7	85.7%
Marriage relatives	5	7	71.4%
Net Enclosed Farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	30	3.3%
Business relationship (selling/buying)	4	30	13.3%
Meeting at community functions (meetings, festivals, etc.)	28	30	93.3%
Close friendships	27	30	90.0%
Blood relatives	26	30	86.7%
Marriage relatives	17	30	56.7%
Lowland pond farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	7	0.0%
Business relationship (selling/buying)	0	7	0.0%
Meeting at community functions (meetings, festivals, etc.)	7	7	100.0%
Close friendships	6	7	85.7%
Blood relatives	5	7	71.4%
Marriage relatives	1	7	14.3%
Net + low + high	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	5	0.0%
Business relationship (selling/buying)	3	5	60.0%
Meeting at community functions (meetings, festivals, etc.)	5	5	100.0%
Close friendships	5	5	100.0%
Blood relatives	3	5	60.0%
Marriage relatives	1	5	20.0%
High + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	4	25.0%
Business relationship (selling/buying)	2	4	50.0%
Meeting at community functions (meetings, festivals, etc.)	3	4	75.0%
Close friendships	3	4	75.0%
Blood relatives	1	4	25.0%
Marriage relatives	2	4	50.0%
Net + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	3	0.0%
Business relationship (selling/buying)	1	3	33.3%
Meeting at community functions (meetings, festivals, etc.)	3	3	100.0%
Close friendships	3	3	100.0%
Blood relatives	3	3	100.0%
Marriage relatives	2	3	66.7%

Relationship with Lowland Pond Farmers IN VILLAGE			
Mobile Capture Fishers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	2	5	40.0%
Business relationship (selling/buying)	1	5	20.0%
Meeting at community functions (meetings, festivals, etc.)	3	5	60.0%
Close friendships	1	5	20.0%
Blood relatives	1	5	20.0%
Marriage relatives	0	5	0.0%
Mobile Capture + Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
No relationship	5	7	71.4%
Business relationship (selling/buying)	1	7	14.3%
Meeting at community functions (meetings, festivals, etc.)	2	7	28.6%
Close friendships	2	7	28.6%
Blood relatives	0	7	0.0%
Marriage relatives	0	7	0.0%
Net Enclosed Farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	30	3.3%
Business relationship (selling/buying)	4	30	13.3%
Meeting at community functions (meetings, festivals, etc.)	28	30	93.3%
Close friendships	27	30	90.0%
Blood relatives	26	30	86.7%
Marriage relatives	17	30	56.7%
Lowland pond farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	7	0.0%
Business relationship (selling/buying)	1	7	14.3%
Meeting at community functions (meetings, festivals, etc.)	6	7	85.7%
Close friendships	7	7	100.0%
Blood relatives	5	7	71.4%
Marriage relatives	0	7	0.0%
Net + low + high	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	5	0.0%
Business relationship (selling/buying)	3	5	60.0%
Meeting at community functions (meetings, festivals, etc.)	5	5	100.0%
Close friendships	4	5	80.0%
Blood relatives	3	5	60.0%
Marriage relatives	2	5	40.0%
High + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	4	0.0%
Business relationship (selling/buying)	1	4	25.0%
Meeting at community functions (meetings, festivals, etc.)	4	4	100.0%
Close friendships	4	4	100.0%
Blood relatives	3	4	75.0%
Marriage relatives	2	4	50.0%
Net + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	3	0.0%
Business relationship (selling/buying)	1	3	33.3%
Meeting at community functions (meetings, festivals, etc.)	3	3	100.0%
Close friendships	3	3	100.0%
Blood relatives	2	3	66.7%
Marriage relatives	1	3	33.3%

