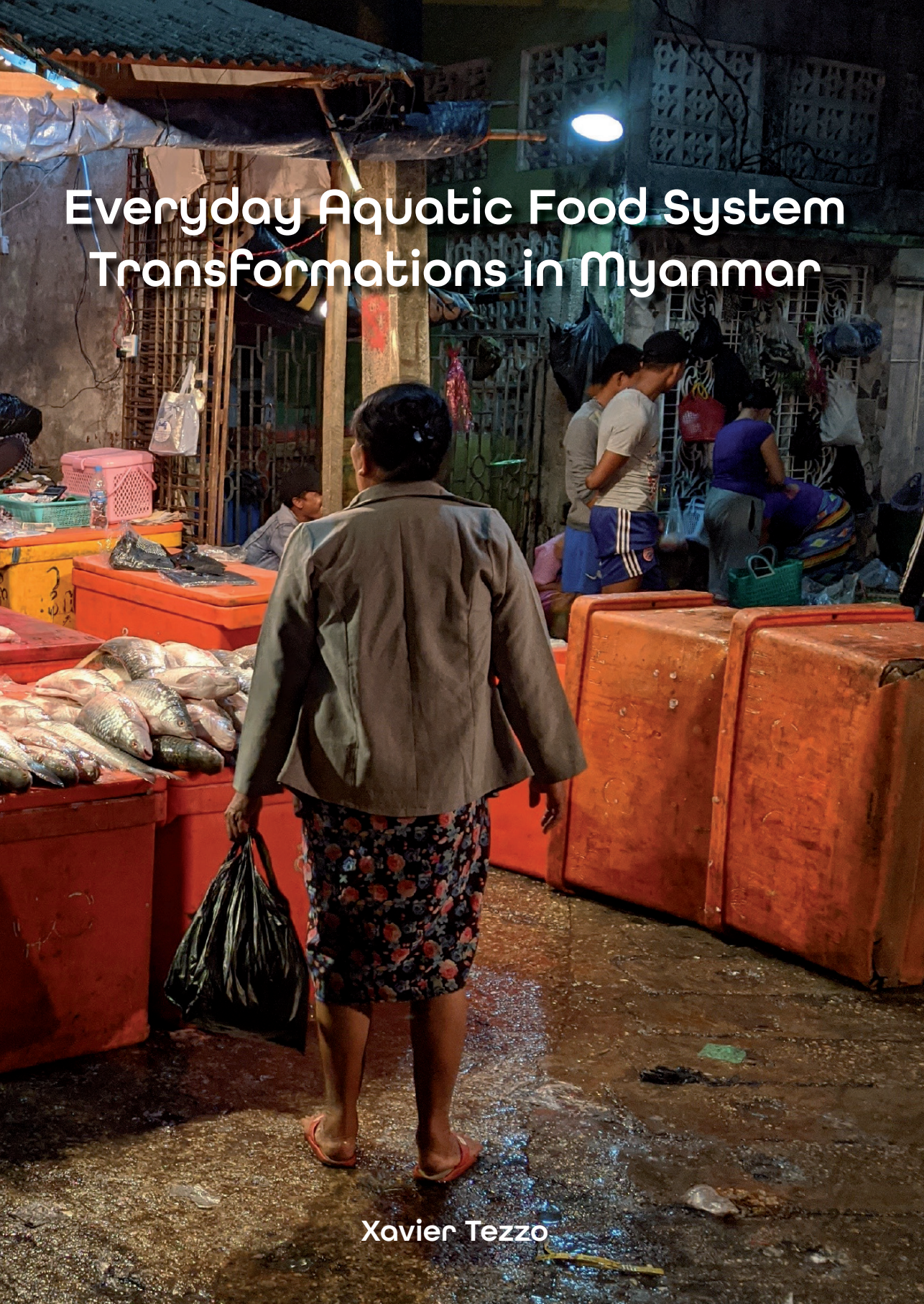
Everyday Aquatic Food System Transformations in Myanmar



Xavier Tezzo

Propositions

1. Differentiating between wild and farmed fish is detrimental to the governance of aquatic food systems.
   (this thesis)

2. Social practices are the fundamental building block of food system transformations.
   (this thesis)

3. Combining social and natural science theories are essential for enhancing their respective analytical power.

4. Artificial intelligence undermines science's credibility in society.

5. Preserving traditional gastronomic cultures is essential for environmental sustainability.

6. The widespread use of smartphones erodes the commensality of dining.

Propositions belonging to the thesis, entitled

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Xavier Tezzo

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Everyday Aquatic Food System Transformations in Myanmar

Xavier Tezzo

Thesis Committee

Promotors
Prof. Dr Simon R. Bush
Professor of Environmental Policy
Wageningen University & Research

Prof. Dr Peter Oosterveer
Personal chair, Environmental Policy Group
Wageningen University & Research

Co-promotor
Dr Ben Belton
Department of Agricultural, Food and Resources Economics
Michigan State University, USA

Other members
Prof. Dr Cees Leeuwis, Wageningen University & Research
Dr Jessica Duncan, Wageningen University & Research
Dr Simon Funge-Smith, Food and Agriculture Organization, Rome, Italy
Dr Mark Vicol, Wageningen University & Research

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Everyday Aquatic Food System Transformations in Myanmar

Xavier Tezzo

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"Your first relationship as a human being is about food [...] The first social experience we have is being put to the breast or bottle. The social act of eating, is part of how we become human, as much as speaking and taking care of ourselves. Learning to eat is learning to become human."

Wilk, Richard.

Chapter 1: Introduction

1.1. Beyond aquatic food productivism

Aquatic foods are important for nutrition, livelihoods and cuisines in many countries across Asia and Africa, yet they have historically been overlooked in food policy and research (Béné et al. 2015; Golden et al. 2021). However, in response to renewed political attention to food systems, including at the United Nations and the World Economic Forum (Tigchelaar et al. 2022; Crona et al. 2023), there is increasing recognition of the accessible and affordable contribution of aquatic foods to nutrition security in both high- and low-income countries (Béné et al. 2015; Bennett et al. 2021; Ryckman et al. 2021). There is also growing realization that this contribution is made possible by the inherent diversity of aquatic food systems – including land and seascapes that produce over 600 farmed species and 2,200 from wild caught animal and plant species (Naylor et al. 2021a; Crona et al. 2023), and a diversity of actors and activities associated with producing, transforming, distributing, and consuming aquatic foods (Short et al. 2021; Tigchelaar et al. 2022; Tlusty et al. 2019).

Owing to a combination of factors - most notably population growth, rising incomes, and urbanization – demand for aquatic food has continued to increase over recent decades, leading to transformations in how it is produced, traded and consumed (HLPE 2014; FAO 2022). Current understandings of these transformations are dominated by a productivist perspective that focuses on the spectacular intensification and expansion of aquaculture - a phenomenon commonly referred to as the ‘blue revolution’ (Garlock et al. 2020). This productivist framing holds important policy implications as it influences the ways in which aquatic food systems are imagined, understood and ultimately governed. At the heart of this blue revolution rhetoric is the assertion that aquatic productivity must keep increasing in order to meet the ever-growing demand for these foods globally

(see Pullin & Neal 1984; Bush 2008; Hishamunda et al. 2009). The conjunction of this narrative with wider neoliberal agendas of economic development and growth (see Sonnino et al. 2016) has consequently asserted that aquaculture is fundamental to food and nutrition security by making aquatic foods more abundant and cheaper (Short et al. 2021). Over time, aquatic productivism has been credited with even wider (yet poorly substantiated) merits (Béné et al. 2016). For instance, 'blue economy' narratives have driven perceptions that aquatic landscapes have an untapped potential for aquaculture expansion to deliver economic growth and improved livelihoods (Cisneros-montemayor et al. 2021). In addition, the blue revolution is assumed to deliver a range of opportunities for improving environmental performance (e.g. lower carbon footprints) of the (global) food systems to which they contribute (Crona et al. 2023; Willett et al. 2019).

While having driven the expansion of aquaculture, aquatic productivism has also drawn attention away from multiple other factors that shape the role of aquatic foods, especially in regions such as Southeast Asia that are dependent on them for nutrition and livelihoods (Belton & Bush 2014; Bush & Marschke 2014; Belton et al. 2017). For instance, although production of aquatic food has been well documented in the region (Belton et al. 2018a; FAO 2022), relatively less attention has been given to their trade and consumption. At the same time, there is a growing body of research questioning some of the core benefits attributed to the blue revolution related to trade and consumption. Questions have also been raised over the nutritional quality of farmed fish compared to wild fish (see Little et al. 2010; Bogard et al. 2017) and the social equity of transforming common access water bodies and landscapes to (semi-) privatised aquaculture production systems (see Adduci 2009; Saguin 2016). Concerns on the environmental sustainability of aquaculture, such as reduced species diversity in waters surrounding aquaculture farms and impacts on ambient water quality, are also widely documented (see De Silva 2012; Edwards 2015). While these concerns hold consequences for consumption and trade, research and policy tends to address them all as production-related issues with production-related solutions.

In view of the limitations of a aquatic productivist framing, this thesis contributes to a food systems understanding of aquatic foods that incorporates the production, distribution and consumption of farmed and wild caught aquatic foods. Linking production, distribution and consumption is not per se new – it has been addressed, for instance, through the analysis of production and consumption driven value chains (Bush et al. 2019) and studies analyzing changing food demand in urbanizing populations of Southeast Asia (Reardon & Timmer 2014; Reardon et al. 2014; Belton et al. 2020). Drawing attention to the conduct and performance of food consumption and trade in urban spaces, these studies emphasize the increasing affluence of urban dwellers and the related increase in expenditure on non-staple food. They also point to the diversification of activities across value chains that structure processing, packaging, and distribution in Southeast Asian cities (*ibid*). But while these value chain related studies reflect wider social change, such as urbanization and changing market demand, they largely fail to explain how trade and consumption are practiced in their everyday contexts, nor how these everyday practices ultimately shape production.

What then might a food systems perspective, that goes beyond value chains as a set of economic transactions, offer to understanding the relationships between production, trade and consumption? Conversely, what might understanding everyday trade and consumption practices offer for moving beyond a productivist agenda to understand and leverage wider societal transformations unfolding in aquatic food systems? Such questions do not only have relevance for aquaculture but point to more fundamental questions of how to understand and contribute to food system transformations (following Willet et al. 2019). They also invite a sociological understanding of food systems based on the social realities of consumers, traders and producers as a means of understanding processes of change based on the lived experiences of those that continually ‘perform' food systems (Hansen & Jakobsen 2020). This thesis sets out to advance such a sociological

perspective of aquatic systems transformations by identifying, documenting, and explaining food system practices as means of understanding everyday food systems transformations.

The context for advancing this sociological perspective on aquatic food systems transformation in this thesis is Southeast Asia, and more specifically Myanmar. Food fish is a staple in the everyday cuisine of most people across this region (Chang 1977; Hortle 2007; Chan et al. 2017). At the same time, Southeast Asia continues to undergo a series of transformations to food systems, including market transitions, industrialization, and urbanization (Reardon & Timmer 2014; Reardon et al. 2014). All of these societal transformations affect the role of aquatic foods in everyday diets, and consequently how aquatic organisms are traded from different production systems in urban, peri-urban and rural environments. Amidst these transformations, the region has, and continues to be, at the very heart of the blue revolution – the rapid expansion of aquaculture (Garlock et al. 2020; Naylor et al. 2023). Myanmar, as one of Southeast Asia's poorest and least studied countries, is an exceptional case for understanding these multiple transformations and exploring the analytical power of a sociological perspective on aquatic food systems. The country underwent a remarkable political and economic transition from 2011-2020 which led to the rapid urbanization and subsequent expansion of aquaculture before the government was ousted in a military coup in 2021. The country is also an exceptional case because the expansion of aquaculture is driven almost solely by the expansion of the domestic market (Tezzo et al 2018). Finally, the case of Myanmar is exceptional because of the ongoing and explicit use of aquatic productivism as a means of achieving food and nutrition security, as well as social equity (Tezzo et al. 2018; Scott et al. 2023). In summary, the prominence of food fish in the everyday lives of people in Myanmar combined with the scale of the social transformations at play offer an opportunity to develop a sociological perspective on aquatic food systems transformation and opportunities for rethinking pathways for achieving normative ambitions for aquatic foods, namely food and nutrition security, but also social equity, all within environmental limits.

The rest of this introductory Chapter is structured as follows. The following section provides further detail on the role of aquaculture in food systems. Section three then further elaborates the case of Myanmar before section four presents a theoretical case for a sociological perspective on food systems transformation. Finally, the overall research questions for the thesis are presented and the research design for answering them.

1.1. Behind the scenes of the aquaculture transition

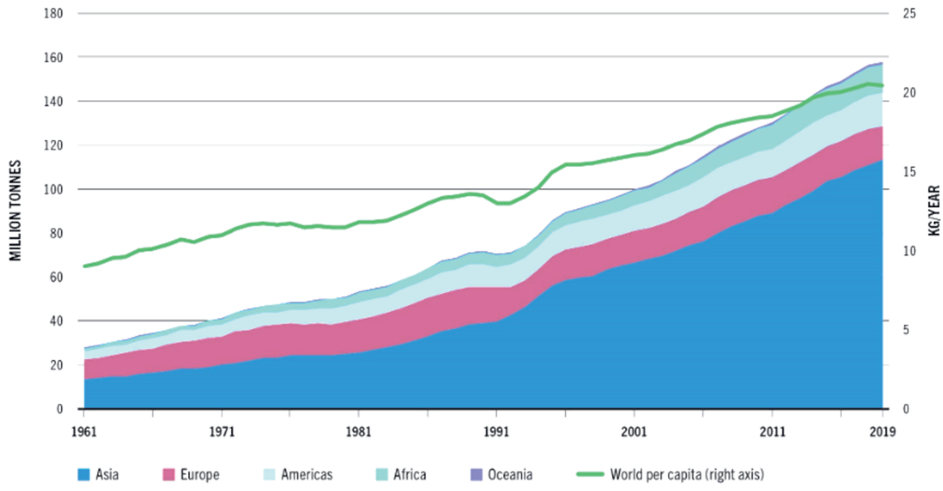
Global aquatic food production is broadly divided into capture fisheries and aquaculture. Capture fisheries are defined as the use of fishing gears to harvest aquatic organisms from public or common access water bodies (FAO 2015). Importantly, these aquatic organisms typically originate from naturally reproducing and self-sustaining populations. Aquaculture, in contrast, is defined as the set of interventions designed to enhance the biological productivity of aquatic organisms, such as artificial reproduction, stocking and feeding, but also private property relations over organisms and the water, land, genetic and feed related resources needed for their growth (FAO 2015; Edwards et al. 2002). While fisheries production volumes have remained relatively stable over the past 25 years, aquaculture production has roughly tripled over that period and the sector now contributes approximately 56% of food fish for humans (FAO 2022; Naylor et al. 2023).

Fisheries and aquaculture at a global level are often considered, in both research and policy, as marine-based activities. This marine focus has, however, largely veiled the importance of freshwater based aquatic food production – especially in historically data poor regions such as Southeast Asia (Naylor et al. 2021b; FAO 2022) and countries such as Myanmar (Fluet-Chouinard et al. 2018; Tezzo et al. 2017, 2018).

Asian freshwater capture fisheries have historically contributed the bulk of food fish to the region's consumers (Ainsworth et al. 2023). Production statistics on freshwater fisheries are poorly reliable and have been the subject of considerable debate over recent years (Ainsworth et al. 2023;

Fluet-Chouinard et al. 2018). However, there is general consensus that freshwater based fisheries in Asia contribute more than 50% of global production (FAO 2022). There is also a relative consensus that freshwater fisheries production has continued to decline in response to a wide range of factors, including land use change, habitat degradation associated with agricultural intensification and water control infrastructure, as well as over-fishing (Youn et al. 2014; Belton & Thilsted 2014; Song et al. 2018). The importance of wild caught freshwater fish continues, nevertheless, to underpin the significant culinary importance of aquatic food in the diets and cultural traditions throughout the region (Chang 1977; Hortle 2007; Saguin 2014).

The stagnation or decline of freshwater fisheries is in direct contrast to the expansion of freshwater aquaculture. Global farmed freshwater production contributes 75% of global edible aquaculture volume, of which 92% comes from Asia (Naylor et al. 2021b; FAO 2022). Asian farmed freshwater production encompasses a wide variety of systems but consists predominantly of household-managed ponds and small- to medium-scale commercial enterprises that produce a variety of carps and other fish in polyculture systems (Ottinger 2016; Naylor et al. 2023). This volume of production in Asia is also significant in the context of consumption, with Asia accounting for over two thirds of global fish consumption (Belton et al. 2018a; FAO 2022 - see Figure 1.1). Consumption in Asia has also steadily grown in line with the regions significant economic growth that has resulted in higher incomes and migration to urban centres – all of which are associated with continued increases in fish consumption (Reardon & Timmer 2014; Belton et al. 2020).



Note: Data in million tons expressed in live weight equivalent.

Figure 1.1. Global aquatic food consumption by continent (1961–2019). *Source: FAO 2022*

When considering the wider growth and development of wild and farmed fish in Asia and Myanmar it is apparent that they are not separate sectors. Despite their different trajectories, several studies in the region have pointed out how capture fisheries and aquaculture continue to interact in terms of trade (Bestor 2001; Saguin 2014) and consumption (Fabinyi 2012; Belton et al. 2014; Belton & Thilsted 2014). These findings, combined with more general observations about the lack of attention paid to fish trade and consumption in the region (Béné et al. 2015; Bush et al. 2019), suggest that these two supposed sub-sectors would benefit from being understood in combination. In other words, this thesis holds that capture fisheries and aquaculture are inherently linked as two sources of aquatic food that are produced separately but traded and consumed either together or in direct reference to each other.

1.2. Aquatic food systems in Myanmar

Myanmar offers an exemplary case to understand transformations in aquatic food systems. First, the historical centrality of freshwater fish in Myanmar means that aquatic foods are ubiquitous in everyday life and, relatedly, central to a range of local culinary traditions (Khin 1948; Khaing 1975; Soe et al. 2020). The country is also an exemplary case because, as argued above, it underwent rapid expansion of aquaculture during a period of political reform from 2011 to 2020, while at the same time being the focus of development agencies supporting aquatic food security and livelihoods.

Located between Thailand, China, and India (see Figure 1.2.), Myanmar is among the top 10 global fish producing nations (Tezzo et al. 2018). This status is attributable to the country's extensive networks of rivers and floodplains which produce two million metric tons of freshwater fish per year, or around 2% of global production (FAO 2022). Historically the most productive region for both wild and farmed fish production is the Ayeyarwady Delta (Tezzo et al. 2018). However, the productivity of the Delta's once abundant capture fisheries is reported to have reached a plateau over the last decade owing to a combination of factors that include over-fishing, land use change, habitat degradation associated with agricultural intensification, the establishment of water control infrastructure, as well as the development of aquaculture (Tezzo et al. 2017, 2018; Mark and Belton 2020). The expansion of aquaculture in Myanmar started in the 1990s in the vicinity of Yangon and subsequently extended into the Ayeyarwady Delta. This rapid, geographically concentrated growth followed the military government's policy of market-reform to promote export-oriented industrial-scale agriculture and aquaculture to generate foreign currency (Mark and Belton 2020). This policy consisted in allocating large land concessions to individuals and companies linked to the regime and it effectively led to the growth of very large farms. Later in the 2000s, as outlined by Belton et al. (2015), the development and structuring of the sector – and notably the development of fish hatcheries – let to the emergence of numerous smaller farms, a

development that reportedly resulted from the stocking of fish in homestead ponds originally excavated for domestic water supply.

Figure 1.2. Locating Myanmar in Southeast Asia. *Source: Encyclopedia Britannica*

Despite this rapid expansion, aquaculture in Myanmar still lags behind neighboring countries in terms of the species diversity, production technologies used, but also total production volumes (Belton et al. 2015; 2018). As a latecomer to the aquaculture transition, combined with the centrality of fish in people's diet, the country's poverty levels and incidence of food insecurity[1] have led various international development organizations intervening in Myanmar to promote aquaculture within their attempts at enhancing the resilience of the country's wider food system (Tezzo et al. 2018). Thus, investment from international donors for aquaculture development interventions in Myanmar has increased more than 24-fold in 5 years, rising from around USD 0.5M in 2012 to over

[1] Drawing from a nation-wide survey implemented from 2017 to 2019, Hlaing et al. (2019) found that over one third of households were suffering of food insecurity with cases of acute (>5% wasting) and chronic undernutrition (>20% stunting) reported among preschool children.

USD 12M in 2017 (DoF, personal communication). These interventions have been supported by assumptions that Myanmar can replicate the expansion of aquaculture seen in neighboring countries such as Thailand – as well as the promise of commercial export-oriented production in response to the economic and political reforms put in place to 2020 (Tezzo et al. 2018; Soe et al. 2020).

Despite the considerable attention to aquaculture by these development organizations, concern has been raised that freshwater fisheries, although of ongoing importance for food security, continue to be overlooked (Tezzo et al. 2017; 2018; Campbell 2019). Concerns have also been raised on the availability of aquaculture-produced fish to poorer populations as farmed fish make an increasingly larger proportion foods traded across the country (see Belton & Thilsted 2014; Scott et al. 2023). The balance between wild-caught and farmed production has also raised questions about the resilience of an overall availability of aquatic foods given that the aquaculture production in Myanmar is poorly diversified, with the indigenous carp – rohu, constituting roughly 70% of production (Belton et al. 2015; Tezzo et al. 2018). This poor species diversification effectively increases the vulnerability of its aquatic production systems to pests, diseases, and climate-related risks.

Finally, Myanmar also constitutes an exceptional case from a consumption perspective. From 2011 to 2020, the country went through a remarkable decade of political and economic transitions. It entered a time of profound economic liberalization and was at one point considered the fastest-growing economy in Asia (ADB 2016). The transition to a market economy having already occurred in the rest of Southeast Asia, Myanmar was then considered its ‘final frontier’, making it a prime case to observe macro-scale societal transformations. For instance, it is possible to observe the intersection of urbanization and agrifood industrialization that both enabled the rapid growth of the country’s domestic market for farmed fish, as well as reconfiguring the process the way people consume fish (Tezzo et al. 2018; Belton et al. 2018a).

In sum, Myanmar is a highly relevant case for articulating a sociological understanding of aquatic food system transformations, due to (1) the domestic orientation of its aquatic food system, (2) the omnipresence of food fish in everyday life, (3) the status and pace of its aquaculture transition, (4) the scale and scope of concurrent societal transformations, and (5) both the prominence and growing critique of aquatic productivism. Characterizing and interrelating these multiple dynamics of change offer grounds for advancing a sociological understanding of aquatic food systems and their role in contributing to socially equitable nutritional outcomes.

1.3. Sociological perspectives on food systems

Food systems have been variously addressed within the social sciences. Studies dealing with their transformation processes draw from a broad variety of influences, including value chain studies, commodity networks, transition theory, and political economy. The following section elaborates on the strengths and weaknesses of these sociological perspectives, before turning to the prospect of applying social practice theory as a relatively new approach to account for the socially-mediated processes of change underlying food system transformations (see Hansen & Jakobsen 2020; Sonnino & Milbourne 2022).

1.3.1. Food systems

The concept of food system is enjoying a resurgence in popularity among researchers and policymakers – as illustrated by a voluminous literature (Hospes & Brons 2016; Béné et al. 2019) and its central role in shaping international policy, as illustrated by the recent United Nations Food Systems Summit. However, the concept of food systems is far from new. The term was first coined in the 1930s and originally referred to limited diets and sectoral supply chains (see Brouwer 2020; Brock 2023). The concept was then revived in the 1970s, reflecting a broader turn to systems thinking and wider debates on global dependencies (see Meadows et al. 1972; George 1976). At the

time, food systems debates were underpinned by a growing recognition of the negative environmental and social impacts of agro-industrial forms of development (Kneen 1989), but also an appreciation of the limits posed by linear approaches to food security thinking (see Jarosz 2014; Brouwer 2020). Overall, these debates led to a growing awareness on the interconnected nature of producing, distributing, and consuming food that have persisted as a core element of food system thinking over time.

Today, food systems thinking offers an holistic approach for integrating "all the elements and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including food and nutrition security, socio-economic and environmental outcomes" (HLPE 2017, p.23). The renewed interest in food systems in the 2010s and 2020s is also directly tied to the aspirations of the United Nation's 2030 Agenda for Sustainable Development – with the recognition that the Sustainable Development Goals are effectively interconnected and that achieving them requires more holistic and systemic approaches (HLPE 2017). As such, it is now widely acknowledged that food systems must transform in order to concurrently improve environmental, health, and livelihood outcomes for society at large (Willet et al. 2019; von Braun et al. 2023). However, the debate continues on exactly *how* food systems do and/or should transform. And while transformation has become a widely used term it now risks becoming naturalized rather than critically engaged with. In other words, what does transformation mean and what transformative processes are evident in the contexts of food systems (Béné et al. 2019; Slater et al. 2022)? Overall, studies that engage with food systems transformations have remained relatively descriptive in nature insofar as they typically acknowledge ongoing transformations without necessarily parsing out the diverse mechanisms underpinning them.

The theoretical and methodological approaches for addressing food systems in academic research have to date been relatively narrow in their scope. Some of the most prominent papers draw on economics, geography and international relations to analyze food systems transformations in

terms of value chains' structure and conduct (HLPE 2017; Farmery et al., 2021; Reardon et al., 2019). A number of these studies have focused on changing patterns of consumption and trade as a result of urbanization and supermarketization in the global South (Reardon & Timmer 2014; Reardon et al. 2014; Belton et al. 2020). However, these studies of value chains have faced critique in the context of food system thinking because they largely fail to account for place-based and contextual aspects of the transformations at play (Escobar 2011). Broader conceptualizations of consumption, trade and production that more effectively align to food systems include 'systems of provision' and commodity networks (see Fine & Leopold 1993; Hughes 2000). These approaches have shed light on the role of culture and meanings that are embodied in the food commodities flowing between sets of networked actors. While providing a stronger sociological perspective on food chains, associated analyses remain largely descriptive (Clapp 2012). Analysis of changes and transformations in these 'systems' also remain relatively static in nature and fail to account for how material cultures evolve over time due, for example, to technological advancements or shifts in consumer preferences (Dixon 1999). Finally, these conceptualizations have also been criticized for their inability to account for the political economic structures that effectively shape food systems transformations (Friedmann 1994).

Other social theories have attempted to characterize social processes of change relevant to food systems. Among the most prominent of these is transition theory, which explores food transitions by identifying and interrelating three distinct scales of societal changes, namely *niches* that are fostered by innovations and if successful, transform system-level *regimes*, which are affected by long term processes of social, political and environmental change at the so called *landscape* level (Geels 2005). The interactions between these levels not only reveal processes of positive change to broad societal goals, but also the tensions that can explain why certain innovations do not diffuse across society (Hinrichs 2014; Geels et al. 2015). Influenced by innovation studies (see Herrero et al. 2020; Klerckx & Begemann 2020), studies that have applied

transition theory to food systems tend to take production as a starting point for change (McLean-Rodríguez et al. 2022; Moritz et al. 2023). As illustrated by El Bilali (2019) applying transition theory to production also has a tendency to explore social processes of technical innovation that are aimed at environmental sustainability instead of wider development-related ambitions, such as socially equitable food and nutrition security. Finally, there is limited attention within papers focused on transitions in food systems on the interactions between different production systems – such as aquaculture and capture fisheries – which instead of competing, may effectively interact in a variety of ways.

On another front, political economy has also advanced the understanding of social processes of change that are relevant to food systems. These studies focus on the intricate connections between economic structures, power dynamics, and political institutions (see McMichael 1996; Clapp 2012). Political economy critically explores the joint influences of these factors in shaping how food is produced, distributed, and consumed, thereby shedding light on issues of inequality and social justice accompanying associated transformations (*ibid*; De Schutter 2017; Swinburn 2019). A subset of political economy scholarship has focused on processes of agrarian change, exploring how the various changes in farming practices, land tenure systems, rural economies, and social structures shape the ways people engage with and derive their livelihoods from the land (Bernstein & Byres 2001; Rigg & Vandergeest 2012; Li 2014). These studies provide rich grounded descriptions of how structural inequalities shape the everyday experiences of producers. In doing so, however, less attention has been given to the changing socio-cultural norms that shape how foods are consumed and traded (Bush & Marschke 2014). These studies also tend not to engage with the social processes steering change in food systems beyond various forms of social resistance.

While providing a rich set of approaches for understanding the structure and conduct of food systems, these theoretical approaches tend not to reason change and transformation from the perspective of every day lived experiences. They tend to focus on particular processes or actors

within food systems – so for instance, the role of traders, suppliers, or competitive processes of innovation – rather than understanding how system change is structured and ultimately changed through the everyday routinised practices and relations between those that constitute food systems. To address this apparent gap, the following outlines the potential of a social practice theory perspective for providing a social-systemic understanding of how food consumption, trade and production are embedded within a set of wider social conditions that ultimately shape how, where, when and by whom aquatic food contributes to societal goals such as food and nutrition security, but also social equity, all within environmental limits.

1.3.2. Social practices

Theories of social practice constitute a range of social theoretical perspectives which emerged in the late 1970s under the influence of, amongst others, sociologists such as Bourdieu (1977) Giddens (1984) and De Certeau (1984). Social practices perspectives focus on the ways social actors engage in everyday activities that collectively shape and are shaped by larger social structures. The analytical focus on practices as a shared social phenomenon that structures social life is what sets these theories apart from other approaches that give precedence to either individual *agency* or *structure* to explain social reality. Social practices exist instead as an expression of shared agency and wider social structures – and as such is well positioned to reimagine the social constitution of food systems as 'social systems' (*ibid*; Schatzki 2002; Shove et al. 2012).

Reckwitz (2002) defines practices as "a routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know- how, states of emotion and motivational knowledge" (p.249). Adopting a social practices theoretical lens therefore means studying the routinization of social life within the contextualized and historical setting of everyday doings and sayings (Reckwitz, 2002; Schatzki, 2002; Shove et al., 2012;

Spaargaren et al. 2016).

Taking Reckwitz (and colleagues) as a starting point, food system practices - in particular consumption and trade – can be thought of basic units of analysis to explore transformations as social reconfigurations. A practice-based perspective on consumption and trade assumes that associated performances are reproduced and routinized by knowledgeable and capable actors, with generally little discursive reflection on the material and social conditions that shape them (Schatzki, 2002; Shove et al., 2012; Spaargaren et al. 2016). As such, following Schatzki (2002) and Shove et al. (2012), the performances of aquatic food system practices can be observed through the intersection of four integrated 'elements', namely: (1) meanings, made up of general understandings or values attributed to a doing or saying; (2) skills and competences required to perform a given practice; (3) material objects and infrastructures that enable the performance of a practice; and (4) goals or 'teleoaffective structures' that give direction to the behaviour of practitioners.

