Examining and Comparing Social Dimensions in Transnational Aquaculture Certification Programs

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ABSTRACT

Certification is a market-based governance instrument for promoting the long-term sustainability of farming fish. While there are dozens of certification programs operating in the global seafood market, this thesis examines the emergence and evolution of certification programs that target aquaculture production in multiple jurisdictions, followed by an examination and comparison of the social principles and criteria in eleven comprehensive programs that are prominent globally. Drawing on an analysis of scholarly publications, gray literature, and certification standard documents, this research is designed with two specific goals: to enhance an understanding of the emergence and evolution of certification schemes in aquaculture sector and to enhance a comparative understanding of their social, economic and community-focused principles in a context of wider efforts to promote socially and ethically responsible aquaculture practices. As very little recent scholarship has focused on these two areas, this research sheds light on: when, how and why various schemes have emerged and evolved over time and space, and what factors and actors drive certification agencies to integrate social, economic and community-oriented principles in to their certification system. The thesis argues that there have been seven key dynamic forces driving a plethora of mainly non-state actors, organizations, associations, foundations, corporations, international networks and alliances to design and develop aquaculture certification programs. The interaction of these forces, and the underlying interests that have shaped key actors in supporting aquaculture certification, have played pivotal role in the emergence and evolution of four organic and seven nonorganic certification schemes during two key periods: 1970-1999 and 2000-2018. The thesis further argues that certification agencies incorporate an array of complementary and distinct social, economic and community-oriented principles into their standards and requirements. These principles target the industry's unresolved problems and promote socially and ethically responsible aquaculture practices through upholding justice, fairness, freedom and equality. These principles of aquaculture certification schemes are also compared with the CFRN framework. The diversity of social, economic and community principles, criteria and indicators within and across certification programs will likely create ongoing pressures related to questions of harmonization and fragmentation.

Keywords: Aquaculture, Certification, Community, Evolution, Principle

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LIST OF ACRONYMS

ACC	Aquaculture Certification Council
AF	All Farm
AMAs	Area Management Agreements
AQ	Aquaculture
ASC	Aquaculture Stewardship Council
BAP	Best Aquaculture Practice
BMPs	Best Management Practices
BMPs	Better Management Practices
BSE	Bovine Spongiform Encephalopathy
CA	Content Analysis
CCRF	Code of Conduct for Responsible Fisheries
CFRN	Canadian Fisheries Research Network
COFI	Committee on Fisheries
EDF	Environmental Defense Fund
EII	Earth Island Institute
ENGO	Environmental Nongovernment Organization
EU	European Union
EurepGAP	Euro-Retailer Produce Good Agricultural Practice
FAO	Food and Agriculture Organization
FLO	Fairtrade Labelling Organizations International
FOS	Friend of the Sea
FSC	Forest Certification Council
GAA	Global Aquaculture Alliance
GAA-BAP	Global Aquaculture Alliance-Best Aquaculture Practices
GFSI	Global Food Safety Initiative
GLOBALGAP	Global Good Agricultural Practice
GSA	Global Seafood Assurances
GSSI	Global Sustainable Seafood Initiative
IAAS	Integrated Aquaculture Assurance Standard
IAPB	IFOAM Accreditation Program Board
IDH	The Sustainable Trade Initiative
IEC	International Electrotechnical Commission
IFOAM	International Federation of Organic Agriculture Movements
ILO	International Labour Organization
IOAS	International Organic Accreditation Service
ISA	Infectious Salmon Anemia
ISAN	Industrial Shrimp Action Network
ISEAL	International Social and Environmental Accreditation and Labeling
ISO	International Organization for Standardization
LSRs	Large Scale Retailers
MAC	Marine Aquarium Council

MAP	Mangrove Action Project
MMT	Million Metric Tons
MoU	Memorandum of Understanding
MSC	Marine Stewardship Council
NACA	Network of Aquaculture Centres in Asia-Pacific
NFI	National Fisheries Institute
NGO	Nongovernmental Organization
NRDC	Natural Resources Defense Council
PAD	Pangasius Aquaculture Dialogue
PE	Political Economy
PH	Protected Harvest
PSIA	Participatory Social Impact Assessment
SAD	Salmon Aquaculture Dialogue
ShAD	Shrimp Aquaculture Dialogue
SSM	Sustainable Seafood Movement
TAD	Tilapia Aquaculture Dialogue
UN	United Nations
UNCSD	United Nations Commission on Sustainable Development
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Programme
USA	United States of America
WAS	World Aquaculture Society
WWF	World Wildlife Fund

CHAPTER ONE: INTRODUCTION

1.1. Stating the problem

Globally, the aquaculture sector has witnessed an unprecedented growth over the past four decades, making it one of the fastest growing commodity sectors. Aquaculture is also widely promoted as a potential solution to helping address the challenge of sustainably feeding nine billion people (Lester *et al*., 2018) and to meeting over one-third of growing protein demand by 2050 (Froehlich *et al*., 2018). The growth of aquaculture globally has been mostly driven by technological development and global stagnation in wild capture fisheries (D'Amico, *et al*., 2016). The Food and Agriculture Organization (FAO) of the United Nations warns that the amount of biologically sustainable wild fish stocks sharply declined from 90% in 1974 to 71.2% in 2011 to 66.9% in 2015 (FAO, 2014a; 2018). In this context, aquaculture is also viewed by some observers as a solution to the "tragedy of the ocean commons" (Smith, 2012: 7). In a context of expected stable global production or collapse of wild fisheries, the share of global seafood from aquaculture production grew from 3.9% in 1970 (White *et al*., 2004) to 25.7% in 2000 to 46.8% in 2016, amounting to 110.2 million tons (fish and aquatic plants) value at about USD 243.5 billion (FAO, 2018). The FAO reports that about half of the total world's fish consumed as food directly comes from aquaculture as farm-based fish production has dramatically risen from 1.6 m tons in 1960 (FAO, 2014b) to 80 m tons in 2016 (FAO, 2018). It is anticipated that aquaculture production, excluding aquatic plants, will grow to an estimated 102.1 m tons in 2026 and 140 m tons in 2050 (Ahmed *et al*., 2018; UNCTAD, 2018).

In addition to providing a rapidly growing source of seafood production in a context of stagnating global wild capture fish production, aquaculture is an important source of livelihood, income and employment globally. FAO (2018) statistics indicate that 19.3 million people currently engage in aquaculture, which has increased from 17% in 1990 to 32% in

2016. Much of this work and labor is in developing country contexts with few alternative livelihood options. By employing local poor people, generating household incomes and providing subsistence food sources, it also contributes to the alleviation of rural poverty and food insecurity, and to the creation of sustainable livelihood options (Belton *et al*., 2011; Little *et al*., 2012; Toufique and Belton, 2014; Bush *et al*., 2019).

While aquaculture offers significant benefits related to supplementing global seafood supplies from limited wild capture sources, food security challenges and social development challenges, the expansion of industrial aquaculture around the world has created a myriad of social and environmental problems since the 1980s. The early industrial expansion of aquaculture caused serious social problems involving damaging livelihoods, land conversion, resistance movements, expropriation and marginalization of communities, and environmental problems such as soil infertility, coastal erosion, marine pollution, and the destruction or degradation of mangroves, natural habitats, marine life, and coastal wetlands (Burbridge, 1982; Snedaker *et al*, 1986; Bailey, 1988; Primavera, 1991; Tilseth *et al*.,1991; Pullin *et al*., 1993; Findlay *et al*., 1995; Muluk and Bailey, 1996; Stonich, 1996; Stevenson, 1997).

Despite ongoing but varied changes in technology and practices, the aquaculture industry is still plagued by environmental issues. These include damaging ecosystem services, coastal biodiversity and crop production, water pollution, bacterial diseases and viral infections, greenhouse gas emissions, negative impacts on freshwater bodies, wetlands and ecological integrity, the release of toxic chemicals, and general degradation of marine environments (Thrane *et al*., 2009; Jonell *et al*., 2013; Kauffman *et al*. 2017; Robb *et al*. 2017; Ahmed *et al*., 2018; Rico *et al*., 2018). Likewise, various socioeconomic problems persist in many operations around the world, such as unhealthy working environments, occupational fatalities and accidents, and negative affects for local communities and coastal livelihoods (Primavera, 2006; Orchard *et al*., 2015; Osmundsen and Olsen 2017; Holen *et al*.,

2018a; Holmen *et al*., 2018). Poor labor practices, exploitation, discrimination and inequality also continue (Marschke and Wilkings, 2014; Marschke *et al*., 2018; Bosma *et al*., 2018).

The mounting concerns over environmental, social and economic impacts of aquaculture development harm the industry's reputation and weaken public confidence and trust, which have forced companies to respond to scrutiny from environmental groups, nongovernmental organizations (NGOs) and broader surrounding communities, who can withhold the "social license"[1]to operate (Vince and Haward, 2017; Vince 2018; Vince and Haward, 2019). Some groups have responded to such challenges by promoting new regulatory and governance instruments, such as market and consumer-oriented certification and product labeling.

