

# The Economic Geographies of Aquaculture

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## **The Economic Geographies of Aquaculture**

**Guanle Lim and Harvey Neo**

Fish protein is projected to make up increasing proportions of our protein intake in the years to come with increasing supply coming from aquaculture. Despite its fast increasing economic importance, there is a relative paucity of research on aquaculture from the standpoint of economic geography. This paper contributes to this literature by first reviewing the socio-economics of certification of fish and the role of aquaculture in economic development – two of the more pervasive research strands in aquaculture. Following that, we show how global commodity chain perspectives can augment geographical research on aquaculture. We argue that despite some shortcomings, the global commodity chain approach is a viable approach to examine the aquaculture industry because of its ability to elucidate the uneven and contested nature of commodity and other resource flows between the production, distribution, and consumption nodes and its potential to analyze the impacts of the wider regulatory and institutional environment on the industry..

### **1. Introduction**

Aquaculture (defined as the farming of aquatic organisms for the purpose of food under controlled conditions, either in inland freshwater bodies or offshore saltwater bodies) has been a bright spot in the generally challenging outlook for global food production. Aquacultural production reached nearly 64 million tonnes in 2011, from less than 1 million tonnes in 1950, contributing close to 42% of total world fisheries output in 2011 (FAO 2012). In contrast, global wild-caught fish (also known as capture fisheries) production has peaked and stabilized at about 90million tonnes per year since 1985. The plight of global capture fisheries is exacerbated by an increasingly uneasy relationship between the concern for stock level sustainability and the attempts by commercial fleets and smaller scale fishers to maximize income and secure livelihoods. These have complicated national policies that

aimed at controlling resource access, supporting income and food supply, and meeting local interests in commercial and artisanal fishing. Through a combination of inadequate regulatory and monitoring capacity, misguided policies, overcapitalization, and short-term profit-seeking by fishing fleets, wild fish stocks have come under increasing pressure (FAO 2012). As the future of capture fisheries becomes more uncertain, aquaculture production has been heralded as a vital strategy to increase food fish protein supply.

Given this reality, the study of fisheries in the social sciences has burgeoned in recent years, with a growing interest in aquaculture. Broadly, the study of aquaculture in geography is intimately tied to rural/development geography (with its attendant concern about sustainable livelihoods of small scale aquaculture fishers) and economic geography (with its interest in aquaculture as a growing economic sector and the ways to approach the political economy of aquaculture companies). From an economic perspective, for instance, aquaculture provides livelihood and income for nearly 16.6 million fish farmers globally, with 97% of them concentrated in Asia (FAO 2012). In poverty-stricken regions like Vietnam's Mekong Delta, indigenous fish farmers are able to raise and market their produce to wealthy consumers in developed countries with the help of the Vietnamese state and international institutions such as the Asian Development Bank (ADB).<sup>1</sup> Thus, food fish is not only a valuable food protein for the farmers and their community but also a commodity that generates export earnings (Duval-Diop and Grimes 2005) and hence a driver of rural change. Apart from Vietnam, other developing countries such as Bangladesh and Chile have also increasingly relied on the export-oriented production and marketing of prized aquaculture commodities as a growth strategy (Saidul Islam 2008b; Phyne 2010; FAO 2012). Despite its economic importance, there is still a relative paucity of research on aquaculture from the standpoint of economic geography. This lack of research is perplexing in view of the vast literature analyzing the larger agro-food system from a political economy perspective,

generated most particularly by geographers, sociologists, and international political economy scholars.