Relationship with Highland Pond Farmers IN VILLAGE			
Mobile Capture Fishers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	3	5	60.0%
Business relationship (selling/buying)	2	5	40.0%
Meeting at community functions (meetings, festivals, etc.)	0	5	0.0%
Close friendships	1	5	20.0%
Blood relatives	1	5	20.0%
Marriage relatives	1	5	20.0%
Mobile Capture + Net Enclosed	**Frequency**	**Total HHs**	**Frequency %**
No relationship	7	7	100.0%
Business relationship (selling/buying)	0	7	0.0%
Meeting at community functions (meetings, festivals, etc.)	0	7	0.0%
Close friendships	0	7	0.0%
Blood relatives	0	7	0.0%
Marriage relatives	0	7	0.0%
Net Enclosed Farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	15	30	50.0%
Business relationship (selling/buying)	3	30	10.0%
Meeting at community functions (meetings, festivals, etc.)	13	30	43.3%
Close friendships	4	30	13.3%
Blood relatives	3	30	10.0%
Marriage relatives	1	30	3.3%
Lowland pond farmers	**Frequency**	**Total HHs**	**Frequency %**
No relationship	3	7	42.9%
Business relationship (selling/buying)	1	7	14.3%
Meeting at community functions (meetings, festivals, etc.)	3	7	42.9%
Close friendships	4	7	57.1%
Blood relatives	0	7	0.0%
Marriage relatives	0	7	0.0%
Net + low + high	**Frequency**	**Total HHs**	**Frequency %**
No relationship	1	5	20.0%
Business relationship (selling/buying)	3	5	60.0%
Meeting at community functions (meetings, festivals, etc.)	2	5	40.0%
Close friendships	3	5	60.0%
Blood relatives	2	5	40.0%
Marriage relatives	0	5	0.0%
High + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	4	0.0%
Business relationship (selling/buying)	1	4	25.0%
Meeting at community functions (meetings, festivals, etc.)	4	4	100.0%
Close friendships	3	4	75.0%
Blood relatives	2	4	50.0%
Marriage relatives	1	4	25.0%
Net + low	**Frequency**	**Total HHs**	**Frequency %**
No relationship	0	3	0.0%
Business relationship (selling/buying)	0	3	0.0%
Meeting at community functions (meetings, festivals, etc.)	3	3	100.0%
Close friendships	1	3	33.3%
Blood relatives	0	3	0.0%
Marriage relatives	0	3	0.0%

25. FA membership

Are you a member of Thuy Dien's FA?			
Mobile capture fishers	Frequency	Total HHs	Frequency %
Yes	1	5	20.0%
Mobile + Net enclosed	Frequency	Total HHs	Frequency %
Yes	3	7	42.9%
Net enclosed	Frequency	Total HHs	Frequency %
Yes	23	30	76.7%
Lowland pond	Frequency	Total HHs	Frequency %
Yes	6	7	85.7%
Net + Low + Highland pond	Frequency	Total HHs	Frequency %
Yes	4	5	80.0%
Lowland + Highland pond	Frequency	Total HHs	Frequency %
Yes	3	4	75.0%
Net + Lowland pond	Frequency	Total HHs	Frequency %
Yes	1	3	33.3%
Total Fisheries HHs surveyed in village	Frequency	Total HHs	Frequency %
Yes	41	61	67.2%

Note: highest membership is among pond farmers (albeit smaller group)
FA head noted that there are 83 HHs (50%) with FA membership in village

Certification

26. Activities registered with the government

Activities registered with the government?	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	Frequency	Total HHs	Frequency %
Mobile capture activities	0	7	0.0%
Net enclosed activities	7	7	100.0%
Net Enclosed only Farmers	24	30	80.0%
Lowland Pond Farmers	4	7	57.1%
Net + Low + High	Frequency	Total HHs	Frequency %
Net enclosure activities	2	5	40.0%
Lowland pond activities	2	5	40.0%
Highland pond activities	3	5	60.0%
Low + Highland Pond	Frequency	Total HHs	Frequency %
Lowland pond activities	3	4	75.0%
Highland pond activities	2	4	50.0%

1 HH who rents pond says landlord has activities registered

Net + Lowland Pond	Frequency	Total HHs	Frequency %
Net enclosed activities	3	3	100.0%
Lowland pond activities	3	3	100.0%

Mobile capture fishers are not required to register their activities w/government