1.1.1. Civil society and industry responses to aquaculture problems

In this context of ongoing and varied environmental and social problems, aquaculture continues to face severe criticisms from various state and civil society actors and institutions. For example, member states of the FAO have called for the development of more effective governance of aquaculture sector. In the mid-1990s, for example, the FAO's voluntary Code of Conduct for Responsible Fisheries (CCRF) recommended that states should "[...] establish, maintain and develop an appropriate legal and administrative framework which facilitates the development of sustainable aquaculture" (Nilsson,2018: 9). At the same time, nongovernmental organizations (NGOs) increasingly put pressure on the industry through consumer boycotts, media campaigns and systematic pressure on producers, restaurants and supermarkets chains (Vormedal, 2017). The evolving problems of aquaculture production

[1] It is a well-established notion in resource extractive sectors like mining, which allows an industry to operate their activities within a complex community setting. It underscores socioeconomic and environmental impacts of project operations on the society, environment and local community. The concept is increasingly being used to explain the relation between local community and industry that describes the interaction of diverse actors to address the negative impacts on local communities and other stakeholders resulting from project development (Koivurova *et al*., 2015). Of late, it slowly gains popularity in aquaculture sector and its recent application urges that how a fish firm or company can achieve social license which involves a group of actors i.e. environmental groups, community groups, local residents and other stakeholders (see: Leith *et al.* 2014; Kelly *et al.,* 2017; Baines and Edwards, 2018; Mather and Fanning, 2019).

provided a strong impetus to NGOs such as International Federation of Organic Agriculture Movements (IFOAM), the Rodale Institute, Naturland and the Soil Association to apply the idea and principles of organic and sustainable production in industrial aquaculture.

Some NGOs responded by creating standards and norms for organic aquaculture producers through which they initially began to certify fish farms that were in compliance with organic principles and criteria. During the 1990s, major organic accreditation[2] and certification[3] bodies emerged in aquaculture such as IFOAM, Naturland, Soil Association and BioGro, which operate at transnational level (see Auld, 2014). While these early certification initiatives focused on organic principles, market actors, industry players, and nongovernmental actors and institutions subsequently initiated diverse nonorganic efforts for addressing a broader range of social and environmental problems in aquaculture (see Chapter Two).

By the end of the 1990s, an industry-based organized response to the socio-environmental problems of aquaculture development emerged. Producers, processors, wholesale buyers, feed companies, input suppliers, large farms, farmer's associations, seafood retailers, wholesalers, marketers, biotechnology and agrochemical companies, aquaculture business groups and transnational corporations organized to develop their own approach to standards and certification (Stonichand Bailey, 2000). This industry-led group formed the Global Aquaculture Alliance (GAA) in 1997 and commenced to develop codes and standards for aquaculture certification programs for sustainable aquaculture. The GAA subsequently constituted the Aquaculture Certification Council (ACC) and assigned an

[2] Accreditation is an ongoing process of assessing "organizations against standards of excellence to identify what is being done well and what needs to be improved" (Accreditation Canada, 2019).

[3] Certification means a "formal process where an authorized person or entity verifies and attests (in the form of a certificate) that a given product or service is associated with specific characteristics or attributes" (Potts *et al*., 2016: 94).

exclusive right on the ACC to certify aquaculture products and facilities (e.g., farms/hatcheries) complying with its standards (Lee and Connelly, 2006).[4]

Also during the late 1990s, a group led by food retailers composed of supermarket chains, NGOs, consumer groups, producer organizations and agro-industries formed a certification consortium, known as Global Good Agricultural Practice (GlobalG.A.P). This initiative, which became the world leader in terms of total volume of certified products (Potts *et al.*, 2016), responded to growing consumer awareness for importing seafood from safe, quality and sustainable sources and initiated voluntary standards and certification schemes for socially responsible and sustainable aquaculture development (Campbell, 2005; Hatanaka and Busch, 2008; GlobalG.A.P, 2018). The development of the GAA and the GlobalG.A.P, thus, represented the emergence of two different competing alliances of industry players and retailer groups promoting their own standards and certification programs for advancing sustainable and socially responsible best aquaculture practices (see Chapter Two).

Environmental NGOs responded to the emergence of major industry-led initiatives by facilitating the development of alternative programs. Following on the involvement of World Wildlife Fund (WWF) in creating Marine Stewardship Council's (MSC) standard-setting and certification program for wild capture fisheries, it helped to create standards for aquaculture certification. In 2004, WWF began the species-specific Aquaculture Dialogue, a multi-stakeholder roundtable with industry, NGO representatives, scientists, farmers, retailers and other stakeholders, to develop both social and environmental standards for 12 aquaculture species. This process eventually led to, with the assistance of Netherlands based Sustainable Trade Initiative (IDH), the creation of Aquaculture Stewardship Council (ASC) in 2010, which began to certify farms in 2012 (ASC, 2014; Boyd and McNevin, 2014). Despite facing

[4]Though the ACC was constituted by the GAA as an independent certifying body, it was dissolved in 2011 in the face of NGOs' criticisms (Boyd and McNevin, 2014) and the emergence of the Aquaculture Stewardship Council (see Chapter Two).

continuous criticisms (Belton *et al*., 2010; Schouten *et al*., 2016; Vince and Haward, 2017), the ASC has become one of the top certification organizations in aquaculture.

The development of different aquaculture certification programs and related initiatives promoting responsibility and sustainability verification and traceability continued. Friend of the Sea (FOS), formed by Earth Island Institute in 2006, developed its final standards in 2013 to certify aquaculture products across the world mostly in developing countries (Potts *et al.*, 2016). More recently, a new traceability program, the Global Seafood Assurances (GSA), emerged in 2018 to meet market demands for credible and sustainable farm-raised seafood where the GAA has played pivotal role in its formation. A 2016 review found more than thirty certification schemes engaged in advancing the long-term sustainability of the aquaculture industry (Tlusty *et al.,* 2016). Though a plethora of certification schemes has emerged to address the evolving environmental problems of aquaculture, many of the programs also address social problems. This is important since the sector is still criticized for land grabbing, impacting community and coastal livelihoods, gender discrimination, forced labor, child labor, bonded labor, unpaid work, violence, labor exploitation, hazardous work, human trafficking and slave labor (Adnan, 2013; Orchard *et al.,* 2015; Amaravathi *et al*., 2016; Levin, 2017; Osmundsen and Olsen, 2017; Roxas *et al*., 2017; Bosma *et al*., 2018; Marschke *et al*., 2018; Nakamura, 2018).

1.1.2. The "social" problem in aquaculture certification

This thesis examines the nature and extent of social considerations in aquaculture certification. Given the ongoing social and economic issues in aquaculture, it is important to examine and compare the extent to which major aquaculture certification organizations like ASC address social and economic considerations (Tlusty *et al.,* 2016; Oxfam, 2018). In-depth examination of the social question is also important because some aquaculture companies that are certified by the ASC and GAA respectively have been subjected to severe criticisms for

many years by environmental NGOs and local community groups for negative socioeconomic and environmental impacts (Vince and Haward, 2017). In a context of similar evolving challenges, Oxfam International, which participated in the WWF-led aquaculture dialogues and contributed to the establishment of the ASC, has recently called upon certification leaders such as the ASC to immediately improve socioeconomic issues (e.g., labor rights, no child labor, workers' safety), including conditions for surrounding local communities, through its aquaculture certification process (Oxfam, 2018). Moreover, Tlusty *et al.* (2016) argue that socioeconomic issues are not rigorously addressed by major aquaculture certification organizations, such as ASC, GAA and GlobalG.A.P. This thesis therefore examines how far and in what ways certification institutions have incorporated social, economic and community-oriented principles in their certification standards and norms to ameliorate socially and ethically responsible aquaculture production (see Chapter Three).

1.2. Purposes of the research

This thesis deals with two broad objectives that the empirical findings of Chapter Two and Chapter Three seek to address. The first objective is to describe and explain the emergence and evolution of various transnational aquaculture certification programs, which are defined as those that "operate transnationally across states, and none of them welcome the participation of states in their governance structures" (Vandergeest and Unno, 2012: 360).The transnational programs reviewed are the most comprehensive schemes in terms of dominating the global seafood markets and total certified production. For this reason, this thesis uses the term "transnational" to examine the emergence and evolution of a particular class of certification agencies, which are operating at globally to promote responsible aquaculture. With an aim to critically examine the broader changing landscape of transnational aquaculture certification schemes, this thesis seeks to explore how various certification

agencies operating globally have emerged and evolved over time and space (see Chapter Two).

The second objective is to critically assess the social, economic and community-oriented principles and criteria of transnational aquaculture certification agencies. This objective is related to the first in that the thesis examines how the changing landscape propels transnational aquaculture certification authorities to include the social, economic and community-focused principles, including those considered important for social license. To cover this objective, moreover, the thesis aims to explore various social, economic and community-focused principles incorporated in the standards and norms of transnational certification programs (see Chapter Three).

1.3. Research questions

In order to examine the rise and evolution of transnational aquaculture certification programs and their social, economic and community-oriented principles, this thesis is guided by two broad research questions:

1. What does the aquaculture certification landscape look like right now, how has it changed over time, and what factors and driving forces have influenced changes in the aquaculture certification landscape over time, particularly those related to socioeconomic issues?
2. What social, economic and community-oriented principles and criteria are integrated into aquaculture certification standards and norms?

1.4. Justification of the study

Understanding why, when and how transnational aquaculture certification schemes have emerged, who are involved in the process of creation, and why they have been changed over time are important and will provide new knowledge to comprehend the broader social and environmental certification landscape. Though a plethora of studies have been devoted to understand sustainability aspects (Bush *et al.,* 2010; Bush *et al.* 2013; Baumgartner *et al.,*

2016), viability for small-scale producers (Marschke and Wilkings, 2014), community management dimensions (Vandergeest, 2007), technical, cultural and institutional fitness (Schouten *et al.,* 2016), legitimacy and fairness issues (Hatanaka, 2010), implementation challenges (Vince and Haward, 2017; Vince, 2018), and comparison among national regulations and standards (Luthman *et al.,* 2019) of transnational aquaculture certification schemes, there is very little scholarly work examining the specific significance of a range of social issues in the emergence, evolution and content of various initiatives.[5]

Moreover, analysis of the various social, economic, and community-oriented principles incorporated in the standards and norms of various certification bodies is limited. Parkes *et al.* (2010) highlight "social issues" very generally within four transnational aquaculture certification schemes and Amundsen and Osmundsen (2018) identify the number of sustainability indicators in four salmon aquaculture certification schemes instead of an in-depth account of the nature and extent of social, economic and community-focused principles and requirements of certification. With respect to the scarcity of scholarly literature, this research will significantly contribute to the knowledge gap and enhance understanding of what principles and criteria are set by the transnational aquaculture certification bodies to advance socially and ethically responsible aquaculture practices.