Analyzing consumption and trade using these practice elements enables an in-depth understanding of how social practices are reproduced and also subject to change given their embeddedness in a wider set of adjacent social practices. Both the reproduction and changes to consumption, trade, and production are a function of habits and routines that reflect changing cultural meanings and lifestyles, or the changing materiality of trade and logistics, or the competences required to perform (changing) food cuisines (see Halkier & Jensen, 2011; Warde 2016). The embedded nature of practices also means they can be positioned and understood in a wider set of practices across time and space. These interlinked practices then form interrelated 'bundles of practices' (Shove et al. 2012), such that consumption or trade cannot be completely isolated in any given place. A practice of consumption instead has to be understood as being shaped by shared routines that position micro-scale doings and sayings within macro-scale societal transformations (*ibid*; Schatzki 2016). Practices as such provide a means of understanding how our everyday lives are not made of isolated actions but are rather composed of performances that are

part of a larger pattern of behaviour within a specific social setting. In the context of this thesis and the combination that is explored with food systems theory, it is presumed that studying the performances associated with consuming, trading, and producing fish, as opposed to analyzing them individually, holds the prospect of making visible broader sociological meanings inherent to the system as a whole.

In summary, contrary to the majority of practice-based food studies that focus on consumption and typically bracket off trade and production, the ambition for using social practice theory in this thesis is to understand (aquatic) food system transformations as social phenomena. It is further presumed that such a social-systemic understanding of food system transformations holds the prospect of identifying alternative normative change processes. In other words, parsing out how changes in food consumption, trade and production practices interrelate and are embedded in a wider set of social practices suggests that it is possible to leverage these practices to effectively govern food system towards desirable outcomes.

1.4. Aim and research questions

This thesis aims to advance a sociological perspective of aquatic food systems that moves beyond aquatic productivism by understanding the everyday realities and interlinkages between aquatic food consumption, trade and production. To realize this goal the thesis addresses the following overall research question:

> *What is the contribution of a social practices perspective on consumption, trade and production to a systemic understanding of aquatic food transformations?*

This central question is addressed through the formulation of two sub questions:

1. *How are transformative processes in aquatic food systems both characterized and affected by the everyday realities of their social actors?*

2. *In what ways do fish consumption and trade practices affect systemic transformations of aquatic food production?*

In addressing these questions this thesis provides one of the first social scientific analyses of Myanmar's aquatic food system. It also, building on Tezzo et al. (2018), presents the first integrated analysis of aquatic food consumption, trade, and production in Southeast Asia. As such, the theoretical ambition of this thesis is to open up a wider field of study on the sociology of aquatic food systems in an attempt to characterize their importance to the social lives of actors making up these food systems. The thesis also contributes to an improved empirical understanding of freshwater aquatic foods. Finally, by developing an aquatic food system perspective, the thesis also contributes to a more nuanced understanding of capture fisheries and aquaculture that transcends a productivist agenda, and in doing so offers guidance on achieving and balancing wider normative goals such as food and nutrition security, social equity, and environmental sustainability.

1.5. Methodology

1.5.1. Research design

The research questions outlined above are addressed through a qualitative case study research design (Stake 1995). Reflecting the analytical focus outlined above on consumption, trade and production, each Chapter is articulated around a specific case study that aims to offer a partial understanding of the social dynamics underpinning different practices in aquatic food systems.

The empirical Chapters move between a macro analysis of food system development policy to a series of thick descriptions of food system practices. Chapter 2 provides a macro analysis by reviewing development policy and research on aquatic food systems in Southeast Asia. On the basis of this review the Chapter establishes a conceptual basis to both understand aquatic food systems, as well as to justify the need to further characterize the practices that constitute aquatic food consumption, trade and production, and the relations between them. The subsequent Chapters then

'zoom in' (Nicolini 2012) to case studies on consumption, trade and production practices in Myanmar. Reflecting the intention of this thesis to break with dominant productivist approaches, Chapter 3 starts with a reassessment of fish consumption against the backdrop of the aquaculture transition by looking at the case of urban migrants in Yangon, the economic capital of Myanmar. Chapter 4 then explores the aquaculture transition from the perspective of trade, by investigating the case of San Pya, the largest wholesale fish market in Myanmar. Finally, Chapter 5 draws on the reflections from these Chapters to revisit production by reflecting on the case of development interventions implemented in the Ayeyarwady Delta, the region from which most of Myanmar fish originate. Chapter 6 then zooms back out to synthesize the findings of the empirical Chapters and generalize these findings into a practice-based theoretical abstraction (following Lund 2014) of aquatic food systems transformations.

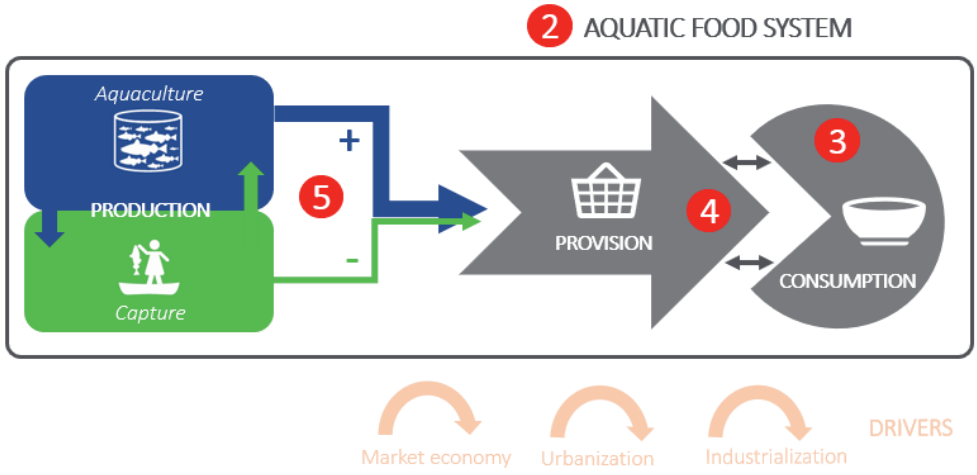


Figure 1.3. Conceptual outline of the thesis core Chapters.

1.5.2. Data collection methods

Case studies often draw on a variety of data derived from multiple sources (Stake 1995; Yin 1998). The case studies developed in each of the following Chapters employed a range of methods that

were chosen depending on the accessibility of primary sources and other available resources, as well as the already established professional experience and networks. Whereas each core Chapter describes these in more detail, the following summarizes the main methods used across the thesis; namely document review, semi-structured interviews, and participant observations (see Table 1.1).

Table 1.1. Overview of theories, methods, empirical focus, and case studies of each Chapter

	Chapter 2	**Chapter 3**	**Chapter 4**	**Chapter 5**
Theoretical focus	Food systems	Food systems & Social practices	Food systems & Social practices	Food systems
Data collection methods	Systematic document review	Semi-structured interviews & field observations	Semi-structured interviews & field observations	Literature review
Empirical focus	Development policy literature (***system***)	***Consumption*** practices	***Trade*** practices	Development interventions (***production***)
Case study	Southeast Asia	Urban migrants (Yangon, Myanmar)	San Pya wholesale (Yangon, Myanmar)	Ayeyarwady Delta (Myanmar)

Document review

The review of secondary sources is used throughout the thesis as a foundation for contextualizing and interpreting findings, as well as for augmenting evidence from other sources (Yin 1998). In the case of Chapter 2, the thesis draws on a systematic review method (Arksey & Malley 2005). In this Chapter - and to some extent also Chapter 5 - where secondary data constitute the main source of information, these are subject to qualitative content analysis, using NVivo 11 Software. These analyses typically reflect and interpret the findings in relation to the research questions in an exploratory and iterative manner.

Semi-structured interviews

Semi-structured interviews represent the backbone of the field-based research efforts deployed in this thesis. These qualitative interviews allowed the researcher to understand interviewees' opinions, attitudes, interpretations of events, experiences, and feelings. As such, they offer a level of flexibility that allow interviewees to speak their mind. This flexibility has the benefit of allowing unanticipated shifts in focus, making semi-structured interviews more appropriate than more rigid interview formats to gain in-depth insight into issues that are not yet widely documented (Smith 1995). In total, 37 interviews were conducted between June 2019 and November 2020, each lasting between one and five hours. All these interviews were conducted using a mix of Burmese and English language before being transcribed in English and subsequently coded using NVivo 11 software for analysis.

Participant observations

Participant observation was used as a complement to the semi-structured interviews whenever possible. In each of the Chapters focused on consumption and trade practices about half of the interviewees were observed performing their daily routines in order to corroborate information collected through interviews. These observations also included ad hoc questions designed to elicit their immediate reactions, as well as the specific meanings and choices that were attached to their performances. A total of 18 interviewees were observed during the course of this research. Supplementing these observations were a range of professional experiences based on 8 years of employment at WorldFish in Myanmar and, as part of this employment, long-term engagement with development projects focused on aquatic food production systems. This professional position, and the networks it enabled, allowed ongoing access to information within the Department of Fisheries as well as access to various stakeholders in aquatic food systems at the political, practitioner, and personal levels.

1.5.3. Researcher positionality

This thesis effectively originated from my extended work and life experiences in Myanmar. As a bioengineer specialized in the modelling and management of freshwater aquatic production systems, I was exposed to a variety of such systems across Africa and Southeast Asia. It was not until I started working in Myanmar that I came to question the logic of interventions in these systems. There, I realized that I had been following and cultivating the same development narratives for years without questioning their underlying productivist assumptions. My assumptions as such reflected my training as a natural scientist and the projects I had worked in, aiming to manage and maximize the productivity of these aquatic systems. These projects were also justified by the idea that Myanmar, as a 'latecomer', should follow the same development pathway as other countries in the region and harness its blue revolution potential (as outlined in Tezzo et al. 2018). It is these professional experiences, especially in the Ayeyarwady Delta, that triggered an interest for the apparent tensions between the various ways in which fisheries and aquaculture overlap despite being regarded and managed as separate sectors.

My personal life and interests have also influenced the research reported on in this thesis. As I became immersed in the city of Yangon and travelling across the country on a regular basis, I came to realize the significance of food in Myanmar's everyday life and the omnipresence of fish. Fish were much more than just cash crops or natural resources to be preserved, they were first and foremost foodstuffs, the most important components of local diets after rice (Soe et al. 2020). There were many beliefs and culinary traditions that were attached to the impressive yet declining diversity of how aquatic foods were consumed. At the same time, it became clear to me that the reporting on food, which was dominated by natural and health sciences, did not reflect my personal observations on the fundamentally social nature of aquatic food systems. In short, I became concerned that the logic of our technical interventions that underpinned the productivist agenda of development organizations in Myanmar and beyond needed to be rethought.

1.6. Thesis outline

The rest of this thesis is organized around four empirical Chapters and a final Chapter that synthesizes their findings and draws general conclusions.

Chapter 2 introduces the food system framework that effectively structures the whole thesis. This Chapter reviews development research and policies surrounding Southeast Asian freshwaters to identify and reflect on the main assumptions underpinning the governance of aquatic food systems in the region. This analysis unpacks the productivist wild-farmed binary and lays important foundations for the remainder of the thesis. An important point to emphasize here is that the core Chapters of this thesis actually refer to the 'food fish system' given that finfish is the only aquatic food that is considered. Nevertheless, with a view to making the points raised more generalizable, the Introduction and Conclusion systematically refer to the 'aquatic food system'.

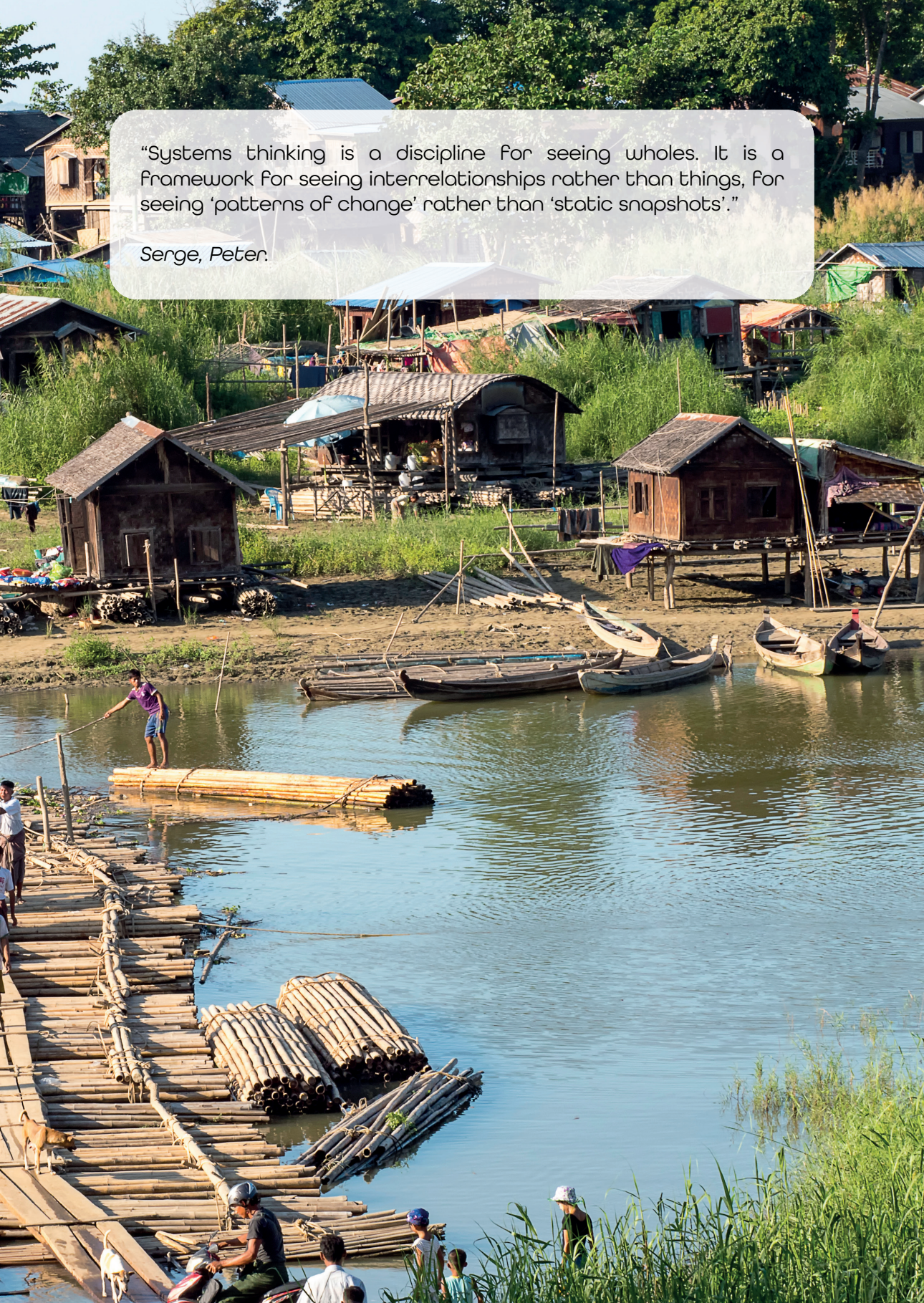
Chapters 3 and 4 then get to the heart of the social reassessment of food systems transformations proposed in this thesis. Both draw on a social practice perspective to explore, respectively, the reconfigurations of fish consumption and trade. Chapter 3 first reassesses fish consumption against the backdrop of the aquaculture transition by looking at the case of urban migrants in Yangon, the economic capital of Myanmar, which is undergoing rapid economic and social changes. This Chapter analyses how everyday fish consumption practices change as people move from the rural Ayeyarwady Delta to Yangon city. In doing so, it demonstrates how the reconfigurations of fish consumption practices are shaped by new routines in urban areas and the transition from capture fisheries to aquaculture.

In the same vein, Chapter 4 goes on to explore the aquaculture transition from the perspective of fish trade practices, by investigating the case of San Pya, the largest fish wholesale market in Myanmar. This Chapter demonstrates the complex and nuanced understanding of contemporary transformations that is allowed by the recognition of food systems practices relating to quality, trust,

and risk. These, it is argued, make it possible to appreciate not only how fish trade is shaped by but also how it does shape aquatic food system transformations.

Chapter 5 then brings back the reflection onto production. It builds on a critical analysis of development interventions in the most important fish production landscape in Myanmar. By elaborating the key processes shaping and linking fish production, distribution, and consumption, this Chapter critically reflects on fisheries and aquaculture development projects to challenge the productivist wild-farmed binary and suggest new directions for a food systems-oriented development agenda in that geography.

Finally, Chapter 6 reflects on the core Chapters and draws conclusions related to the core and sub-questions of this thesis. It concludes by proposing a conceptual framework capable of grasping socially mediated processes of change in food systems and discusses some of its implications for governance and future research.



"Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing 'patterns of change' rather than 'static snapshots'."

Serge, Peter.

Chapter 2:

Food system perspective on fisheries and aquaculture development in Asia

Abstract

This paper reviews development research and policies on freshwater fish in South and Southeast Asia. We conduct a systematic review of academic literature from three major science-based policy institutions to analyze development research and policies that have accompanied the ongoing transition from freshwater capture fisheries to aquaculture in the region. Using a 'food fish system' framework allows for the identification and systematic comparison of assumptions underpinning dominant development policies. We analyze the interrelations between the production, provisioning, and consumption of wild and farmed fish and demonstrate a shift toward food fish systems thinking in the sampled literature. We discuss gaps and weaknesses in the literature, as identified through the application of the food fish systems framework and present an agenda for future research aimed at securing the potential of fish as food.

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2.1. Introduction

'Food systems' are receiving renewed interest as means of moving beyond the productivist agendas that tend to dominate food policy (Béné et al. 2019). Central to food systems thinking is the transdisciplinary analysis of social and environmental trade-offs and synergies across the whole set of production, provisioning, and consumption activities that affect food security (Ericksen 2008; Ingram 2011; Eakin et al. 2016). Here, food security is understood as a condition related to the availability, accessibility, and use of food (Eakin et al. 2016). Such approaches are increasingly being promoted in policy circles as a way of identifying and understanding the effects of broader drivers of change such as urbanization and globalization on sustainable food provisioning (HLPE 2017; IPES 2017).

Despite growing attention, food systems thinking has yet to be applied in a systematic way to fish production, provisioning, and consumption (Olson et al. 2014; Béné et al. 2015). Recent policy discussions have marginalized or overlooked the role of fish, in comparison with conventional agricultural commodities (HLPE 2014; Willett et al. 2019). This is a major oversight given the significant contribution that fish makes to global food security: fish is a relatively cheap and accessible micronutrient-rich food that provides over 3 billion people with almost 20 percent of their average per capita intake of animal protein, and a further 1.3 billion people with about 15 percent of their per capita animal protein intake (Beveridge et al. 2013; HLPE 2014). Golden et al. (2016) further predict that over 10% of the world population is vulnerable to micronutrient and fatty acid deficiencies due to declining fish supply over the next decade, with developing nations being particularly exposed.

Moreover, when fish is considered, it is articulated predominantly in terms of marine 'seafood', leaving freshwater food fish marginalized (Cooke et al. 2013; Lynch et al. 2019). Limited attention to freshwater fish production can be attributed to its relatively dispersed nature, the poor consistency of associated data, and the bias of northern-dominated research towards exported

seafoods (FAO and WorldFish 2008; McIntyre et al. 2016; Bush et al. 2019; Tlusty et al. 2019; Belton and Bush 2014). This omission is particularly problematic in the context of South and Southeast Asia, which account for over a quarter of global fish production, the bulk of which is comprised of freshwater fish species (Chan et al. 2017; FAO 2018).

There is a rapid ongoing shift in the supply of freshwater fish in Asia, from wild to farmed sources, constituting an important, yet poorly understood food transition. Throughout inland areas of Asia, fish has been historically supplied by the harvest of wild fish from extensive networks of rivers and floodplains (Delgado et al. 2003; Brummett et al. 2013). The same region now accounts for the majority of global aquaculture (or farmed fish) production, most of which also takes place in freshwater environments. China, South and Southeast Asia are expected to remain the largest suppliers of farmed fish globally for the foreseeable future (Edwards 2015; FAO 2016; Ottinger et al. 2016). Integrated understandings of this transition are rare. Literature on the contribution of freshwater fish to food security tends to emphasize two polarizing narratives. As summarized by Little et al. (2016), the first narrative stresses trajectories of decline in wild capture fisheries production, while the second emphasizes the role of a 'booming' aquaculture sector in meeting growing future demand for food fish.

The production focus central to both narratives, risks limiting how policy makers understand freshwater food fish in the context of rapid urbanization, rising incomes and changing diets (Reardon et al. 2014; Bene et al. 2016). A 'food fish system' approach, in contrast, integrates the role that provision and consumption play in shaping different demands for fish as food, and examines how these demands can be met through existing or potential capture fisheries and/or aquaculture production. We argue that this perspective can support the formulation of more proactive food security policies to address healthy and sustainable food fish provisioning at national, regional, and even global scales (see for e.g. Jennings et al. 2016).

Developing a food fish system perspective is especially relevant for South and Southeast Asia, as a major fish producing and consuming region that is undergoing rapid economic and social change. This raises the question of whether, in line with the wider food production literature, a shift towards food systems thinking is taking place in the science-based development literature on freshwater fish as food in this region. In other words, are science-based policy institutions with a mandate to support the fish sector development in South and Southeast Asia moving away from productivism toward more integrated approaches? To what degree are their perspectives locked in the two polarizing narratives of capture fisheries and aquaculture? And to what extent do associated development policies integrate and leverage interrelations across freshwater fish production, provision, and consumption activities?

In this paper we address these questions by reviewing the past 45 years of science-based development-policy literature on freshwater fish as food in South and Southeast Asia. Our investigation builds on a systematic review of the academic literature affiliated with three international organizations – FAO, SEAFDEC, and WorldFish – that have a long history of providing policy advice for fisheries and aquaculture in the region. The evolution of their academic positions provides a basis for identifying and systematically assessing evidence of progress from polarized narratives to more integrated understandings of freshwater fish as food.

The following section introduces the food fish system framework used for the review and positions it within the wider literature on food systems research. Section three then describes the methodology used for the review. Sections four and five present the results of the analysis, identifying and comparing literature focused on farmed or wild fish production, provisioning and consumption. Section six evaluates progression towards food fish systems thinking. The remaining sections discuss the broader implications of the results, and the emerging opportunities for revitalizing development agendas around food fish security.

2.2. The food fish system

The concept of food systems was formulated as early as in the 1980s, but it remained relatively marginal in food policy over subsequent decades (Kneen 1989). Renewed interest in food systems in recent years provides a framework for understanding trade-offs and synergies between food production with diverse consumer demands and complex provisioning systems that affect food security (Ericksen 2008; HLPE 2017). As argued by Béné et al. (2019), in policy terms this means moving beyond a focus on productivist technology and extension to pay greater attention to the full range of social and environmental concerns that affect how food is distributed and consumed.

'Commodity chain' and 'value chain' perspectives constituted an important first step away from productivist approaches by extending the scope of research and policy beyond the production 'node'. These perspectives emphasize multi-directional flows of products, finance, and information between actors connecting sites of production and consumption, as well as extra-transactional actors that shape these flows (Ponte and Sturgeon 2014; Bush et al. 2015) Recent years have seen a broadening in the scope of value chain research with increasing consideration for social equity (see for e.g. Barrientos et al. 2003; Kaplinsky 2000). Yet, associated approaches largely conceive governance as a process of linking codified norms to economic value in order to leverage improvements in production (Marsden et al. 2000; Gereffi 2005; Ponte and Sturgeon 2014). Food systems thinking goes beyond value chain based approaches by recognizing the multidirectional relations between interrelated sets of production, provision, and consumption practices (Spaargaren et al. 2013), and the possibilities for coordinating these practices and relations for achieving outcomes that extend beyond the performance of producers alone, such as food security or sustainability (Ericksen 2008; Ingram 2011). In addition, the food systems approach extends beyond value chain approaches by incorporating broader societal transitions such as urbanization and globalization and their influence on where and how food is produced, distributed, and consumed (HLPE 2017; IPES 2017).

Our review is based on a simplified food system framework that focuses on the interactions between wild and farmed freshwater fish across activities related to the production, provisioning, and consumption of food fish. The framework is used to identify governance approaches used to steer these activities toward normative goals such as food security or sustainability (Figure 2.1.). Each of these components is explained in turn below.

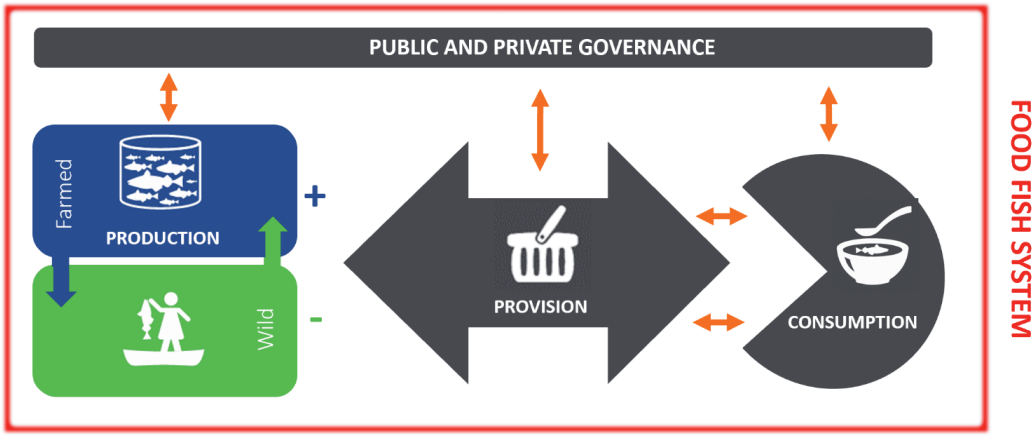

Figure 2.1. The Food Fish System conceptual framework.

First, production is defined as the entire set of activities involved in the production of freshwater fish and derived foodstuffs. Production activities related to wild capture fisheries and aquaculture are highly differentiated. Capture fisheries use fishing gears to harvest wild fish and other aquatic organisms (i.e. originating from naturally reproducing, self-sustaining populations) from public or common access water bodies (FAO 2015). Aquaculture is a form of farming. This implies active management interventions to enhance biological productivity (e.g. artificial reproduction, stocking and feeding), and private property relations – i.e. private ownership of fish stocked in enclosed water bodies (FAO 2015; Edwards et al. 2002). However, in practice, the lines between these forms of production are often blurred. For example, aquaculture systems can rely to varying degrees on natural or stocked recruitment of wild fingerlings to ponds, fenced off habitat,

or rice fields, while capture fisheries in lakes and reservoirs may rely on stocking of artificially spawned and raised fingerlings (FAO 2015). The review explores the diversity of these production activities and the degree to which they are differentiated from the perspective of provisioning and consumption.

Second, food provisioning refers to the organization of social and economic practices involved in the delivery of goods and services (Fine & Leopold 1993; Evans 2011). These practices encompass activities related to the transmission and transformation of fish from raw material to marketable products – such as sourcing, transport, storage and trade, as well as processing and packaging. Provisioning practices also include social relations amongst chain actors that enable the flow of goods and/or preservation/transformation of products, including credit and finance, cultural and food safety norms and standards, and the use of cooperation and/or contractualization to set prices and supply (Reardon and Timmer 2014; HLPE 2017). Combined, these food-provisioning practices set the conditions for producers to access markets, information, and resources necessary for production. They also condition consumption practices while at the same time translating consumer demands to producers.

Third, consumption is defined as the entire range of activities related to the selection, purchase, preparation, and eating of fish. Consumption, as such, is influenced by economic determinants, such as price, but also by a range of practices that determine which species of fish are purchased, in what forms (e.g. fresh, processed, or prepared), from which outlets (e.g. wet markets, supermarkets, or restaurants), and with what consideration to quality - related to food safety, taste or culture (Spaargaren et al. 2013). From a systems approach, consumption is shaped by wider processes of urbanization, globalization and/or food (in)security rather than individual choice alone (HLPE 2017).

Finally, governance is defined as the rules, authority and institutions that coordinate, manage, or steer the food system. These include governments, and non-state institutions such as markets,

traditions, networks, and civil society (van Bers et al. 2019). Among these governing entities, the present review focuses on science-based development policy actors and explores the logic of their efforts to move the system toward delivering food security. Food security here is understood as a condition related to the availability, accessibility, and use of fish as food. From a food fish systems perspective, governing food security requires incorporating the multiple ways in which production, provisioning and consumption interact (Ericksen 2008; Ingram 2011). The challenge of accounting for the full range of food system activities is in sharp contrast to the productivist paradigm that permeates much of the science underlying food policy in developing countries (Ickowitz et al. 2019). This focus on production has meant that the governance of food security has relied heavily on the extension of technologies to increase output, with the assumption that food availability would shape provisioning and consumption practices (Ickowitz et al. 2019; Gómez et al. 2013). However, as we explore further in this paper, a shift to a food fish systems thinking calls for understanding production as bound up with both the diverse demands of consumers and the complex factors influencing the development of provisioning systems in between.

2.3. Methodology

We undertook systematic review (Arksey and Malley 2005; Levac et al. 2010) to assess the extent to which the development policy literature on freshwater fisheries and aquaculture in South and Southeast Asia reflects a shift to food systems thinking. We acknowledge that this literature does not provide a complete picture of how fish has been taken up in food systems thinking. But, aligned with our objective, this literature does represent the extent to which academic thinking has been translated into policy-directed science. As we describe below, this methodology follows a two-step process, comprised of: (1) document selection; (2) content analysis.

2.3.1. Document selection

For the purpose of narrowing the scope, the review of the science policy landscape was limited to a selection of 'boundary organizations' that straddle politics and science (Guston 1996). As such, we only selected documents published by FAO, SEAFDEC, and WorldFish - three multilateral science-based policy organizations with more than 40 years of experience advising governments on improving fisheries and aquaculture for food security. The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations established since 1945. The Southeast Asian Fisheries Development Center (SEAFDEC) is an autonomous intergovernmental body established in 1967 with membership of 11 Southeast Asian countries.[2] WorldFish was established in 1973 as the International Center for Living Aquatic Resources Management (ICLARM) and integrated into the Consultative Group on International Agricultural Research (CGIAR) in the 1980s (cf. Pullin and Neal 1984).

Scientific publications from these organizations addressing freshwater fisheries and/or aquaculture in South and Southeast Asia were sourced through Scopus and Aquaculture Science and Fisheries Abstract (ASFA) databases. The search included all reviews, conference papers, and articles published between 1975 and 2018[3] in academic journals, using the search terms: AF-ID ("WorldFish" OR "ICLARM" OR "FAO" OR "SEAFDEC") AND ("Cambodia" OR "Myanmar" OR "Vietnam" OR "Thailand" OR "Laos" OR "Indonesia" OR "Malaysia" OR "Philippines" OR "Bangladesh" OR "India" OR "Pakistan" OR "Nepal" OR "Bhutan" OR "Sri-Lanka" OR "South Asia" OR "Southeast Asia") AND ("Freshwater Fisheries") OR ("Inland Fisheries") OR ("Aquaculture") in titles, abstracts, and keywords. The pooled search returned a total of 457 (N_T) distinct documents published in English.

[2] Brunei, Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

[3] The search was initially done using 1960 as a starting date, corresponding to the beginning of the Green Revolution. 1975 was eventually retained as the start point because it corresponded to the earliest publication in the sample fitting the review inclusion criteria. The end date of 2018 was used as it corresponded to the year when the review process was initiated.