27. Factors important to the sustainability of fishing and aquaculture in the lagoon

Good management of production systems	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	2	5	40.0%
Mobile + Net Enclosed Farmers	7	7	100.0%
Net Enclosed only Farmers	19	30	63.3%
Lowland Pond Farmers	2	7	28.6%
Net + Low + High	2	5	40.0%
Low + Highland Pond	1	4	25.0%
Net + Lowland Pond	3	3	100.0%
Aggregate	36	61	59.0%

Good water quality with no pollution	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	4	5	80.0%
Mobile + Net Enclosed Farmers	7	7	100.0%
Net Enclosed only Farmers	28	30	93.3%
Lowland Pond Farmers	6	7	85.7%
Net + Low + High	3	5	60.0%
Low + Highland Pond	4	4	100.0%
Net + Lowland Pond	3	3	100.0%
Aggregate	55	61	90.2%

HHs that did not agree answered no, or were indifferent.

Feed regulations	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	1	30	3.3%
Lowland Pond Farmers	0	7	0.0%
Net + Low + High	0	5	0.0%
Low + Highland Pond	2	4	50.0%
Net + Lowland Pond	0	3	0.0%
Aggregate	3	61	4.9%

100% of HHs for mobile and mobile + net were indifferent because are not concerned with feed
Net enclosed HHs did not see the important of feed regulations or were indifferent.

Food safety and quality	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	0	30	0.0%
Lowland Pond Farmers	3	7	42.9%
Net + Low + High	0	5	0.0%
Low + Highland Pond	1	4	25.0%
Net + Lowland Pond	1	3	33.3%
Aggregate	5	61	8.2%

Size and quality of fish*	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	3	5	60.0%
Mobile + Net Enclosed Farmers	6	7	85.7%
Net Enclosed only Farmers	28	30	93.3%
Lowland Pond Farmers	6	7	85.7%
Net + Low + High	4	5	80.0%
Low + Highland Pond	4	4	100.0%
Net + Lowland Pond	3	3	100.0%
Aggregate	54	61	88.5%

*This should have been 'aquatic species' not 'fish' since we are dealing with fish, crab and shrimp. I have an email in to Nhung to ask her how she posed the questions.
No overall interest in feed regulations, medicine regulations or workers' rights

Medicine regulations	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	2	30	6.7%
Lowland Pond Farmers	0	7	0.0%
Net + Low + High	0	5	0.0%
Low + Highland Pond	0	4	0.0%
Net + Lowland Pond	0	3	0.0%
Aggregate	2	61	3.3%

HHs that did not agree answered no, or were indifferent.

Ability to export aquatic species	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	2	5	40.0%
Mobile + Net Enclosed Farmers	6	7	85.7%
Net Enclosed only Farmers	23	30	76.7%
Lowland Pond Farmers	4	7	57.1%
Net + Low + High	4	5	80.0%
Low + Highland Pond	3	4	75.0%
Net + Lowland Pond	3	3	100.0%
Aggregate	45	61	73.8%

Although 'international' was not initially specified, once emphasized everyone who agreed noted that they were referencing international exports; this is further endorsed in final FG.

Workers' Rights	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	0	30	0.0%
Lowland Pond Farmers	0	7	0.0%
Net + Low + High	0	5	0.0%
Low + Highland Pond	0	4	0.0%
Net + Lowland Pond	0	3	0.0%
Aggregate	0	61	0.0%

HHs that did not agree answered no, or were indifferent.

Stable quantity of fish*	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	4	5	80.0%
Mobile + Net Enclosed Farmers	7	7	100.0%
Net Enclosed only Farmers	25	30	83.3%
Lowland Pond Farmers	6	7	85.7%
Net + Low + High	3	5	60.0%
Low + Highland Pond	2	4	50.0%
Net + Lowland Pond	3	3	100.0%
Aggregate	50	61	82.0%

28. Food safety compliance

Food safety compliance?	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	0	30	0.0%
Lowland Pond Farmers	1	7	14.3%
Net + Low + High	0	5	0.0%
Low + Highland Pond	0	4	0.0%
Net + Lowland Pond	0	3	0.0%

HH noted compliance with food safety attended a workshop put on by the government, to what degree he complies is questionable.