1.5. Methodology

1.5.1. Scoping and selection of schemes

This research explicitly focuses on the rise and evolution of aquaculture certification initiatives and their principles on social, economic and community related issues. Though there are more than 30 certification schemes engaged in advancing the long-term sustainability of the aquaculture industry, not all initiatives have been selected for this study. The following criteria and conditions have applied to select the certification schemes for

[5]Though Auld (2014) partly analyzes aquaculture certification schemes within the broader context of rising fisheries certification, this analysis was limited to the emergence of the programs, not focused on the social question and has not been updated.

analysis: a) comprehensiveness and dominance in global seafood markets, b) geographical coverage and operation at the transnational level, and c) schemes created by non-state actors, institutions, organizations and alliances. Based on applying these criteria, 11 certification agencies were selected to be reviewed in detail: four are organic (i.e., Naturland, Soil Association, IFOAM and BioGro) and seven are nonorganic (i.e., GAA, GlobalG.A.P, FOS, FLO, ACC, ASC and GSA) certification organizations.

1.5.2. Study method

This study is based on qualitative content analysis (CA) method that is widely using in health, tourism, information science, psychology and communication research. The CA method engages a number of techniques for collecting and analyzing data generated from verbal, electronic and print sources such as articles, books, manuals and documents that are useful to make objective inferences from a wide range of subjects (Kondracki *et al.,* 2002). The CA aims at systematically transforming a huge volume of texts into a well-organized and precise summary of significant findings (Erlingsson and Brysiewicz, 2017). It is used as a method for "systematic reading of a body of texts, images, and symbolic matter" (Krippendorf, 2012:10) and also a legitimate process of analyzing texts relying on the concrete research questions and quality materials (Mayring, 2015).For this study, CA is applied as a method for subjective interpretation of the content of large volumes of texts through the systematic process of coding and categorizing themes. In addition, this study relies on the latent technique of content analysis where "a human researcher reads the relevant text(s) and then responds to the research question at hand with a textual response" (Dooley, 2016: 244). The latent technique helps this research to analyze the deeper meaning and structure of the texts.

1.5.3. Sources and techniques of data collection

As the study is based on analyzing documents, secondary data was collected through literature searches, reviews and examines according to the relevance with research aims and questions. The peer-reviewed journal articles and gray literature (e.g., periodicals, gazettes, annual reports, books, newsletters, conference proceedings and presentations, technical guidelines, newsfeeds, government documents, policy notes and media analysis) were collected through online searches using various electronic databases such as Google, Google Scholar, Scopus, Web of Science and Memorial University of Newfoundland's databases. Different keywords were used during online searching such as aquaculture certification, rise of certification, certification standards, aquaculture movement, and the creation of aquaculture certification and emergence of certification agencies. The scholarly articles and books that were unavailable and inaccessible via online were directly collected from authors through email communication and postal services. Recent data on certified aquaculture production were collected from certification organizations' websites and through personal email contacts with responsible persons of those organizations.

The official websites of eleven aquaculture certification agencies were extensively reviewed to explore their emergence and development, particularly the beginning of species-specific certification, and the release of various standards over time. These organizations regularly release updates and news into the media portal of their websites that have become effective sources of information for this study. Opening an account with Global Aquaculture Alliance (GAA) Advocate was very effective to get access to their regular online articles and archives. In addition, various social, economic and community-focused principles set into the standards and norms on which the findings of Chapter Three are built were collected from the websites of eleven certification agencies. Finally, some seafood news portals such as

IntraFish, SeafoodSource, Global Salmon Initiatives, SeafoodNews.com and The Fish Site were reviewed for collecting information for this thesis.

1.5.4. Data analysis

Secondary materials collected through reviewing scholarly and gray literature and other sources were systematically analyzed. Materials collected from websites and news portal were saved in a Microsoft Word file. For analyzing the large volume of texts of various literatures, this research utilized a series of steps of CA method proposed by Krippendorf (1980) which include formulating a research question, defining the categories, coding the content, and analyzing and interpreting data based on final codes. In doing so, the broad research question (see Section 1.3) was classified into the following sub-questions that helped to identify categories and codes:

a) What are the key driving forces in the rise and development of aquaculture certification schemes?
b) Who are actors, institutions, foundations, organizations, and what types of alliances and networks are involved in the evolution of aquaculture certification?
c) What are the underlying ideas and interests in the programs' initiation and development?
d) When and how have various certification programs emerged?

Likewise, research question 2 was divided into the following sub-questions:

e) What are the social principles guiding certification organizations and their standards and criteria?
f) What are the economic principles of certification organizations and their standards and criteria?
g) What are the community-oriented principles of certification organizations and their standards and criteria?

Based on sub-questions, a number of categories (a category looks like a collection of words) were created from large volume of texts and each category was supported by sub-question. Sub-question d, for example, helped to create a specific timeframe of the emergence and evolution of aquaculture certification schemes and standards (see Figure 2.1 and 2.2). To generate the categories, texts' themes and its deeper meaning were explicitly understood and linked to the sub-questions. A list of categories was made and written on the research notebook. Texts related to all categories were highlighted and saved with specific number and particular heading. The categories built through the sub-questions (a-d) were effective to explore the interactive engagement of transnational actors, market forces, institutions, alliances and networks in the rise and evolution of certification initiatives (see Chapter 2). Similarly, the categories created through sub-questions (e-g) also helped to identify social, economic and community-focused principles of certification bodies. The creation of categories helped to systematically organize a large volume of literature and arrange the texts for coding.

Based on the categories, a wide range of codes (a code looks like a word or a noun) were manually created (see Table 1.1) to identify important passages within the texts, link the data to core themes of the questions, and organize the data to interpret in a structured way. In this regard, a descriptive coding technique was applied for data analysis which is suitable to deal with a wide variety of data forms (i.e., articles, documents, notes) through summarizing a passage in a word or often as a noun (Saldana, 2009). The 'Ctrl + F' button of a personal computer assisted to explore various codes in the texts of bulky MS word documents and arrange the passages for final interpretation. The codes helped to explore significant verbatim within the texts that correspond to the objectives and questions. The codes were rechecked to remove redundancy. The analysis of data was manually performed by researcher based on categories, codes and themes. Overall, then, this research is built on a desk-based thematic analysis.

Table 1.1: Categories, codes and themes used in the research

Categories	Codes	Themes
Driving forces	Collapse, governance, institutional, management, government, fishery, environmental concerns, social impacts, resistance, coalition, alliance, food safety, regulatory framework, sustainable seafood movement, production, trade, market	Causes behind the emergence of certification schemes
Program initiation, competition and proliferation: 1970-1999	Organic movement, accreditation, standard, actor, institution, organization, interests, ideas, market, industrial aquaculture, group, association, company, network, meeting,	Creation and development of early initiatives
Program initiation, proliferation and termination: 2000-2018	Codes, organization, aquaculture dialogue, credibility, species, supermarket, workshop, consultation, challenges, commitment	Advancement, proliferation and termination of modern schemes
Program-level harmonization and consolidation	Partnership, auditing, chain of custody, duplication, integrity	Cooperation and integration among the initiatives
Contexts of incorporating social, economic and community focused principles	Social/environmental impact, improvement, criticisms, socially responsible	Reasons of integrating social, economic and community-oriented principles
Social principles	Labor, housing, rights, freedom, justice, safety, discrimination, benefits, security, health	Diverse social issues incorporated into certification standards
Economic principles	Wages, fair, employment, payment, hours, agreement	Various economic issues integrated into certification standards
Community principles	Rights, values, welfare, relation, conflict	Different community issues inserted into certification standards

1.5.5. Limitations of the study

The study is marked with the following limitations. The literature on the emergence and evolution of various aquaculture certification schemes is very scarce, which made it difficult to draw a broader comparative discussion and development of diverse initiatives and their standards. Most importantly, very old information (i.e., around the 1990s) is generally unavailable in the certification and accreditation bodies' websites. This limited the author's ability to describe the development of standards from the beginning of species-specific certification programs. Besides, researcher faced difficulties while downloading newly published documents as these were publicly inaccessible. Despite these limitations, this thesis will significantly enhance understanding about the evolution of aquaculture certification and their principles for advancing socially and ethically responsible aquaculture.

1.6. Theoretical lens

This thesis draws analytical insight from the lens of political economy and from a framework for the comprehensive social-ecological assessment of sustainability. The approaches are introduced below.

1.6.1. Political economy (PE) approach

PE is an interdisciplinary perspective that provides an opportunity to analyze social science issues within a broad theoretical context. It engages with "how power and resources are distributed and contested in different contexts and provides insights into underlying interests, incentives, rules and institutions" (Haider and Rao, 2010: 4). PE studies the distribution of power and resources in the contexts of ideas, interests, rules and institutions. Campbell (1998) argues that the ideas play a very significant role in PE analysis that can be either cognitive or normative. He identifies four distinct types of ideas: programs, paradigms, symbolic frames and public sentiments. The symbolic frames and public sentiments tend to affect the people's perceptions about specific course of actions whereas program ideas signify the selection of particular solutions from a specific paradigm.