Metadata for all articles was imported to Excel and titles, abstracts, and keywords were screened to select documents. First, we removed articles that were not fisheries or aquaculture related (n_1=19). We then excluded books and book chapters (n_2=48) as well as non-peer-reviewed documents (n_3=38) based on the observation that institutional reports from FAO, WorldFish and SEAFDEC were largely replicated in the peer-reviewed literature. We further excluded literature focusing only on geographical areas outside the scope of the study (n_4=37), as well as articles focusing solely on marine and coastal production systems (n_5=138). The final sample included 177 (N_{S1}) articles.

2.3.2. Content analysis

The data extraction and analysis was carried out in two-steps.

First, a scan of the literature was conducted over all 177 articles. Titles, abstracts, introductions, and conclusions were used to classify articles in terms of their relevance to (1) aquaculture and/or capture fisheries, and (2) production, provision and/or consumption. Papers focusing exclusively on wild or farmed fish were categorized as 'segregated'. Papers focusing on both wild and farmed fish were categorized as 'integrated'. Similarly, the coverage of production, provision and/or consumption supported a further classification: papers that did not explicitly refer to production, provision or consumption, or did refer to one component but did not provide any analytical focus on that component; and papers that effectively covered production, provision and/or consumption as an integral part of their analysis. In case of uncertainty, the screening of the text extended to the results and discussion sections of the paper.

Second, a content analysis of articles cited at least 15 times (N_{s2} = 85) was undertaken. For each category defined in the first step, the papers were read and assessed for the degree to which they focused on wild and/or farmed fish, and the extent to which production, provisioning and/or consumption were analyzed, including the relationship between them.

Finally, both stages of the analysis took into consideration the change in food systems thinking over time, breaking the literature into five evenly distributed time-periods from 1975 to 2018.

2.4. Overview of the sampled literature

The first overall observation about the sampled literature is the institutional bias. The selection of documents is heavily skewed to WorldFish, which represents 78% of all documents compared to FAO and SEAFDEC making up 15% and 7% respectively (Figure 2.2.). This bias is caused by the higher prevalence of publications by WorldFish staff in international peer-reviewed journals compared to the higher proportion of institutionally published reports by FAO and SEAFDEC. Nevertheless, the review indicates that themes covered in the review are shared across the three organizations and, as a result, our analysis does not make any comparison between them. A detailed comparative analysis of the science policy interface that scrutinizes the contributions of these institutions to the complex process of policy-making (Gluckman 2018) goes beyond the scope of this study.

The second observation is the bias in the geographical scope of the documents sampled. Bangladesh, which has received more development attention than other South and Southeast Asian nations over the past 40 years, represents over 35% of the documents reviewed. The Philippines, which hosted both ICLARM (now WorldFish) and SEAFDEC, makes up close to 10% of the articles reviewed. Meanwhile other major freshwater fisheries and aquaculture countries, such as Thailand and Vietnam, make up only 3% of the papers reviewed (Figure 2.2.). Overall, however, the sampled literature indicates that development policies and perspectives surrounding fish as food are largely shared across all countries covered in the review. Hence, while we are mindful that our choice of treating the great diversity of South and Southeast Asian contexts as one group implies important simplifications, we contend that our approach paints a faithful (albeit general) description of research and development policy around freshwater fisheries and aquaculture in the region.

The third and most significant observation is that the segregated literature (i.e. analytical focus on wild or farmed fish) represents 75% of the literature sampled, while the integrated literature (analytical focus on wild and farmed fish together) represents only 25% (Figure 2.3.). This confirms that freshwater fish production is largely understood as either farmed or wild caught, with limited understanding of how these two modes of production relate to each other. The division also confirms the polarization of narratives associated with farmed and wild fish production and their expected contribution to food security (cf. Little et al. 2016).

In the following section we present the results of the review by food fish system components (i.e. production, provisioning and consumption). In doing so we only reference papers categorized under the respective food fish system component and not papers that, even while relevant to the observations made, are not categorized under that component.

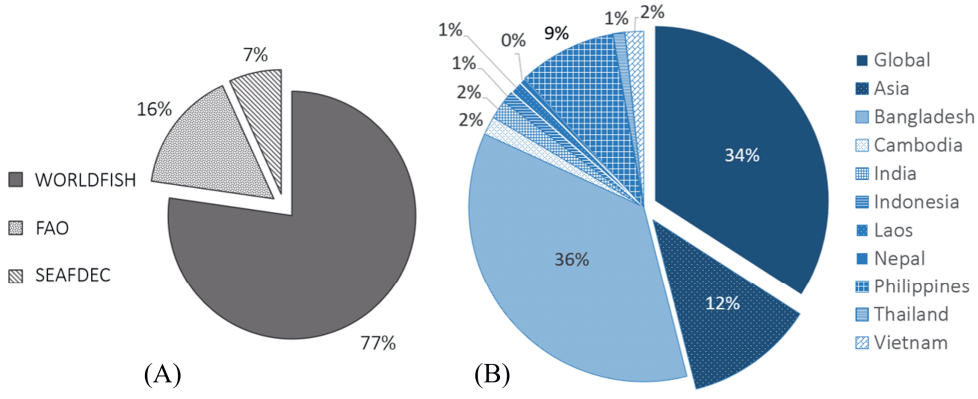

Figure 2.2. Institutional **(A)** and geographical **(B)** coverages of the sampled literature.

2.5. Coverage of the segregated literature

2.5.1. Production

An observation shared across both the wild and farmed fish literature is the disproportionate and persistent focus on production. Nearly all (99%) the articles reviewed included analysis of production, creating a clear division between capture fisheries and aquaculture respectively (Figure 2.3.). This production focus was absolute from the 1970s into the 2000s. As the following shows, provision and consumption became more prevalent themes from the 2000s onwards. Nevertheless, a clear division between wild and farmed fish persists. The following outlines the main themes and topics covered under associated bodies of literature.

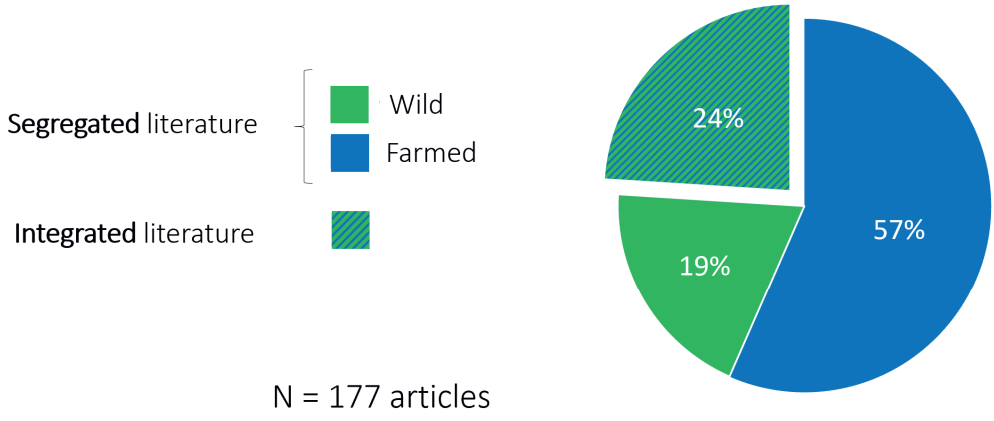

Figure 2.3. Proportions of segregated and integrated articles in the sampled literature.

The starting point of our review, in the mid-1970s, coincides with a redefinition of the capture fisheries research and development agenda. While the early literature from the 1960s-1970s had focused predominantly on increasing production through improved technology and

infrastructure[4], the new agenda emerged from the recognition that resources were not endless and that small-scale operators were the most impacted by their exhaustion (Smith 1981). This new agenda, commonly labelled "small-scale fisheries" largely developed around perspectives from both coastal and freshwater fisheries. From the 1990s onwards, this literature largely put the emphasis on overfishing as the main factor driving fisheries decline (Smith 1981; Sultana and Thompson 2004; Ratner 2006). Subsequently, in the late 2000s the scope of factors driving fisheries decline expanded to include environmental degradation and fish habitat destruction derived from industrial, agricultural developments, or climate change (Allison et al. 2009; Baran and Myschowoda 2009; Beard et al. 2011).

In parallel, a body of capture fisheries literature emerged in early to mid-2000s focusing on solutions for improving the status of wild fish stocks. The literature on solutions for fisheries decline can be further divided into two main themes. In the mid-2000s a broad range of resource management options were focused on, with co-management emerging as a leading approach for promoting the empowerment of fishing communities in the management and help to address broader inter-sectoral conflicts (Thompson et al. 2003; Nielsen et al. 2004; Andrew et al. 2007). In the mid to late 2000s, this management-focused literature broadened to include more attention to the social and economic conditions of fisheries production. Most notably, this literature has moved beyond conflict resolution to include social welfare (Béné et al. 2010), resilience (Ratner and Allison 2012), human rights (Allison et al. 2012) and well-being (Weeratunge et al. 2014). This 'social-turn' in freshwater capture fisheries contrasts markedly with the early literature in placing fishing communities as centrally important for the persistence of the fisheries as a source of food security.

In contrast to capture fisheries, the aquaculture literature has persisted from the 1970s with a strong productivist agenda (Pullin and Neal 1984). Throughout this early literature, the focus on

[4] Refer to Smith (1979) and the more recent sequel article of Pomeroy (2016) for a contextualization of the research agenda prevailing at the time.

production was justified by perceptions of declining wild capture fisheries, the assumption that aquaculture would replace declining stocks, and a broader agenda to further 'the tropics' as central to the development of the sector on a global scale (Coche 1978; Pullin and Neal 1984). The alignment of aquaculture under the wider 'blue revolution' narrative emphasizes the 'untapped biophysical potential' of the sector and (reflecting green revolution rhetoric) the need to advance the production technologies and cost-efficiency of a variety of production systems. This narrative of technical efficiency has persisted in the literature as a guiding principle for farmed fish research and development in South and Southeast Asia to the present (Dey et al. 2000b; Dey et al. 2005b; Katiha et al 2005; Karim et al. 2016).

The focus on the technical efficiency of production is observed in the sampled literature through two further persistent narratives around Asian aquaculture. First, in line with the priorities of the three institutions studied, calls for technical efficiency have been made predominantly in relation to small-scale rural aquaculture (Dalsgaard 1997). The assumption underlying this focus is that these producers dominate the overall production in Asia and make the most direct contribution to food security (Ahmed and Lorica 2002; Dey et al. 2005a; Dey et al. 2005b). Second, the focus on technical efficiency has meant that a significant proportion of the literature sampled (33%) has been on fish breeding. Associated research has concentrated on single species' yield maximization, denoting a change from earlier conceptualization of aquaculture as "an extremely diverse means of food production" (Pullin and Neal 1984, p. 227). While still including a number of species overall (see Lind et al. 2012), fish breeding research has been dominated by tilapia (Eknath et al. 1993; Ling et al. 2008; Dey et al. 2000b; Bentsen et al. 2012); a species that now contributes over 20% of freshwater farmed fish in the region.

In contrast with fisheries, and the wider literature on industrial (largely marine) aquaculture in other parts of the world[5], the sampled literature on freshwater aquaculture gives limited

[5] Refer to Naylor et al. (2000), or Natale et al. (2013) for a discussion on the environmental impacts of (marine) aquaculture.

consideration to environmental impact. This apparent gap may be explained by assumptions expressed in some papers around the limited environmental impact of production of low trophic-level freshwater carps (Prein 2002; Dey et al. 2005b). These papers assume a high efficiency of such systems, with only limited attention to the gradual intensification of carp production systems. This is particularly evident in the research around terrestrial ingredients used in their diets[6], where the emphasis has essentially consisted in ascertaining "economically optimal" feeding rate (Tacon and Silva 1997; Karim et al. 2011).

In addition to a sustained focus on production, the sampled science-policy literature is characterized by two persistent narratives. The fisheries literature has emphasized the decline of fish resources and the need for more effective stewardship and management through the empowerment of fishing communities. The aquaculture literature, in contrast, has persisted with a narrative of unfulfilled potential and the need for improved technical efficiency. As a result of their distinct narratives, a division is also observed between the disciplines underlying these two literatures: social scientists for wild fish, and natural scientists and economists for farmed fish research. As the following sections demonstrate, this dichotomy is also apparent across other food fish system components.

[6] Refer to Pahlow et al. (2015) for a discussion on the terrestrial feed demand of (marine and freshwater) aquaculture.

DIRECTIONALITY OF THINKING

FOCI	PRODUCTION	PROVISION	CONSUMPTION
Wild	Decreasing contribution. Collapsing stocks/intersectoral conflicts. Priority = empowering communities	Largely immovable trade/barter informal networks serving consumption close to landing sites	Emphasis on direct consumption. Consumption-based studies increasingly suggesting a "hidden harvest" scenario.
Total (35 articles)	100%	11%	37%
FOCI	PRODUCTION	PROVISION	CONSUMPTION
Farmed	Increasing contribution. Untapped biophysical potential. Priority = advancing technology	Prevalence of global value chain perspectives influencing ideals of 'upgrade' (incl. certification)	Emphasis on direct consumption. Growth of aquaculture leads to increased affordability and availability of fish.
Total (98 articles)	99%	18%	35%

Figure 2.4. Proportion of segregated articles and key messages by food fish system components.

2.5.2. Provision

Research related to provisioning is evident in papers published from 2000 onwards but represents less than 20% of the literature reviewed (Figure 2.4.). Hence, provisioning represents the least documented food fish system component across both the wild and farmed fish literature. Provisioning activities are commonly observed as being related to, and of importance for consumption and production, rather than being a direct analytical focus of research. Nonetheless, the sampled literature does make various assertions around the importance of provisioning for addressing development priorities for both wild and farmed fish production.

Only 11% of wild fish-related papers integrate provisioning in their analysis (Figure 2.4.). Although not explicitly articulated, activities associated with moving and marketing freshwater fish are often assumed to be mostly traditional and homogenous by nature and therefore not worth further examination. For example, Thompson et al. (2003) do not consider market attributes related to community-based fisheries management in Bangladesh because "they are not significantly different between inland wetlands in Bangladesh" (p. 310). This is in direct contrast to more recent research which gives greater attention to complex and fragmented informal networks of trade and bartering

that shape wild fish provisioning and catches (Cooke et al. 2016). As shown in the following section, there is mounting evidence of wild fish consumption far beyond the communities that catch them, but little research has been done on the provisioning practices that distribute this food fish.

The literature on farmed fish pays relatively greater attention to provisioning, with 18% of the papers reviewed making analytical reference in some way to provisioning related activities (Figure 2.4.). This literature can be further divided into papers focused on global provisioning (to major export markets like the EU and US), representing 12% of the sampled papers, and provisioning activities related to domestic and regional markets, representing only 6% of the sampled papers.

The main focus of the global provisioning literature addresses broad questions around the role of aquaculture in meeting global demands for export-oriented species like shrimp and pangasius (Ahmed et al. 2008; Little et al. 2012). Building on such a global perspective, it is often implied that Asian producers should target global export markets to benefit from enhanced profits compared to domestic or regional markets (Ahmed et al. 2010; Haque et al. 2010) and ideals of 'upgrading' trajectories are essentially articulated around international trade (Ponte et al. 2014). However, a smaller proportion of the literature raises questions around the merits of international trade, especially with regards to regulation and certification aimed at improving the environmental and social performance of the sector (Bush et al. 2013; Jonell et al. 2013; Troell et al. 2014). This literature acknowledges the limits of existing regulatory tools and points towards the necessary complementarity of public and private governance to address these challenges.

Papers focused on domestic and regional provisioning have been published from 2010 onwards and highlight the growing importance of aquaculture to food security and social wellbeing. Two major themes emerge from the literature sampled. First, the papers emphasize the development of farmed fish supply chains towards the provisioning of cities (Jahan et al. 2010; Karim et al. 2011; Toufique and Belton 2014; Belton et al. 2016). These papers show that urbanization translates into

increased demand for (farmed) fish, rendering the development of the sector largely a peri-urban phenomenon, with fast-developing supply chains and associated services[7]. Second, this literature indicates a growing attention to gender in domestic supply chains, emphasizing on the one hand the more important roles women play in farmed fish post-harvest activities compared to men, and on the other the existence of formal and informal barriers limiting equal benefits from the sector for women (Morgan et al. 2017; Kruijssen et al. 2018). These papers, however, tend to focus on gendered roles and benefits from provisioning fish rather than the performance or conduct of provisioning activities themselves, such as processing, transportation or trade.

While some food system-related themes like the effects of urbanization on farmed fish demand are emerging, the sampled literature remains largely focused on international trade, regulation and social dynamics that condition but do not explain provisioning activities. This has consequences for understanding the relative contribution of wild and farmed fish to food security beyond the sites of production, especially in Asian domestic markets. As the following section demonstrates, this also has consequences for the attention paid to fish consumption.

2.5.3. Consumption

Consumption is analyzed substantively in 35% of the articles reviewed (Figure 2.4.). However, these studies only emerged from 2000 onwards, indicating a relatively late recognition of the importance of freshwater fish as food in the region. Reflecting the dearth of attention given to provisioning, consumption is commonly considered in conjunction with production, which emphasizes subsistence or semi-subsistence production and thereby overlooks the wider contributions of fish to food security. The following outlines the overarching themes covered under consumption in the literature on wild and farmed fish respectively.

[7] See Bush et al. (2019) for a recent synthesis of aquaculture research on domestic and regional supply chains in the global south.

In line with the overall sample, only 37% of wild fish-related articles integrate fish consumption in their analysis (Figure 2.4.). This overall bias can be explained by the predominant focus on production, which views fish as a resource to be conserved rather than as a food source (Hall et al. 2012). As demonstrated by Evans et al. (2011), less than 10% of studies on co-management consider fish consumption. Our review indicates that even when the wild fish literature considers consumption, the attention tends to be limited to direct or 'subsistence' consumption by fishing communities (Thompson et al. 2003; Badjeck et al. 2010). This subsistence focus also tends to reinforce assumptions that fishing communities are highly vulnerable (Allison et al. 2009; Badjeck et al. 2010), which is underpinned by the lack of knowledge on provisioning and, as such, their engagement with the wider (food) economy.

A more recent key theme in the wild fish literature is the assessment of freshwater production on the basis of consumption data (Fluet-chouinard et al. 2018). These consumption-based approaches build on a wider "hidden harvest" narrative of FAO, WorldFish and other international policy organizations[8] that advocates that up to 80% of freshwater fish landing volumes are not recorded, with the consequence that the contribution of wild fish to food security is fundamentally misunderstood (Hall et al. 2012; Youn et al. 2014). Studies focused on nutrition have also emphasized the importance of species diversity for healthy fish-based diets, which in turn reaffirms the need for production-oriented management strategies to maintain biodiversity (Nurhasan et al. 2010; Youn et al. 2014).

Also in line with the overall sample, 35% of sampled papers from the farmed fish literature cover consumption in their analysis (see Figure 2.4.). An overarching theme in this subset of papers, in direct support of the productivist 'blue revolution' narrative, is that farmed fish is compensating for the decreasing availability of wild fish (e.g. Ahmed and Lorica 2002; Prein 2002). Except for a

[8] See Kelleher et al. (2012) for more on the "Hidden harvest" narrative.

few papers that explore how vulnerable (poor) consumers access fish (Jahan et al. 2010), the literature places considerable emphasis on increasing the overall affordability and accessibility of farmed fish supply across the region (Dey 2000; Dey et al. 2000a). This literature overwhelmingly refers to a generic category of 'fish' rather than giving details on consumer preference for different species (Morgan et al. 2017). Instead, claims of consumer preference lead to distinctions of preference that provide generalized and often unsubstantiated claims. For example, "common carp has traditionally been a preferred cultured species […] tilapia are proposed as an alternative because these fish are cheap to raise, give high yields and are also quite palatable" (Fernando and Halwart 2000, p. 45) or "prices of fish […] are the driving force that influence consumers' decision to buy a particular species" (Dey et al. 2005a, p. 105).

Similar to the wild fish literature, another persistent theme is farmed fish consumption by producers, often framed as a benefit of aquaculture development interventions (Prein 2002; Karim et al. 2011; Pant et al. 2014)[9]. Following Ahmed and Lorica (2002), increased fish consumption is positioned next to two other 'linkages' (income and employment) by which aquaculture contributes to food security of producing households. Increased direct consumption is the only linkage that has been documented in the sampled literature (Jahan and Pemsl 2011). Claims that increased income from aquaculture increases the consumption of nutritious foods, or that the nutritional benefits brought by aquaculture extend to the hired labour, are not well supported in the sampled literature (Kawarazuka and Béné 2010). Nevertheless, these assumptions are commonly advanced to legitimatize aquaculture development interventions in the interest of food security (Jahan et al. 2010), including when the production target is oriented towards export (Ahmed et al. 2010).

Finally, there is a strong bias in favour of rural farmed fish consumption, despite relatively early acknowledgement of the growth and importance of urban fish consumption (Dey et al. 2000a;

[9] Refer to Belton and Little (2011) for an analysis of the aquaculture development narrative in Asia.

Ahmed and Lorica 2002). Studies that do focus on urban consumption highlight the role of higher urban purchasing power as a means of driving rural development, rather than the importance of fish consumption to urban food security (e.g. Karim et al. 2011). More recently, albeit to a lesser extent, attention has been given to the wider influence of urbanization as a key driver of aquaculture development, with attention going to the effects growing urban demand will have on both the volume and kinds of fish produced (Belton and Bush 2014).

Overall, however, the science-policy literature treats consumption in relatively limited respects, placing emphasis on direct and spatially proximate consumption rather than the wider contribution of food fish, both wild and farmed, to domestic and regional economies of South and Southeast Asia. Our comparative review of the segregated fisheries and aquaculture literature shows how this segregation has had a foundational role in the articulation of development policies associated with the two sectors.

2.6. Coverage of the integrated literature

While most papers segregate wild and farmed fish production, consumption and provisioning, a small but growing set of papers takes a more integrated perspective. In breaking down the distinction between wild and farmed fish, this literature has increasingly drawn attention to the interlinkages between production, provisioning and consumption, thereby giving rise to progressively more food system-oriented perspectives on fish (Figure 2.5.).

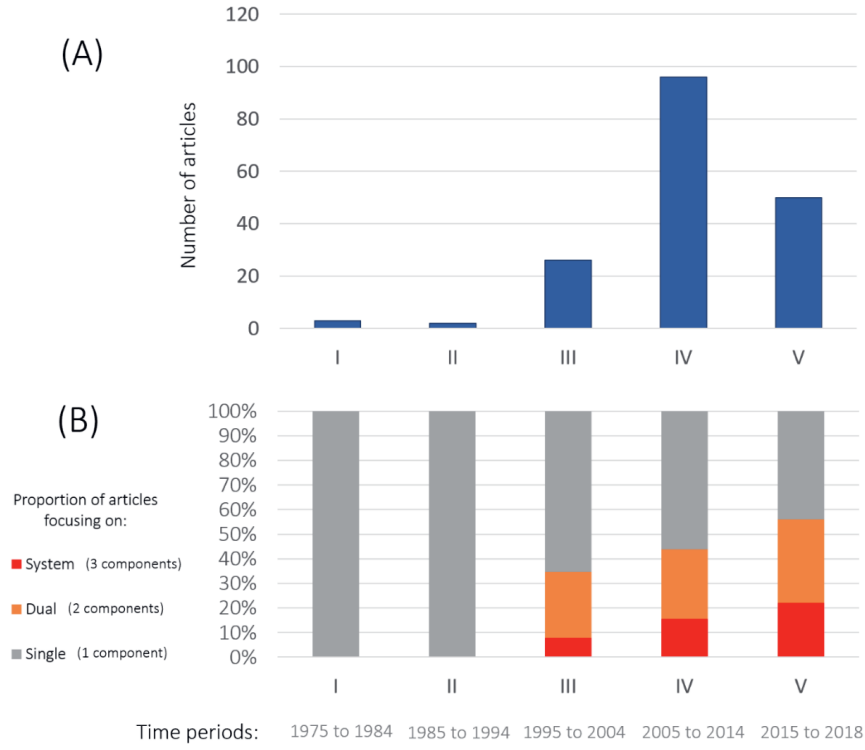

Figure 2.5. (A) Number of sampled articles and **(B)** their proportional focus on food fish system components in the sampled literature from 1975 to 2018.

In stark contrast to the segregated literature, nearly two thirds of the articles in the integrated literature focus on consumption as a main area of inquiry (see Figure 2.6.). Also, in direct contrast with the segregated literature, these papers emphasize the degree to which wild and farmed fish are not substitutable. Belton and Thilsted (2014), for example, demonstrate the complementarity of wild and farmed fish in contributing to food security in Asia and other developing regions. In doing so they challenge the prevailing policy narrative that aquaculture will gradually replace declining wild fish stocks by showing that wild fisheries continue to make an important contribution to nutrition, particularly for the most vulnerable consumers. This is supported by a number of other papers that underscore the relatively higher nutritional value of wild fish and, as such, the importance of maintaining species diversity, particularly highly nutritious small fish that are consumed whole

(Welcomme et al. 2010; Kawarazuka and Bene 2011; Beveridge et al. 2013; Belton and Thilsted 2014; Youn et al. 2014; Bogard et al. 2017).

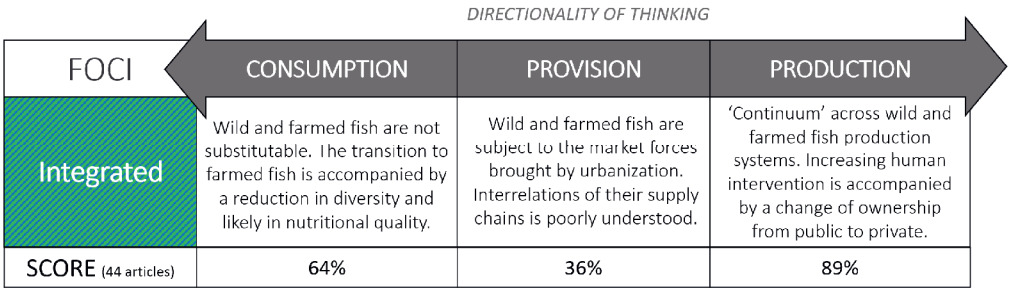

Figure 2.6. Proportion of integrated articles and key messages by food fish system components.

Similar to the segregated literature, relatively few papers (36%) in the sample give analytical attention to provisioning (see Figure 2.6.). Although the integrated literature has the merit of being more focused on regional dynamics, farmed fish in this literature is still more commonly framed as a cash crop than a food crop (Kawarazuka and Béné 2010). This tendency has contributed to steering development efforts towards the production of larger-sized fish aimed at the urban middle-classes rather than smaller and economically accessible fish aimed at poorer rural and urban consumers (Beveridge et al. 2013). While this literature emphasizes the value of wild fish for rural food security, it also recognizes that wild fish are increasingly traded to meet growing urban demand (Kawarazuka and Béné 2010). These general observations, however, lack empirical evidence and underlines a need for increased attention to how the transition to farming affects access to and use of food fish by different consumers. As argued by Toufique and Belton (2014), the greater the recognition given to fish as food in domestic markets, the more important it will be for the science-policy literature to shift the understanding of consumption beyond the producers and beyond categories of 'wild' and 'farmed'.

Like the segregated literature, 89% of papers in the integrated literature focus their analysis on production (see Figure 2.6.). In opposition to the segregated literature however, the integrated

literature challenges the dichotomy commonly assumed between farmed and wild fish: from the late 1990s onwards the integrated literature has emphasized a spectrum or continuum based on increasing human inputs and control over freshwater fish production and increasing private ownership moving from fisheries to aquaculture (Welcomme and Bartley 1998; Lorenzen et al. 2012). More recently, Little et al. (2016) explain the origin of aquaculture by describing the transition from fishing as "a gradual process" developing in "responses to times when demands for wild foods outstripped supplies" (p. 275). Despite its analytical power to rethink freshwater fisheries and aquaculture as closely interrelated production processes, it is evident from the review that such continuum perspective has had very little influence on the science-policy literature surrounding South and Southeast Asian freshwater.

Across consumption, provision, and production the integrated literature emphasizes the different contributions of wild and farmed fish as food, highlighting their complementarity rather than their substitutability. While this perspective underlines the importance of food fish systems thinking, it also shows that further evidence is still needed on the linkages between the three food system components, especially with respect to access and use of food fish by poor consumers in both rural and urban settings.

2.7. Discussion: Towards food (fish) systems thinking

Our review of the science-policy literature on freshwater fish reveals a gradual shift toward understanding freshwater fish in South and Southeast Asia from a more integrated perspective. Historically, the science-policy literature has focused heavily on fish production and maintained a clear division between capture fisheries and aquaculture. However, attention is increasingly being paid to the provisioning and consumption of freshwater fish, and an emerging strand of ‘integrated’ literature is beginning to break down the dichotomy between wild caught and farmed fish. Though these emerging strands still represent a small proportion of the literature, and are not framed

explicitly in terms of food systems thinking, they demonstrate the complementarity of wild and farmed fish as food, and lay the foundations for a more precise understanding of freshwater food fish in the region. We argue that the main value of the food fish systems approach, as applied to the Asian freshwater fish science-policy landscape in this review, is to reveal weaknesses and lacunae in the existing literature and identify agendas for future research.

Three points stand out. First, the science-policy literature on capture fisheries and aquaculture are heavily siloed. The two sectors are erroneously framed as separate, and in opposition, while their overlapping and highly complementary contributions to food security are rarely recognized. Second, the strongly productivist bias of the literature results in inadequate understanding of the system of provision and consumer behavior and their mutually constitutive and recursive relationships with the system of production. Moreover, a focus on specific types of production (subsistence, export) means that many important forms of production and associated systems of provision and consumption are overlooked. Third, the literature on freshwater fish largely assumes simplistic relations from production to consumption with the consequence that governance is conceived predominantly around production. Such framing ignores the multidirectional relations between the production, provision, and consumption of freshwater food fish and, as a result, falls short in leveraging other important entry points for governing food security. We address these points in greater detail below.

First, the deep disciplinary and epistemological disconnect between scientists working in freshwater fisheries and aquaculture, and the framing of the two sectors as separate and distinct policy spheres, often in competition or opposition to one another, has severely curtailed the terms in which policy-makers and researchers understand the relative roles and contributions of wild and farmed fish. In contrast, the food fish system perspective stresses the complementarity of these forms of production within the same food system, making it possible to appreciate their overlapping (albeit differentiated) contributions to food security in the region. As such, the food fish system perspective

lays the ground for reconciling the siloed research agendas surrounding wild and farmed fish, suggesting multidisciplinary perspectives that combine elements from social and natural sciences. Such a reassessment notably calls for a better recognition of intermediate forms of production, that are still largely disregarded, and which understandings could help leveraging ecological synergies across wild and farmed fish production (Lynch et al. 2019). For instance, the food fish system would help moving the aquaculture research agenda beyond technical efficiency to pay greater attention to species diversity and become more sensitive to the ecology of local fish communities. By articulating a more integrated perspective on production, a food fish system perspective holds the promise to not only better tackle food security, but also to put greater emphasis on agroecological integrity rather than production efficiency alone (Eakin et al. 2016).