29. Legal documentation and record keeping

Net enclosed group

Official documentation for net enclosed water surface area?	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	6	7	85.7%

Net enclosed farmers	1	30	3.3%
Net + Lowland + Highland farmers	0	5	0.0%
Net + Lowland farmers	0	3	0.0%
Written Records of Operations ~ Net enclosures			
Production operations	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%
Net enclosed farmers	1	30	3.3%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Illiterate: 2 mobile + net; 2 net only; 1 net + pond; 1 net + low + high			
Production costs	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	4	7	57.1%
Net enclosed farmers	6	30	20.0%
Net + Lowland + Highland farmers	2	5	40.0%
Net + Lowland farmers	0	3	0.0%
Illiterate: 2 mobile + net; 2 net only; 1 net + pond; 1 net + low + high			
Hygienic conditions of food safety (FSH)	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%
Net enclosed farmers	0	30	0.0%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Illiterate: 2 mobile + net; 2 net only; 1 net + pond; 1 net + low + high			
Harvesting and transportation (pond to net)	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%
Net enclosed farmers	0	30	0.0%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Illiterate: 2 mobile + net; 2 net only; 1 net + pond; 1 net + low + high			
Drugs, chemicals, biological products	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%
Net enclosed farmers	0	30	0.0%
Net + Lowland + Highland farmers	0	5	0.0%
Net + Lowland farmers	0	3	0.0%
No group keeps records of drugs, chemicals and biological products (if used); Illiterate: see above			
Types of waste and sources of pollution	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%
Net enclosed farmers	0	30	0.0%
Net + Lowland + Highland farmers	0	5	0.0%
Net + Lowland farmers	0	3	0.0%
No group keeps records on types of waste and sources of pollution; Illiterate: see above			
Know the geographical coordinates (đị̣a lý tọ̣a độ̣) of nets?	Frequency	Total HHs	Frequency %
Mobile and Net enclosed farmers	0	7	0.0%

Net enclosed farmers	0	30	**0.0%**
Net + Lowland + Highland farmers	0	5	**0.0%**
Net + Lowland farmers	0	3	**0.0%**
No group has knowledge of geographical coordinates of their net enclosures			
Do you know the map location of your net enclosures?	**Frequency**	**Total HHs**	**Frequency %**
Mobile and Net enclosed farmers	4	7	57.1%
Net enclosed farmers	20	30	66.7%
Net + Lowland + Highland farmers	2	5	40.0%
Net + Lowland farmers	2	3	66.7%

Lowland pond group

Is your lowland pond certified?	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	6	7	85.7%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	3	3	100.0%
Lowland + Highland farmers	4	4	100.0%
Is lowland pond land legally authorized for aquaculture development?	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	7	7	100.0%
Net + Lowland + Highland farmers	4	5	80.0%
Net + Lowland farmers	3	3	100.0%
Lowland + Highland farmers	4	4	100.0%
Written Records of Operations ~ Lowland ponds			
Production operations	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	2	7	28.6%
Net + Lowland + Highland farmers	2	5	40.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	1	4	25.0%

Illiterate: 1 net + low; 1 net + low + high

Production costs	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	3	7	42.9%
Net + Lowland + Highland farmers	2	5	40.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	2	4	50.0%

Illiterate: 1 net + low; 1 net + low + high

Hygienic conditions of food safety (FSH)	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	1	7	14.3%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	1	4	25.0%

Illiterate: 1 net + low; 1 net + low + high

Harvesting and transportation (pond to net)	Frequency	Total HHs	Frequency %
Lowland pond farmers	0	7	0.0%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	0	4	0.0%

Illiterate: 1 net + low; 1 net + low + high

Drugs, chemicals, biological products	Frequency	Total HHs	Frequency %
Lowland pond farmers	1	7	14.3%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	0	4	0.0%

Illiterate: 1 net + low; 1 net + low + high

Types of waste and sources of pollution	Frequency	Total HHs	Frequency %
Lowland pond farmers	0	7	0.0%
Net + Lowland + Highland farmers	0	5	0.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	0	4	0.0%