This research examines the emergence and development of diverse aquaculture certification schemes designed to address and incorporate an array of social, economic, environmental and related ideas. It assumes that the participation of various actors is driven by underlying interests and ideas, which significantly shape the proliferation of aquaculture certification initiatives. This thesis identifies the underlying ideas and interests of diverse groups driving to the programs' initiation and advancement.

In PE perspectives, moreover, rules govern the relations between individuals and institutions. It also encompasses different actors, interest groups and institutional contexts. For transnational aquaculture certification organizations, specially ASC, GAA and GlobalG.A.P, rule-making is an "expert-driven" process, which requires the engagement of non-state actors like scientists, advocacy groups, NGOs, consultants, individuals and industry experts (Havice and Iles, 2015). The rules of transnational certification organizations are designed to be driven by the power of market forces, not by regulatory power and authority of state, because market actors use the instruments of certification to validate the sustainability of products (Foley and McCay, 2014).

The application of PE in examining socio-environmental issues has been advanced with a plethora of actors' involvement and their interactions (Martin and Nissan, 2010). In positioning the PE approach globally, Newell (2008) shows the relationship among state, market and civil society actors regarding the distribution of relative power. He argues that power of traditional state functions has been redistributed between state, market and civil society players, wherein civil society actors are more powerful and create pressure on the transnational governing institutions, multinational companies and firms to accept "socially responsible actions".

In international PE context, Melo and Wolf (2005) argue that state's failure in responding to the problems of sustainability led to the emergence of "a new environmental conservation strategy" seeking to utilize market competition and dominant interest of economic actors to improve the environmental performance of production and business. Furthermore, NGOs have played a significant role in harmonizing the private and public interests. These dynamics in the resource management and conservation system combined with powerful civil society actors, market forces, economic players and NGOs have collectively played pivotal role in the emergence of nongovernmental market-oriented initiatives like eco-certification[6] schemes.

The most recognized eco-certification schemes are created by civil society actors, environmental NGOs and industry players. Lambin and Thorlakson (2018) elaborate the large spectrum of interaction between civil society members and private sector actors who interact in various ways around the creation of NGO-led certification programs and sustainability standards. Thorlakson *et al.* (2018) explore the involvement of large retailers and manufacturers in dealing with consumers who adopt such standards. The retailers hold significant power in seafood supply chain through which they influence the growth of certification programs. Roheim *et al.,* (2018), for example, explore the past 20-year commitments of giant food retailers (e.g., Walmart, Tesco, Sainsbury's, Whole Foods) in the UK, US and Canada which played an important role in the growth of major certification organizations, notably ASC, GAA-BAP and GlobalG.A.P. These retailers are increasingly demanding only sustainably sourced seafood products that are verified by the third-party certification organizations to whom they have committed.

[6] Eco-certification is defined as "an environmental seal of approval (ecoseal) endorsed by an independent organization" which is used by manufacturers to underscore the basic environmental attributes of a product (Teisl *et al*., 1999: 1066).

Lambin and Thorlakson (2018) argue that the exclusion of one major stakeholder group (e.g., civil society or producers) from existing private sustainability schemes can potentially drive them to the creation of certification program for their own sake. It implies that there is a growing power struggle among the creators of certification schemes. This is well-noted by Foley and Havice (2016) who argue that "eco-certifications have become an important site of power struggles in commodity sectors" (p.24) including aquaculture, and non-state actors (e.g., industry and trade associations, fisheries associations and environmental NGOs), institutions and their underlying interests play powerful role in the development of territorial eco-certification schemes worldwide. Overall, this type of PE analysis is useful to examine the evolutionary contexts and interactive role of diverse actors, institutions, market forces and stakeholder groups in the emergence and development of aquaculture certification schemes. Drawing on this PE insight, Chapter Two of this thesis explores the pattern of involvement and key role of various non-state actors, institutions, foundations, organizations, market forces, international networks and alliances in the creation and evolution of eleven competing transnational aquaculture certification programs and its standards and codes of practice. Moreover, this type of PE analysis also helps to explain the rise (e.g., GAA and ASC) and termination (i.e. ACC) of major certification schemes in the face of criticisms by various actors and institutions over time, which is illustrated in Chapter Two.

1.6.2. Canadian Fisheries Research Network (CFRN) framework

The CFRN framework for evaluating fisheries holistically across social and ecological considerations was constructed through a series of workshops, conference calls and working groups of a collection of people representing the fishing industry, government representatives and interdisciplinary academics of Canada, which is a result of the framework development project began in 2010 (Stephenson *et al*. 2018; 2019). The CFRN framework is designed with

core elements of four pillars of sustainability such as ecological, economic, social and institutional which intends to build a social–ecological approach for sustainable fishery management. Stephenson *et al*. (2018) argue that the CFRN sustainability framework can be applied to evaluate fishery management plans and planning, management performance and performance based indicators. Though the CFRN framework of Stephenson *et al*. is built for sustainable fisheries management, two pillars (i.e., social and economic) of this analytical model are also useful for this thesis to examine the social, economic and community-oriented principles of aquaculture certification initiatives. It is therefore one of the core aims of this thesis to examine the social, economic and community principles of aquaculture certification schemes using the CFRN framework as the baseline for evaluation.

The social pillar of CFRN framework is composed of "sustainable communities", "health and well-being" and "ethical" issues. The "sustainable communities" encompass social capital, informed citizenry, vital civic culture and community well-being. According to the framework, social capital means shared values and norms of local residents, participation in social institutions within local communities and building social networks with communities. Informed citizenry underscores valuing the preference of dependent communities for their existence. By vital civic culture, Stephenson *et al*. indicate the situation of social institutions and quality of local education. The CFRN framework includes the promotion of "individual and collective well-being" for sustainable local communities. The "ethical" issues of the social pillar intend to evaluate workers' rights, freedom, welfare, and equity in allocations and access. The "health and well-being" element encompasses proportion of workforce meeting certification standards and occupational safety of workers such as number of deaths and injuries over time. It also includes basic services that need to be available including medical care, housing, education and daycare. Some important social

issues are considered in CFRN framework such as income disparity (highest and average wage), unemployment rate and proportion of people below the poverty line.

The economic pillar of the CFRN framework of Stephenson *et al*. (2018, 2019) is constituted by four elements: economic viability and prosperity, sustainable livelihoods, distribution of access and benefits, and regional economic benefits to community. Under the economic viability and prosperity, Stephenson *et al*. include a collection of performance indicators in which some are demographic variables (e.g., age, sex and education), employees meeting certification standards, technological impacts on losing jobs and customary knowledge, production cost and output, net profits, bankruptcy rates, investment and stock-flow, required education and experience, means of compensation, amount of labor force represented by industry and legislation for checking market failure. In the "sustainable livelihoods" category, Stephenson *et al*. include unemployment rate, employment gains and losses, viability of livelihoods, reallocation of stakeholders without compensation and livelihood security index. The CFRN framework sets the objective to promote equity and fairness in distributed benefits. In the distribution of access and benefits, it includes intergenerational equity and equitable relationship. The framework indicates regional economic benefits to community can be advanced through the integration of regional community resources and value of resource (i.e. fisheries)-related public and private infrastructures.

While the CFRN of Stephenson *et al*. (2018, 2019) is a comprehensive framework to advance wild capture fisheries management and planning, the broad scope of social and economic principles, criteria and indicators provide a means to categorize, code, and compare the development and characteristics of social and economic principles and criteria in aquaculture certification initiatives. This framework is mainly used to show similarities between the components of the CFRN framework and the principles in the certification

standards that are discussed in Chapter Three of this thesis. Social and economic pillar of this analytical framework is utilized to explore the homogeneity of various principles and criterions of certification standards described in Chapter Three, for examples, community wellbeing, industry's ethical and fairness practices (e.g., equality, freedom, justice and human rights), and occupational safety, health, facilities, benefits and basic services for employees/workers. Besides, the components of economic pillar also help to frame the principles of aquaculture certification standards related to sustainable livelihoods and economic benefits to local communities, which are examined in Chapter Three.

1.7. Outline of thesis

This thesis is built on four chapters as follows. The first, and current, chapter provided an overview of the problems facing the aquaculture industry and the responses of diverse actors to the evolving problems of aquaculture development, including social problems. It highlights the study's purposes, research questions, thesis statement and justification of this research. This chapter outlined the method, schemes' selection process, data sources and analytical techniques. It also delineated two analytical insights used in the two core empirical chapters.

The second chapter explores the emergence and evolution of various transnational aquaculture certification schemes. At the beginning of this chapter, seven driving forces are identified and used to explain the rise of certification programs. Also discussed in this chapter is the relative role of a plethora of actors, institutions, associations, foundations, networks and alliances in the creation and evolution of transnational certification schemes, standards and codes of practice during 1970-1999 and 2000-2018 periods. Despite a growing competition amongst proliferating programs, this chapter discusses patterns of harmonization and consolidation among various schemes.

The third chapter identifies and describes social, economic and community-oriented principles and criteria included in transnational aquaculture certification schemes. This

chapter initially outlines the context and driving forces for the inclusion of particular sets of principles and criteria into aquaculture certification standards and norms. The underlying principles and criteria are detailed in broad three categories: social, economic and community. Finally, the fourth chapter contains a conclusion to this thesis and presents a brief overview of the key findings along with an indication of potential areas for future research.