Second, a focus on fish production - and on specific types of production - has contributed to inadequate and distorted understandings of fish provision and consumption. Except for the literature on global value chains dealing with production for export, fish provision has been largely overlooked, creating a 'missing middle' in food fish system science-policy literature. Processing, distribution and consumption of fish, and the ways that changes in these spheres (e.g. technological and institutional innovations, new forms of retail, evolving consumption practices) ultimately shape production practices have been overlooked. Excessive attention towards export-oriented production in aquaculture has framed freshwater fish more as a global commodity for revenue generation than as a foodstuff contributing to food security in producing nations. Similarly, emphasis on the role of subsistence production in freshwater capture fisheries and aquaculture has contributed to ignoring the wider contribution of food fish to domestic and regional economies of South and Southeast Asia. As a result of these biases, understandings of fish consumption in the region fall short of grasping the socio-cultural factors that underpin where, how, and why, capture fish and/or farmed fish are consumed (see for e.g. Jennings et al. 2016), and their contributions to food security. In short, a food fish system perspective gives rise to clearer recognition of the specific nature of provision and

consumption, implying a reconsideration of how these in turn shape and structure the system (Koc and Dahlberg 1999; Bene et al. 2019).

Third, our review demonstrates the value of understanding multidirectional interrelations between production, provisioning and consumption that make up a food fish systems approach. As such, the food fish system thinking goes beyond 'chain' approaches where the emphasis is on bi-directional flows of products and finance and where governance is predominantly perceived in terms of leveraging improvements around production (Ponte and Sturgeon 2014). In contrast, by recognizing interrelated sets of production, provision, and consumption practices, a food fish system perspective reveals multiple entry points for governing outcomes associated with food. Seen from this angle, achieving food security or sustainability requires incorporating and coordinating the multiple ways in which these different sets interact (Ericksen 2008; Ingram 2011). In the context of rapid societal transitions such as those occurring in South and Southeast Asia, acknowledging such multi-directionality has the potential to better anticipate what changing consumer demands and systems of provision mean for the relative contributions of wild and farmed fish to consumers in the region; both vulnerable and affluent (IPES 2017).

We have articulated our food fish system approach here around freshwater fish, the marginalized bulk of food fish in the region, and argued that it makes a compelling case for advancing food systems thinking. Yet, more research is needed to complement these understandings with a food systems-based analysis of marine food fish, which is another substantial component of the regional food basket. It will be even more important for future research to move beyond these two broad aggregate categories of food fish in order to fully account for diversity within them, and better appreciate the differentiated contributions that individual species and products make to the overall food fish system (Tlusty et al. 2019). Going even further, we argue that a food fish systems thinking can be advanced by engaging with the turn to 'diet-thinking'. The latter works back from the practice of consuming meals or dishes to integrate the multiple and extended systems of ingredients (Haddad

et al. 2016; Willett et al. 2019). A diet approach can also help avoid the common export bias surrounding food fish (see Belton and Bush 2014; McClanahan et al. 2015; Bush et al. 2019) by articulating the geographic scope of production through consumption and provisioning (Béné et al. 2019).

2.8. Conclusion

A partial shift towards a food fish system perspective is apparent in the freshwater fisheries and aquaculture literature in South and Southeast Asia. The approach appears to be useful in explaining and reconciling polarizing narratives surrounding freshwater food fish by questioning key assumptions around what drives their production, provisioning and consumption in the region. The science policy literature is yet to frame future directions in 'food fish systems' terms. Nevertheless, there are indications that this literature, and the organizations it represents, are starting to open up to the value of systemically linking production, provision and consumption and translating these linkages into the policy landscape. By doing so they hold the potential to shift policy towards more integrated perspectives, moving beyond the simplistic productivist narratives to better consider how food fish is distributed and consumed in the region.

There remains considerable opportunity to further develop a food fish systems approach in Asia and beyond. While food systems research has generated considerable enthusiasm in recent years, such studies are still for the most part limited to the 'temperate minority'[10] from where most academic contributors originate (see for e.g. Jennings et al. 2016). In advancing the food fish system agenda, it will be essential for academics to make sure that they account for the realities of the 'tropical majority'[9], in particular Asia, where most of the world's fish is produced and consumed (FAO 2018). In that regard, the present study should be taken as a preliminary broad-brush

[10] This terminology is borrowed from Bavinck et al. (2018) to refer to the global north and the global south respectively.

assessment. Because food fish systems (however global) are dependent on local conditions, further attention should be given to fine-grained place-based studies that dissect and document how complex and interrelated sets of production, provision, and consumption practices affect the availability, accessibility, and use of food fish in particular places.

Notwithstanding this ongoing shift towards food fish systems thinking, we contend that the latter needs to be more explicitly fostered and adopted by research and development actors at the center of our review. Only then will it have a substantial influence in framing how the contribution of fish to food security is understood and translated into policy in regions such as South and Southeast Asia. It is worth noting that some of the criticisms stemming from our review have been recurring. It has been over 20 years since Bailey (1988) wrote in this same journal: “international development agencies have promoted a dualistic pattern of fisheries development within the Third World […] fisheries development and resource management need to be seen as complementary aspects of a single process”. To do so effectively, we have argued here for a food fish system as a promising framework for revitalizing fisheries and aquaculture development agendas towards food security.

"To say that consumption of food is a vital part of the chemical process of life is to state the obvious, but sometimes we fail to realize that food is more than just vital. The only other activity that we engage in that is of comparable importance to our lives and to the life of our species is sex [...] But these two activities are quite different. We are, I believe, much closer to our animal base in our sexual endeavours than we are in our eating habits. Too, the range of variations is infinitely wider in food than sex. In fact, the importance of food in understanding human culture lies precisely in its infinite variability ..."

Chang, Kwang-Chi.

Chapter 3:

Consumption practices in transition: Rural-urban migration and the food fish system in Myanmar

Abstract

This article explores the reconfiguration of fish consumption practices in Myanmar in a context of rapid urbanization and changing availability of wild and farmed fish. Using a social practice lens, we analyze how everyday fish consumption practices change as people move from the rural Ayeyarwady Delta to Yangon city. We show how these reconfigurations are shaped by new routines in urban areas and the transition from capture fisheries to aquaculture. Our analysis reveals a growing detachment of consumers from production processes but, at the same time, a continuity in their everyday food routines through the upholding of "mother's traditional cuisine", and a general drive to preserve commensality. We demonstrate the value of using a social practices lens integrating micro- and meso-scale socio-cultural processes to understand dietary change by examining how rural-urban migration influence the sourcing, cooking, and eating of wild and farmed fish. These insights have implications for the everyday geography of consumption, including the persistence of socio-culturally appropriate food practices and the hybridization of rural-urban food environments. As such, social practice approaches to the study of food consumption open up a means of understanding and even steering complex food system transitions in dynamically changing regions such as Southeast Asia.

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3.1. Introduction

Food systems thinking is gaining traction in science and policy as a common framework for understanding and shaping the relationships between food production, provision, and consumption (Ericksen 2008; HLPE 2017). In doing so food system thinking goes beyond the productivist focus that has historically dominated research and policy to highlight how production affects and is affected by the ways in which food is traded, cooked and eaten (Haddad et al. 2016; Béné et al. 2019a; Tezzo et al. 2020). Focusing on these interrelations is increasingly important given the growing variation of food consumption practices by urban populations and their dynamic interconnections with rural areas (Seto & Ramankutty 2016; Béné et al. 2019b). As urban populations expand, new urban lifestyles and an overall acceleration of working lives influence the variety of food choices available. These changes to how food is traded, cooked and eaten shape wider transitions in the food system (HLPE 2017; IPES 2017; Drewnowski & Popkin 1997).

Despite their growing significance, the mechanisms that cause changes in food consumption in urban spaces remain poorly understood (Seto & Ramankutty 2016). Macro-level analyses tend to emphasize the increasing share of non-staple food items in urban diets, including animal products and processed foods, as well as the increasing opportunity costs of time, and the higher prevalence of eating away from home (Popkin 2001; Ma et al. 2006; Pingali 2007; Reardon et al. 2014). However, such analyses tend to conflate growing urban populations with rising incomes and the 'westernization' of food practices, and in doing so tend to overlook micro- and meso-scale socio-cultural effects of changing urban food practices and their impact on the wider food system – both in urban and rural settings (Fine 2002; Veeck & Burns 2005; Fourat & Lepiller 2017; Hansen 2018). Research on these dynamics is particularly pressing in Asia given the region has the highest rate of urbanization in the world (UN 2014), and there remains persistent concern over urban food security (Haddad et al. 1999; Sonnino et al. 2016; Ruel et al. 2017).

In this paper we analyze the effects of rural-urban migration on food systems using a social practice lens. Theories of social practice have been used to reimagine food systems as a set of routinised doings and sayings that shape food practices across different socio-cultural contexts (Wertheim-Heck & Spaargaren 2016; Warde 2016; Brons et al. 2020). By understanding how social actors carrying these practices reconfigure and/or reinforce both the routines and relations that enable consuming, provisioning, and producing food, a practice approach highlights how everyday consumption practices are carried and transformed (or not) across space, notably here between rural and urban environments (Bell & Valentine 1997; Rigg 1998; 2007; Sahakian et al. 2016). As such, a social practice lens can help link 'micro' changes to wider food system transformations, and shed light on whether transformations deliver equitable access to nutritious and sustainable food (Domaneschi 2012; Hinrichs 2014; Geels et al. 2015; Hansen 2018).

We build on Fine's (2002) approach of using the in-depth analysis of a single commodity, 'fish', to understand complex food system-level changes. We have selected fish for three reasons. First, the consumption of fish is ubiquitous and culturally significant across much of Asia, contributing to a rich culinary diversity (Khin 1948; Chang 1977; Khaing 1975). Second, the production and provision of fish in the region is rapidly shifting from wild to farmed, driven in part by growing demand in urban centres (Bush & Marschke 2014; FAO 2016; Bush et al. 2019; Tezzo et al. 2020). Third, fish remains important in the Asian diet because it is a relatively cheap and accessible form of animal protein rich in micronutrients (Beveridge et al. 2013; HLPE 2014). These factors make fish an ideal commodity 'lens' through which to explore the relationships between food practices, rural-urban migration, and food system transitions.

We examine these interrelationships in Myanmar, a country in Southeast Asia that experienced rapid urban development during its brief political and economic opening from 2011 to 2020 (Forbes 2016). Yangon, the largest city, is a fast-emerging metropolis, with growth fueled by rapid rural-urban migration, similar to many other large cities in the region (Rogers & Williamson

1982; Zhang & Shunfeng 2003; Belton & Filipski 2019). Yangon has experienced particularly large inflows of migrants from the surrounding Ayeyarwady Delta (Forbes 2016; Estoque 2017; Sabrié 2019), the most important fishery region in the country. Analysis of the latest national census suggests that this regional inflow resulted from 'push and pull' dynamics with, on the one hand, a high incidence of landlessness pushing people out of the Ayeyarwady Delta and, on the other, the emergence of employment opportunities pulling people in the economic capital (Pritchard et al. 2018). In parallel to this migration dynamic, areas surrounding Yangon have witnessed a rapid expansion of aquaculture aimed at meeting growing urban demand for food fish, mirroring developments elsewhere in the region (Belton et al. 2015; Little et al. 2016; Saguin 2018; Tezzo et al. 2018).

Building on Tezzo et al. (2020), we examine the practices of Yangon's rural migrants to understand the role of urban dietary change and transforming patterns of fish consumption in shaping the food fish system. Our analysis is structured around three questions. First, how do fish consumption practices (in both urban and rural spaces) change in response to rural-urban migration? Second, what implications do these reconfigurations hold for understanding broader processes of change in the food fish system? Third, how does the specific case of food fish in Yangon advance a more general understanding of urban dietary changes? We find that fish consumption practices are reconfigured by new routines as they travel back and forth across urban and rural spaces. The analysis of these reconfigurations offer a geographically-sensitive approach to understanding the effects of shared practices on system-level processes of production and distribution that ultimately affect food and nutrition security.

The following section elaborates the link between practices and food system transitions. We go on to describe the geographical context and the methodology used for identifying and investigating migrant households in Yangon. Our results are then presented through three fish consumption practices of sourcing, cooking, and eating, drawing attention to how these practices

have been reconfigured or reinforced as they move from rural to urban settings, as well as how new urban practices 'return' to rural contexts. We go on to reflect and conclude on the significance of changing urban food practices for the wider food fish system.

3.2. Practices in food systems

Practice theories focus on the routinization of social life within the contextualized and historical setting of everyday doings and sayings (Reckwitz 2002; Schatzki 2002; Shove et al. 2012; Spaargaren et al. 2016). Social practices are reproduced and routinized by knowledgeable and capable actors, with generally little discursive reflection on the material and social conditions that shape these practices (Spaargaren 2011; Maller & Strengers 2013). Practices are, as such, neither rational nor utilitarian. They are instead continually shaped and reshaped in relation to the (often mundane) social and material context in which they are performed (Shove et al. 2012; Spaargaren et al. 2016).

In this paper we focus on changes to contemporary urban fish consumption practices in two ways. First, we examine how these practices are shaped by their historical context. That is, how they become habitualized based on 'accepted' (and often unquestioned) social norms, relations movements, and meanings (Spaargaren 2011; Doddema et al. 2018). Second, we analyse the ways in which these habitualized practices are 'carried' by those performing them in time and space (Fine 2002; Maller & Strengers 2013; Wertheim-Heck & Spaargaren 2016). In doing so, we examine how these mobilized practices are confronted with new social and material settings that can lead to the integration, rejection or emergence of completely new ways of sourcing, preparing or eating food (Oosterveer 2006; Mak et al. 2012; Spaargaren et al. 2013). Examining changes to practices over time and space shows how food practices routinized in rural settings change when moved to an urban context, but also how these 'new' urban practices then feedback onto rural settings, reflecting their continual transition across spaces (Bell & Valentine 1997).

All food practices are embedded in other sets of interrelated practices that together constitute daily life. As Warde (2016) argues, a given practice is not singular, but rather is formed through the articulation of a range of different practices with different logics and rules. As such, any practice is part of a 'bundle' of practices, that are multiple practices interwoven across time and space (Shatzki 2002; Shove et al. 2012). The three fish consumption practices we focus on, sourcing, preparing, and eating, are each comprised of other practices. For example, eating is not only a bodily practice of assimilating food, but also the reproduction of cultural meaning and social relations (Warde 2016). By focusing on the bundles of practices that constitute sourcing, preparing, and eating fish we explore the ways in which routinized rural fish consumption practices change (or not) as they are carried into urban contexts (Figure 3.1.).

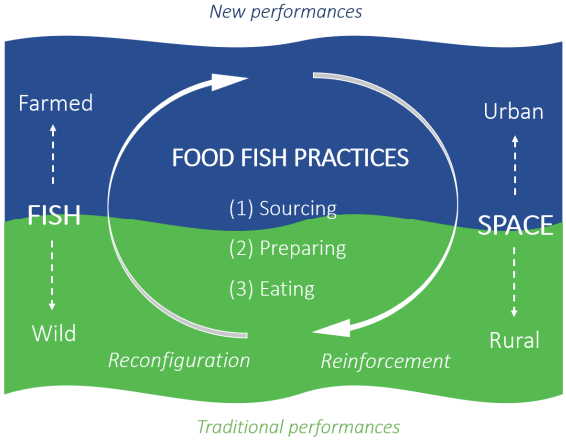


Figure 3.1. Fish consumption practices theoretical framework.
Source: Adapted from Warde 2016

Following Shove et al. (2012), we observe and analyze the performances of (bundles of) fish consumption practices through the intersection of three integrated 'elements' of food practices. These are: (1) meanings, made up of general understandings or values attributed to a doing or saying; (2) skills and competences required to perform a given practice, and; (3) material objects

and infrastructures that enable the performance of a practice. While constitutive of all practices, one element may be more prominent than another in any given performance of practice (Shove et al. 2012). Our focus, however, is not on the role of these elements. Rather we examine how these elements collectively change and affect the performance of fish consumption practices as practitioners move from rural to urban settings.

A focus on food practices provides an alternative way of understanding food systems. Instead of bracketing off production, provision and consumption, a practices approach highlights the ways in which ostensibly autonomous doings and sayings are both linked and co-constitutive (Halkier & Jensen 2011; Southerton 2013; Warde 2016). This means that a 'food system' is not an object of research in and of itself. It is instead made up of, and therefore best understood as, the accumulation of inter-*acting* bundles of practices. Systems transitions, either intentional or not, are then determined by the sum interaction of these practices. As argued elsewhere (see Bene et al. 2019a; Tezzo et al. 2020), a practices approach thus provides analytical power that is generally lacking from the broadly heuristic use of 'food systems'.

3.3. Methodology

We analyze changes in rural and urban fish consumption practices through a qualitative case study methodology (Stake 1995). Data is based on a mix of direct observation and narrative descriptions from field visits and interviews with members of households that have migrated from the Ayeyarwady Delta to Yangon over the past 40 years. These households were selected through purposive sampling, with attention given to diversity to ensure generalizability of the results (N=13 households, encompassing a total of 46 people). The resulting sample included a spread of (1) early/late migrants; (2) young and old; (3) male and female; (4) large and single-member households; (5) low and high income; and (6) households with/without children (see Table 3.1.).

Additionally, households were selected to maximize geographical representativeness of the sample across both the Ayeyarwady Delta and Yangon (Figure 3.2.).

All households were interviewed following a semi-structured questionnaire based on five modules made up of questions about their: (A) migration and life histories, (B) general everyday food practices, (C) fish eating practices, (D) fish cooking practices, and (E) fish sourcing practices. Interviews were conducted with the member of the household deemed most knowledgeable about the household's food practices in their Yangon residence. Whenever necessary, additional household members were also interviewed to complement the information. This resulted in a total of 25 interviews, each lasting between two and five hours. Whenever possible, the participating households were also observed during their shopping excursions and/or while preparing and eating their meals. These structured observations (N=8) were used to corroborate some of the information collected in the interviews by asking ad hoc questions to participants to elicit their immediate reactions, meanings and choices that were attached to the practices being performed.

All interviews were conducted by the first and second authors using a mix a Burmese and English language. All data was then transcribed in English and coded in NVivo 11 software. A codebook was developed based on the theoretical framework: the main code categories corresponded to its three analytical dimensions, namely (1) Spaces (i.e. urban/rural), (2) Fish consumption practices (i.e. sourcing/preparing/eating), and (3) Fish (i.e. wild/farmed). Subsequently, secondary codes were added to the codebook to inductively explore additional themes that emerged from the analysis.

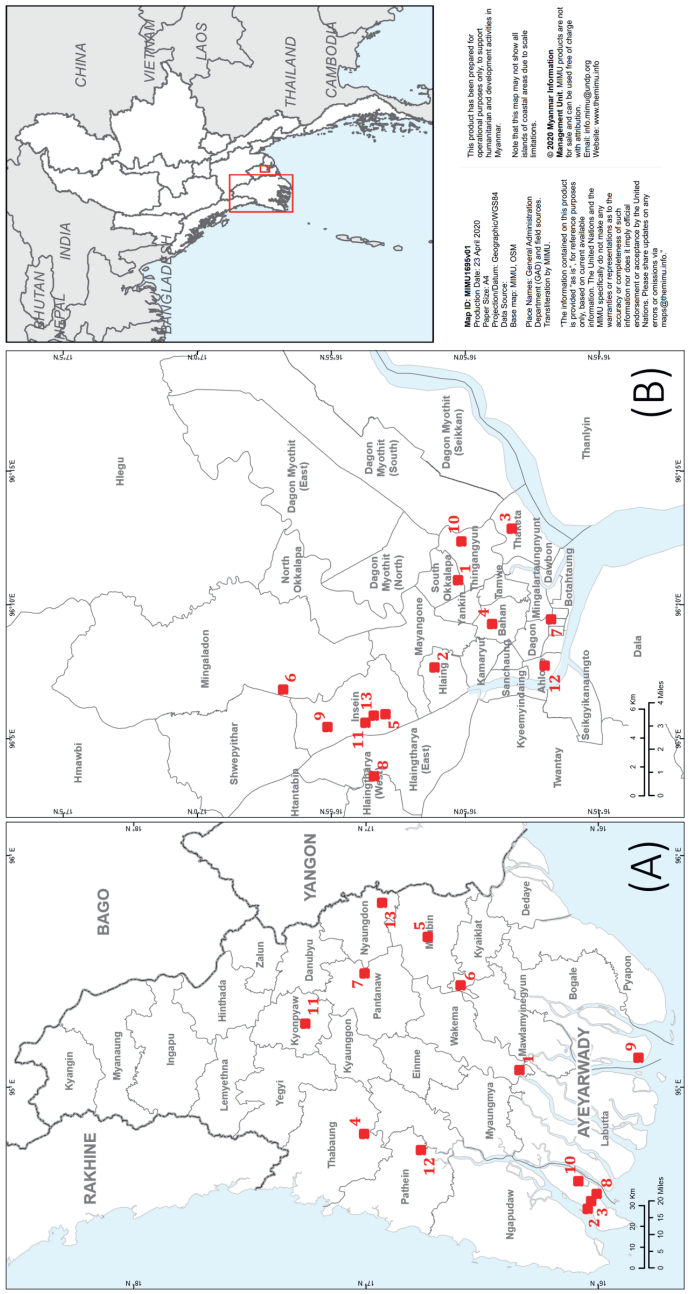


Figure 3.2. Residing locations of sampled households across (A) the Ayeyarwady Delta Region and (B) Yangon City.

Source: Myanmar Information Management Unit (MIMU)

Table 3.1. Summary information on sampled households

	Main respondent		Household information					
HH #	**Gender**	**Age**	**HH size**	**N° of children**	**Township of origin**	**Yangon neighborhood**	**Time in Yangon** (years)	**Household main occupation(s)**
1	Female	61	4	0	Wakema	South Okkalapa	38	Store keeper, private driver
2	Female	32	4	1	Ngapudaw	Hlaing	9	Researcher (NGO)
3	Male	31	2	0	Ngapudaw	Thaketa	10	Civil servant, administration (company)
4	Female	44	2	0	Thabaung	Bahan	15	Private nanny
5	Female	38	4	0	Maubin	Insein	10	Public servant
6	Female	49	6	2	Kyaiklat	Hlawgar	22	Electrician (self-employed), cleaner (NGO)
7	Male	28	2	0	Pantanaw	Kandawlay	9	Administration (NGO)
8	Female	51	2	1	Ngapudaw	Hlaingthayar	7	Factory worker
9	Female	38	2	0	Bogalay	Insein	24	Tour guide, Entrepreneur (textile retail)
10	Female	62	3	3	Ngapudaw	Thingangyun	3	Air-conditioning technician
11	Female	44	5	2	Kyonepyaw	Insein	6	Private driver, civil servant
12	Female	58	6	1	Pathein	Ahlone	10	Civil servant
13	Male	54	4	2	Nyaungdon	Insein	25	Civil servant

3.4. From rural to urban fish consumption practices

This section presents our description and analysis of the three bundles of fish consumption practices: sourcing, preparing, and eating fish.

3.4.1. Sourcing: Detachment from production and handling mistrust

Sourcing fish for consumption includes four constitutive practices, namely self-provisioning, bartering, wet market shopping, and door-to-door shopping (Table 3.2.). Overall, our analysis points to a detachment of provision and consumption practices from production processes as they transition from a rural to an urban setting. This growing divide has implications for how fish are sourced, resulting most notably in a growing suspicion about freshness and quality and new practices for determining these.

Respondents recalled the absolute importance of self-provisioning fish in the rural space. When they lived in these areas, most villages in the Ayeyarwady Delta had seasonal (rather than permanent) wet markets organized around specific food items like fish or vegetables. For most of the year, therefore, they harvested their own food for household consumption or occasionally bartered with neighbors. This self-sufficiency extended to harvesting fish from the wild, including estuaries, streams, rivers, floodplains, and rice fields. As more generally recognized, wild caught fish was (and often remains, see Gregory 2017; Oo & MacKay 2018; Tezzo et al. 2018) the dominant animal source food in these rural areas. The practice of catching fish and collecting plants from surrounding areas or procuring these through neighbors was widespread. It was also clearly noted by respondents that food harvesting in general, including fishing, was strongly seasonal, resulting

in extended periods of low dietary diversity and food scarcity for the poorest households.[11] As one respondent stated:

> "We were poor but we would still eat fresh fish regularly because it was readily available and relatively cheap […] During the summer, fish was often scarce and there would be little food available […] we would sometimes simply have rice with oil and salt." (Main respondent, household # 13)

[11] See Thein et al. (2019) and Okamoto et al. (2021) for more on seasonality and subsistence-oriented livelihoods in the Ayeyarwady Delta of Myanmar.

Table 3.2. Overview of fish sourcing practice reconfigurations from rural to urban space

		RURAL SPACE		URBAN SPACE
PRIMARY	SELF-PROVISIONING	The customary practice for sourcing fish and plants, attached with low diversity and high seasonality. It is marked by periods of scarcity for the poorest households.		The practice prevails (to a lesser extent) for plants whenever possible. People overall retain good competence (e.g. for identifying herbs). The performance represents the reproduction of a fondness for their former rural lifestyle.
		SUMMARY	*Actors carry competence (i.e. species identification) but the meaning changes from everyday subsistence to an occasional wistful ritual.*	
	NEIGHBOUR BARTERING	Like self-provisioning, the practice is attached with low diversity and high seasonality. It is very common during the high fishing season. It is essentially conceived as a neighbourly service.		The practice prevails through the establishment of complex social networks to source quality fish from the village. Even though it sometimes entails trade, it is mostly based on a system of reciprocity.
		SUMMARY	*The meaning of the practice largely prevails (i.e. peer support) but actors must often adjust competences (i.e. extended social networking).*	
	WET MARKET SHOPPING	In (small) villages, these are mostly seasonal and organized around specific food lines, hence of minor everyday importance. Established markets are often relatively distant from home.		The everyday practice for sourcing fresh food, typically in the morning. Outlets are often available nearby residences. Food is abundant, diverse and can be purchased by weight. Important concerns over freshness.
		SUMMARY	*Material availability of outlets makes the practice become the norm. Actors adjust competences to deal with material differences (i.e. farmed fish).*	
ECONDAR	DOOR-TO-DOOR SHOPPING	Particularly performed during low season, fresh food (i.e. vegetables, and occasionally fish and chicken) is purchased from specialized itinerant retailers visiting homes in the morning.		Service newly offered by modern retail outlets but seldomly used by migrant households because prices are reportedly prohibitive. Increasingly common way to procure rice (regular delivery).
	CROSS-CUTTING OBSERVATIONS	Fast increase in the supply of farmed fish (mostly urban space, but also increasingly in the rural). Chicken reportedly replacing fish in food baskets (lower price).		

Albeit to a limited extent, the practices of self-provisioning and bartering are still performed by migrants in Yangon. Whenever possible, those with the knowledge and skills to do so continue to collect wild plants from nearby vacant lots. However, the persistence of this practice has less to do with subsistence than it did in their rural homes. It instead represents the reproduction of a fondness for their former rural lifestyle. More commonly, migrant communities organize direct supply of wild caught fish from their rural village. However, unlike bartering in the village, such arrangements depend on intricate social networks that extend beyond direct neighbors (as observed in other Southeast Asia countries, see Bush 2004a). For example, the transport of fish to Yangon depends on people commuting from their villages by public express bus and a system of reciprocity rather than remuneration. As is expected, the provision of this wild caught fish is particularly common during the monsoon fishing season (see Welcomme et al. 2010; LeGrand et al. 2020).

Despite this persistence of self-provisioning, the dominant means of sourcing food in Yangon is local urban markets. Supermarkets are visited only occasionally to supply processed food or other household consumables. The vast majority of fresh food, including fish, is sourced through wet markets visited in the early morning. This daily routine can be partly linked to 'door-to-door' trading in the rural space; where fresh produces such as vegetables, and occasionally fish, are traded by specialized itinerant traders moving through the village during seasons with low primary production. Although comparable fresh food delivery services are available in the city, the practice is seldom performed by urban migrants given, they argue, prohibitive prices. Walking to wet markets is instead the dominant practice, enabled by their high prevalence in Yangon and as such convenience of walking to them from residential areas (as observed in many other urban centres across Southeast Asia, see Wertheim-Heck & Spaargaren 2016; Saguin 2018). Indeed, these wet markets were commonly praised by respondents for their accessibility and year-round abundance and variety of food; as one respondent stated, "... (food is) more available than in my village. You

can literally find every type of food here!", even though, they added "you need the money" to buy it (Main respondent, household #10).

A typical wet market in Yangon consists of an agglomeration of small to medium-sized vendors, each specialized in one food line (as also common across Southeast Asia, see Cadilhon et al. 2006; Zhong et al. 2020). Meat and fish retail usually takes place in the morning. Generally, the larger the wet market, the more specialized the fish retail operations. In descending order of volumes, fish retail operations in Yangon normally consist of freshwater farmed fish, processed fish (e.g. fermented fish paste *'ngapi'*, salted fish, and smoked and dried fish), marine wild fish, and freshwater wild fish vendors. Small-scale fresh wild fish vendors (referred to as *'byan ka zay'* or 'illegal/unlicensed market operators') typically move around the market and trade from a tarpaulin or basket laid directly on the ground. The other fish vendors operate from a designated stall consisting of an elevated wooden platform. Fresh fish are commonly sorted by species and size and displayed on large metallic plates (Figure 3.3.). Despite the value given to freshness, ice is rarely used by any of the vendors. This is, paradoxically, for fear of triggering suspicion over the freshness of fish (as observed in other countries of present-day Asia but also in nineteenth century Europe – see Freidberg 2015; Zhong et al. 2020). As one respondent explained:

> "When I buy fish in Yangon, freshness is more of an issue than in my village. Whenever the fish is frozen or displayed on crushed ice, I simply do not buy it." (Main respondent, household #6)

Figure 3.3. Illustration of a small farmed fish vendor in a typical wet market in Yangon.

Source: Picture by Tezzo.X, Thingangyun Township.

Freshness is indeed the main indicator of value and is assessed through a set of three common techniques carried by migrants from their rural villages. They check how vibrant the color of the gills is, whether there is clarity to the color of the eyes, and whether the flesh of the fish is firm. The rural origin of these competence is made clear by their absence among younger family members, or people who have spent most of their adult life in the city. These competences also differ within migrant households depending on their respective experience with the practice, typically shaped in the rural space. As one respondent confessed:

> "My husband often makes fun of me saying that I have spent too much time in Yangon and cannot recognize fresh fish anymore […] To be fair, he used to be the one catching fish back in the village and he is really good at checking freshness." (Main respondent, household #4)

The respondents also indicated that urban life entails a relative detachment from food production, which in turn has led to a growing distrust of retailers by consumers. All of the people

interviewed reported being 'cheated' by their fish vendors. This distrust of vendors appears to be especially strong in the context of processed fish products, in which the identification of species and product quality is substantially more difficult. One respondent, for example, explained how they did not trust the quality of fish paste[12] in Yangon because, in contrast to their village, they do not know the people from whom they purchased it leading to suspicion on the safety and quality of the ingredients:

> "The [fish paste] we ate in the village was either homemade or purchased from people we knew […] I heard that most of the fish paste sold in Yangon is not fermented long enough and that some processors use chemicals instead […] The retailers, they often lie about the fish species they have used so they can sell their product for a higher price." (Main respondent, household #5)

Such mistrust has led to the emergence of new sourcing strategies of fresh and processed fish in Yangon. Reflecting observations made across Southeast Asia (see for e.g. Evers and Mehmet 1994; Bush 2004a; Máñez and Pauwelussen 2016), consumers build trust in the products they purchase by demonstrating loyalty towards a single vendor for specific products. In turn this loyalty provides a basis for trust in quality and price. It is also the absence of such trust, it seems, that contributes to the persistence of sourcing fish directly from rural villages through neighbors and acquaintances.