This is not to imply a lack of geographical research on fisheries in general. Indeed, there is a significant corpus of research, which is tangentially political economic, focusing on the issues of certification, health, and value on one hand (Hall 2010; Bush and Duijf 2011; de Vos and Bush 2011; Mansfield 2011) and the industry's impact on the environment and rural development on the other (Schurman 1996; Salmi 2005). Straddling both of these broad thematic foci are works that explicitly look at the role of broader institutions and market-oriented policies in shaping fisheries (Barton 1997; Mansfield 2006; Bush 2010). Given that capture fisheries are commonly thought as common pool resources, a particularly popular research theme on capture fisheries (as opposed to aquaculture) analyzes the effectiveness of community-based management approaches to fish stocks (Cheong 2005; St. Martin 2006; Abbott et al. 2007). Nevertheless, much of the literature cited above focuses on capture fisheries while those that look at aquaculture are considerably fewer. In any case, geographical research on aquaculture tends to sidestep the increasingly globalized nature of export-oriented aquaculture. For instance, the analysis of commodity flows and firm relations (especially at a transnational level) linking aquaculture's production, distribution, and consumption nodes is not adequately addressed; this is despite the fact that the aquaculture industry will likely mirror the livestock industry in becoming more widespread, intensive, and internationalized. To this end, Stringer et al. (2011) illustrate how the New Zealand post-harvest fisheries industry has undergone a transformation in which much of its harvested fish (not limited to those from aquaculture) are outsourced to China for further processing before such products are re-exported to the final consumers (in or outside of China). This arguably erodes the country's fish processing knowledge base and its 'industrial commons – the collective R&D, engineering, and manufacturing capabilities that sustain innovation' (Pisano and Shih 2009, p. 116). Moreover, the broader relationship between historical socio-political

relations and their lingering impacts upon the development of the industry and its related institutions is also under-researched, as argued by Oseland et al. (2012) in their study on (the lack of ) labor unionism in the Chilean aquaculture industry. They postulate that Chile's path toward aquaculture unionism is a tortuous one as the South American country needs time (in this case, decades) to remedy the labor repression, much of it carried out during the neoliberal Pinochet regime (1974–1990), on Chile's national institutions and organizational traditions.

With the above as a backdrop, this paper contributes to the existing corpus of research on aquaculture. This paper argues that socioeconomic actors across spatial scales are often interconnected in a network representing multiple interest groups but with lead firms appropriating economic value from them. It highlights the importance of interfirm networks and the role of lead firms within these networks. Nevertheless, the power relations and market dynamics within the industry are also mediated by the diverse institutional and structural environments that these actors are embedded in.

Following this introduction, this paper reviews existing research on aquaculture, focusing on certification schemes and the role of aquaculture in rural development. For both of these themes, we have tried to draw mostly – but not exclusively – from geographers. First, for certification schemes, we will unravel the debate on the multifaceted issues – health and hygiene standards, environmental sustainability, and labor issues, to name a few – implicated in the farming and marketing of aquaculture produce across borders. These issues highlight the power of firm-driven networks across places, although this relationship is not always clear-cut. Thereafter, the paper discusses the difficulties and contradictions often involved in balancing poverty reduction efforts against the sustainability of the industry, focusing on examples pertaining to the rural regions of the Global South. Such a tenuous relationship is further complicated by culturally mediated and historically contingent socioeconomic intricacies embedded within the locales. This is then followed by a critical

examination on the intellectual framework to unpack the power relations and market dynamics within the aquaculture industry. To this end, this paper draws upon insights from commodity chain studies that focus on interfirm networks and the role of lead firms within these networks, with emphasis also placed on the broader structural environment. In so doing, the paper shows how commodity chain analyses can enrich our understanding of quality certification in aquaculture, as well as aquaculture's role in rural development. Overall, it reasserts the intricacies linking the various socioeconomic actors and their power relations with respect to each other and multi-scalar institutional settings.

## **2. Theoretical Framework**

### ***2.1 Aquaculture and Certification Schemes***

Certification schemes and standards of aquaculture products, particularly those from the Global South, have been a salient feature at the nexus of (mainly) Northern public and private organizations. In recent years, these certification schemes have moved away from their traditional regulator, the state, to more 'politically legitimate' multi-stakeholder initiatives involving both public bodies and private organizations (see Pattberg 2005; Bernstein and Cashore 2007). In addition, these schemes represent diverse interest groups and straddle borders, polarizing opinion on subjective issues such as environmental sustainability, production/outgrow methods, and species labeling (Bush et al. 2013). For instance, the Aquaculture Stewardship Council (ASC), one of the leading certification bodies for aquaculture products, is often viewed as exclusionary to producers in the Global South. This is because the ASC is primarily organized by Northern-based environmental groups cooperating with brand-conscious European and North American buyers. Its Northern focus is apparent as carp – the single most important Asian aquaculture species, but with minimal export to Europe and North America – has consistently been a missing species in the ASC's dialogs and outreach efforts (Vandergeest and Unno 2012).<sup>2</sup> Such a development is not unique to aquaculture products per se as a similar situation has already been established in