CHAPTER TWO: THE EMERGENCE AND EVOLUTION OF AQUACULTURE CERTIFICATION

This chapter explores the emergence and evolution of diverse aquaculture certification schemes designed to address an array of environmental, sustainability, social and related issues. Drawing from gray literature and scholarly publications, it provides an in-depth analysis of the changing landscape of aquaculture certification initiatives over time and space. Although there are currently more than thirty certification schemes operating to promote the long-term sustainability of the aquaculture industry, this chapter is only engaged with transnational non-governmental initiatives because these types are the most comprehensive and dominant in global seafood markets. The chapter argues that the growth of certification for aquaculture emerged in a particular context and was driven by a particular set of factors. The chapter examines the key social and environmental pressures and forces impacting global aquaculture production since the 1980s that helped to facilitate the emergence of certification standards and processes as a response to these pressures and forces, which include global resistance to industrial aquaculture development, crises in food safety and fragile regulatory models of the governments. These driving forces are examined at the beginning of this chapter.

Through this analysis, the chapter also provides a detailed understanding on the pattern of involvement of key actors, institutions, foundations, alliances and networks in the creation of standards and certification schemes. It also identifies underlying ideas and interests of different groups driving to the programs' initiation and development. With an aim to maintain chronological sequence, the evolution examined in this chapter is divided into two timelines that mark significant changes in the historical development of aquaculture certification: 1970-1999 and 2000-2018. This periodization reflects predominant and distinctive patterns about the types of actors, processes and institutions characterizing the emergence and evolution of certification programs. This chapter wraps up with exploring the

ongoing and recent emergence of institutional initiatives aiming to develop program-level harmonization and consolidation in a field marked by ongoing proliferation and various degrees of competition and divergence in program characteristics.

2.1. Driving forces in the rise of aquaculture certification

The driving forces for the development of transnational aquaculture certification emerged around three decades ago in a context of evolving challenges of aquaculture worldwide, which were also connected to a broader context of environmental and social controversies in industrial production and consumption across a range of sectors. Widespread challenges of industrial aquaculture have played a major role in the rise of certification schemes in this sector, but various other issues have influenced the early emergence of aquaculture certification. This section examines the key conditions and factors that influenced the rise of transnational aquaculture certification programs.

2.1.1. Collapsing wild capture fisheries and government failures

Stocks of wild capture fisheries have dramatically decreased since the 1970s due to the rapid introduction of industrial-scale fishing worldwide particularly in the Northern Hemisphere and the developing world since the 1950s and 1960s (Pauly *et al*., 2002). The amount of biologically sustainable wild marine fish stocks has sharply declined from 90% in 1974 to 71.2% in 2011 followed by 66.9% in 2015 (FAO, 2014a; 2018). The fall of global capture fisheries is often connected to the problem of "fragmented governance" that is marked with fragile decision-making, potential conflicts and schism between the management authorities (Crowder *et al*., 2006). The crisis explicitly stemmed from widespread "institutional failure" related to a lack of best institutional performance, and ineffective management rules and governance structures (Acheson, 2006: 118). Research suggests that many large fisheries of different jurisdictions across the world collapsed due to dysfunctional role of central

governments, fragile management structure, corruption, and lack of decentralization (Hilborn, 2007).

For some analysts, these failures manifest in failure of "the centralized, hierarchical, bureaucratic administrative model" of regulation and governance (Wunsch, 1999: 244).For instance, the depletion of Northern cod stocks in eastern Canada lies not only in failed scientific and bureaucratic management but also in the decision of the Canadian government to support industrial expansion of fishing capacity (Finlayson, 1994). Decisions to expand fishing effort and quotas were also based on the prognosis of government scientists that was characterized by an "overly optimistic, politicized stock assessment [process] used by a powerful, centralized bureaucracy determined to improve a poor and relatively weak province with a poorly advised fleet expansion" (Acheson, 2006:106). Likewise, an assessment error and overestimation by the scientists also exacerbated the overfishing problem, which eventually led to the collapse of the New England ground fishery (Walters and Maguire, 1996).

In addition, policy failures increased state interventions and corporate concentration undermined regulatory institutions and increased competition for earning profits and control over resources, setting in motion the mismanagement of major fishing grounds (Marchak *et al.,* 1987). The collapses of major fishing grounds occurred "because the politics of fishery management favor continued exploitation" (Rosenberg, 2003: 102). Moreover, changes in the fisheries regulations over time to increase catches rapidly fueled the predicament. For instance, a crisis in the Norwegian cod fishery in 1990 originated from the incorporation of small boat fisheries into the regulated trawl fishery, driving the intense competition for fish, economic benefits and incentives (Fulton *et al.*, 2011). Increased catches intensified the industries' competition for more production, (over)capitalization and profit accumulation (Garcia and Grainger, 2005; Hilborn *et al*., 2005; Rosenberg, 2003). Government funds have

also been used to buy excess fishing capacity that led to a vicious cycle of overfishing and diminishing of major stocks elsewhere (Beddington *et al.,* 2007). However, the failure in public governance mechanisms to effectively check collapses in fisheries around the world has resulted in a relative stagnation in the global production of capture fisheries since the late 1980s, thus providing the justification for those actors and interests seeking to grow aquaculture production as an alternative source of seafood commodity.

2.1.2. Sustainability challenges in aquaculture industry during 1980-2000

In a context of stagnant production in capture fisheries, aquaculture has been viewed not only a solution to the "tragedy of the ocean commons" (Smith, 2012: 7) but also an alternative way of meeting the increased demand of fish for human consumption. Though modern aquaculture offers the promise of attenuating the exploitation of wild fish and feeding an ever-growing human population, the practices of industrial aquaculture have raised serious environmental and social concerns since the mid-1980s. These concerns and controversies precipitated the emergence of global resistance movements and actions against industrial aquaculture by the early 1990s that contributed to the subsequent formation of major aquaculture certification initiatives.

The environmental concerns of industrial aquaculture were manifold. The earlier findings reveal that the swift growth of shrimp aquaculture during the late 1970s and the early 1980s in many tropical developing countries (e.g., Indonesia, Ecuador, Philippines, Thailand, Vietnam and Bangladesh) increased coastal erosion and saltwater intrusion in agricultural fields, and destroyed mangrove forest, natural habitats, marine life, nursery areas, coastal wetlands and ecosystems (Burbridge, 1982; Snedaker *et al,* 1986; Bailey, 1988). The growth of coastal shrimp aquaculture was primarily responsible for disappearing over 52 percent of the global mangrove forests between 1980 and 2000, according to some assessments (Valiela *et al.* 2001). The intrusion of saline water for shrimp aquaculture also

threatened soils and freshwater systems, affected various water users and resulted in diseases and viruses (Flaherty *et al*., 1999; Vandergeest *et al*., 1999). Likewise, the spread of salmon aquaculture in Europe and North America by the late 1980s caused marine pollution, environmental problems, pathogenic diseases, and affected wild fishes and regional ecosystems (Tilseth *et al.,* 1991; Findlay *et al.,* 1995, Bakke and Harris, 1998). Intensive aquaculture practices in the early 1990s significantly discharged particulates and chemical effluents that contaminated coastal water, ground water aquifers and domestic water supplies (Baird and Quarto, 1994; Flaherty and Karnjanakesorn, 1995).

The social repercussions of aquaculture development were also evident during these periods. It led to the conversion of agricultural lands, destruction of home gardens, declining yields and repeated crop failures (Pullin *et al*., 1993; Dierberg and Kiattisimkul, 1996; Stevenson, 1997; Vandergeest *et al*., 1999). The spread of aquaculture also resulted in the massive displacement of small-scale fishermen and producers, loss of forest-dependent livelihoods, expropriation of local residents, and privatization of open-access resources. It also limited employment opportunities in some region, and was criticized for low wage rates, marginalization of local communities and skewed distribution of benefits (Smith and Pestafio-Smith, 1985; Primavera, 1991; Muluk and Bailey, 1996; Bailey, 1988). These socio-environmental outcomes of aquaculture production helped spur the development of a global resistance against industrial aquaculture and the creation of a transnational network of environmental nongovernmental organizations (ENGOs) that raised strong voices against unsustainable aquaculture practices and for the development of better practices.

2.1.3. Global resistance to aquaculture industry

The adverse impacts of fish-farming in the late 1980s and the early 1990s sparked intense criticisms among ENGOs which led them to call for reform in aquaculture sectors and form a global coalition to pressure the industry in the late 1990s (Boyd *et al.,* 2013). By the early

1990s, for example, the detrimental effects of shrimp industry had escalated tension in the Global South, which provoked coastal communities and local and national peasant groups to begin movements that fueled widespread conflicts and protest marches against the expansion of industrial farming (Stonich, 1996).The activities of movement groups usually ranged from passive resistance to violent confrontations in the form of destroying canals, burning farm houses and blockading roads to shrimp farms. They maintained regular contact with supporters around the world encompassing groups in industrialized nations.