Practices for determining the quality and building trust with vendors in urban areas has also been shaped by the overwhelming prevalence of farmed fish on the city's market. Farmed fish are regularly purchased by urban migrants who appreciate their year-round availability. However, respondents had a shared sense that the quality of farmed and wild fish are intrinsically different.

[12] Fish paste (referred to as *ngapi*) is a generic term to refer to pungent pastes made from either freshwater fish (referred to as *'nga ngapi'*) or marine shrimps (referred to as *'pazun ngapi'*). There are several regional variations based on the species used in the preparation.

Contrary to wider assertions on their substitutability (Delgado et al. 2003; Natale et al. 2013), respondents all indicated a strong preference for wild fish, stating that farmed fish is only purchased because of the high price of wild fish in Yangon (as reported elsewhere in Asia – see Bestor 2001; Saguin 2018). Respondents also consistently argued that the quality of farmed fish is more difficult to discern than that of wild fish. Farmed fish are commonly displayed as cutlets placed besides the head of the fish, making it more challenging to determine their freshness and easier to disguise which species is being sold, and relatedly, their farmed origin, in attempt to charge a higher price. As illustrated by one respondent:

> "With farmed fish, you are never really sure that the head you're checking actually belongs to the same fish […] Often, the only check you can make is on the sliced flesh […] Whenever I buy fish balls[13], I prefer to have the vendor scratching the flesh in front of me so I am sure of what I am buying" (Main respondent, household #12)

The responses of rural migrant consumers in Yangon indicate that there are similar processes of change occurring in the rural space. One respondent related:

> "When I was young, there were already quite a lot of fish farms around my village but farmed mrigal [*Cirrhinus cirrhosus*] and catla [*Gibelion catla*] were all sold to Yangon back then […] As aquaculture operations have kept increasing over the years, an important proportion of the former fishing sites have been turned into fish ponds. Nowadays people in my village increasingly resort to farmed fish that they purchase from the market … " (Main respondent, household #13).

There seems to have been a recent proliferation of wet markets across some villages through the Ayeyarwady Delta. This expansion, which can be largely attributed to the dramatic development

[13] Also referred to as '*nga chit*' or '*surimi*', these minced fish balls are obtained by scrapping the flesh of rohu [*Labeo rohita*] or featherback fish [*Notopterus notopterus*]. They are typically sold ready-to-cook, sometimes already mixed with baking soda and spices.

of road infrastructure across the region in recent years, seemingly leads to an increasing occurrence of shopping for food in these villages. Our discussions indicate that such development is accompanied by the growing availability and diversity of fresh food. When it comes to the transition to farmed food fish, it increasingly appears that changes occurring in the urban space are extending to the rural food basket. As we will see in the next section, these reconfigurations of fish provision interconnect with the urbanization of culinary practices.

3.4.2. Cooking: Upholding (and adjusting) mother's cuisine

Cooking food fish in Yangon by rural migrants can be divided into a bundle of four constitutive practices, namely cooking fish curry, serving fish paste, frying, and steaming fish (Table 3.3.). Our overall observation is that rural migrants in Yangon maintain a strong attachment to traditional 'rural cuisine', which is typically associated with the cooking performances of their mothers. Yet, as migrants transition to the urban space, changes in food environment and lifestyle may lead to adjustments of traditional culinary practices and a reconfiguration of the bundle of fish cooking practices.

Table 3.3. Overview of fish cooking practices reconfigurations from rural to urban space

		RURAL SPACE	URBAN SPACE
PRIMARY	COOKING A CURRY	The practice is quite elaborate (i.e. diversity of ingredients, time-consuming) and considered as cooks' reference dish. It is by far the most common way of preparing wild fish.	The practice is often made simpler and quicker. Farmed fish are typically considered unsuitable for curry by conservative (often older) migrants.
		SUMMARY	*The competence remains a reference in culinary repertoires, but changing material aspects (i.e. equipment, farmed fish) induce adaptations.*
	FRYING	The practice is relatively common to prepare small fish. It reported to be effective for preserving fish over a few days in the absence of a fridge. Oil is considered a relatively expensive commodity.	The practice is considered the easiest, the fastest, and the most suitable for preparing farmed fish (richer in fat). It is very common among less-experienced cooks, particularly with fish balls.
		SUMMARY	*Very little competence required. The practice gains increasing prominence as it is considered ideal to prepare materially different fish (i.e. farmed).*
	SERVING FISH PASTE	The practices of serving fish paste as a dip with vegetables (i.e. *ngapi yay*) is a day-to-day practice. Cooking fish paste with a few condiments (i.e. *ngapi gyet*) is mostly seasonal - during off season.	*Ngapi yay* is more exceptional and it is mostly conceived as a treat to eat with guests. *Ngapi gyet* is typically an everyday practice for poorest consumers who cannot afford fresh fish.
		SUMMARY	*Material quality and actor's competence remain essential, but the meanings attached to different cooking methods change across space.*
SECONDARY	STEAMING OR COOKING SOUP ('MOHINGA')	The practices are typically performed for donation ceremonies or other special occasions. Species (only wild) used vary according to locations and seasons.	The practices are still mostly performed for donation ceremonies or other special occasions. Farmed fish are often used as more affordable alternatives, allowing the preparation of larger quantities.
	CROSS-CUTTING OBSERVATIONS	Equipment differs between urban (hot plates, slow/rice cookers, fridge) and rural spaces (i.e. coal stove). Common practice across urban and rural spaces to cook once a day (i.e. same menu for lunch and dinner). Cooking is predominantly the responsibility of women although this is sometimes transgressed in the city.	

Our first observation is that cooking is strongly gendered within rural migrant households, with women responsible for food preparation and the performance of often distant (rural) mothers serving as benchmarks for determining 'proper conduct' of cuisine. Although this gendered responsibility is occasionally transgressed in Yangon, the competences for cooking are still typically passed-on generationally through women in the urban space. This was confirmed by a woman respondent who recalled how her youngest daughter, upon getting married and taking over responsibilities for her new household, had to "catch up" her cooking skills "by learning from her sister and myself" (Main respondent, household #10).

Central to the culinary repertoire of mothers is the practice of cooking fish curry. Myanmar has a highly diverse range of cooking methods and dishes, reflecting the influence of both India and China. Despite this diversity, 'curry' is the reference dish across the country (Nash 1965; Khaing 1975) and holds a strong role in cultural identification and language – the traditional greeting in Myanmar literally translates as *"Which curry did you eat?"*[14]. In rural areas, cooking a curry is by far the most common way of preparing wild fish, notably catfish (commonly *Clarias batrachus*) and climbing perch [*Anabas testudineus*] among several other species. While our interviews with rural migrants indicated that the preparation of fish curry varies by region and fish species, the process of cooking a fish curry is consistently elaborate, requiring several ingredients (usually oil, tomatoes, onions, turmeric, cardamom, coriander, garlic, ginger, and chilies) and necessitating a long preparation time. When probed about the specificities of their curry, respondents systematically alluded to the routinized practices of their distant rural mothers.

While fish curry remains a reference dish in Yangon, its preparation has been sped up. The use of electric equipment such as hot plates and slow cookers enables a faster cooking time than the

[14] In Myanmar, a typical meal includes steamed rice as the main dish and one (or several) accompanying curry. According to local customs, asking someone whether s/he has already eaten is a common greeting. As such, '*Htamin sa pi bi la'* (which translates as: *'Have you already eaten rice?'*) is typically followed by *'Ba hin sa leh'* (which translates as: '*Which curry did you eat?').*

traditional coal stoves found in rural kitchens (Figure 3.4.). People in the city also commonly report cooking with fewer ingredients, sometimes only using chilies and tomatoes. In some other instances, reconfigurations of curry cooking in the city follow other motives such as the incorporation of new flavors in contradiction to their mother's cooking method. This can involve diverging, as one respondent outlined, by "I flavor my fish curry mostly with pepper, which my mother never uses." (Main respondent, household #3). Other respondents noted changes on the basis of dietary considerations. For example, one migrant argued that, in contrast to her mother who "uses a lot of oil in her fish curry ... [which] she argues ... helps preserve the food longer ... I use much less oil because I am more concerned about eating healthy." (Main respondent, household #2).

Figure 3.4. Illustration of the typical kitchen set from a Delta migrant household in Yangon.

Source: Picture by Thadoe Wai, Wakema Township

As seen in sourcing practices, urban cooking practices were also noted as being carried back into rural areas. As the electricity grid has expanded, so too has the use of cooking equipment. In the process, some elements of urban cooking have been taken up, including the use of dried (instead of fresh) shrimp and the use of taste enhancers like monosodium glutamate (MSG) – to the extent,

as one respondent put it, that "even my grandmother (in the village) now occasionally uses MSG in her cooking." (Main respondent, household #2).

Overall, however, it is apparent that the propensity for reconfiguring well-established food fish cooking practices related to dishes like fish curry is greater in younger rather than older generations. In contrast, older people appeared more likely to perpetuate traditional cooking practices based on rural performances. It is between these generations that the use of farmed and wild caught fish to cook curry differs. But even if younger generations of migrants tolerate certain species of farmed fish into their curries, such as mrigal [*Cirrhinus cirrhosus*] or rohu [*Labeo rohita*], there is also a relatively strong consensus amongst them on the inappropriateness of some other farmed species such as tilapia (most commonly *Oreochromis niloticus*). As unequivocally stated by a respondent:

> "We would never cook a curry with (farmed) tilapia. That fish is better eaten either fried or barbecued." (Main respondent, household #10)

The 'suitability' of farmed fish for frying is indeed a generally shared position within the migrant community in Yangon. The practice of frying is also used in rural areas for cooking small fish species such as gourami [*Trichopodus pectoralis*], mola [*Amblypharyngodon mola*], or anchovies (a generic term referring to several small marine fish species). However, it appears that rural migrants in Yangon also fry widely available farmed fish like tilapia in order to assimilate them into their everyday diet. Even though the consumption of farmed fish is still partially resisted by more conservative migrants, younger generations typically recognize the benefits of frying them. First, they point out it saves a considerable amount of time in contrast to the preparation of curries and, as such, aligns to their faster-paced urban lifestyle. Second, they note the easiness of the technique rendering it convenient for less-experienced cooks. This is particularly true for ready-to-fry fish balls, which are processed from (farmed) rohu and increasingly part of the diets of most

urban households. Third, fried fish is considered more easily accepted by children. As one respondent argued, "I fry it (farmed mrigal) for my daughter […] she really likes it because the taste is less fishy and there are only few bones." (Main respondent, household #2).

Other cooking practices have experienced a subtler reconfiguration. Among them is the consumption of fish paste which has changed its meaning as compared to performances in the rural space. As one respondent in Yangon recalled:

> "Back in the village, *ngapi* would be prepared during the peak of the fishing season, mostly using unsold catches of gourami, climbing perch, or sometimes mola. It would then be used during the rest of the year, making fish part of our meals even during the low fishing season. Together with firewood and rice, I remember that storing fish paste before the rainy season was a major preoccupation in my village." (Main respondent, household #13)

In addition to its traditional use as a condiment, fish paste is commonly prepared into a dip and eaten with fresh raw or blanched vegetables. This practice (referred to as '*ngapi yay*'[15]) is typically performed to serve as an everyday side dish in the rural areas to complement the main course. The same respondent went on to explain:

> "The daily preparation of *ngapi yay* consists in boiling fish paste, filtering it to remove the bones and then mixing it with chilies. Some people like adding turmeric to the mix because it helps covering the fishy smell […] *Ngapi yay* is definitely more of a food to share, you don't prepare it for only one person … (Main respondent, household #13).

Another method for cooking fish paste as a main dish (referred to as '*ngapi gyet'*) is practiced in rural areas to compensate for the lack of fresh fish during the less fish abundant dry season. In Yangon, however, *ngapi*-based dishes serve different functions. *Ngapi yay* has become a less

[15] We decided to focus the attention here on the two most common practices. There exist several other ways of consuming fish paste (i.e. as a condiment, baked, in salad, *'balachaung'*, etc.).

common dish, served mostly when receiving guests. *Ngapi gyet* on the other hand is typically considered as the "curry of the poor" (Main respondent, household #2) with less affluent households cooking the dish all-year-round as a cheaper alternative to fresh fish. Despite these differences, the quality of the fish paste itself remains of utmost importance, no matter the dish. Mirroring some of the observations made around fish sourcing, there appears to be a shared consensus among all of the rural migrants interviewed that cheaper fish paste processed from farmed fish - and now overwhelmingly more available in Yangon than *ngapi* made from wild fish - is not of an 'acceptable' quality.

In contrast, fish cooking practices that consist of steaming fish or cooking fish soup (such as '*mohinga'*[16]) demonstrate how cooking practices have been reconfigured by replacing wild fish by farmed fish in Yangon. These fish cooking practices are only performed at home on special occasions such as moon festivities, Buddhist donation ceremonies, weddings, birthdays, funerals, housewarming, or other social events. In rural areas, expectations remain as to which (wild) fish species should be used - according to the season, regional preference, and the social status of people attending - normally either catfish, striped snakehead [*Channa striata*], hilsa [*Tenualosa ilisha*], or seabass [*Lates calacarifer*]. In contrast, the same cooking practices in Yangon incorporate farmed fish species. Rural migrants now typically steam or cook *mohinga* with mrigal, rohu, or sometimes even tilapia. This shift to use of farmed fish has also been driven by the large quantities of food required during these celebratory occasions, which has also affected their normalization in everyday cooking.

[16] *Mohinga* is a rice noodle and fish soup that is traditionally prepared for breakfast and considered 'the national dish' of Myanmar.

3.4.3. Eating: Preserving commensality

Eating fish can be broken down in a bundle of four constitutive practices, namely the family meal, eating out, eating from a lunchbox, and observing food restrictions (Table 3.4.). Overall, our analysis points towards an individualization of eating as people migrate from rural areas to Yangon. However, despite this trend, migrants continue to attach considerable importance to commensality – or eating together. Below, we illustrate some of the strategies devised by migrants in the urban space to revive this central value through their everyday eating performances.

In the rural areas, everyday meals are eaten with the entire family. This entails sitting on the floor in a circle with dishes served on a low round shaped table or directly on the floor. Rice plates are typically placed in front of each person while dishes are laid out in the middle. The number and combination of dishes vary according to both context and social status, but there is generally a main dish (often a curry), a soup, and some *ngapi yay* (Figure 3.5.). On special occasions or for more affluent households, meals commonly comprise an assortment of main dishes, served in combinations that follow relatively clear codes and etiquettes (see Khaing et al. 1975). In rural areas, such commensality is performed for both the lunch and the dinner. In Yangon, however, it is often limited to dinner. Respondents also noted that migrant households in Yangon have even shifted to more individualized dinners because of the different work/home routines of their members. As one respondent elaborated:

> "Most of the time, my family does not take their meals together. For dinner, me and my granddaughter would normally eat first while other family members eat whenever they arrive back from work. Usually, my son arrives first. My husband and my daughter-in-law are always late." (Main respondent, household #12)

Table 3.4. Overview of fish cooking practices reconfigurations from rural to urban space

		RURAL SPACE	URBAN SPACE
PRIMARY	FAMILY MEAL	The practice is common for most meals, except for breakfast. Household members usually share the same pace of life and meals are taken together with the whole family.	The ideal embodied by the practice prevails but people more commonly cook and eat separately because of differentiated paces of life. Dining spaces are also typically more confined.
		SUMMARY	*The meaning (i.e. commensality) persists but material differences (i.e. space) and diverging paces of life render performances only occasional.*
	EATING OUT	The practice is the norm for breakfasts, for which there are often a few specialized stalls operating at dawn. Except from these there is typically no restaurant outlets.	The practice prevails for breakfast and is generally performed in tea shops. It is also a common for family (especially young people) to eat out over weekends. There is a rich diversity of options.
		SUMMARY	*Material availability of outlets render the practice common (esp. for younger generations). Meaning of certain dishes is altered in the process.*
	EATING FROM A LUNCHBOX	The practice is seldomly reported and mostly performed during periods of important agricultural activity or for household members going to school or working far from home.	The practice of eating a home cooked lunch is the norm for most workers. It is common for colleagues to sit together and share food from their respective boxes, jointly constituting a more diverse meal.
		SUMMARY	*The meaning (i.e. commensality) is reinforced by the decline of the family meal. People develop new competence to revive this core value.*
SECONDA	OBSERVING RESTRICTIONS	Observing taboos around food is very common. Associated superstitions can typically be traced back to either religious or animist beliefs within the household.	The practice largely persists There can be occasional transgressions, but restrictions are generally observed even when their origins have become blurry.
	CROSS-CUTTING OBSERVATIONS	Preference for freshwater or marine species is categorical and deep-rooted based on (inland or coastal) origins Children and elders often receive special attention in the household when it comes to food	

Figure 3.5. The typical Myanmar meal served in a Yangon ('rice shop') restaurant.

Source: Picture by Sethlui, West Shwegonedaing Township

The individualization of meals in Yangon is also driven by other factors. For instance, it was observed that some households do not have enough dining area to accommodate shared meals. In other cases, the nuclear structure of migrant households in the city has been fragmented by the addition of more distant relatives and/or non-related housemates leading to a further individualization of eating practices. This was captured in a response by a single man describing his living and eating practices:

> "Now I share a flat in town with my brother […] Usually, we do not eat together. I guess we just have different ways. Me, I only need one main dish with rice because I snack a lot during the day. My brother does not and always has at least one main curry together with a soup and fried vegetables […] Whenever our older sister is visiting, she brings climbing perch from our village and cooks for us. When she is in town, we always eat together in the evenings." (Main respondent, household #7)

The practice of eating alone is not, however, completely unknown in rural areas. Because fresh food is typically purchased and cooked in the morning, it is common for individuals to have breakfast outside the house. *Mohinga* hawkers and other small stalls selling boiled beans or fried snacks at dawn are common in most villages. As a result, breakfast is more commonly regarded as a snacking activity performed by individual household members at different times and with different menus. This individualization of breakfast is reflected in Yangon by the profusion of teashops and restaurants[17] that provide an abundance of individual choice. As one respondent illustrated:

> "For breakfast, I would usually have '*ikyakwe'* [deep fried twisted dough stick] and boiled chickpeas which I buy from outside […] My husband is like my father: he does not have enough with snacks and prefers to have a rice meal so they normally cook rice and warm up the curry from the day before […] My mother, she really likes *mohinga* for breakfast. She always buys it from the same shop." (Main respondent, household #2)

While breakfast is usually the only meal people eat outside the household in rural areas, migrants in Yangon report their shift to also eating lunch and dinner out of the house. They also noted that similar changes to eating habits are happening in their home villages with the recent increase in the number of restaurants, small tea shops and 'beer stations'. That said, the practice of eating out in both rural and urban areas was also clearly resisted by older generations. Either older family members do not join meals outside the house or, as one respondent described:

[17] In Burmese, a distinction is made between *'la-phe-ye-sai'* (i.e. tea shops) on the one hand, which typically operate in the morning and serve specialized breakfast dishes, and *'htamin-sai'* (i.e. rice shops) which serve mostly rice-based dishes and are more oriented towards lunch. In practice, both types of outlets now operate all day long and it is often the case that there are crossovers.

> "Whenever we go outside together and have food in a restaurant, she (mother-in-law) would not order anything and just sit and wait for us to finish our meals (Main respondent, household #11).

For younger migrants in Yangon, eating out is sometimes experienced as a privilege not only because it opens up individual choice, but also because it renders 'special dishes' more accessible. As outlined above, *ngapi yay* is a perfect example given it is now even served on a complimentary basis while ordering a curry from any restaurant (see Figure 3.5.). *Mohinga* too can now be purchased at any time from the many teashops spread across the city.

Despite the increasing occurrence of eating out, its positive associations do not generally apply to workers' lunches. Although the practice of eating from office canteens or restaurants close-by their workplace has become more common, the norm is to eat a home cooked meal out of a lunchbox. While ostensibly individual in its consumption, the lunch-boxed meal is homecooked, which contributes to link workers to the commensality of their household. As one respondent recalled:

> "Lunch was always prepared by my auntie for the whole family. She and all my cousins would share the same menu every day. The only difference is that some of us would take it separately from our lunchboxes at work." (Main respondent, household #13)

In addition, both discussions with and observations of respondents indicated that workers do also recreate a broader sense of commensality while eating from their lunchbox at work. The performance typically involves colleagues placing their respective lunchboxes on the table and sharing a collective meal. As expressed by one respondent:

> "I find it (i.e. the practice of sharing lunchboxes) is always a win-win situation because one day someone has too much curry while the other has too little. The other day it might

be the opposite. Also, I think Myanmar people simply do not like eating alone...” (Main respondent, household #13)

Finally, across both the rural and urban spaces, the observance of religious or customary food restrictions that affect the consumption of fish is very common. These restrictions are linked to either Buddhist or animist beliefs and generally apply to the whole household. As elaborated by one migrant:

> “Because my grandmother was a fervent [Buddhist] devotee, she did not eat four-legged animal meat nor large fish species. She could only eat the small fish specimens. Because she was the main responsible for food in our home, we just observed the same restrictions.” (Main respondent, household #11)

Observing such food restriction is performed on a strict basis in the village where individual food intake is observed by other household members. While these same restrictions persist in principle in Yangon, there seems to be more transgression, particularly by younger generations who are often not able to identify the origin of the practice anymore. Yet, what the performance of food restrictions clearly demonstrates is that members from the same household are expected to conform as a single unit with a homogenous set of everyday eating practices that affect the consumption of key foodstuff such as fish. In the words of one respondent, “what I eat, my daughter eats. What I do not eat, my daughter does not eat either” (Main respondent, household #8).

3.5. Discussion

This paper examined the effects of rural-urban migration on fish consumption in Myanmar. Our analysis of how fish consumption practices are shaped by historical context and are (or are not) reconfigured as they are carried over time and space illustrates the value of understanding micro- and meso-scale socio-cultural dynamics of food systems. We contend that there is considerable

scope for human geographers to explore the complexity of transitions in food systems through their articulation in 'everyday' food practices. By understanding and characterizing these practices and their reconfigurations, it is possible to conceptualize dietary change as a combination of socialized routines of buying, cooking, and eating food (building on Spaargaren et al. 2013; Warde 2016; Wertheim-Heck & Spaargaren 2016; Brons et al. 2020). Below, we discuss four key insights that emerge from our analysis and that have implications for understanding the everyday geography of consumption and food system transitions.

First, our analysis of social practices demonstrates the value of understanding how contemporary food transitions are shaped through situated lived experiences (Rigg 2007; Sonnino et al. 2016). Such an understanding complicates macro-scale accounts of urban dietary change in Asia which tend to reify narratives around the 'westernization' of diets across the region (Pingali 2007). In contrast, our detailed examination of fish consumption practices in Myanmar demonstrates the social and historical significance of everyday realities of food provision and consumption that are continuously shaped by their mobility between rural and urban spaces. Our analysis draws attention to how changes in all three bundles of fish consumption practices are reflected in subtle and diverse reconfigurations of meanings, competences, and materials. As such, our contribution aligns with others (see McEwan et al. 2015; Hansen & Jakobsen 2020) who have advocated for a better acknowledgement of locality and context in shaping food practices and the relevance of multi-scalar approaches to rightfully decipher the variegated trajectories of change that make up food transitions in the global South.

Second, by drawing attention to how food practices are reconfigured or reinforced as routines travel back and forth across space, our analysis makes the case for a 'hybridizing spatiality' between the urban and the rural (see Kantor 2018; Rigg 2019). By understanding how rural and urban consumption practices intersect in both rural and urban spaces, it is possible to open up a new means of defining 'foodscapes' or 'food environments' – that is, not only in terms

of the space where food is acquired and prepared, but also for broader doings and sayings that are mobile and constitute how which kinds of food are consumed (MacKendrick 2014; Vonthron et al. 2020). Our findings demonstrate that urban fish consumption practices are indeed hybridized with rural consumption practices, and that this hybridization remains dynamic as practices continue to move between changing rural and urban food environments. Consumption cannot then simply be reduced to the bodily assimilation of nutrients that predictably varies from rural to urban space, nor can associated transformations be boiled down to an expression of Westernized consumerism. It is instead a manifestation of specific and complex identities, meanings and competences that shapes contemporary dietary changes in Asian cities (Laquian 1996; Sahakian 2016; Reddy & van Dam 2020).

Third, our results suggest that presumptions of dynamic change in Southeast region should be framed in more gradual terms than is often the case in food modernization narratives. This is reflected at several levels in our study. We observe, for instance, a strong generational influence on dietary change, pointing at the relative resistance of older migrants to changing their practices and a transmission of conservative food values to younger generations. Similarly, we see that gender-based norms around everyday cooking performances in rural areas are retained in urban settings (as seen elsewhere in the region - Tacoli & Chant 2014; Luo & Chui 2019). We also observe the persistence of proximity and trust-based mechanisms in the supply of fresh food in the city, thereby complicating the dominant 'supermarketization' thesis and the displacement of the informal sector in urban food chains (Reardon et al. 2003). This highlights the need to rethink urban food practices in terms of 'multiple modernities' – where trajectories of urban change and food transition emerge simultaneously in combination and in parallel along different time frames (Spaargaren et al. 2005; Scheinberg & Mol 2010; Maller & Strengers 2013). At the same time, it challenges neoliberal modernization narratives permeating food policies in the

region and implies instead a need to better acknowledge and integrate the socio-cultural appropriateness of food (Alkon et al. 2013; Jarosz 2014; Kyeyune & Turner 2016).

Finally, our findings demonstrate there is much to be gained from combining social practice and food systems approaches to understand urban dietary change. Social practice framing enables the kind of fine-grained analysis of micro- and meso-scale changes in everyday provision and consumption routines that is often missing in wider food system debates. At the same time, food systems thinking highlights the need to understand the mutually constitutive and recursive relationships between macro- and micro-scale transformations across the system – that is, across consumption, provision, and production (Spaargaren et al. 2013). By 'zooming in' and 'zooming out' (Nicolini 2012) between social practices and (in our case) the food fish system, it is possible to identify and explain complex dynamics of system-level change with consequences for who can access sustainable, nutritionally valuable, and culturally appropriate food at various spatial scales and contexts. This in turn creates opportunities for rethinking interventions by states, NGOs and private firms alike aimed at improving access to fish (and other forms of nutrition) that move beyond both individual capacity and broad scale assumptions of changing systems of production, provision and consumption.

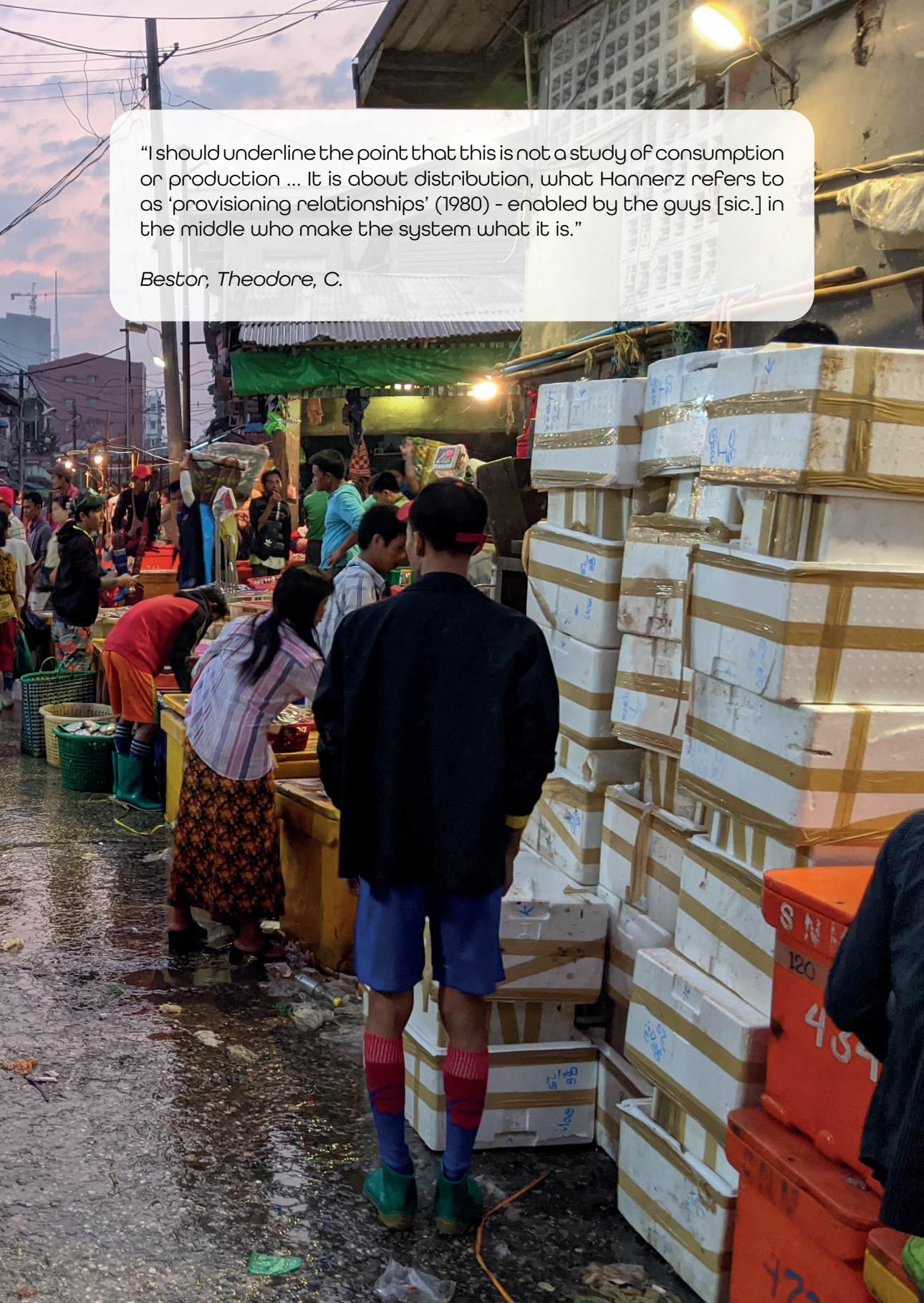
3.6. Conclusion

This paper has demonstrated the value of a social practices approach for analyzing food system change. By structuring our assessment around the food fish transition, we have shown how urban reconfigurations of fish consumption practices are shaped by new and hybridized routines that intersect with the changing availability of wild and farmed fish. We argue that this food transition is best understood in terms of changes to the meanings, competences and materials that underpin how fish is sourced, cooked, and eaten. Once these social practices of consumption are identified

it is possible to better understand existing changes to production, and redesign interventions aimed at more sustainable, equitable and nutritious food system outcomes.