the broader agro-food industry (see Lerner and Le Heron 2006; Ponte 2008; Guthman 2009; Ponte 2012). More specifically, Bush et al. (2013) and Vandergeest (2007) show how technical standards – to contain negative social and environmental impacts of the Thai shrimp farming industry – set by Northern certification bodies are not effective in achieving their goals. This lack of efficacy is a direct result of the top-down implementation of technical standards, which sidesteps the potentially pragmatic input from the local community and local government into setting, monitoring, or enforcing such standards. These certification networks could arguably be more effective ‘if they borrowed from Community-Based Natural Resource Management approaches to make the definition of technical standards more flexible and open to participation by affected communities’ (Vandergeest 2007, p. 1152).

Arguing these issues from a more firm-centric perspective, Saidul Islam’s (2008a) research on the Bangladeshi shrimp farming industry shows that Northern retailers, the lead firms, are still able to dictate the types of shrimp to farm (and how to do so) by setting and enforcing parameters on factors such as food quality, supply response time, payment terms, and purchasing quantity. They have managed to maintain their grip on the industry despite being forced to ‘share’ some of their power with newly emergent certification bodies. Thus, the retailers exercise their existing purchasing power over the Bangladeshi shrimp farmers and other food trading firms by cooperating (or co-opting?) with these certification bodies, engaging their concerns on non-market issues such as environmental well-being and labor rights. In the same vein, Wilkinson (2006) shows that UK retail firms are reluctant to separate farmed salmon from captured ones by labeling them as such. Although high levels of contamination in farmed salmon (caused by the usage of contaminated industrial feed) have been recognized by the European Commission, necessitating their labeling at retail points, the retail firms are still reluctant to do so for fear of alerting consumers to the potential health risks of farmed salmon. Their reluctance suggests that the retail firms are both locked-

in to and complicit in propagating the production methods and supply chain solutions of upstream firms (Wilkinson 2006).

At the consumption end of these certification schemes and the aquaculture products that they represent, there is another type of complexity, with retail firms playing a key mediating role (again). The complexity is aptly described by Bush and Duijf (2011, p. 191) in their research on the certification schemes for the export of Vietnamese pangasius (catfish) to European supermarkets: 'The variety of these initiatives means there is no consensus over sustainability. Instead each focuses on often similar but still different social and environmental aspects'.<sup>3</sup> The vagaries of food politics organized by a network of interests groups – not limited to the lobby groups representing seafood exporters and importers, the media, and non-governmental organizations (NGOs) – with often inconsistent and conflicting information surrounding the pangasius' alleged lack of hygiene and quality are evident as they make opinion rather than knowledge-based claims:

[T]he Mekong is one of the most polluted rivers in the world, and pangasius is cheap (…untrustworthy) tasteless fish, full of antibiotics, which is dumped on the European market (Bush and Duijf 2011, p. 193).

In this context, the European public have been left to their reflexive interpretation, leading to a self-reinforcing discourse that is suspicious and distrustful of Vietnamese fish farming practices. Despite such reservations, the retailers (the lead firms in this example) are still able to exert their influence throughout the farming and trade of pangasius as they gain legitimacy (in the eyes of their customers) when they are able to respond to such claims responsibly. To this end, Bush and Duijf (2011, p. 193) illustrate that European retailers' interpretation and the management of such certification schemes and standards provide them with a new avenue, along with the traditional financial power that their purchasing decision carries, in defining and operationalizing the regulation over pangasius farming and

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trade at a global scale (in this case, from the supermarkets in Europe to the pangasius farming villages in southern Vietnam). The still evolving and cross-border nature of the certification schemes underlines the struggles within them, yet it is clear that financially powerful firms (such as the retail firms) play a key role in their governance structure. This development also highlights the importance of interfirm networks and the dominance of lead firms in these schemes. Nevertheless, an overly focused spotlight on the certification schemes is bound to provide scholars with a limited understanding of place-specific socioeconomic conditions across the production, distribution, and the consumption nodes of the industry. More prosaically, a narrow interpretation of such conditions would hamper the capacity of aquaculture to deliver economic progress to the relevant locales.