The resistance to industrial aquaculture[7]was also supported by a variety of national and international organizations. Stonich and Bailey (2000) argue that these incorporate major ENGOs (e.g., Greenpeace International, Earth Island Institute (EII), Sierra Club of Canada, Environmental Defense Fund (EDF), Natural Resources Defense Council (NRDC), WWF and Swedish Society for Nature Conservation); human rights organizations (e.g., Human Rights Watch); development organizations (e.g., Inter-American Foundation, Christian Aid); and private foundations (e.g., the MacArthur Foundation and the Rockefeller Brothers Fund). Greenpeace International, EII and WWF, which were also actively involved in anti-whaling campaign in 1975, dolphin-safe tuna fishing in the mid-1980s and the creation of Forest Certification Council (FSC) in 1990 respectively (Weyler, 2004; Auld, 2014), were important

[7] The resistance took place in Africa, Asia and Latin America (e.g., India, Bangladesh, Honduras, Ecuador and elsewhere) against the commercial production of shrimp by large shrimp companies, biggest shrimp farms/firms, powerful owners of shrimp enclosures, local small-scale shrimp farmers, multinational corporations, wealthy urbanities involved in rural and coast-based shrimp culture, processors, exporters, promoters and investors (i.e. Asian Development Bank, World Bank, United Nations Development Programme) of industrial shrimp culture projects who played driving role in the expansion and development of shrimp industry in the 1980s and 1990s (see: Alauddin and Hamid, 1999; Stonich, 1996; Stonich and Bailey, 2000; Adnan, 2013; Pokrant, 2014; Roy, 2016). Though the resistance broadly took place against industrial shrimp aquaculture in the Global South, commercial salmon farming in the Global North was also severely criticized at the World Aquaculture Society's (WAS) meeting at Washington in 1997 because of its widespread development and persistent problems (Hargreaves, 1997). During the similar periods, salmon aquaculture was significantly developed by large private companies and corporations in Norway (UFN A/S and Skaarfisk-Mowi (the largest single salmon exporter) (Foreign Fishery Developments, 1990), Canada (Aquarius Seafarms Ltd. (the largest salmon farming company), B.C. Packers Ltd., General Sea Harvest Corporation, Hardy Seafarms Ltd., IBEC Aquaculture, Pacific Aqua Foods Ltd., and SeaFarm Canada) (Department of Fisheries and Oceans, 1991), It is worth mentioning that Mowi, a Norwegian seafood company established in 1964 and formerly known as Marine Harvest until the 1st January of 2019, spearheaded the expansion of salmon farming across the world particularly Norway, Scotland, Ireland, Faroe Islands, Canada and Chile.

actors in the resistance to industrial aquaculture. Natural and social scientists also were indirectly involved in the movement through Mangrove Action Project (MAP) and Industrial Shrimp Action Network (ISAN), which supported the rural poor and resistance groups whose interests were neglected by powerful industrial actors involved in farming process.

Meanwhile, groups of diverse actors, organizations and foundations collectively formed a network-building institution by the mid-1990s, *International Network against Unsustainable Aquaculture*, to connect various actors and activists, particularly from Bangladesh, Indonesia, India and Vietnam. Likewise, Greenpeace International along with Greenpeace Central America and Greenpeace Spain mobilized campaigns in Latin America and Europe. The most inclusive network-building institution, MAP which seeks to integrate the voices of the local communities, NGOs and the Global South to conserve and restore mangrove forests worldwide, formed in 1992 in Seattle, Washington by 400 organizations and 300 individuals from more than 60 nations to bridge the gap between North and South, and to present the repercussions of unsustainable aquaculture practices to consumers and international government bodies such as United Nations Commission on Sustainable Development (UNCSD) (Stonich and Bailey, 2000).

In 1996, MAP arranged a strategy meeting that involved northern environmental organizations and NGO leaders from developing nations. The meeting focused on the potentiality of consumer campaigns in the U.S. that would be aligned with the interests and concerns of local groups in the tropics where shrimp aquaculture adversely affected. The first formal meeting was in April 1996, coinciding with the meeting of the UNCSD, and called for governmental interventions. During the closing session of UNCSD, the coalition of

NGOs presented a joint 'NGO Declaration on Unsustainable Aquaculture' to the General Assembly of the United Nations (UN) in April 1996[8] (Stonich and Bailey, 2000).

In February 1997, an annual meeting of the World Aquaculture Society (WAS)was held in Seattle, Washington. The meeting was dominated by the industry delegates and their close allies, but also involved over 20 NGO representatives from 17 developing countries of Asia, Latin America and Africa (Stonich and Bailey, 2000). Grassroots voices were represented by the major ENGOs, foundations, academics, human rights and development organizations. The NGO leaders criticized industrial shrimp and salmon farming at the WAS meeting because of similar problems associated with industrial aquaculture more generally and the contestation took place between the representatives of industry and NGO leaders (Hargreaves, 1997). In addition, various actions such as billboard campaigns, radio interviews, and press conferences were also made by the activists to influence consumers and public perception about the effects of industrial aquaculture development. Finally, a formal global coalition, *Industrial Shrimp Action Network* (ISAN), was formed by the NGO leaders, environmental organizations and representatives of community groups on the World Food Day of October 16, 1997 to act as powerful pressure group against aquaculture industries, particularly for shrimp aquaculture. However, the most significant outcome of global resistance to industrial aquaculture was the creation of the Global Aquaculture Alliance (GAA), which is discussed in section 2.2.1.2.

[8] This is a significant year in the seafood certification landscape because two-month before the WWF (an ENGO) and Unilever (transnational consumer goods company) published a joint Statement of Intent on February 22, 1996 to create MSC for long-term sustainability of wild capture fisheries and effective management of marine life which was officially registered on February 17, 1997 as a private company, and has administered certification programs in wild fisheries sectors (The Press Association, 2017). The formation of MSC provided strong impulse to the WWF to undertake another initiative for creating a transnational certification scheme in aquaculture sectors in 1999 (see Section 2.2.1).

2.1.4. Global concern for food safety and quality

During the 1980s and 1990s, concerns of food contamination around the world increased dramatically. A number of high-profile food scares, including seafood poisoning, weakened public confidence regarding the ability of industry and government regulatory agencies to ensure the safety and quality of food aggravated public anxiety (Washington and Ababouch, 2011). For instance, the spread of botulism in 1982 caused a person's death in Belgium which resulted from the consumption of canned salmon led to a scrutiny of the Alaskan salmon canning industry. The epidemic of bovine spongiform encephalopathy (BSE) or mad cow disease in 1986 raised death toll nearly 200 around the world and affected over 35,000 animal farms in the United Kingdom till 1996 (Washington and Ababouch, 2011). The use of fertilizers, dioxins, growth hormones, and antibiotics in the intensive agricultural production exacerbated the tension during these periods (Kurek, 2007).Concerns also stemmed from imported food items sourced from countries where food safety assurance mechanisms are perceived as fragile (Washington and Ababouch 2011). The use of antibiotics, toxins and contaminants in aquaculture production aggravated the situation and increased concern worldwide for safe and quality seafood.

In context of food concerns, coalitions of food firms emerged and engaged in competition on the issues of safety, quality, price, product range and level of service (Washington and Ababouch, 2011). Moreover, in response to the consumer awareness and demand of safe and quality food, the European Union (EU) argued that the retailers were mainly responsible to ensure the safety of supplied food items (Campbell *et al.* 2005; Kurek, 2007). However, the global food scares had significant influence on these firms and retailers that made them to be responsible on the entire food safety system. The food firms set their own standards which eroded trust amid the erosion of faith in regulatory systems and curtailed the dependency on government inspection services (Washington and Ababouch,

2011). Likewise, the grave concern of food safety and quality spurred a group of large retailers to create a private certification scheme (i.e. GlobalG.A.P.) in 1997, which is discussed in section 2.2.1.2.

2.1.5. Fragile role and capacity of governments

In a context of widespread actual and perceived failures in the governance of capture fisheries, widespread challenges in aquaculture's industrial activities and effects, global resistance against aquaculture development and worldwide concerns about food safety, governments have had limited success in responding to pressure for increased regulatory action and oversight. For instance, at the inter-governmental level the UNFAO formulated an international 'Code of Conduct for Responsible Fisheries' (CCRF) in 1995 and encouraged Member States to enforce and efficiently implement the CCRF. Article 9, under the heading of 'Aquaculture Development,' provides underlying principles and standards for Member States to ensure sustainable management and responsible development of aquaculture (FAO, 1995). In a follow up report of FAO (1998), it was revealed that very few nations had effective policies and legal frameworks for aquaculture development. The existing policies and regulatory frameworks of governments had long overlooked the evolving challenges and mostly emphasized the technical sides of aquaculture development. Policy-makers had also typically treated aquaculture as an isolated activity distinct from others (FAO, 1998).

In this context, Vormedal (2017) argues that the government frameworks have been poorly target-oriented and state regulation is fragmented, overly complex and often extensive. For instance, Sandersen and Kvalvik (2014) examine how Norwegian aquaculture regulation has long faced criticisms for being fragmented and emphasizing economic development over environmental sustainability. In Chile, government policies were widely identified as a major reason for the spread of the Infectious Salmon Anemia (ISA) virus epidemic that led to the collapse of the industry (Alvial *et al*., 2012). Likewise, aquaculture farms in the USA are

being regulated under a large number of federal fisheries management frameworks, pollution control agencies and coastal acts that are regarded as unable to deal with environmental problems (Smith, 2012; Naylor *et al.,* 2003).

Moreover, the role of the state in promoting extension services (i.e., roads, bridges, electricity, technologies, training and information) for aquaculture has significantly reduced in many countries during the last several decades, while the involvement of private sector actors, markets, and business firms has dramatically increased (Phillips *et al.,* 2012). This reflects a broader societal change emphasizing the role of the market over the role of government in the provision of goods and services, including regulatory and governance services. Regarding this, Konefal (2012) argues that government is a "slow and messy institution" (p.346) and the regulatory power of the state has diminished with neoliberal restructuring and globalization whereas the market is viewed as more efficient (Konefal, 2006; 2012).

In this context of limited state capacity and broader calls for a greater role of the market in regulatory change, industry and non-governmental organizations have developed private codes, standards and specifications. The rise of certification schemes developed by various NGOs is a key aspect of this set of regulatory and governance changes and have appeared as an important instrument promoted to ensure food safety, industries' sustainability and socially and ethically responsible practices. The expansion of non-governmental private sector initiatives emerged partly as a response to insufficient government regulations (Bush *et al.,* 2013), and the growing emphasis on private certification standards is widely viewed as part a broader shift in regulatory responsibilities from government to business (Washington and Ababouch, 2011). These changes have appeared within the aquaculture sector, as well as food, environmental and natural resource sectors more generally (e.g. Auld, 2014).