Such a practice-based approach is geographically-sensitive in that it enables the integration of micro- and meso-scale socio-cultural influences embedded in specific places. We have argued that understanding the interrelations between consumption practices and system-level processes of production and distribution offers a means of better understanding macro food transitions at large. This also holds implications for the everyday geography of consumption and the ways in which dietary change is understood; that is, as a gradual process subject to the persistence of socio-culturally appropriate food and the hybridization of rural-urban food environments.

Our study makes it apparent that global research agendas on food security and sustainability need to incorporate empirically-based and socio-theoretical understandings of food transitions. By acknowledging the mobility of consumption practices and deciphering how these reconfigure as they travel back and forth across urban and rural spaces, our study has opened up a means of understanding and even steering the complex contemporary transitions observed in our food systems. Our analysis of food consumption further suggests opportunities for extending practice-based approaches to the realm of food trade, production and governance to fully grasp system-level changes. Doing so holds the promise of a more comprehensive understanding of who can access sustainable, nutritionally valuable, and culturally appropriate food at various spatial scales and contexts. Yet, advancing this agenda will first require food scholars shift their focus to the global South where contemporary food system transitions are fastest, and where stakes are the highest.



"I should underline the point that this is not a study of consumption or production ... It is about distribution, what Hannerz refers to as 'provisioning relationships' (1980) - enabled by the guys [sic.] in the middle who make the system what it is."

Bestor, Theodore, C.

Chapter 4:

Changing fish trade practices in Myanmar's rapidly transforming food system

Abstract

Wholesale markets, wholesalers, and processors play critical but underappreciated roles in shaping food systems. Most conventional research on food provisioning analyzes value chains in terms of their structure, conduct, and performance. We contend that a practices lens can illuminate how food systems are produced and reproduced through the emergence of new wholesale practices relating to quality, trust, and risk, and provide more nuanced understandings of how markets and trading shape and are shaped by food system transformation. Applying a practices lens to the analysis of these changes can help identify new ways of steering food systems toward more sustainable outcomes.

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4.1. Introduction

Wholesale markets and the actors that populate them – wholesalers, brokers, processors, and retailers – play critical but underappreciated roles in shaping food systems and provisioning sustainable and nutritious foods (Gerber et al. 2014; Tezzo et al. 2020; Ebata 2022; Subramanian et al. 2022). As argued by Bush and Oosterveer (2007), studying these actors' shared practices makes it possible to decode lived experiences that are central to the social and cultural reproduction of food systems. But the roles that provisioning actors play in steering food system transformations are poorly understood (Reardon 2015; Béné et al. 2019; Veldhuizen et al. 2020). The 'hidden middle' of the food system is transforming particularly quickly in Asia, where wholesale markets are proliferating to supply increasingly urban and affluent consumers (Ahmadi-Esfahani & Locke 1998; Hu et al. 2004; Reardon & Timmer 2014; Reardon 2015; Barrett et al. 2019; Alita et al. 2021).

Previous research on food provisioning has tended to analyze trade relations in terms of supply chain structure, and the conduct and performance of actors producing and distributing value along these chains (Gereffi et al. 2001; Bair 2009). Associated development strategies typically focus on identifying opportunities for chain actors to reduce economic and production risks and/or increase their efficiency and economic performance via processual or institutional "upgrading" (Gereffi 1999; Humphrey & Schmitz 2000). However, viewing agrifood value chains in terms of their economic logic can disembed them from their historical and sociocultural context and emphasize linear trajectories of development (though for exceptions see Lie 1997; Goldman et al. 1999; Gerber et al. 2014).

The role of traders in provisioning non-staple perishable foods such as fish, meat, and fruit has been analyzed elsewhere (e.g., Steenbergen et al. 2019; Bestor 2001; Ebata et al, 2022; Sharma et al., 2016; Qanti et al., 2017), but relatively few studies have characterized and situated the everyday experiences of 'trade, traders and trading' in wet markets in Asia (Alexander 1987).

Similarly, there has been little attention to how provisioning actors in wholesale markets effect and are affected by changes in the availability of and demand for food products, forms of production, and changing consumer cuisines and lifestyles (although see Fabinyi and Liu 2014; Fabinyi et al. 2018; Tezzo et a. 2021; Fang & Fabinyi 2021). Following Bestor (2001), we contend that illuminating what provisioning actors do on an everyday basis, and why, can contribute to understanding how women and men in the middle of the chain "make the system what it is" (p. 77).

In this article, we use a social practices approach (Reckwitz 2002; Schatzki 2002; Shove et al. 2012; Spaargaren et al. 2016) to examine the social embeddedness (Granovetter 1985) of aquatic food trade in the context of a rapid shift from wild-caught to aquaculture-based fish production. Aquatic food is comprised of diverse wild and farmed aquatic animals and plants that are central to diets, cuisines and nutrition across much of Asia (Ishige 1993; McIntyre 2002; Fabinyi and Liu 2014; Tezzo et al. 2021). These aquatic organisms are socially and culturally reproduced as food through a myriad of everyday and even mundane shared practices – that is, routinised sayings and doings (Spaargaren 2011; Spaargaren et al. 2016) that shape the performance of consumption, trade and production.

Asian aquatic food practices are changing rapidly as once abundant supplies of freshwater and marine aquatic animals are increasingly supplemented or supplanted by farmed products (Bush et al. 2019; Tezzo et al. 2020). Changes in the production, consumption and trade of farmed fish are often aligned to already existing aquatic food practices where farmed fish are substituted into culturally established dishes, but also lead to the emergence of new 'urban' fish consumption practices (Tezzo et al. 2021). It remains unclear, however, how the social and cultural provisioning routines of aquatic food trade, traders and trading are affected by this transition, especially in 'wet markets', which are often characterized by highly routinised practices of trust, loyalty and patronage (e.g., Alexander 1987; Acciaioli 2000; Mele et al. 2015).

We examine changes to wholesale market provisioning practices in Myanmar, one of Southeast Asia's poorest and least studied countries, located between Thailand, China and India. Myanmar underwent a remarkable decade of political and economic transition from 2011-2020[18], accompanied by rapid transition from wild caught to farmed freshwater fish supply (Tezzo et al. 2018). We focus on San Pya, the largest fish wholesale market in Myanmar's largest city, Yangon, where the share of farmed fish traded has grown rapidly. Drawing on Cadilhon et al. (2003) and Tezzo et al. (2021), we examine how provisioning practices in San Pya have been affected by the growth of aquaculture and fast-changing consumption practices in urban centers. We find that new provisioning practices related to quality, trust and risk have emerged, that shape the conduct and performance of production, trade and consumption. We argue that applying a practices lens to the analysis of these changes can support the identification of new ways of steering food systems toward more sustainable outcomes.

Our article is organized as follows. First, we explain the key elements of a social practice approach to food system transformation and its relevance to food provisioning. We then introduce Myanmar, describing the current transition in fish production and justifying the empirical focus on the country's main wholesale fish market San Pya. We then describe our methodology, before presenting empirical results showing how practices of quality, trust and risk have been reconfigured in the context of growth of freshwater farmed fish production. Finally, we reflect on the implications for understanding and governing food systems in rapidly-transforming low and middle-income countries.

[18] The reform period came to an abrupt and tragic end in 2021 when the democratically elected government was ousted in a bloody military coup.

4.2. Understanding provisioning practices in food systems

Food systems are generally understood as a set of production, trade and consumption activities embedded within social, political, economic and environmental contexts that affect the availability, accessibility and utilization of resources necessary for food security, environmental sustainability and social welfare (Ericksen 2008; HLPE 2017). The concept of food systems has recently been used to examine the contribution of aquatic foods to environmental, social and nutritional outcomes (e.g., Golden et al. 2021; Simmance et al. 2022). But while the food systems 'turn' has encouraged more thorough consideration of the relationships between these dimensions, the concept has relatively limited analytical power with respect to the social dimensions steering system change (e.g., Béné et al. 2020). In particular, the links between the micro-scale behavior of actors and macro-scale systemic change remain poorly understood, especially when behavior is embedded in complex trade relations.

In contrast, analyses of global value chains, commodity chains, and production networks have focused directly on the structure, conduct and performance of trading activities. Value chain research has variously examined market coordination by lead firms (Gereffi 2018), processes of innovation and upgrading (e.g., Pietrobelli & Rabellotti 2011), market-based sustainability governance (Bush et al. 2015) and the immanent development of new industries (e.g., Belton et al. 2018b). Recently, the structure, conduct and performance paradigm has been applied to understanding food systems transformation (e.g., Reardon et al. 2019; Farmery et al. 2021). However, much of the literature on value chain upgrading focuses on reducing the complexity of information, bargaining, and monitoring to improve efficiency and rationalization and enable higher volume, higher value and/or lower risk market exchange (Abebe et al. 2016; Reardon et al. 2021). We argue that adopting a food systems perspective opens up space for closer attention to the social embeddedness (Granovetter 1985) of provisioning actors involved in handling,

processing and trading food, and can illuminate how provisioning actors' conduct is shaped by and shapes food system change.

We use a social practice-based approach to explore the relationships between social embeddedness and food system transformation. By emphasizing practices as fundamental building blocks of markets and trade, practice theories draw attention to how commodities such as fish are shaped by the meanings and values assigned to them by producers, traders and consumers throughout the food system (Fine 2002). Understanding how actors negotiate these meanings and values in the context of highly routinised provisioning practices related to buying, handling, processing and selling offers opportunities to investigate how food is socially produced in changing social and material settings (Reckwitz 2002; Spaargaren et al. 2016).

We define provisioning practices as routinised doings and sayings that are reproduced by knowledgeable and capable actors with little discursive reflection on the material and social conditions that shape them (Spaargaren 2011; Spaargaren et al. 2016). Following Shove et al. (2012) and Schatzki (2002), we observe and analyze fish provisioning in terms of four integrated 'elements' of practices. The first is meanings, made up of general understandings or values attributed to a doing or saying. The second is skills and competences required to perform a given practice. The third is material objects and infrastructures that enable the performance of a practice. The fourth is the goals or 'teleoaffective structures' that give direction to the behavior of practitioners. Our focus is not on the role of each of these elements, but rather, building on Tezzo et al. (2021), we examine how they are reconfigured by and contribute to transformations within food systems.

We focus specifically on changes to provisioning practices for aquatic foods. Drawing on Cadilhon et al. (2003) and Tezzo et al. (2021), we start with the provisioning practices of buying, processing and selling. This enables us to identify the actors carrying these practices and understand how practices were reconfigured and/or reinforced by new materials, meanings, competences and goals introduced through the growing trade of farmed freshwater fish. In doing

so, we deductively identified new bundles of practices related to quality, trust and risk that contribute to a more systemic understanding of the conduct of provisioning actors (building on Spaargaren et al. 2013; Welch 2017; Welch & Warde 2016). By reimagining food systems as continually produced and reproduced through new practices relating to quality, trust and risk, we offer a more nuanced understanding of how markets and trade shape and are shaped by food system transformation.

4.3. San Pya market

San Pya market is the largest fish wholesale market in Myanmar and an ideal site for exploring changes to provisioning practices associated with the transition from wild caught to farmed fish. Located on the Yangon River on the western side of Yangon, Myanmar's largest city, the market is the main gateway for fish from the Ayeyarwady Delta where most of Myanmar's wild and farmed freshwater fish are produced (Figure 4.1.). San Pya was established in 1991 as the main landing and trading point for freshwater fish in Myanmar, during a period of partial economic liberalization as the country transitioned from a military-socialist to a "market reform military" rule following a coup in 1988. Prior to this time, private trading was not permitted (Turnell 1999).

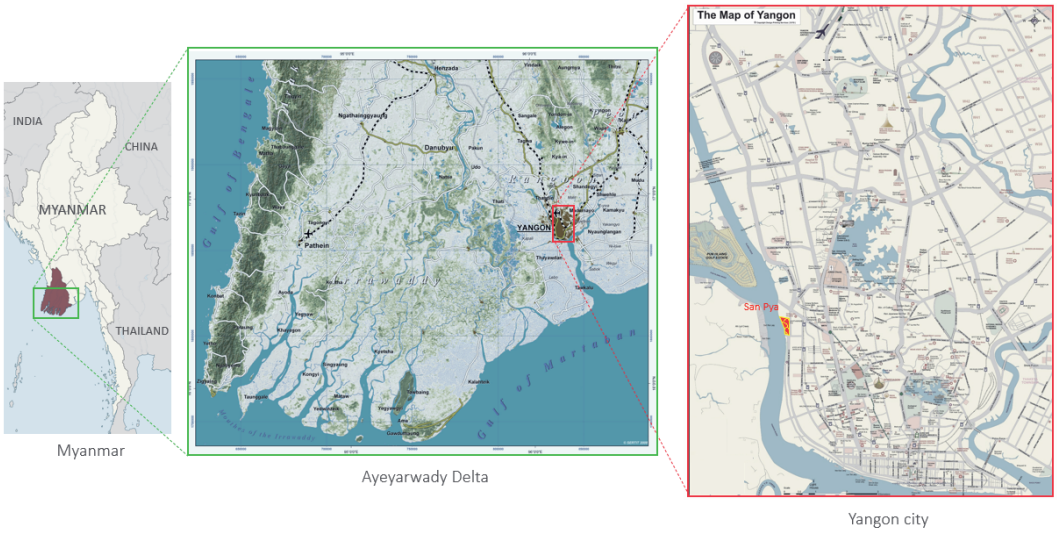

Figure 4.1. San Pya wholesale market location in Yangon and in the Ayeyarwady Delta

San Pya is administered by the Markets Department of the Yangon City Development Committee (YCDC) and operates daily from late night until mid-morning. Fish arrives at the market by boat and truck, where it is aggregated and redistributed in and around Yangon and to the rest of the country. Most fish is delivered to San Pya by boat, because many aquaculture ponds in the Delta are accessible only by canal (Belton et al. 2015).

Fish are landed at six 'jetties' on the river, operated by the six largest traders in the market – licensed commission agents who auction fish and exert most control over fish supply in San Pya (Figure 4.2.). Around 300 licensed wholesale fish businesses operate stalls in three large buildings set back from the river, at the center of the market. Nearly all license holders are men, although some of the businesses are operated by both men and women family members. Approximately half of the licensed wholesalers are considered 'large' or 'medium' scale, and offer advance output-tied loans to farmers and/or fishing boat owners and traders to secure supplies of fish directly from them (Figures 4.2., 4.4.). The remaining 150 or so smaller licensed traders do not offer credit to their suppliers, and they obtain fish purchased at auctions from commission agents. A further estimated 150 small unlicensed wholesalers operate from buildings

around the outskirts of the market and along the side streets leading to it; they buy fish from wholesalers and commission agents (Belton et al. 2015; Figure 4.2.).

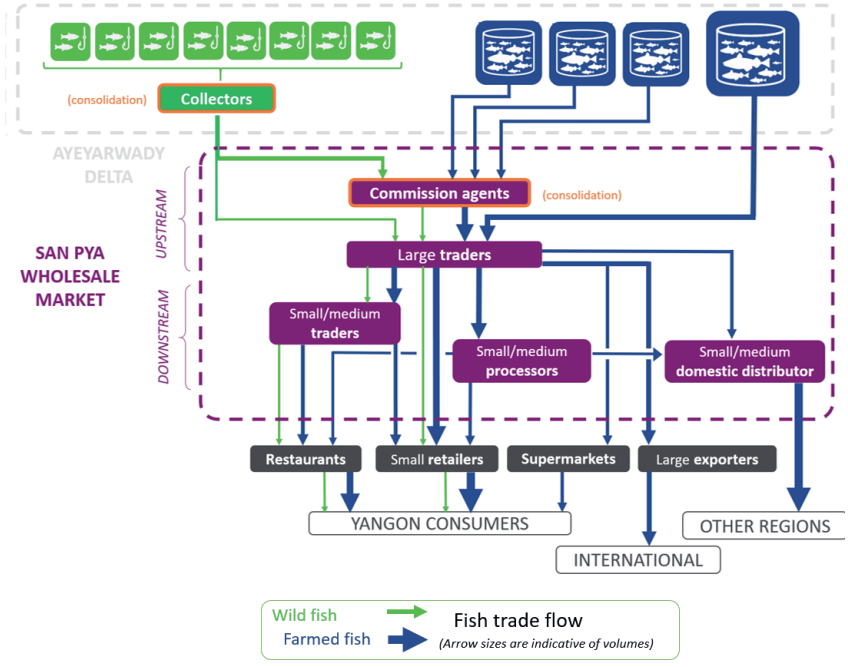

Figure 4.2. San Pya trade structure and key midstream actors

More than 50 small-scale fish processing businesses producing fish balls (*nga chit* in Burmese) are located around the outer fringes of the market (Figure 4.3.). Their proprietors are mainly women, originating from a single village located across the river from the market. Nga chit production employs as many as 1,500 workers, the majority women. Around 2,000 male casual laborers provide loading and unloading services to wholesalers. Numerous other ancillary businesses are clustered around the periphery of the market, including transport companies and drivers, ice suppliers, small restaurants and tea stalls, and shops selling equipment such as weighing scales, chopping boards and knives (Belton et al. 2015).

Figure 4.3. (A) Small fish ball processing plant (B) Fish ball product retailed in San Pya

Source: Picture by Tezzo.X., Kyi Myin Daing Township.

About 30 unlicensed traders without fixed business premises act as brokers, buying fish from licensed wholesalers for distribution to other parts of the country. Retailers and small wholesalers from Yangon and surrounding areas (mainly women) visit San Pya daily to buy fish, often using transport rented collectively with other traders from their locality (Figure 4.2.). Approximately half of the fish traded at San Pya is distributed by truck or bus to domestic markets outside Yangon (Belton et al. 2015). Trade of fish from San Pya to the rest of the country boomed in the wake of economic liberalization initiated by the quasi-civilian Union Solidarity and Development Party (USDP) government in 2011, deepening following the election of the National League for Democracy (NLD) in 2015. Key reforms included removal of fuel rationing and vehicle import restrictions, deregulation of private transport companies, the banking sector and telecommunications, and the construction of a new highway linking Yangon to the country's second largest city, Mandalay. This spurred a decade of rapid economic growth that greatly increased domestic trade, mobility and consumer incomes (Belton et al. 2015; 2019).

San Pya is an ideal location to study everyday provisioning practices. The diversity of provisioning actors, selling to a range of wholesale and retail market channels (Figure 4.2.; Table

4.1.), is indicative of the importance of fish – both wild caught and farmed - in the diets of consumers in Yangon and throughout Myanmar (Scott et al. 2023). San Pya's location on the edge of Ayeyarwady Delta and its transport connections to the rest of the country also make it the ideal site to examine changing practices associated with the transition from capture to farmed fish. When the market was established, fish originating from capture fisheries in the Delta accounted for the vast majority of aquatic food traded, and farmed fish a small share. These proportions are now inverted, with farmed fish accounting for an estimated 70% in 2014 (Belton et al. 2015); a share which has grown since.

Table 4.1. Summary information on sampled mid-chain provisioning actors

#	Gender	San Pya XP (years)	Midstream actor role	Fish traded		
				Volumes (kg/day)	Wild (%)	Farmed (%)
1	Male	25	Unlicensed *processor*	1,500	10	90
2	Male	20	Licensed commission agent	3,500	90	10
3	Male	17	Unlicensed domestic distributor	700	20	80
4	Male	25	Licensed large trader	1,700	0	100
5	Male	18	Unlicensed domestic distributor	800	30	70
6	Female	40	Unlicensed *processor*	1,200	5	95
7	Male	33	Unlicensed *processor*	800	0	100
8	Female	8	Unlicensed *processor*	500	0	100
9	Male	8	Farmer & licensed *large trader*	32,000	0	100
10	Female	15	Unlicensed *retailer*	80	25	75

Most of Myanmar's fish farms lie within a 50 km radius of Yangon, extending westward into the Ayeyarwady Delta, which is also the location of the most important inland fishery in the country (Tezzo et al. 2018). Fish farms in the Delta expanded rapidly from the 1990s following the policy of the market-reform military government to allocate large land concessions to individuals and companies linked to the regime. This policy was intended to promote export-oriented industrial-scale agriculture and aquaculture, with the aim of generating foreign

exchange. Aquaculture grew steadily from the 1990s until the coup in 2021, driven by the continued growth of very large farms and the emergence of numerous smaller ones (Mark and Belton 2020).

During the same period, the productivity of the Delta's once abundant inland and marine capture fisheries declined sharply due to factors including over-fishing, land use change, and habitat degradation associated with agricultural intensification, the establishment of water control infrastructure, and the enclosure of aquatic commons for use in aquaculture (Mark and Belton 2020). The growth during the reform period of an increasingly affluent population in Yangon and other cities in Myanmar stimulated demand for fish sourced through San Pya (Tezzo et al. 2021) and oriented most farmed fish production towards the domestic market. Similar patterns of aquaculture development have occurred throughout much of South and Southeast Asia over the past 30 years, resulting in a wider 'aquaculture transition' in the region's food systems (Belton and Thilsted 2014; Bush & Marschke 2014; Garlock et al. 2020).

4.4. Methodology

We studied changes in provisioning practices at San Pya via a mix of direct observation, narrative description from visits, and quick interviews during peak evening and morning trading hours (n=35), followed by in-depth interviews with a smaller selection of respondents outside market hours (n=12). Respondents were selected through purposive sampling to encompass a broad mix of small, medium, and large-scale operators, including un/licensed traders, retailers, laborers, domestic distributors, and fish processors who sold both wild and farmed fish (Table 4.1.).

All respondents were interviewed using a semi-structured interview guide focused on: (1) the life history of respondents and their experiences in San Pya; (2) everyday sourcing behavior; (3) stocking and processing activities, where relevant; and (4) selling practices. Interviews were typically conducted with the main stallholder or their righthand person (i.e., manager, spouse). Depending on availability, additional staff were interviewed to complement the information.

Whenever possible, the respondents were also observed during their trading activities (n=10) to confirm some of the information collected in interviews, with ad hoc questions to respondents aimed at eliciting their immediate reactions, meanings and choices attached to the practices performed.

All interviews were conducted by the first and second author using a mix of Burmese and English. These interviews were audio-recorded and lasted between one and two hours. All data were then transcribed in English and coded in NVivo 11 software. A codebook was developed based on the theoretical framework: the main code categories corresponded to two analytical dimensions, namely (1) types of fish traded (i.e. wild/farmed) and (2) provisioning practices (i.e. sourcing/stocking & processing/selling). Secondary codes were added inductively to explore new themes emerging from the analysis.

4.5. Analysis of provisioning practices

In the following section, we examine how increasing scarcity of wild fish, the growth of aquaculture, and the commoditization of fish ball production has led to new practices for (1) assessing quality, (2) consolidating or developing new long-term and trust-based relationships, and (3) mitigating new economic risks associated with growing disparities between large traders and their smaller counterparts.

4.5.1. Quality

Faced with the declining availability of wild freshwater fish and the rapid expansion of aquaculture in Myanmar, provisioning actors have adapted how they determine, maintain and/or cope with the different qualities of wild and farmed fish. Provisioning actors perceive farmed fish to have higher fat content, lower firmness, and less appealing flesh and flavor than wild caught species (reflecting observations in other Asian markets, Bestor 2001; Saguin 2014). However, despite these differences, *"*most customers cannot tell the actual difference [between

wild and farmed fish]," in the words of one trader. Consequently, provisioning actors have established and leveraged constructions of quality that go beyond the materiality of the fish they sell. For farmed fish, emphasis is placed on affordability and year-round availability to meet the demands of urban consumers. At the same time, increasingly scarce wild fish fill new high-value niches associated with ruralness and family cuisine (Tezzo et al. 2021).

New practices are also emerging around the provision of fish balls that were traditionally made with specific wild species, but are now mass-produced to capitalize on the influx of 'lower quality' farmed fish. Fish balls consist of the scraped or minced flesh of fish (Figure 4.3.). Said to have Chinese origins, the processing of fish balls is accepted as a means of providing urban consumers with low-value marine fish across Southeast Asia (Heng & Eong 2005; Saguin 2014; Siriraksophon et al. 2009). In Myanmar, fish balls were traditionally made using a wild caught freshwater fish called featherback (*Notopterus notopterus*), which has become increasingly expensive, and so fish balls now commonly use cheaper farmed rohu carp (*Labeo rohita*). As recounted by a processor whose family had been in the business for over 40 years,

> At the time of my grandmother and mother, we were only processing featherback fish balls … Since 1995, we mostly process rohu fish balls because their demand keeps increasing. Featherback fish balls are now only made on order by few customers, typically for special occasions.

The processing of farmed fish balls has enabled these provisioning actors to broaden demand. When visiting San Pya market, the scale of farmed fish ball processing is immediately evident, with small processing plants – often operating without a license – in and around the market, serving not only Yangon but also other expanding urban centers countrywide (Figure 3).

The increased volume of fish balls is related to the qualification of 'first' and 'second' grade fish in the market, based on tangible product qualities such as freshness, shelf-life, and new intangible credence qualities (Wessells 2002) associated with the origin of the fish and (farm) production processes. The fish balls produced using wild caught fish are unquestioned as

of higher quality over those made from farmed fish – in some cases proving just as important as other attributes such as freshness. The quality of fish balls made from farmed fish is downgraded further if the fish come from (or are perceived to come from) more intensive farms or integrated chicken-fish farming systems. Provisioning actors have enabled this seemingly intangible quality by ascribing new meanings to observable product attributes. As one respondent explained:

> *The stomach should not be full of feces so we always check for the black color around the cloaca …The size of the head is another indicator of quality: it should not be too big. What is more difficult to check before slicing the fish is the quality of the flesh. For instance, if farmers feed too much peanut cake, the flesh tends to be whiter and very oily… A quality flesh should be slightly pink.*

By creating new grades of fish balls from farmed fish based on the farming process, provisioning actors have been able to increase the value of both wild fish and farmed fish from more extensive farming systems. These new definitions of quality are also deployed to bargain down the price of fish originating from less preferred farming systems. In the process, traders have positioned themselves as key arbiters in determining quality grades, setting new incentives for suppliers and influencing which fish is made available to urban consumers and at what price.

The mass processing of fish balls has also been affected by the standardization of trading lots. Commission agents and large traders are responsible for sorting lots of wild fish based on a wide range of sizes and species – with a generally higher demand for larger size classes of fish (as elsewhere Gates et al., 1974; Sjöberg 2015). However, the growth of aquaculture has meant that these commission agents, who control the wholesale movement of fish to San Pya, receive lots made up of uniform sized fish (see Figure 4.4.). At the same time fish ball processing has redefined the relationship between quality and size – with demand shifting to lots made up middle size fish. As one processor explained, higher quality rohu fish balls are made using "specimens ... about a hand size (i.e., 600g). If much smaller, the flesh is too soft and if much

bigger, the bones make it harder to scrape the flesh." One trader in San Pya explained even further qualification:

> There are three sizes of rohu and we have specific names for them: *Gaw* refers to fish below 600g; *Chit nga* is the standard 600g size and finally *Khon koe koe tit* for fish larger than 600g. Most processors buy chit nga, but I typically target the ones that are slightly bigger because they are cheaper and tend to better travel long distance.

The standardization of grading has created feedback between production and trade. Compared to wild caught fish supply, the control over size grading by farmers and the larger and more consistent lots that commissioning agents can deliver to San Pya has driven the practice of mass fish ball processing. As processing volumes have increased, processors have developed new practices that have created new product categories for consumers while also requiring new harvesting and trade practices upstream in the chain.

Figure 4.4. Fish being traded at a large trader' stall in San Pya at the end of a morning shift

Source: Picture by Tezzo.X., Kyi Myin Daing Township.

4.5.2. Trust

Supply from capture fisheries is more geographically dispersed than supply from aquaculture and involves more complex trade networks that rely heavily on long-term quasi-credit relations to secure intermittent supplies of fish (as elsewhere in Southeast Asia and beyond, Platteau & Abraham 1987; Bush 2004a; O'Neill and Crona 2017; Ruddle 2011). In contrast, aquaculture is geographically concentrated within a 25–50 km radius from Yangon city, with production dominated by large farms (Belton et al. 2015; 2018). These farms typically have production volumes large enough to bypass local fish collectors, so farmed fish supply tends to be aggregated at San Pya (see Figure 4.2.). This consolidation is exacerbated by the fact that upstream actors in the wholesale market often extend loans to large farms – the largest of which are several thousand hectares in size – to secure fish supply. These differences in the structure of wild and farmed fish supply chains have implications for how trust between provisioning actors is reproduced, and lead to new emerging practices.

Commission agents and large traders tend to buy directly from individual producers more than is the case with wild freshwater fish. The rapid adoption of mobile phones and mobile banking in Myanmar, which expanded dramatically between 2012 and 2020 (Rieffel 2016), have been important in enabling increasing numbers of sourcing transactions. While increasing the ease of communication along the chain, digital technologies have also increased the need for new ways of creating trust. As one buyer trader explained enthusiastically:

> I don't even need to go the market anymore: I simply place my order by phone a day ahead and confirm quantity, price, and quality… trust is all the more important between us and our suppliers because we usually do not see the fish lots before buying.

The success of sourcing is dependent on both retaining reliable suppliers and reaching out to new suppliers, often through familial networks. Alternatively, very large traders have sought to vertically integrate to circumvent trust issues around their farmed fish supply. In doing

so they can better align harvest and buying, as one trader explained, “according to the demand,” enabling them to “transport ... fish daily from the pond to the market.”

Provisioning actors have also developed new ways of building trust to cope with weaker transparency in supply chains associated with a growing number of intermediaries. Here the case of farmed fish balls serves as a good illustration. As one processor explained, “some of my customers now buy my product to process it further. They mix it with salt, MSG, coloring powder, and baking soda to make it a bit stickier and ready-to-cook.” Other processors explained how, under increasing competition, it had become common practice to pass fish balls through a blender to get rid of bones. They also explained how this practice made it possible to conceal the quality of the fish being processed.

Overall, additional stages of processing render adulteration easier (see also Fine 2002). In San Pya, there were reported instances where “retailers trick their customers by labelling their products as (wild) featherback fish balls when they actually use a combination of featherback and (farmed) rohu fish.” As a result, fish ball supply chains are now tinged with suspicion, increasingly leading buyers to request that their fish balls be processed in front of them at time of purchase. Even when they already have some processed product for sale, fish ball processors increasingly process new product on demand from prospective customers as a demonstration of their integrity.

The growth of fish farming has multiplied the number of intermediaries that traders at San Pya have to deal with downstream. As one processor complained, “it is getting more and more difficult to establish trusted relationships with our customers because they keep changing and they are becoming more and more demanding ... sometimes, we have to operate at loss just to keep the business going.” In response, medium and small-scale traders in San Pya have had to invest in marketing themselves to secure business with retailers. This is visible around the processing of fish balls where it has become the norm for actors to display their product on trays in front of their shop to showcase the quality of their products (see Figure 4.3.). With all the

weight of her 40 years' experience processing fish balls, one processor regretted "Even though the demand has kept increasing, we do not make as much profit as we used to because the competition is much higher and we sell smaller volumes individually."

It is increasingly difficult for downstream provisioning actors to create loyalty among customers given the simultaneous proliferation of competitors and potential buyers. As a result, marketing efforts and price increasingly shape transactions for the multitude of small and medium actors operating downstream in San Pya.