## ***2.2 Aquaculture and the Political Economy of Rural Development***

Like other transnational industries, aquaculture is being restructured by the forces of globalization: the types of commodities produced, the way production is organized, and the livelihood that it engenders are all changing (Raynolds 1997). While it is convenient to speak of temporally and spatially unified trends, which are global and all-encompassing in their influence, clearly not all places and all communities are enjoying the same types and rates of growth. Specifically, the market dynamics of the aquaculture industry tend to be shaped by the existing institutional and structural environments that the aquaculture producers are situated in. These place-specific attributes affect the industry's capacity to deliver economic development, especially when they are intertwined with the physical environment and socioeconomic fabric of the community. This is not to say that the industry – especially leading firms – does not actively try to mold the broader institutional environments to their advantage.

From a rural geographical perspective, it is useful to examine how households practising aquaculture are integrated into trade networks, with an emphasis on poverty reduction and sustainability. Belton and Little (2008) demonstrate that intensive shrimp

export farmers in the rural central Thailand are able to realize average annual returns, which are approximately ten times greater than those of rice farmers. The high return of this enterprise enticed many rice farmers to convert their paddy plots into shrimp culture ponds, giving up other integrated agricultural activities that are closely tied to paddy cultivation. Coupled with credit access from the government, the ease with which well-capitalized input suppliers and financial companies (most of them from Bangkok) are able to extend their services to these shrimp farmers only encouraged them to (over)leverage and to expand their operations in the expectation of continuing high prices and favorable cultural conditions (Stonich and Vandergeest 2001). However, the long-term impact of the industry is damaging to these farmers because with minimal farm product diversification (following the conversion of paddy fields to shrimp ponds), they are vulnerable to the international price fluctuation of shrimps (and to a smaller extent, other competitive pressures and disease outbreaks), resulting in reduced revenue and profit, overcapitalization, and debt when shrimp price decreases. Moreover, the ecological sustainability of intensive shrimp farming methods – uncontrolled influx of salt water into low-lying inland areas and improper effluent treatment – is highlighted as a point of concern for policymakers (see also Flaherty et al. 1999).

Compared to Thailand, shrimp farming along Honduras' Gulf of Fonseca has brought about different socioeconomic and ecological challenges. Unlike the small farm-dominated Thai shrimp farming industry, Honduras government policies have favored large shrimp producers over smaller ones (Stonich and Vandergeest 2001; Stanley 2003). In addition to their lack of political power to influence the government, small producers lack the technical prowess and financial assistance to participate meaningfully in shrimp farming. Such socioeconomic desperation, coupled with the polluting effect of the large shrimp farms on the flora and fauna surrounding the gulf, has pushed the small producers and the broader coastal community to organize themselves to actively resist the large farms and the authorities (Dewalt et al. 1996). It has since provoked open and well-organized forms of

resistance ranging from theft, protest marches, to more violent confrontations such as physically obstructing equipment, barricading roads to shrimp farms, and sabotaging of shrimp farm operations (Stonich and Vandergeest 2001).

A similar level of complication at the microscale is also apparent in the aquacultural region of northern Bangladesh's Mymensingh district. Belton et al. (2012) question the conventional wisdom, which argues that direct participation in aquaculture by low income producers provides greater potential to alleviate poverty than more capital intensive forms of food fish production (see Brummett et al. 2008).<sup>4</sup> Specifically, they illustrate the need to pay attention to the pre-existing agrarian structure and relations in the food fish farming communities. Because of Bangladesh's highly skewed distribution of land ownership toward wealthier households and other structural inequalities, it is argued that quasi-capitalist forms of aquaculture is more effective in reducing poverty and enhancing food security than the quasi-peasant/small scale modes of production. This finding suggests that if poverty reduction aquaculture policies are to be more successful, then they ought to be tailored to the broader social, cultural, and political economic contours embedded within the locales where they are implemented (see also Turner and Nguyen 2005; Turner 2007).

Overall, an understanding of place-specific institutions and actors is useful to determine the socioeconomic benefits that the locales could potentially receive, while minimizing the related externalities. However, such a perspective might not be relevant in analysing the macroscale power relations and market dynamics of the aquaculture industry as it tends to operate globally and link multiple interest groups across borders (see Barton and Staniford 1998; Goldberg 2008).