2.1.6. Rise of sustainable seafood movement

By the mid-to-late 1990s, various distinct consumer-oriented boycotts, movements and initiatives initially began in response to the government failure to responsibly manage marine fish stocks and seafood (Sutton and Wimpee, 2008). Widespread campaigns later developed in Europe to raise public awareness regarding the impacts of shrimp aquaculture (Jacquet and Pauly, 2007). Within scholarly and practitioner venues, these diverse and sometimes coordinated and interconnected campaigns and initiatives were characterized as the Sustainable Seafood Movement (SSM), which broadly coalesced around the idea to influence consumer behaviors and encourage the public to avoid the consumption of seafood produced and captured unsustainably. Consumer campaigns and certification linked to eco-labels constituted leading components of this overall market-oriented movement.

While the movement had no formal leadership or organizational structure, Gutiérrez and Morgan (2015) identify how the movement coalesced through ten actor groups including ENGOs, philanthropic foundations, verification experts, retailers/food service providers, certification schemes, industries, academics, chefs, consumers and the media. The ENGOs involved in the movement include WWF, Environmental Defense, Blue Ocean Institute, Oceania, SeaWeb, Ecotrust, Pew Institute for Ocean Science, National Resource Defense Council, National Environmental Trust, Sustainable Fishery Advocates, and Coastal Alliance for Aquaculture Reform (Konefal, 2012).

SeaWeb has often served as convener of ENGO actors and promoted dialogue to persuade the actors of seafood supply chain. The WWF has worked closely with large retailers, procurement managers, seafood brands and aquaculture producers across Asia, Europe, North America, South Africa and Australia to promote the sustainable production of seafood (Barclay and Miller, 2018). Philanthropic foundations (e.g., Pew Charitable Trusts, David and Lucile Packard Foundation, Gordon and Betty Moore Foundation, Walton Family

Foundation) often provide financial supports and strategic guidelines to foster the movement and influence governments and seafood supply chain actors. Foundations often financially supported ENGO campaigns regarding the production and consumption of sustainable seafood (Gutiérrez and Morgan, 2015). Some foundations like Pew and Packard promote market-based approaches as a top priority of their conservation funding and built partnerships with large corporations driven by vested interests closely aligned with the supply of sustainable seafood (Konefal, 2012).

Certification and eco-labeling emerged as one of the most preferred mechanisms amongst key leaders in the sustainable seafood movement. The Marine Stewardship Council (MSC)'s environmental standard, certification and labeling program was a pioneer in this regard, emerging from one of the most prominent ENGO-corporate partnerships of the 1990between WWF and Unilever (a multinational corporation) with funding from Packard Foundation (Cummins, 2004; Konefal, 2012). The MSC was modeled on the Forest Stewardship Council, which the WWF also helped establish, based on the idea that market-based approaches could overcome government failures and driven by a coalition of actors and their allies that promoted market-oriented tools like certification to incentivize market change (Cashore, 2002; Sutton and Wimpee, 2008; Jacquet *et al.*, 2009; Konefal, 2012).

Retailers, brands, producers and seafood companies have increasingly committed to purchasing seafood from only certified producers (Barclay and Miller, 2018). ENGOs have collaborated with seafood producers and buyers to persuade them to attain certification and to help them acquire certification (Duggan and Kochen, 2016). Other producers are compelled to acquire certification to maintain access to international markets that have shifted to supporting certification.

2.1.7. Production, international trade and market structure

While the share of fish production from aquaculture operation was 3.9% in 1970 (White *et al*., 2004), it has reached 25.7% in 2000 followed by 46.8% in 2016 (FAO, 2018).Globally, aquaculture-based seafood production has dramatically grown from 1.6 m tons in 1960 (FAO, 2014b) to 80 m tons in 2016 (FAO, 2018).It is anticipated, however, that aquaculture production, excluding aquatic plants, would grow to 102.1 m tons in 2026 and 140 m tons in 2050 (Ahmed *et al.,* 2018; UNCTAD, 2018).

The value of global aquaculture production, including aquatic plants, has also risen from about US$ 56.5 billion in 2000 to US$ 243.5 billion in 2016 (FAO, 2000; 2018).An increasing trend in global trade of this sector over the four decades has been a remarkable growth in exports from developing nations. High-value species (e.g., shrimp and salmon) are mainly traded in developed countries whereas low-value products are largely exported to the low-income consumers in developing regions and low-income food-deficit countries. While the contribution of aquaculture in total food fish consumption in 1966 was 6 percent, it has reached53 percent in 2016 (FAO, 2018). A thriving international trade in fish and fish products has been triggered by economic globalization, trade liberalization, technological advancement, increased consumption, and a growing number of large-scale retailers and seafood supermarkets across the world. Lower wages in the processor countries, versatile products and international marketing campaigns have also provided strong impetus to the trade competition in global seafood markets.

New emerging markets are the driving forces playing significant role to the development and expansion of aquaculture at global scale. The markets are increasingly dominated by the powerful global food firms of industrialized nations resulting from the consolidation and concentration of large-scale seafood companies (Washington and Ababouch, 2011). Throughout the last decade, retailers who were increasingly expanding the

seafood sections in their super-shops and offering various fish products have become the most dominant market players over fish processing and manufacturing firms. For instance, large-scale retailers (LSRs) account for 74 percent of total fish sales in five European countries (Italy, Spain, France, Germany and the UK) in 2017 (European Commission, 2018). The chain of supermarkets and large brand owners also influence international market conditions regarding the sales and marketing of seafood items. The LSRs who develop good connections with direct producers of aquaculture sectors exercise their bargaining power in the supply chains which normally appears when the producers prove that their products have maintained certain standards such as food safety, and quality, animal health, environmental protection and social responsibility (FAO, 2008; Washington and Ababouch, 2011).

The growing vertical integration in seafood supply chains is facilitating the proliferation of private standards as instruments used in procurement contracts between LSRs, suppliers, processors and producers of farmed fish. In this context, private certification schemes in aquaculture sectors which are designed with various standards, codes and principles have emerged as an approach for not only harnessing the market forces to generate incentive through price premiums but also offering an opportunity to the well-managed fish-farms to influence and control access to global markets. In addition, the remarkable growth in aquaculture production has driven the swift expansion of global seafood markets and trade in fish and fish products wherein the actors in seafood supply chains such as retailers, processors, brands, producers and seafood companies have increasingly committed to source seafood from only certified producers (Barclay and Miller, 2018). This condition has created a space for the emergence and proliferation of certification programs in aquaculture sectors.

In sum, seven key driving forces (i.e. collapsing wild capture fisheries and government failures, sustainability challenges in aquaculture industry, worldwide resistance to aquaculture development, global concerns for food safety, fragile role of the governments,

sustainable seafood movement, and seafood production, trade and market) were instrumental in facilitating the emergence of aquaculture certification. These driving factors motivated and influenced a plethora of actors, institutions, associations, organizations, corporations, networks and alliances to create and support certification schemes in aquaculture sector.

2.2. The evolution of aquaculture certification

This section highlights various efforts and initiatives adopted by different actors, institutions, alliance and networks which have played pivotal role in the emergence, evolution and proliferation of aquaculture certification programs over time. The emergence and evolution of aquaculture certification has occurred through following ways: first, organic certifiers, in the late 1980s and the early 1990s, applied their ideas of organic farming to the rapidly grown aquaculture industry; second, an aquaculture industry alliance responded to the global resistance to industrial commercial aquaculture by the end of 1990swith certification as a tool for reform; third, a retailer alliance responded to the widespread concerns of food safety and quality through creating new voluntary standards and an independent certification system by the end of 1990s; fourth, the WWF employed its prior experiences of FSC and MSC formation to the aquaculture sector in the 2000s; fifth, the initiation of two programs by the end of 1990s and the beginning of 2000s was driven by the idea of improving small-scale producers' livelihoods and establishing an independent auditor; and sixth, the idea of two recent schemes began as part of assessing tuna fishery for saving dolphins, and providing credible assurance to the consumers and markets on the responsible production of seafood. The analysis of the proliferation and evolution of aquaculture certification schemes follows this general sequence that is presented in two broad timelines: 1970-1999 and 2000-2018.

2.2.1. Program initiation, competition and proliferation: 1970-1999

2.2.1.1. Early organic initiatives and the beginning of aquaculture certification

The emergence of transnational aquaculture certification programs to some degree originated in efforts to develop certification for organic food in the 1970s and 1980s. Within the broader context of the movement to certify organic food, the Soil Association is credited with adopting the first initiative for developing organic aquaculture standards in 1988 (WWF, 2007) and commenced to work on a draft standard for certifying organic farmed trout and salmon in 1989 (Auld, 2009). A number of small-scale salmon farm operators in Scotland approached the Soil Association and showed their keen interest in distinguishing their practices and products from the industrial farming operations of their competitors (Soil Association, 2004). Though the Soil Association launched its certification schemes for other commodities in 1973, the initiative for organic aquaculture unfolded fifteen-years later and even forty-two years after of its establishment (formed in 1946) in the United Kingdom by a group of people concerned with health implications of intensive farming (Soil Association, 2018a).

The institutional beginnings can also be linked to the formalization of the organic movement through the International Federation of Organic Agriculture Movements (IFOAM), which was developed in 1972 by the Roland Chevriot of Nature et Progrèsin France with the assistance from other organic pioneers such as the UK-based Soil Association, the Swedish Biodynamic Association, and the Rodale Institute (IFOAM, 2018). By the end of the 1980s, the IFOAM reformed its technical committee and created a Program Evaluation Committee, Accreditation Committee and Standards Committee (IOAS, 2006). During the IFOAM's General Assembly in 1990, it approved the creation of a fully-fledged accreditation program aimed to promote uniformity among the numerous organic certifiers (e.g., Naturland, Soil Association, BioGro and KRAV) at that time (Auld, 2007). In 1992, the

IFOAM's Accreditation Committee, with contributions from the Program Evaluation Committee, developed a program that eventually led to the creation of the IFOAM Accreditation Program Board (IAPB), which finished its first accreditation process in March 1993 and officially accredited three certifiers by December 1994 (Commins 2003; IOAS, 2006).