4.5.3. Risk

The rapid growth of aquaculture in Myanmar has opened new opportunities for people previously excluded from fish trade; with them, new economic risks were introduced. In contrast to the trade of wild fish, controlled by a smaller number of well-established actors (Ruddle 2011; Miñarro et al. 2016), trade in farmed fish has opened up livelihood opportunities for laborers working for more established patron traders. After a few years of loyal service, some workers are able to secure the support of their patron to start their own business trading fish balls and/or consolidating and shipping farmed fish to new consumption hubs across the country (see Figure 4.5.). The growing number of entrants, many of whom operate without a license, has led to strong competition and associated economic risks. In response, new practices have emerged that both mitigate these risks and/or shift them to others in the chain.

Figure 4.5. Domestic distributor's stall in San Pya with orders packed in boxes for dispatch

Source: Picture by Tezzo.X., Kyi Myin Daing Township.

First, traders in San Pya have expanded the practice of selling on credit. It is common for large provisioning actors selling to major buyers such as supermarkets and international export-oriented processing plants to provide these privileged customers with secure and fast delivery of large volumes of fish and accept delayed payment (as elsewhere in Southeast Asia, see Boselie et al. 2003; Reardon et al. 2012). However, selling on credit is also becoming common for smaller traders who are expected by their own buyers to offer the same service. As one fish ball processor described, "(selling on credit) used to be something you would only do with trusted customers, but if every other processor starts taking this risk, we end up having no choice ... Nowadays most retailers expect to buy our product on credit." She went on to explain how providing credit to new buyers has rendered her business riskier:

> We lost a lot of money recently … that retailer bought a lot of our fish balls on credit and she never came back. There is another retailer who contracted a credit of USD 900 in only 2 months. I still deal with her but we ask her to pay every order cash ... We must keep the business running because we have some outstanding debt ourselves.

The expanded practice of trade credit has enabled smaller traders to reduce their own cash flow risks when sourcing fish but, simultaneously, this has exposed them to new risks as credit providers. With increased competition for buyers in San Pya, these credit relations, once reserved for well-established trading partners and often secured through patron-client relations, have become marketized, with credit provided without a requisite level of trust or the kind of leverage that clientelism affords. However, compared with the older practice of output-tied credit that binds clients and their patrons together in exclusive relationships over long periods, the normalization of selling on credit has facilitated the accelerated circulation of capital.

Increased volumes of farmed fish in the wholesale market also mean that traders exceed their cold storage capacity more often than in the past, leading to spoilage. This is particularly true for smaller provisioning actors who tend to have more limited storage capacity. As a domestic distributor trading both wild and farmed fish explained, "(freshness) mostly concerns farmed fish because the volumes being traded are just too big and people always have some unsold or poorly stored fish that they try to palm off" (Figure 4.4.). To mitigate this risk, provisioning actors in San Pya have developed more systematic purchase orders that make use of the new mobile banking infrastructure to optimize their storage operations. This involves, as one trader explained, carefully planning the orders to match their storage capacity:

> A typical day starts the night before around 7pm when I start collecting orders from my customers over the phone. From 8pm to 9pm I usually go around the market and check for the best deals. Often, I would also call some of my customers to get additional orders based on the available supply. Until around 3am, I would then buy the fish according to my purchase orders.

Other traders reported completely bypassing the need for storage by further optimizing their use of mobile communication and shifting to order-based delivery. For instance, some distributors "do not buy fish unless they have a customer order" meaning that in practice they "immediately pack and dispatch upon receiving a purchase order."

The growing trade volumes of farmed fish are also leading larger provisioning actors to engage in speculation. The expansion of aquaculture together with the development of mobile banking infrastructure means that more sales are transacted remotely. Taking advantage of new circumstances under which auctions are held 24/7, commission agents and brokers increasingly speculate on farmed fish supply, causing increased price volatility throughout the whole chain. The practice was described by a retailer in these words "(Farmed) fish price is set by the big guys according to supply and demand ... At times when fish supply gets low, they typically purchase all of it before selling it back to us at a higher price." From the perspective of the few large upstream actors who can afford to pull these strings, the advent of aquaculture is welcomed with great enthusiasm: "For my business, farmed fish is more profitable ... The appeal of being a broker in San Pya is the capacity of making money quick and easily. Right now, I could easily generate USD 100 profit without doing much," Yet, for the myriad of smaller actors downstream who endure associated price fluctuations, the picture is less cheerful. One small domestic distributor who had been in business for 17 years expressed a sense of despair: "even though I have been dealing with increasing volumes, my business is now barely making any profit."

4.6. Discussion and conclusion

Our results provide insight on how provisioning actors at the San Pya fish market affect and are affected by changes in the food system related to the transition from wild to farmed fish. By drawing attention to provisioning actors, we show how food systems are shaped by everyday practices related to sourcing, processing, buying and selling, and integrative social practices

around the formation of quality, trust and risk (Figure 4.6.). Following Bestor (2001), identifying how these practices emerge and evolve allows us to better understand food system dynamics.

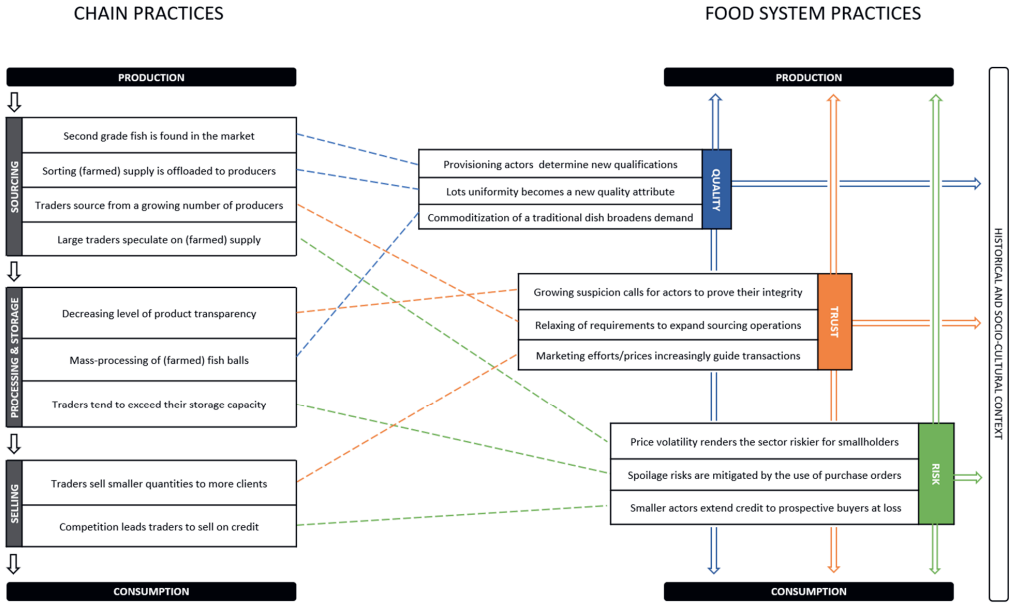

Figure 4.6. Comparing chain and food system practices framings of food provisioning

We contend that conceptualizing food systems as a set of interrelated social practices offers opportunities to steer food system transformations in rapidly transforming low- and middle-income countries toward normative goals such as nutrition, sustainability or equity (Béné et al. 2020; Farmery et al. 2021). Drawing on the analysis above, we outline two broad ways in which this approach can help to reimagine food value chain dynamics and food system governance.

First, using a practices lens to study food systems in low- and middle-income countries such as Myanmar and, specifically, the "hidden middle" of trade, traders and trading, demands explicit recognition that value chains are more than the sum of sequential economic transactions; they are deeply socially embedded institutions. Building on the work of economic sociologists

(e.g., Granovetter 1985; Platteau 1994; Fine 2002), this is an important corrective to largely asocial conventional accounts of value chains and food systems (e.g., HLPE 2017; GLOPAN 2016). Rethinking trade and trading in relation to the social construction of quality, trust and risk, and conceptualizing food provisioning as a bundle of practices, adds nuance to accounts of food systems that reduce actor conduct to the calculus of individual economic efficiency and rationality (e.g. Gabre-Madhin 2001).

Second, a practices lens reveals that provisioning actors in wholesale markets are active agents in shaping food systems. Evolving provisioning practices accommodate changes in the conditions of upstream production and downstream consumption by creating new meanings of quality, trust and risk, with the potential to reshape value chain structure and performance. Policy makers, development practitioners and researchers must be more cognizant of the roles of provisioning actors and their practices in shaping food systems outcomes, if they wish to design interventions that are effective in guiding food systems toward normative goals such as providing sustainable and healthy diets. As demonstrated in other contexts (Simmons 2010; Lauer et al. 2012; Harris 2016), applied practice-based approaches can open up new ways of exploring situated processes of change, and potential context-specific and appropriate ways of addressing these.

5

"We must plant the sea and herd its animals using the sea as farmers instead of hunters. That is what civilization is all about - farming replacing hunting."

Cousteau, Jacques-Yves.

Chapter 5:

Food systems see fish, not fisheries and aquaculture

Abstract

This paper contends that dropping the wild-farmed binary from development thinking and replacing it with a singular understanding of food fish can fundamentally change the way we understand and govern fish production landscapes. I articulate such an appreciation by elaborating the key processes shaping and linking fish production, distribution and consumption in the Ayeyarwady Delta of Myanmar. By reflecting critically on fisheries and aquaculture development projects in this space, I open up avenues for reflection on how development policy and action could deliver aquatic food security in a way that is more socio- economically equitable and environmentally sustainable.

5.1. Introduction

It is increasingly recognized that addressing food insecurity without further compromising environmental sustainability and social welfare requires systemic change (Ericksen 2008; Ingram 2011). Food systems approaches enable the identification and diagnosis of complex interactions among multiple simultaneous processes operating across scales that shape how food is produced, distributed, and consumed (*ibid*, HLPE 2017).

A food fish system approach, as introduced by Tezzo et al. (2018), integrates the role that distribution and consumption play in shaping different demands for fish as food and, consequently, its production (see also Jennings et al. 2016). A food fish system approach as such contrasts with the pervasive productivist perspectives and the corresponding duality observed in development agendas currently shaping the expansion of fish production in the global South. As summarized by Little et al. (2016), the first agenda stresses trajectories of decline in wild capture fisheries and promotes their management while the second agenda keys on booming aquaculture developments in meeting the growing future demand for fish. Neither of these agendas effectively explores how farmed and wild fish are actually traded and consumed in combination, thereby limiting how policy makers understand and leverage associated dynamics of change. This productivist *status quo* is particularly unsettling in contexts of rapid societal transitions, such as Southeast Asia, where fast-paced urbanization dynamics are accompanied by rising incomes and changing diets (Reardon et al. 2014; Béné et al. 2016).

By considering how fish production is shaped by trade and consumption, a food fish system perspective challenges the dominant productivist assumptions surrounding fish production in the global South. I elaborate the value of a food fish system perspective by reflecting on the conventional wisdoms underpinning the development of aquaculture and fisheries production in the Ayeyarwady Delta, the most important fish production landscape

in Myanmar. I argue that development practitioners and policy makers seeking to govern aquatic food security sustainably need to conceive of wild and farmed fish as interrelated production, distribution, and consumption processes unfolding in the same system rather than being part of two separate worlds.

My argument is developed in two steps. First, I use a food system perspective to elaborate key processes shaping and linking fish production, distribution, and consumption in the Ayeyarwady Delta. I then contrast this illustration of fish production in the Delta as an integrated food fish system with the pervasive productivist agenda in the international donor community that continues to single out fisheries and aquaculture as separate development strategies. Finally, I argue that by breaking down the wild-farmed binary a food system perspective can fundamentally change the way we understand and govern food fish to deliver aquatic food security for all in a way that is socio-economically equitable and environmentally sustainable.

5.2. Conceiving of the Delta as a food system

An integrative food fish system perspective draws attention to three current transformations shaping fish production in the Ayeyarwady Delta, namely: (1) the privatization of fish production landscapes, (2) the restructuring of fish supply chains, and (3) the changing fish consumption practices. From a food fish system perspective none of these processes can be linked solely to capture fisheries or aquaculture. Each instead demonstrates that these two allegedly distinct modes of production fundamentally influence each other in both material and immaterial ways.

First, there is a gradual shift from common to private ownership of fish production landscapes and grasping the magnitude of this transformation requires going beyond the wild-farmed binary. In Myanmar, this shift has notably materialized through the privatization of freshwaters, a process which originated under British occupation as a way

to generate rents. It was reinforced much later by the subsequent military regimes (see Reeves et al. 1999; Tezzo et al. 2017; 2018) but it is now driven mainly by a rapidly growing urban demand for aquatic food. As the capital city of Yangon is expanding, so too is the demand for a steady and reliable supply of fish and fish products (Belton et al. 2018b; Tezzo et al. 2021; 2024). As observed elsewhere in the region, this rapidly growing demand is being met by an increasing sustained human control over land and water resources, a dynamic that is leading to their expanding privatization (as seen in other countries of Southeast Asia, e.g. Saguin 2016; Arthur et al. 2021). When viewed from a productivist perspective, the privatization of fish production landscapes is being driven by two distinct processes. The first of these is the spatial expansion of fish farming, as aquaculture by definition (see FAO 2015) implies individual or corporate ownership. In practice, this expansion results mostly in the establishment of new fish ponds throughout the Delta, a dynamic which is somewhat visible (see Belton et al. 2018b). The second process, in some ways a more subtle variant of privatization, is the progressive enclosure of common property land and water resources. The latter is less a matter of a physical alteration of the production landscape than of a legislative change leading to a shift in the access rights to the resources. Yet these two privatization processes are fueled by the same growing urban demand and both go together with an increasing artificialization of fish production (incl. notably stock enhancement, supplementary feeding, etc. – see Tezzo et al. 2017; 2018; Soe et al. 2020). The connections between these two processes are further compounded by the fact that land and water resources are shared by wild and farmed fish production. Thus, I argue that they are effectively two facets of the same dynamic: the gradual appropriation of common resources underpinning fish production landscapes into private ownership.

Second, trade dynamics in the Delta's food fish system further break down the divide between wild and farmed fish. In response to growing urban demand, and under the set of policies enacted in the wake of the now late economic liberalization, the distribution of fish has undergone rapid improvements to roads and cold chain infrastructures (see Belton et al. 2018b).

Over the same period, the aforementioned privatization of land and water resources combined with cronyism within the state (see Ford et al. 2016) has enabled political and business elites to increase their control over the trade of fish (see Reeves et al. 1999; Nyein & Zimmermann 2015; Campbell 2019). Large and vertically integrated companies operated by members of these elites now control significant portions of wild and farmed fish supply chains from upstream input and grow-out operations to downstream processing, distribution and wholesale operations (Belton et al. 2015). As a result, and in contrast to the historically localized nature, fish trade now extends over large distances to predominantly urban centers where it is either consumed or redistributed on to other urban centers or diffused across large rural swathes of the country. This is evidenced by the presence of fish originating from Yangon's central wholesale market on local fish markets scattered across the Delta (Tezzo et al. 2024). As observed elsewhere in the region (see Gaja-Svasti et al. 2022), the restructuring of supply chains in response to increased farmed fish production and demand has meant that wild fish, traditionally consumed close to landing sites by fishers and their families, are increasingly indistinguishable to the wide flow of farmed fish in these markets.

Third, and underpinning the other two transformations, are changing practices of consumption shaping the demand for multiple forms of food fish. Even though there is still very little documentation about how fish is actually consumed across the Ayeyarwady Delta, evidence from urban areas demonstrates rapid reconfigurations of everyday fish consumption practices (see Tezzo et al. 2021). As observed in other parts of Southeast Asia (see Saguin 2014), urban consumers do not simply eat more fish; they attach more importance to the convenience of year-round and consistent fish supply allowed by aquaculture. At the same time, however, they continue to refer to a value system largely inherited from the historical dependence on capture fisheries. For instance, urban consumers across the Delta display a growing tendency to eat fish away from home and increasingly consume it in new processed forms. These new practices tend to distance consumers from

the fish they eat and render different forms of fish (particularly farmed) more acceptable. Although they tend to become rare delicacies consumed by wealthy urban consumers in the process, wild fish continue to form the historic and cultural foundation from which these new fish consumption practices emerge. Fish balls (*nga chit* in Burmese) are a case in point. This traditional dish, seasonally made from wild fish, has gradually integrated farmed fish, transforming it into a mass-consumption fish product (see Tezzo et al. 2024). Hence while the original fish ball has become an authentic luxury treat in the capital's restaurants, its farmed equivalent has contributed to broaden urban demand for second-grade fish originating from more intensive production systems. Thus, even though increasing production across the Delta is mostly accountable to the growth of only one (or a few) species that best lend themselves to controlled culture, changing fish production landscapes cannot be understood without considering the broader and underlying socio-cultural value system that was historically shaped by capture fisheries.

In highlighting these three transformative processes, the central message is that changes occurring in the production of both wild and farmed fish in the Delta occur in the context of, and in relation to, changes in patterns of fish consumption and fish trade that exert similar forces on both sets of products. Put differently, the food fish system shapes fish production. Despite this, development strategies continue to isolate production from the wider food system, meaning fisheries and aquaculture are still seen as distinctly separate forms of production.

5.3. Overcoming the wild-farmed binary in development strategies

In contrast to the systemically integrated nature of fish production in the Ayeyarwady Delta outlined above prevailing policy and development narratives continue to separate out fisheries and aquaculture into distinct production-driven industries. The following reflects on how major international development projects operating in 2018 addressed fish production in the Delta, including how they problematized constraints, and directed resources for expansion. All four

projects reviewed[19] demonstrate how capture fisheries and aquaculture are persistently used as distinct and separate categories. Among them, only one incorporated both wild and farmed fish in its scope but treated them as two distinct components with different issues that demanded different development strategies. From the remaining three projects, two looked exclusively at aquaculture and one was fully focused on capture fisheries. This division of capture fisheries and aquaculture sets up a binary that favors discrete technical interventions associated with aquaculture over systemic management-oriented interventions in fisheries (as variously seen in other parts of Southeast Asia - see Bailey 1985; Bush 2004b). The projects reviewed in Myanmar highlight this continuing division. From a total investment of US$ 32.6M by international donors in the Ayeyarwady Delta in 2018, approximately 85% was directed exclusively to aquaculture development, which was typically identified as the most promising (if not the only) solution to aquatic food security in the region, owing to the fact that "wild stocks have rapidly declined over the past decades". This observation runs counter to the food systems perspective described above and is problematic for three reasons.

First, the wild-farmed binary underlying development strategies wrongly supposes that fisheries and aquaculture occur in distinct fish production landscapes. As such, it is typically assumed that aquaculture supplements and never impedes fisheries production. This misconception was notably challenged by local authorities participating in the only capture fisheries-focused project from the review. The latter aimed at improving the benefits of fish-dependent communities by focusing exclusively on the governance of capture fisheries. Along the implementation of the project in Maubin, a target township neighboring Yangon which accounts for over half of fish pond area in the Delta, an internal report from the Department of Fisheries Department prepared by the township officer for the central office reported over 50 cases of aquaculture ponds directly encroaching on fishing areas. This confidential account,

[19] Only projects with funding over $1 million in Myanmar as of 2018 were considered.

which the project was able to obtain, documented impacts of aquaculture on fish migration and access to fishing grounds by local communities (DoF, personal communication). Yet it proved very challenging for the project to effectively address these constraints given that its capture fisheries mandate prevented it from integrating the politically sensitive context of illegal appropriation of waterways by aquaculture businesses (Soe 2018). This example illustrates the risks and consequences for development practitioners to keep treating wild and farmed fish separately, thereby overlooking important privatization dynamics and political economy issues impacting fish production landscapes through the Delta (*ibid*; Nyein & Zimmerman 2015; Nyein et al. 2018; Campbell 2019; Ivars & Venot 2020).

Second, the wild-farmed binary reflects an inadequate understanding of the many intermediate forms of fish production that cannot be distinctly labelled as aquaculture or fisheries. Reflecting earlier work by Welcomme & Bartley (1998), hybrid production systems such as 'enhanced fisheries' or 'culture-based capture fisheries' are widespread yet generally poorly documented and under-appreciated in Myanmar (see Tezzo et al. 2017; Oo & Mackay 2018) and across Southeast Asia (De Silva 2003, 2016; Pounds et al. 2022). This limitation was relatively well illustrated by the adjustments made to the strategy of one of the two aquaculture-focused project, which aimed at improving the income, and food and nutrition security of smallholders through the dissemination of aquaculture technologies. Building on earlier studies that had characterized aquaculture in the Ayeyarwady Delta as composed nearly exclusively of large and commercial farms with almost non-existing small-scale aquaculture operations (see FAO & NACA 2003; Johnstone et al. 2012), the project adopted the strategy of assisting small-scale agricultural farmers to excavate new ponds throughout the Delta. Over time, and thanks to the increasing characterization efforts, came the realization that an important number of ponds had effectively gone under the radar not only because of their small size, but also because of their primary functions of harvesting rainwater and sometimes trapping migrating wild fish (Belton et al. 2015; Soe et al. 2020). From this late observation, the strategy of the project was

successfully reoriented towards leveraging this rich network of homestead ponds through the Delta, thereby enabling for a better efficiency of investments (project manager, personal communication). Hence, better identifying hybrid forms of production and overcoming the reductive nature of the wild-farmed binary is not only a statistical issue, it is also a matter for development practitioners of more systemically and effectively harnessing opportunities in fish production landscapes.

Third, because of their focus on production, there is a tendency for both fisheries and aquaculture development projects to overlook the influence of domestic consumption and trade. In the case of fisheries, this underappreciation reflects a general lack of attention to supply dynamics and the underlying assumption that catches are still only serving consumption close to the landing sites (see Tezzo et al. 2021). In the case of aquaculture, the disregard for urban consumption has more to do with a persistent idea that farmers either produce for their own households to ensure their food and nutrition security, or for international markets to generate higher income (*ibid*; Veldhuizen et al. 2020). In both cases, the root of the problem lies in the fact that consumption is still mainly observed from the perspective of the producer. Of the four projects reviewed in the Delta, only the second aquaculture-focused project had a dedicated supply chain component. The overall rationale of that project lied into the intensification of aquaculture production and the establishment of a conducive policy to facilitate the distribution and access to farmed fish over the country. Yet even there, the logic was not to document and capitalize on inherent consumption and trade dynamics, which we have argued have been historically shaped by capture fisheries, but rather to 'ensure a better access to farmed fish in fish-deficit areas'.

In summary, development projects concerned with food fish in the Ayeyarwady Delta in Myanmar clearly do not overcome their bias of approaching farmed and wild fish as two separate domains. Understanding production in food system terms would require some profound rethinking to transform the way commonly used categories are understood. This does not only

mean that 'production' cannot be seen in isolation from the wider food system, including trade and consumption. It also means that aquaculture cannot be seen in isolation from the social and ecological dynamics of capture fisheries when viewed across complex aquatic landscapes, or that aquaculture cannot be seen as having no other affect than increasing supply. These changes can only be made, I argue, if the wild-farmed binary is dropped from development thinking and replaced with a singular understanding of 'food fish' that would effectively be a function of combined practices of production, trade and consumption.

5.4. Conclusion: implications for development strategies and policies

A food fish system approach to policy and development sees fish, not fisheries and aquaculture. Overcoming the wild-farmed fish binary therefore opens up significant opportunities for development strategies and policies to improve the role of food fish in delivering aquatic food security. From such perspective, it becomes possible to rethink the governance of food fish system 'efficiency' (see Benton 2019) in terms that goes beyond making fish more abundant and cheaper and instead understand key trade-offs between food and nutrition security in the context of wider socio-economic and environmental change. As a first step development policy and action should integrate three strategies for putting a food fish system perspective in practice.

First, moving beyond the wild-farmed binary has implications for the way we problematize and address aquatic food security. A more integrated logic focused on food fish would suggest that development strategies and policies move away from their current producers-centered approaches. This would mean broadening the scope of development interventions to a much broader range of consumers than fish farmers and fishers. Doing so would allow for a better appreciation of food fish culture. For instance, development projects could put more efforts in apprehending and leveraging the penetration of processed food fish products such as dried fish, or other important fish foods that are often culturally preferred and more easily accessed by vulnerable consumers (*ibid*; Belton & Thilsted 2014). In the process, development interventions

would then hold the prospects for improving the livelihoods of a larger number of actors taking part in these value chains (see Belton et al. 2022).

Second, integrating wild and farmed fish lays important foundations for improving our social understanding of fish production. As illustrated by our description of the Delta, fish production landscapes are subject to important power dynamics and it is crucial that development strategies and policies stop turning a blind eye on these. This reassessment could effectively start from a substantial decompartmentalization and cross-fertilization of prevailing fisheries and aquaculture expertise. Yet, as illustrated in the case of the Delta's food fish system, genuinely integrating political economy, development actors must elevate their action one step further, going beyond local-level management solutions to open up and influence more sensitive regional and national-level debates around the grabbing of natural resources. As observed elsewhere (see Berhanu & Poulton 2014), it is only by recognizing and better apprehending the underlying political economy that development strategies will be able to leverage more equity in food production landscapes.

Third, and finally, moving beyond the wild-farmed binary allows for a better integration of environmental sustainability in development strategies surrounding fish production in the global south. As illustrated by the case of the Delta, development policy and action are mostly guided by the blue revolution agenda, under which the ambition is too often limited to the intensification of aquatic food production. At a time when there is an increasing interest in the global north for "nature-based solutions" to improve the sustainability of food production (see Girardin et al. 2021), I join Costa-Pierce (2002) in contending that traditional food fish systems across Asia should be considered an integral part of our common planetary wisdom and cultural heritage. In this respect, their plurality, not only in terms of production methods (e.g. species diversity, level of human domestication) but also in terms of traditional processing and consumption practices (e.g. aspects of seasonality) might hold some important keys to improve the sustainability of our food systems at large.


6

" I think and think for months and years. Ninety-nine times, the conclusion is false. The hundredth time I am right."

Einstein, Albert.

Chapter 6: Conclusion

6.1. Introduction

Transformations towards sustainable aquatic food systems have primarily focused on technological interventions to production, such as the intensification and expansion of aquaculture in response to 'declining fisheries' (Williams 1996; Belton & Thilsted 2014; Garlock et al. 2020). This emphasis on aquaculture, as reflected in both research and development policy (Short et al. 2021; Cisneros-Montemayor et al. 2021; Crona et al. 2021), has drawn attention away from the wider set of practices that shape food system outcomes - including food and nutrition security (see Bogard et al. 2017; Scott et al. 2023), social equity (see Adduci 2009; Saguin 2016; Campbell 2019), and environmental sustainability (see De Silva 2012; Edwards 2015). This is especially evident in regions such as Southeast Asia, and countries such as Myanmar, where drivers for the expansion of aquaculture continue to be framed in productivist terms rather than being seen as a function of changes to the role aquatic foods play in everyday production, trade and consumption practices.

This thesis has addressed the productivist bias in aquatic foods research and development policy by answering the question: *What is the contribution of a social practices perspective on consumption, trade and production to a systemic understanding of aquatic food transformations?* In doing so the thesis has used a social practices approach to develop a sociologically-informed understanding of how consumption, trade and production constitute aquatic food systems and their transformations. Transformative processes in aquatic food systems, it has been argued throughout the preceding chapters, can be best understood by considering and interrelating routinized practices through which aquatic foods are consumed, distributed, and produced. Together these practices constitute the performance and conduct of aquatic food systems such that a change in any single practice, such as production, needs to be

seen as a systemic change affecting and affected by practices in other parts of the food system. Furthermore, production, consumption and trade practices are in themselves continually reproduced within a wider set of embedded social practices that reflect wider societal transformations such as urbanisation. A social practices approach to aquatic food systems can, as such, enable a social scientifically informed understanding the role of aquatic foods in achieving and balancing wider normative goals such as food and nutrition security, social equity, and environmental sustainability.

This final Chapter further develops the overall thesis that aquatic food systems are dynamic, interconnected social systems, and that their transformative processes are best understood by characterizing the effective relations among consumption, trade, and production practices and their embeddedness in everyday life. It does so by synthesising the findings from four empirical Chapters to answer the two sub questions outlined in the Introduction: *(1) How are transformative processes in aquatic food systems both characterised and affected by the everyday realities of their social actors?* and *(2) In what ways do fish consumption and trade practices affect systemic transformations of aquatic food production?* The Chapter then uses these empirical reflections to further a practice-based theoretical perspective on food systems transformations. The final section then provides wider reflections on how a practice-based theoretical perspective can inform the governance of food systems before concluding with several recommendations for future research.

6.2. Key research findings

6.2.1. Food fish practices in everyday life

Considering food fish practices as part of everyday life reveals the range of transformations in which they are embedded and correspondingly contribute to in aquatic food systems. Grasping how transformative processes in aquatic food systems are rooted in the everyday realities of

social actors also enables a more dynamic and contextual understanding of change (c.f. Dixon 1999; Escobar 2011; Farmery et al. 2021; Reardon et al. 2019). The findings from Chapters 3 and 4 demonstrate the analytical power of analysing fish consumption and trade in Myanmar as interconnected social practices in three ways.

First, the practices of consumers, traders, and producers in Myanmar show the social and historical significance of everyday realities in shaping aquatic foods transformations. The results of both Chapters 3 and 4 highlight the shortcomings of a productivist focus on food system change. For example, Chapter 3 emphasized how the situated lived experiences of buying, cooking and eating fish condition how, where and why aquatic foods are consumed. Here changing 'demand' for fish in an urban setting is understood as the reconfiguration of socialized routines of accessing and preparing fish for consumption in a household setting that reflect the intergenerational meanings intermixed with 'urbanised' competences and materialities. This practice-based understanding of aquatic food consumption not only challenges reified narratives around the 'westernization' of diets across the region (Pingali, 2007) but it also acknowledges how rurality is both carried and transformed by consumers as they move to urban areas (building on McEwan et al. 2015; Hansen & Jakobsen 2020). Chapter 4 extended the practice-based analysis to the wholesale trade of fish – i.e., buying, processing, and selling fish. Echoing the work of economic sociologists (e.g., Granovetter 1985; Platteau 1994; Fine & Leopold 1993), this Chapter demonstrated how the sum of sequential economic transactions that make up value chains can be reimagined as a set of interrelated practices involving quality, trust, and risk. The combined results from these Chapters show how practices provide an alternative way of understanding standard concepts such as consumption and trade as fundamentally social – that is, related to the meanings, competences and materialities that shape routinized ways of being, doing and saying in everyday life.

Second, the results from Chapters 3 and 4 showed how reconfigurations in consumption and trade practices are embedded within a wider set of routinized everyday practices. By

analysing the reconfigurations of fish consumption practices in urbanizing Myanmar, Chapter 3 identified how the ways fish are purchased, cooked and eaten are shaped by shifts in the lives of urban migrants – such as the acceleration of urban lifestyles and the recomposition of households away from traditional household structures in urban Yangon (see Forbes 2016). Similarly, Chapter 4 described changes in the trading practices that respond to but also shape demand for fish in urban settings. For instance, the practices of sourcing, processing, and selling fish by wholesalers is embedded in wider changes in urban settings, such as the emergence of convenience in urban lifestyles reflecting changing working schedules and the accompanying emergence of aquatic food-based urban cuisines that reflect but are different to rural aquatic food cuisines (Khaing et al. 1975; Scott et al. 2023). Understanding how these practices shape wider demand for aquatic food challenges the conceptualising of consumption and trade as discrete activities (HLPE 2017; Béné et al. 2019b). From a practice perspective consumption and trade are not only market-based activities of food systems, but instead reflect changing conditions of urban pace of life, cuisines, and social composition of households.