### **3. Global Commodity Chain: An Economic Geography of Aquaculture?**

The preceding sections have illustrated the ability of lead firms in extracting economic value indirectly among the gamut of certification bodies representing assorted interests and problematized aquaculture's potential in delivering economic development and reducing poverty. They also suggest that the industry is often enmeshed in place-specific institutional and structural environments that are not automatically pro-growth. These observations demand a framework to unpack the power relations and market dynamics within the aquaculture industry, yet it must also be sensitive to the larger social, cultural, and political economic contours embedded within places. To this end, this paper draws upon insights from global commodity chain (GCC) studies that focus on the organization of transnational industries and how interfirm networks create and distribute value among the interest groups (not limited to firms) involved.

In the seminal publication of *Commodity Chains and Global Capitalism*, Gereffi and Korzeniewicz (1994) introduced the global commodity chain as a relatively coherent approach to study the 'network of labor and production processes whose result is a finished commodity' (Hopkins and Wallerstein 1986, p. 159). Focusing on products such as vehicles and non-traditional agricultural goods, they examine the emergence of a new global manufacturing system in which economic integration extends beyond international trade in raw materials and final products to encompass centrally coordinated yet internationally dispersed production of many of the activities along the chains of given commodities or manufactured goods (Raikes et al. 2000). Because of its success in unpacking the spatially dispersed and organizationally complex production and trading networks of contemporaneous industries, the GCC approach has attracted considerable attention from scholars and policymakers with a breadth of literature that includes but is not limited to biotechnology (Birch 2008), apparel (Bair and Gereffi 2002), wine (Gwynne 2006), farmed salmon (Phyne et al. 2006), and tourism (Clancy 1998).

Gereffi identifies four dimensions by which every commodity chain could be examined: an input–output structure, a territoriality, a governance structure (Gereffi 1994), and an institutional framework (Gereffi 1995). The input–output structure and the territoriality of the GCC are used to delineate the distribution of value-added and spatial configuration of a sequence of economic activities. The governance structure determines the relations of power that arbitrate resource allocation along the commodity chain. The institutional framework identifies how local, national, and international conditions and policies shape the globalization process at each stage in the chain. Of these four dimensions, the governance structure has thus far received the most attention (Henderson et al. 2002) because of its focus on the organizational aspects of international trade, and the power relations influencing the activities from primary production to the final consumption, aspects almost completely overlooked in economic trade theory (Raikes et al. 2000). It is especially useful to unpack the ways in which lead firms coordinate and control the linkages and flow of resources and products between raw material suppliers, farmers, processors, traders, wholesalers, retailers, and consumers.

The concept of governance recognizes the findings of much of the literature on flexible specialization or post-Fordism – in the contemporary international economy, dynamics of power and control are not necessarily correlated with traditional patterns of ownership. Moreover, empirical research has also established the centrality of the interfirm network as an organizational form that is neither market nor hierarchy (though it might exhibit characteristics of each). Such findings lead to two distinct structures (Gereffi 1994; Gereffi et al. 1994): the producer-driven commodity chain (PDCC) and the buyer-driven commodity chain (BDCC), dominated by large multinational companies (MNCs), which operate large scale and high-technology production facilities and branded merchandisers that concentrate on managing the design and marketing of the products while outsourcing

most (if not all) of their production processes to subcontractors (especially those from developing countries), respectively.

The most insightful observation about the dichotomy between these ideal types is the theorization of commercial capital (often termed 'big buyers' in the GCC literature) as the lead firms that 'call the shots' for the many subordinate firms involved in the BDCC that they control, although they do not necessarily possess equity stakes in the firms actually producing the goods on their behalf (Bair 2005, p. 159). While the apparel industry represents the archetype of the BDCC, examinations on the commodity chains of aquaculture products such as farmed salmon (Phyne and Mansilla 2003; Phyne 2010) and farmed catfish (Duval-Diop and Grimes 2005) reflect a similar governance structure, in which 'big buyers' or lead firms in developed countries such as retailers and trading companies exercise disproportionate control over the other actors (not limited to farmers in developing countries) within the respective chains (Bair 2005, p. 160).