No group keeps records of waste and sources of pollution; Illiterate: see above

Sources and types of feed used	Frequency	Total HHs	Frequency %
Lowland pond farmers	0	7	0.0%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	1	4	25.0%

Illiterate: 1 net + low; 1 net + low + high

Sources and types of seed used	Frequency	Total HHs	Frequency %
Lowland pond farmers	0	7	0.0%
Net + Lowland + Highland farmers	1	5	20.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	0	4	0.0%

Illiterate: 1 net + low; 1 net + low + high

Do you know the geographical coordinates (**địa lý tọa độ**) of your nets?	Frequency	Total HHs	Frequency %
Lowland pond farmers	2	7	28.6%
Net + Lowland + Highland farmers	0	5	0.0%
Net + Lowland farmers	0	3	0.0%
Lowland + Highland farmers	1	4	25.0%
Do you know the map location of your net enclosures?	**Frequency**	**Total HHs**	**Frequency %**
Lowland pond farmers	5	7	71.4%
Net + Lowland + Highland farmers	2	5	40.0%
Net + Lowland farmers	2	3	66.7%
Lowland + Highland farmers	3	4	75.0%

Highland pond group

Is your highland pond certified?	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	3	5	60.0%
Lowland + Highland farmers	2	4	50.0%
Rented ponds (so do not know): 2 net + Low + High; 2 Low + High			
Is highland pond land legally authorized for aquaculture development?	**Frequency**	**Total HHs**	**Frequency %**
Net + Lowland + Highland farmers	5	5	100.0%
Lowland + Highland farmers	3	4	75.0%

1 HH is not sure because rents pond ~ all else answered

Written Records of Operations ~ Highland ponds			
Production operations	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	2	5	40.0%
Lowland + Highland farmers	1	4	25.0%
Illiterate: 1 net + low + high			
Production costs	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	3	5	60.0%
Lowland + Highland farmers	2	4	50.0%
Illiterate: 1 net + low + high			
Hygienic conditions of food safety (FSH)	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	1	5	20.0%
Lowland + Highland farmers	1	4	25.0%
Illiterate: 1 net + low + high			
Harvesting and transportation (pond to net)	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	1	5	20.0%
Lowland + Highland farmers	0	4	0.0%
Illiterate: 1 net + low + high			
Drugs, chemicals, biological products	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	1	5	20.0%
Lowland + Highland farmers	1	4	25.0%
Illiterate: 1 net + low + high			
Types of waste and sources of pollution	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	0	5	0.0%
Lowland + Highland farmers	1	4	25.0%
No group keeps records of waste and sources of pollution; Illiterate: see above			
Sources and types of feed used	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	1	5	20.0%
Lowland + Highland farmers	1	4	25.0%
Illiterate: 1 net + low + high			
Sources and types of seed used	Frequency	Total HHs	Frequency %
Net + Lowland + Highland farmers	1	5	20.0%
Lowland + Highland farmers	0	4	0.0%

Illiterate: 1 net + low + high			
Do you know the geographical coordinates (đị a lý tọa độ) of your nets?	**Frequency**	**Total HHs**	**Frequency %**
Net + Lowland + Highland farmers	0	5	0.0%
Lowland + Highland farmers	0	4	0.0%
Neither group has knowledge of the geographical coordinates of their highland ponds; Illiterate: see above			
Do you know the map location of your net enclosures?	**Frequency**	**Total HHs**	**Frequency %**
Net + Lowland + Highland farmers	2	5	40.0%
Lowland + Highland farmers	2	4	50.0%

30. Knowledge of VietGAP

Heard of VietGAP?	Frequency	Total HHs	Frequency %
Mobile Capture Fishers	0	5	0.0%
Mobile + Net Enclosed Farmers	0	7	0.0%
Net Enclosed only Farmers	1	30	3.3%
Lowland Pond Farmers	0	7	0.0%
Net + Low + High	0	5	0.0%
Low + Highland Pond	0	4	0.0%
Net + Lowland Pond	0	3	0.0%
Aggregate	1	61	1.6%

The only HH who said he had heard of VietGAP noted he has heard about it on TV but only related to produce not fisheries product