Third, the results demonstrated how wider societal transformations, such as urbanisation, are reproduced through everyday food practices. Chapter 3 demonstrated, for instance, how food practices also reproduce wider practices of urbanisation – again, the pace of life, cuisines, and the changing composition of households. Furthermore, the results show how food practices remain dynamic – i.e., are de- and re-routinized (Warde 2016; Brons et al. 2020) - as they are carried between urban and rural areas. Similarly, Chapter 4 showed how wholesale practices related to quality, trust, and risk shape how aquatic foods are both commoditized and standardized as part of a wider market transition and associated industrialization of the aquatic food system (in line with Belton et al. 2020). At the same time, however, the results of Chapter 4 show how this long-term process of agrifood (fish) industrialization – based on the expansion of aquaculture - does not have to conform to a pre-defined trajectory of intensification and 'high consumerism' as seen in other countries (Josephson 2008; Belton et al. 2018a). Instead,

'industrialization' is a continually reproduced set or bundle of shared trade and consumption practices that together constitute a particular form of the food system. Furthermore, responding to the challenge set out by the policy review in Chapter 2, this practice-based understanding of food systems also opens up the possibility of steering system-level change towards normative goals – such as food and nutrition security, social equity, and environmental sustainability – by changing how consumption and trade practices are performed.

6.2.2. Consumption and trade shape aquatic food systems

The findings of the empirical Chapters provide a thick description of where, how and by whom aquatic food production is shaped through consumption and trade practices. These results challenge productivist understandings of food systems that assume changes in production will affect supply and demand, and in turn shape access to aquatic foods (Pullin & Neal 1984; Garlock et al. 2020). A practice-based understanding of aquatic food systems illuminates how fish consumers and traders shape food systems by creating new meanings, acquiring new competences, or fostering new material conditions that effectively dictate how fish is produced. Taken together these practices open up a new way of understanding and ultimately intervening through the performance and conduct of consumption, trade and production to achieve normative food system outcomes – including food and nutrition security, but also wider food sustainability goals such as social equity and environmental sustainability. The results demonstrate the way consumption and trade shape aquatic food systems in two ways.

First, the results demonstrate the value of seeing fish as food rather than the product of 'aquaculture' or 'fisheries'. By doing so fish become a fundamental building block of food systems and open up new ways of understanding the transformations needed for achieving wider normative ambitions such as food and nutrition security. Productivist understandings that frame fish in terms of cash crops and natural resources (Little et al. 2016) hold little analytical meaning when linked to the performance of trade and consumption (see Belton & Thilsted 2014; Tlusty

et al. 2019). For instance, as shown in Chapter 3 - echoing the work of Saguin (2014) in the Philippines - differences in wild and farmed fish can be understood in terms of how their culinary form (materiality) and role in wider culinary traditions (meanings and competences) condition their consumption. In some cases, the consumption of certain dishes – as shown by the case of fish balls - enables the integration of both capture and culture species of fish. Which fish are incorporated into practices of food consumption is, as such, not only determined by where they are produced, but also by their alignment and/or reconfiguration into either existing ways of cooking and eating, or the emergence of new or adapted ways of cooking and eating. Similarly, as shown in Chapter 4, the production categories of 'farmed' and 'wild caught' (as shown in Chapter 5) do not reflect the ways in which practices of reproducing 'quality' and 'trust' in sourcing, processing, and selling fish enable dynamic shifts between fish species from a range of capture and aquaculture production sources. Put differently, trader practices routinize demand for different and multiple forms of food fish which respond to and affect the practices of producers and consumers. Echoing the work of Veldhuizen et al. (2020), a practice-based understanding challenges the notion that fish trade is made up of a series of linear 'intermediations' or 'transactions'. Practices instead highlight the socially embedded ways in which fish are qualified, exchanged, distributed and consumed in different forms by different groups in society.

Second, the results show how, by extending the analytical focus beyond aquatic productivism to a practice-based food system, new pathways for transforming aquatic food systems become possible. As shown in the review of development policy in Chapter 2, the persistent focus on production as the 'only' way to affect the availability and affordability of aquatic foods, reflects the inherent neglect of consumption and trade as means of achieving food systems outcomes – including socially equitable food and nutrition security (see also Jennings et al. 2016). Refocusing the governance of aquatic food systems by including consumption and trade practices also appears to open up opportunities for new forms of intervention and steering

– such as for example nutrition-based education programs (see Ragasa et al. 2023) or interventions aimed at improving the nutritional labelling and overall traceability of aquatic foods (see Jin et al. 2021). It also enables a more fundamental understanding of how the performance of consumption and trade, as summarised in the above paragraphs, are embedded in a wider set of social practices that reproduce rural and urban (food) cultures, cuisines and lifestyles. Focusing on cultures, cuisines and lifestyles as a means of enhancing food and nutrition outcomes then also offers a means of governing where, when and how food fish are produced – including issues related to changing access to land, water as aquatic landscapes that are communally accessed or enclosed for private forms of food production. As such, albeit more speculatively, Chapter 5 has illustrated the extent to which considering these practices beyond the wild-farmed binary may also provide a means of addressing issues of social equity (see Adduci 2009; Saguin 2016; Campbell 2019), and environmental sustainability (see De Silva 2012; Edwards 2015) in aquatic food systems.

6.3. A social understanding of food system change: Theoretical reflections

The results presented above demonstrate the relevance of a social practices framework for understanding aquatic food systems and their transformations (see Figure 6.1). The three core components of this framework are: (1) Food practices as the foundational unit of food systems; (2) The systemic relations between food system practices; and (3) The dynamic embedding of food system practices. Below, I present these three analytical dimensions, reflect on their analytical power for understanding food system transformations, and explore their implications for opening up new approaches to food system governance (see Figure 6.1.).

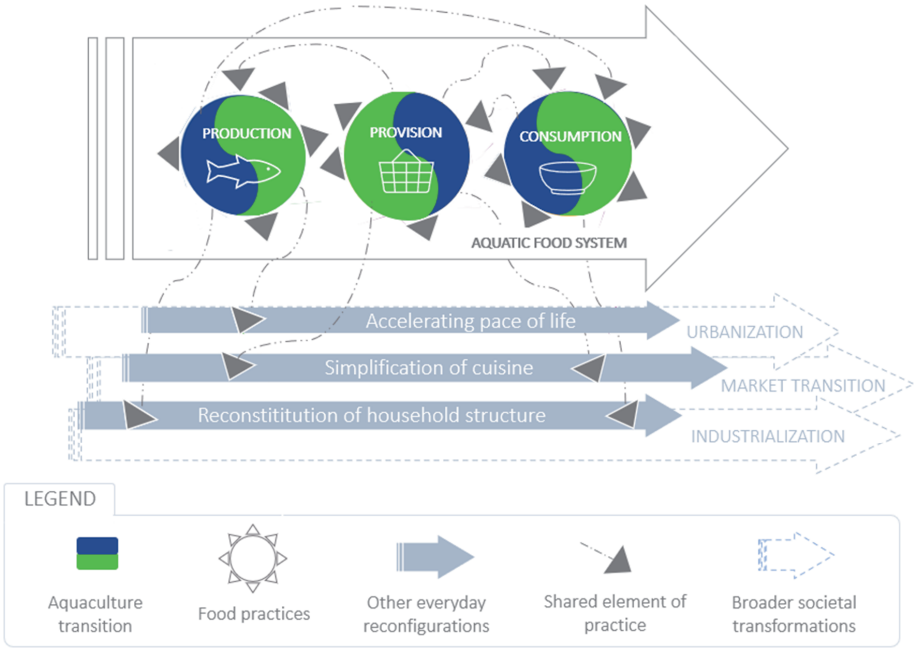

Figure 6.1. Conceptual framework to analyse social dynamics of change in food system.

6.3.1. Food practices as foundational units of food systems

In the proposed framework, food practices are the foundational analytical unit for observing and steering processes of change in food systems. By placing practices at the centre of analysis emphasis is given to the composition of supply chains as a series of interrelated practices spread across and around these chains. Doing so goes beyond a transactional understanding of value chains, coordinated by lead actors and steered through contractual coordination (Ponte et al. 2014; Reardon & Timmer 2014; Reardon et al. 2014; Belton et al. 2020) to instead make visible the specific meanings, competences and materialities that routinely enable the production, transformation, distribution and ultimately consumption of food. It is precisely these elements of food system practices that typically fall outside the scope of chain analysis, yet, as argued by Halkier & Jensen (2011), are essential for grasping processes of change in where, how and by whom food contributes to normative goals of, for instance, food and nutrition security.

Food practices enable the analysis of change because their performances reflect relics of the practices that preceded them in time and space (Spaargaren 2011; Warde 2016). Building on Fine & Leopold (1993), the analytical power of practices to understand changes over time is realised by focusing on their social and historical contingency. For example, when positioning contemporary food fish practices in their wider socio-historical (e.g. urban change) and spatial (e.g. rural-urban migration) contexts, the aquaculture transition is not dependent on production technologies and techniques alone, but also on changing cuisines, urbanising values and modalities of economic exchange as illustrated throughout the preceding Chapters. Said differently, farmed fish do not simply replace their wild equivalent in the baskets and plates of consumers (see Dey et al. 2000a; Valderrama & Anderson 2010). Instead, a practice-based approach highlights how wild fish practices remain fundamental to shaping the culinary and other cultural traditions that condition where, how and by whom farmed fish are incorporated into existing routines of aquatic food consumption.

A practice-based analysis also enables understanding how food items tend to be related to each other. For instance, food practices link food items across time and space. A relevant example in the case of Myanmar, which is briefly touched upon in this thesis, is the link between food fish and chicken. Wider observations in Myanmar have shown that chicken substitutes for food fish in the baskets and dishes of urban consumers (see Scott et al. 2023). Practice-based approach can enable a clearer understanding of how these food items become and are reprodued over time as subsititutes. As shown in Chapter 3, substitution is performed through shared wet-market shopping and culinary performances. It is therefore through these performances that changes to food systems can be observed.

6.3.2. Systemic relations between food system practices

The systemic relations between food practices constitute the second analytical dimension (see Figure 6.1). Emphasizing these relations extends previous work on food practices that tend to

focus on consumption, without considering production and trade (see for e.g. Halkier & Jensen 2011; Warde 2016). In some respects, such a consumerist turn suffers from the same shortcomings as productivist framings of food systems (see Klerkx & Begemann 2020; Moberg et al. 2021). Embedding food practices into a wider food system framing invites a more precise understanding of the flow of materials, meanings and competences between the practices that enable the performances of consumption, trade and production.

The interrelated character of food system practices can be framed and understood through co-evolutionary 'bundles of practices': that is, a set of interconnected and interdependent routinized sets of practices that form a larger pattern within a given social setting (Shove et al. 2012). The flows of materials, meanings and competences between bundled practices in food systems are not linear or unidirectional – as often assumed by organizational metaphors of value or commodity chains. The flows between bundled practices instead unfold simultaneously across various activities and in any number of directions. At the same time, there may also be 'integrative practices', that are core practices that form the backbone of and interconnect all food system activities (Schatzki 1996; Warde 2005; Welch 2017). Just like the bundles, although more directly related to the practices of consuming, trading and eating, the notion of integrative practices helps moving beyond linear chain thinking by conceiving of meanings, values, or goals – such as the formation of food quality - that effectively transcend individual food practices. Both concepts suggest the existence of a broader transformative pattern that effectively extends across the different food practices.

Recognizing and studying bundles of food practices and characterizing integrative practices enable food systems to be reimagined as dynamic and interconnected social systems (Nicolini 2012; Shove et al. 2012; Wertheim-Heck 2018). Together, bundled and integrative practices provide a means of grasping the relational and systemic nature of food systems transformations, making it visible how these transformative processes are effectively a function of the ways foods are consumed, distributed, and produced.

6.3.3. Dynamic embedding of food system practices

The third and final dimension of the proposed framework is the dynamic embedding of food systems in wider system-level phenomena. Dynamic embedding refers to the relationship between food system practices and transformative social phenomena in food systems. The dynamic nature of these practices is not only influenced by but are also co-constitutive of these wider transformative social phenomena such as urbanization, industrialization, and market transition (see Figure 6.1). The embedded nature of these practices extends 'bundles of practices' (see also Schatzki 2016) to interact with these social phenomena in two ways.

First, bundles of food practices evolve in relation to wider reconfigurations of practices in everyday life that are both a part of and extend beyond food systems. As shown throughout this thesis, bundles of fish consumption and trade practices are interconnected in multiple ways to wider social practices embedded in urban life and markets – such as the accelerating pace of life and the simplification of consumer cuisines brought about by urban lifestyles. These wider lifestyle-related bundles of practices are part of food systems as far as they affect how, where, when and by whom food fish are consumed and traded. They also, as argued above, ultimately affect how farmed fish are integrated into existing and new markets and cuisines in urban areas. By linking up meso- and macro-level transformations, this practice-based conceptualization of dynamic embedding goes beyond transition theory insofar as it expands the analytical scope, making it possible to explore how multiple and diverse meso-level transformative processes effectively co-constitute macro-level transformations.

Second, the bundles of reconfiguring practices described above effectively produce and reproduce broader societal transformations. Said differently, reconfiguring food practices also contributes to wider lifestyle and market changes that constitute the everyday lived experience of urbanization, market transitions and agrifood industrialization. Such bi-directional dynamism between food and wider bundles of practices forms an important dimension of understanding

how food systems, in wider urban systems (for example), are continually produced and reproduced and, in doing so, continually change.

These two dimensions of dynamic embedding of food practices in wider societal transformations go beyond the conventional analysis of food systems that sees processes such as urbanization and market transitions as related but discrete and relatively static food systems drivers (Ericksen 2008; HLPE, 2017; Béné et al. 2019b). The wider literature on food systems tends to externalize these drivers and in doing so render them unidirectional – shaping but not being affected by food systems (Reardon et al. 2019; Seto & Ramankutty 2016). By conceptualizing food practices as not only constitutive of food systems but also of these wider societal transformations, this dynamic embedding opens up a multicausal theorization of food in society that highlights the interdependency between food and society. Taking this more holistic view in turn ultimately opens the way to new governance strategies for achieving broader normative outcomes through food systems.

6.4. Implications for food systems governance

According to the sociologically-informed understanding of aquatic food systems advanced in this thesis, characterizing transformative processes requires bringing the focus onto the routinized practices through which aquatic foods are consumed, distributed, and produced, but also their interrelationships and their dynamic embedding in wider social phenomena. Such a theorization has implications for the way we think about governing aquatic food systems towards desirable outcomes. The following section outlines two key recommendations for a practice-based approach to (aquatic) food systems governance.

6.4.1. Practice-based approach to food policy

A practice-based food systems approach to food system governance calls for a profound rethinking of food policies that directly challenges mainstream policy and development

approaches in regions such as Southeast Asia – as reviewed in Chapter 2. For instance, as stated repeatedly in the preceding Chapters, a practice-based approach to food policy calls for moving beyond productivism to systematically integrate trade and consumption and assessing and harnessing the ways systemic change affect and are affected by practices in other parts of the food system. Paradoxically, and contrary to the empirical choice of this thesis, a practice-based approach to food policy also invites us to think in terms of food practices as opposed to specific commodity chains. Such thinking can notably be advanced by engaging with the turn to 'diet-thinking', working back from specific food practices to integrate their multiple and extended systems of ingredients (Haddad et al. 2016; Willett et al. 2019). Finally, a practice-based food systems approach to governance suggests state and international development policy to focus on food practices in their situated - that is place-based - social setting (Sonnino et al. 2016). In this respect, this thesis has offered an alternative to dominant economic perspectives to account for and integrate Myanmar's distinctive food culture in the governance of its aquatic food systems. In arguing for a more practice-based and contextualized governance of food systems, the reassessment proposed in this thesis concurs with Levkoe et al. (2017) who pleads for the infusion of the food sovereignty paradigm in current food security reasoning, thereby fundamentally reorienting and contextualizing associated development agendas (see also Dwiartama et al. 2023; Jarosz 2014; Claeys & Duncan 2019; Sonnino & Milbourne 2022).

6.4.2. Governing multidimensional food systems

In addition, this thesis has offered a rich illustration of the inherent complexity of aquatic food systems, and notably the trade-offs that must be balanced when governing food system transformations. This realization is fundamental given the growing popularity of food systems thinking to reorient development programming and policy in recent years (Béné et al. 2019a; Brouwer et al. 2020). Contrary to the productivist approaches that have historically guided state and international development policy to achieve food and nutrition security, there is now a

growing realization that this outcome needs to be addressed while also paying attention to the needs for social equity (Short et al. 2021) and environmental sustainability (Crona et al. 2023). Importantly, our detailed characterization of food fish in Myanmar showed that even though food system analysis can generate in-depth understanding of the complex and dynamic interrelationships that prevail between its multiple components, these understandings do not make food system transformations amenable to the planning and control methods that are typically deployed by development projects (see Jennings et al. 2016; Simmance et al. 2021). In contrast, the conceptual framework advanced in this thesis suggests thinking of food systems as complex and multidimensional systems whereby food system change, whether desirable or not, can effectively be related to wider societal transformations. Acknowledging this multidimensionality - and the bi-directional dynamism emphasized above between food and wider bundles of practices – suggests that it is possible to steer food systems transformations by either enabling or impeding the wider societal transformations that are entwined with them. In proposing an understanding of food system change that goes beyond cause-and-effect relationships, my findings echo Leeuwis & Boogaard (2021) and emphasize the need for food systems governance to transcend the engineering logic of system analysis. Instead, a multidimensional approach to governance calls for the recognition that food systems cannot be tackled by intervening at a single point in the system and requires instead to think in terms of sets of interventions that are likely to resonate with one another.

6.5. Recommendations for future research

Finally, this thesis has paved the way for future research endeavours. The following outlines these ideas in a set of three recommendations moving forward. The first relates to a possible improvement of the proposed analytical framework while the other two follow on from the empirical progress made by this thesis.

6.5.1. Integrating global social dynamics

The first recommendation has to do with what is both a strength and a weakness of the proposed conceptual framework. As developed and justified in the Introduction (see 1.3.), this thesis purposely chose to focus on a food system of which the transformations were primarily of a domestic nature. This choice was motivated by two intentions: first, it owed to a willingness to address the export bias that has deeply influenced the understanding of aquatic systems (see Belton & Bush 2014; Bush et al. 2019). Second and foremost, it was motivated by the desire to explore relatively simple relationships in order to characterize the dynamics of social change within food systems. Putting these ideological and practical motives aside, any future research on food system transformations needs to explicitly integrate the influence of the rapidly intensifying dynamics of globalization in order to expand and further strengthen the understanding of food systems change offered by the conceptual framework advanced in this thesis (see Oosterveer 2005; Puma 2019). Such an integration appears possible through the third analytical dimension of the framework, namely the dynamic embedding of food systems practices. In the case of aquatic food systems, this would mean exploring the extent to which domestic food fish practices in Myanmar are both constitutive of and influenced by transformative processes of globalization (see Clark et al. 2022; Ainsworth et al. 2023).

6.5.2. Keep documenting everyday realities of the 'tropical majority'

Following on from the empirical progress made by the present thesis, the second recommendation is a renewed appeal for future research to keep documenting and re-understanding food systems transformations from perspectives of the global south. Owing to the prevailing northern academic bias (Rigg (2007, 5), there has been a tendency to articulate the understanding of societal transformations - and also the appreciation of their issues and solutions - in terms that reflect the everyday realities of the global north, or as brilliantly captured by Bavinck et al. (2018) the realities of the 'temperate minority'. Given this premise and considering

the pace and stakes of the transformations in the global south, it is argued that there is much to be gained from apprehending the ways food systems transformations are unfolding and experienced in these geographical settings. In that respect, the conceptual framework advanced in this thesis laid some important groundwork, making it possible to interrelate reconfiguring practices in everyday life with broader social phenomena such as urbanization, market transition, or agrifood industrialization (see 6.3.3.). Parsing out these societal transformations and appreciating their variegated trajectories of change across the global south is a very important step forward as it broadens our understanding of the many transformations taking place within both terrestrial and aquatic food systems. Documenting these phenomena across the global south and exploring their implications for food security, social equity and environmental sustainability effectively holds the potential of informing new development trajectories that better negotiate the necessary trade-offs between these outcomes.

6.5.3. Focus on freshwater

The third and final recommendation also stems from the empirical progress made in this thesis. As explained in the Introduction (see 1.2.), freshwaters are and will remain the main scene of the aquaculture transition (FAO 2022; Garlock et al. 2020), yet they have been largely overlooked owing to a bias from dominant northern-based scholars towards the food they consume (Belton & Bush 2014; Bush et al. 2019). Although the exploration of Myanmar freshwater aquatic systems proposed by this thesis represents only a small piece of a much bigger puzzle, its conceptual approach and the recognition that wild and farmed fish share the same production landscapes shed light on two fundamental issues that deserve to be explored further in greater depth. The first has to do with the privatization of aquatic landscapes that goes along with aquaculture development. The political economic implications for wild fish resources that have been documented in the case of Myanmar (Campbell 2019; Ivars & Venot 2020) but also elsewhere in the region (see Saguin 2016) open up a whole new perspective as regards to the

implications of the aquaculture transition. The second issue concerns the loss of biodiversity in freshwater aquatic systems. While not at the centre of the present research, the realization that aquaculture leads to a decrease of species diversity in freshwaters raises questions about the ecological implications of the aquaculture transition. Such a concern is all the greater given the unprecedented ecological crisis facing freshwater resources over recent years (Albert et al. 2021; Harrison et al. 2018). Thus, based on the evidence emerging from the case of Myanmar freshwaters, it is argued that additional research efforts should be deployed around these two issues. In many ways, the proposed conceptual framework opens up a whole new range of options for exploring them further. In addition, the concept of the continuum put forward by Welcomme and Bartley (1998), which proposes an understanding of wild and farmed fish in relation to one another, appears as a promising conceptual basis to draw on.

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Annexes

Annex 1: Acknowledgements

So much has happened since I started this PhD back in 2016 that I can hardly believe that I am about to cross the finish line. In short, I had two children, changed jobs three times, each time in a different country, and called six different places home. Today I look back fondly on those profoundly transformative years but there were also many difficult times when I almost gave up. I now have so many people to thank for helping me along the way.

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Annex 2. Thesis summary

Current approaches to understanding transformations in food systems have generally focused on particular processes or actors within food systems – so for instance, the role of traders, suppliers, or competitive processes of innovation – rather than understanding how system change is structured and ultimately changed through the everyday routinised practices and relations between those that constitute food systems. When it comes to aquatic food systems, most of the emphasis has been on the technological shift in production, that is, the intensification and expansion of aquaculture. In view of these limitations, this thesis set out to advance a sociological understanding of food system transformations by considering and interrelating routinized practices through which aquatic foods are consumed, distributed, and produced in everyday Myanmar.

This geography, I argue, offers two significant advantages for this endeavour. First, aquatic foods are ubiquitous with routinized doing and saying associated with consuming, trading, and producing them. And second, the country is subject to major societal transformations, making it an ideal geography to study food system transformations in relation to these. The research question that guides this thesis is as follows: *What is the contribution of a social practices perspective on consumption, trade and production to a systemic understanding of aquatic food transformations?* This research question is further broken down into two sub questions that are addressed across the four core Chapters of this thesis (i.e. Chapters 2, 3, 4, and 5). These two sub questions are as follows: *(1) How are transformative processes in aquatic food systems both characterised and affected by the everyday realities of their social actors?* and *(2) In what ways do fish consumption and trade practices affect systemic transformations of aquatic food production?* In addressing these questions, the combined results of these Chapters show a fundamentally new way of apprehending food system transformations as fundamentally social – that is, related to the meanings, competences and materialities that shape routinised ways of

being, doing and saying in everyday life. In doing so, these Chapters challenge the conventional wisdoms associated with the aquaculture transition, the productivist transition that has largely influenced the ways in which aquatic food systems are imagined, understood, and ultimately governed.

Chapter 2 sets the stage by introducing the aquatic food system conceptual framework that effectively structures the whole thesis. This Chapter reviews development research and policies surrounding Southeast Asian freshwaters to identify and reflect on the main assumptions underpinning the governance of aquatic food systems in the region. This analysis -and notably unpacking the productivist wild-farmed binary- lays important foundations for the remainder of this research. It analyses the interrelationships between the production, provisioning, and consumption of wild and farmed fish, making visible gaps and weakness while at the same time demonstrating the emergence of a systemic thinking in this literature. Drawing from the aquatic food system framework introduced in this Chapter, the subsequent core Chapters each deal with a constitutive part of Myanmar aquatic food system.

Chapter 3 starts with a reassessment of fish consumption against the backdrop of the aquaculture transition by looking at the case of urban migrants in Yangon, the economic capital of Myanmar. Drawing on a social practices lens, this Chapter analyses how everyday fish consumption practices change as people move from the rural Ayeyarwady Delta to Yangon city. In doing so, it demonstrates how the reconfigurations of fish consumption practices are shaped by new routines in urban areas and the transition from capture fisheries to aquaculture. The analysis illustrates the value of using a social practices lens to integrate micro- and meso-scale transformative processes to understand dietary change by examining how rural-urban migration influence the sourcing, cooking, and eating of wild and farmed fish.

In the same vein, Chapter 4 then explores the aquaculture transition from the perspective of trade, by investigating the case of San Pya, the largest fish wholesale market in Myanmar. This Chapter also draws from a practice-based analysis to explore how wholesale markets,

wholesalers, and processors effectively shape aquatic food systems transformations. In this Chapter, the social practices perspective is contrasted with conventional approaches where food provisioning is mostly understood under the prism of value chains. The comparison demonstrates the more complex and nuanced understandings that is allowed by the recognition of integrative practices relating to quality, trust, and risk. These, it is argued, make it possible to appreciate not only how fish trade is shaped by but also how it does shape aquatic food system transformations.

Chapter 5 then brings back the reflection onto production. It builds on a critical analysis of development interventions implemented in the Ayeyarwady Delta, the most important fish production landscape in Myanmar. By elaborating the key processes shaping and linking fish production, distribution, and consumption, this Chapter critically reflects on fisheries and aquaculture development projects in that geography. Based on this reflection, it is argued that dropping the wild-farmed binary from development thinking and replacing it with a singular understanding of food fish can fundamentally change the way we understand and govern aquatic food production landscapes.

Finally, the concluding Chapter of this thesis draws conclusions related to the core and sub questions of this thesis. It presents and reflects on the main research findings on Myanmar aquatic food system before proposing a conceptual framework capable of grasping socially mediated processes of change in food systems. The latter draws from a combination of food systems and social practices theories and brings the analytical emphasis onto three co-constitutive and sociological dimensions of food system change, namely: (1) Food practices as the foundational unit of food systems; (2) The systemic relations between food system practices; and (3) The dynamic embedding of food system practices. Based on the analysis of aquatic food systems transformations in Myanmar and the proposed conceptual framework, the thesis concludes by discussing its main implications for governance and future research.

Overall, this thesis argues that (aquatic) food systems are in fact dynamic, interconnected social systems, and that their transformative processes are best understood by characterizing the

effective relations among consumption trade, and production practices and their embeddedness in everyday life. Such theorisation, it is argued, open up new ways not only for understanding food systems transformations, but also for steering them towards the realization of wider normative ambitions such as food and nutrition security, social equity, and environmental sustainability.

Annex 3: Completed training and supervision plan

Xavier Simon André Tezzo
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Environment and development (ENP33306)	Environment Policy Group (ENP)/WUR	2017	6
Advanced Qualitative Research Design and Data Collection (GEO-56806)	Environment Policy Group (ENP)/WUR	2017	4
Anthropology and Ethnographic storytelling	Social and Cultural Anthropology/Vrije Universiteit Amsterdam	2018	3
B) General research related competences			
Transparency Summer School	Environment Policy Group (ENP)/WUR	2016	2.2
'Domestic-led aquaculture transitions in Myanmar'	Wageningen Centre of Sustainability Governance PhD day (WCSG)/WUR	2017	1
Organization and facilitation of the first Myanmar Fisheries and Aquaculture Research Symposium	WorldFish Myanmar	2017	4
'*Adopting a Food System Perspective on Fisheries and Aquaculture Development in Asia'*	MARE Conference, Amsterdam	2019	1
'*The aquaculture transitions in Myanmar: introducing my PhD project'*	WLE-FISH Irrigation symposium, Yangon	2018	1
'*Reconciling aquaculture and Fisheries interventions in Southeast Asia freshwaters'*	WorldFish-IRRI rice fish system symposium	2019	1
WASS Introduction Course	WASS	2021	1
C) Career related competences/personal development			
Burmese language classes	Myanmar dimension	2016-2017	4
Teaching and supervising MSc students	Yangon University	2018-2019	1.2
Supervision interns	WorldFish Myanmar	2018-2019	2.3
Reviewing MSc thesis	Environment Policy Group (ENP)/WUR	2021	0.5
Total			**32.2**

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

Annex 4: About the author

Xavier was born in 1985 in Abidjan, Ivory Coast from a Belgian mother and a Congolese father. With both of his parents working in development cooperation, Xavier spent his entire childhood in Africa, alternating between the Democratic Republic of Congo, Rwanda, Benin and Ivory Coast. After these formative years, Xavier went back to Belgium where he completed a MSc in Bioengineering from Université Libre de Bruxelles (ULB) during which he specialized in aquatic ecosystem modelling, followed by a MSc in Microfinance from Solvay Brussels Schools of Economics and Management (SBS-EM) where he studied the empowerment of fisheries communities through cooperatives in Senegal.

After his studies, Xavier worked for over 10 years in the field of fisheries and aquaculture development projects across Africa (Belgian Development Agency) and Southeast Asia (Food and Agricultural Organization, and then WorldFish). It is in 2016, during his experience as a Research Program Coordinator for WorldFish Myanmar that he started this thesis with the Environmental Policy Group (ENP) at Wageningen University as a sandwich candidate. As such, his research took as its starting point and drew on his development work with fisheries and aquaculture in Myanmar.

Xavier continued working throughout his PhD, first with WorldFish where it all began. In 2021, he joined the ENP as a researcher where he assisted the cross-country learning of the CGIAR-funded 'Food Systems for Healthier Diets' (FSHD/A4NH) research program and supported the

completion of the NWO-funded ‘Supermarket supported area-based management and certification of aquaculture in Southeast Asia’ (SUPERSEAS) project. As of 2023, Xavier is employed as an Agriculture and Food Systems Expert by the Belgian Development Agency (Enabel) where he formulates and coordinates development interventions over sub-Saharan Africa, with a particular focus on the African Great Lakes Region.

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Cover: A retailer browses through the stalls of San Pya fish wholesale market in Yangon at dawn, photography by Xavier Tezzo, January 2020.

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