However, the utility and applicability of the PDCC/BDCC distinction has been challenged (Henderson et al. 2002; Gellert 2003; Sverrisson 2004), and subsequent research in this tradition has evolved and been refined in response to these critiques. In the aquaculture industry at least, Bush et al. (2013) show that certification schemes are gaining prominence in the governance of aquaculture production and trade. Advancing the PDCC/BDCC divide, Saidul Islam (2008a) observes that a 'twin-driven commodity chain' is taking shape in Bangladesh, one of the world's largest shrimp growers. He postulates that lead firms from the Global North are still orchestrating the supply network (observed in an archetypical BDCC), but they have externalized much of the non-commercial aspects of shrimp aquaculture (e.g., environmental regulation and quality standards) to third party certifiers and other environmental NGOs, cooperating with these non-firm actors on such matters. As illustrated in Section 2.1, their influence is not to be underestimated as national governments and lead firms (such as Northern retailers and trading houses) are increasingly

reliant on such schemes to achieve their goals. Notwithstanding the shortcomings regarding the PDCC/BDCC dichotomy, the governance structure of the GCC approach still provides a coherent framework for researchers to examine new forms of coordination and control in the global economy, which in turn affect the composition, organization, and geography of various economic activities.

Together with the institutional framework, the governance structure also provides valuable insights to examine how chains are articulated within and through the complex social and institutional environments in which they 'touch down' locally. These insights are crucial as they help researchers understand how aquaculture (and other types of ) commodity chains are shaped across places, and how different actors could benefit by participating in the chains. For instance, in their analysis of the Chilean salmon farming industry, a BDCC dominated by large Northern distributors and retailers, Phyne and Mansilla (2003, p. 113) reveal that 'historically-derived social relations in the Chilean countryside' influence the power relations between different actors within the chain. Their analysis depicts the path dependence of Chile's class structure (a longstanding presence of strong landed elites) and neoliberal government policy in explaining the industry's organization and the extent to which domestic capital, at the expense of labor, have benefited from the expansion of salmon farming in certain communities. On the other hand, Norway's predominantly social democratic regimes (and their commitment to the welfare state) have consistently enacted policies that favor small scale fish farmers over capital, leading to decentralized local ownership and geographic dispersion of Norwegian salmon aquaculture (Phyne 2010). Despite the economic crisis, which hurt the salmon aquaculture industry in 1992, the Norwegian government has established legislation that allowed consolidation of weaker (and usually smaller) firms while still protecting the many small scale rural salmon farmers that reside along its extensive coastline. Apart from the common ideological commitment to the welfare state among most of the country's political parties, Norway's sizable earnings from

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its oil industry reinforce limits to economic and geographical concentration in the salmon aquaculture industry (Phyne 2010). To put it simply, 'place' is a critical explanatory variable. From this example, it can be argued that the strengths of the GCC approach – especially in unearthing the multifaceted interplay of power relations along the nodes of the commodity chain – are suitable to elucidate the contrasting fortunes of the Chilean and Norwegian salmon farming industries. GCC, then, reminds scholars that:

Economic actors such as firms are always embedded in dense social and institutional networks of relations (including labour relations and state regulation)··· and these relations impinge in important ways upon the variability of economic development outcomes across space. (Smith et al. 2002, p. 48)

GCC researchers have often called for policy interventions at local, national, and even international levels that enable firms (especially those in developing countries) to improve their positions in particular commodity chains, a process known as upgrading. As empirical findings from Africa has shown (Gibbon 2001), the GCC approach – focusing on the opportunities and constraints presented by the forms of global integration of production and trade in specific agricultural commodities – provides a useful heuristic device to determine upgrading opportunities for local producers. Similarly, the GCC approach provides insightful avenues for the upgrading of aquaculture producers in developing countries. For example, Duval-Diop and Grimes (2005) offer some pragmatic advice for Vietnamese catfish farming firms to circumscribe the non-tariff barriers imposed by the US government. Their advice centers upon upgrading – increasing the value-added of the humble catfish through further processing such as smoking. In addition, more effective marketing efforts to promote 'an image of the product that resonates with wealthy consumers and reinforces their image of themselves as sophisticated consumers' are also useful in 'legitimizing a higher price' (p. 196). They further posit that:

By identifying and facing the obstacles to creating an image of Vietnamese catfish as an exotic Asian product that is eaten at special occasions or as a necessary ingredient in a trendy dish (such as the famous New Orleans blackened redfish), Vietnamese catfish producers can create new niche markets. (Duval-Diop and Grimes 2005, p. 196)

The above analysis of upgrading places the firm as an object of analysis and is generally concerned with 'increased competitiveness that allows for the capture of greater value-added through the production process' (Bair 2005, p. 165). Such a firm-centric focus is not surprising as many GCC researchers are influenced by comparative development and international business literature. Yet, as the upgrading angle is analyzed by scholars from other disciplines, a more multidimensional viewpoint has emerged. A recent trend is to examine upgrading from a rural livelihood context. With poverty reduction and sustainable rural development as its goals, this body of research supplements the more 'mainstream' upgrading perspectives as it examines the resilience of rural households that depend on integration into a particular commodity chain for their income and livelihood (Challies 2008). As Section 2 has shown, aquaculture production (especially in the Global South) targeted at eradicating poverty is often complicated by place-specific institutional configurations and ecologies, affecting the extent to which aquaculture producers benefit from their participation in the commodity chains that are supposed to enhance their well-being. To better understand these development outcomes, it is important to adopt a more holistic angle that is sensitive to the embeddedness of firms (in this case, they could be the aquaculture producers, traders, or even processors) at the society, network, and territory levels. This concept is explicitly emphasized by Gereffi et al. (1994, p. 2): 'These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embeddedness of economic organization'. More specifically, it is vital to incorporate the wider socio-spatial context surrounding the firms and households (a cluster, for example)

into such analysis. To this end, the horizontal relations of an aquaculture cluster can help firms to respond to commercial pressure and upgrade successfully without harming the environment, evidenced by the diversification of Norway's Austevoll seafood cluster into higher value-added farmed marine products (Phyne et al. 2006).

#### **4. Discussion and Conclusion**

The above sections have provided an exegesis of existing research on aquaculture by examining certification schemes and rural development, two key themes that underpin the industry. Examining these themes primarily from an economic geographer's perspective, the overarching aim is to explicate how firms coordinate and control the distribution of resources across multiple interest groups, while not neglecting the larger institutional and structural environment enveloping the industry. An intimate understanding of the uneven and spatially differentiated impacts associated with historically contingent socioeconomic embeddedness is important, especially if aquaculture promoting efforts aimed at reducing poverty are to be successful. These place-specific attributes affect the industry's capacity to deliver economic development, particularly when they are intertwined with the physical environment of the community.

More importantly, there is a need to adopt a conceptual framework to unpack the power relations and market dynamics within the aquaculture industry. This paper draws insights from the GCC approach, focusing on interfirm networks and the role of lead firms to elucidate the contested nature of commodity flows and firm relations across the aquaculture industry's production, distribution, and consumption nodes. Moreover, the GCC approach's theoretical orientation sheds light on the overall governance structure of the aquaculture industry, making it a valuable asset in analyzing the power relations influencing the actors at various locales. Furthermore, subsequent research in this tradition has been refined to address more contemporary topics such as the increasing importance of certification schemes in the aquaculture industry and the interpretation of upgrading from a rural

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livelihood context, underscoring its sensitivity to the broader structural and institutional environment. In doing so, the GCC approach provides a useful vista to identify ways in which stakeholders from poor countries can participate in economically and socially sustainable activities. This is not to suggest that aquaculture can only be studied through this approach. Nonetheless, the lens of GCC does illuminate intricate chains and excavate values in the aquaculture industry, as well as appreciate the differences place make in one's analysis.

## **Notes**

1 Private sector exporters and processors are taking an increasingly proactive role in the industry.

2 These schemes tend to veer from one extreme (an excessive concern on profitability and industry standards as it is organized by Northern buying firms) to the other (an excessive concern on local effects such as environmental issues as it is organized by non-profit social groups).

3 Almost all the pangasius is cultivated in Vietnam's Mekong Delta.

4 Asian Development Bank (2004) defines small scale aquaculture as the farming of food fish using semi-subsistent measures.

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