Other organizations played a role in establishing transnational aquaculture certification during this period as well. This included Naturland, an international association founded in 1982 with a joint effort of civil society, private sector and producers of Germany which initially aimed to convert a tea garden to organic agriculture (Naturland, 2018a). Naturland revealed its first species-specific standards for organic pond farming in 1995 (WWF, 2007). In 1995, Naturland also began its certification process through certifying carp fish farms in Austria and Germany (Tacon and Brister, 2002) followed by a salmon farm located in the west coast of Ireland in 1996 (Bergleiter *et al*. 2009; Auld, 2009). The organic farmers in Germany, however, who produced carp fish in their private freshwater bodies like ponds increasingly showed keen eagerness in the Naturland certification (Bergleiter, 2008). Naturland soon gained significant popularity and became one of the leading standard-setting institutions for organic aquaculture development at global level. It has pioneered numerous international organic aquaculture development projects in Europe, Latin America and Asia.

However, the competition for species-specific programs and certifications rapidly increased among the leading organic players. Another organization that emerged in the movement included BioGro, a New Zealand-based organic certification body founded in the mid-1980s to assist producers to comply with emerging international organic regulations. It not only sought to assure consumers about genuine organic products and markets in the United States, Europe, Canada, and many parts of Asia, but also commenced to certify salmon farms in 1994 followed by crayfish and oysters in 1999 (BioGro., n.d; Tacon and

Brister, 2002).As a result of increasing interests among European producers, buyers and market players, the Soil Association reinitiated its standards drafting process by 1996 and released an "interim" standard in 1998 (Auld, 2014). The Soil Association began certification of salmon and trout farms in 1999 (Tacon and Brister, 2002; WWF, 2007). In the meantime, Naturland released its latest shrimp-farming standards in 2000, offering its services to the rapidly growing controversial shrimp sectors in developing countries (Scialabba and Hattam, 2002).

2.2.1.2. Early nonorganic efforts and the creation of GAA and EurepGAP

While the products of organic certifiers were entering the global seafood markets, the resistance against industrial shrimp production was growing in the Global South, presenting industry and allies with the challenge to respond and change. In April, 1996, a coalition of NGOs, presented 'NGO Declaration on Unsustainable Aquaculture' at the closing session of UNCSD (see Section 2.1.3). The response by industry coalition was ultimately precipitated by the 'Shrimp Tribunal', conducted by ENGOs at the UNCSD meeting in May 1996 and the 'Choluteca Declaration', a list of joint statements declared by the representatives of 21 NGOs and community organizations. This group demanded a global moratorium on the expansion of industrial shrimp farming, in Choluteca, Honduras in October 1996 (Boyd and McNevin, 2014).

While the organic certifiers in Europe and New Zealand had developed numerous species-specific standards and began certifying aquaculture farms, an industry-based organized response also emerged from producers, processors, wholesale buyers, feed companies, input suppliers, and even scientists presented at the annual meeting and trade show of the World Aquaculture Society (WAS) held in Seattle, Washington in 1997. In response to the pressure of NGO coalition, the industry executives eventually formed a group known as Global Aquaculture Alliance (GAA). The alliance was comprised of 56 individuals

from 12 countries representing the biggest shrimp farms (e.g., U.S-based Sea Farms Group, Deli Group Ecuador, CP Aquaculture Business Group and Bangkok-based corporation dealt with shrimp culture in Asia), feed companies (e.g., Ralston Purina International, Zeigler Brothers and Nicovita Feeds Peru), association of shrimp farmers (e.g., Camara Nacional de Acuacultura Ecuador and ANDAH of Honduras), biotechnology/agrochemical companies (e.g., Monsanto), seafood retailers and wholesalers (e.g., Ocean Garden Products), marketers and processors (Stonich and Bailey, 2000).

The creation of the GAA was thus chiefly an organized response to a coalition of NGOs consisting of movement groups, foundations, institutions interconnected through a global network that challenged the expansion of industrial aquaculture. The formation of this industry-based alliance is well described by an industry representative, who suggested that

> "[…] the militant attack from environmentalists has emerged as the industry's second biggest problem. The GAA has been formed to resolve this problem" (Rosenberry, 1998: 300).

A key player from the emerging industry coalition was Dr. George Chamberlain, who spearheaded the creation of GAA and served as director to the aquaculture feed program of Ralston Purina Company. Chamberlain was also president of WAS in 1996 and GAA from1997 to the present. Along with his leading role, a number of industry actors were also involved in the creation of GAA. The driving forces of the emergence of this industry-led alliance is revealed further in an interview with Chamberlain taken by Rosenberry (2013) of *Shrimp News International*:

> Actually, it had it roots in WAS around the time of the Bangkok meeting in 1996. Andy Davlin, a financial advisor to the aquaculture industry, was convinced that there was a need for a commercially oriented aquaculture association, and he used to write a public letter to WAS each year complaining that the society wasn't doing enough. Each year, whoever was President would respond to Andy by advising him that WAS was an academic organization whose charter prevented such commercial activities. During my term as President of WAS, Andy somehow missed sending me a letter. When I saw him at the 1996 annual meeting in Bangkok at the very end of my term, I invited him to join me for breakfast with the upcoming WAS President, Meryl Broussard. During the conversation, Andy began his familiar tirade about the need for WAS to be more commercially oriented, and Meryl made the brilliant suggestion that it would be more appropriate to form a separate international aquaculture trade association. That idea resonated with me, so as I finished up my term with WAS, I tried to help

> Andy organize the new association with the expectation that he would run it. I asked the Board of directors for permission to host a discussion at the next WAS meeting in Seattle in 1997 [...] I began writing to various industry leaders asking their opinions about forming an international aquaculture trade association and encouraging them to join us for the discussion in Seattle. At that discussion in 1997 […] Andy Davlin began with a convincing argument about the need for such an organization. One-by-one, each participant expressed his or her views, and the group reached unanimous agreement. Just before our time ran out, Dr. Plodprasop, who had been so influential at the 1996 WAS meeting in Thailand, stood and said that it had been a good discussion, but that the meeting would soon end and nothing further would happen unless we took action. He recommended that an Organizing Committee be formed and that I chair that committee. I agreed, provided others would help. Immediately, several people raised their hands including Andy Davlin, Bill Herzig, Jim Heerin, Peder Jacobson and Lee Weddig. Bill agreed to host the first meeting of the Organizing Committee at the Darden Restaurants headquarters in Orlando, Florida, USA. At that meeting, we chose the name, Global Aquaculture Alliance.

An executive of Ralston Purina feed company was nominated as the first acting president to organize of the GAA with backing from the National Fisheries Institute (NFI), a trade group representing over one thousand seafood companies in the U.S. (Stonich and Bailey, 2000). A trade organization, the 'Shrimp Council', linked to the NFI representing producers, retailers, importers and processors also played active role in attacking the critics of shrimp farming. The GAA immediately raised a substantial amount of funding of at least $400,000, for which $25,000 was allocated to consultants, from 40 founding members such as shrimp producers, buyers, feed industry, processors, retailers and wholesalers. It also published a trade magazine "the Global Aquaculture Advocate" to promote sustainable aquaculture production (Stonich and Bailey, 2000).

By the end of 1997, the GAA commissioned a scientific study by its paid consultants, mainly scientists who acted on behalf of the industry-led alliance, to develop a set of 'best management practices' (BMPs) for shrimp producers. The final report, *Codes of Practice for Responsible Shrimp Farming*, was presented by the GAA's consultants at the WAS annual meeting of 1998 (Boyd and Weddig, 1997). The advocates of GAA acknowledged that some producers were responsible for the social and environmental problems highlighted by ENGOs and other civil society organizations. Though the report was reviewed by scientists, producers and environmental experts, it was criticized by NGO groups (Boyd 1999) who argued that the

anecdotal evidence in the report rarely reflected or addressed the broader social justice and environmental concerns (Ahmed, 1998).Among these pressures, the GAA continued to develop its standards and producers were requested to implement the BMPs in their farms. The first review of the codes of practice was completed by a technical committee in 1998 (GAA, 1998). With an aim to "develop a single comprehensive industry plan for sustainability", the GAA released, in 1999, its first completed version of the codes of practice indicating that farms complying with the codes would have access to the certification that was in progress (GAA, 1999).The idea of independent third-party certification was also part of these early discussions and development. The legitimacy difficulties of self-evaluation methods of the BMPs were eventually recognized as ineffective (Boyd and McNevin, 2014). Until the end of 1999, the process of developing standards for a new certification program was led by the proponents of GAA.

While the first generation of organic products of various certifiers (e.g., BioGro) entered into European supermarkets and the GAA established its certification standards, another global coalition led by aquaculture industries attempted to develop a certification program. Known as 'EurepGAP' (Euro-Retailer Produce Good Agricultural Practice), this initiative was formed in 1997 by a consortium of large European food retailers and supermarket chains, including Royal Ahold, Safeway, Tesco, Marks & Spencer and Sainsbury's to produce and retail safe and sustainable food (Campbell, 2005; Hatanaka and Busch, 2008). Before the creation of EurepGAP, which can be understood as an alternative approach to the organic certification, the European supermarket chains and cooperatives tended to work directly with producers and private organic certifiers who were mostly operated by the IFOAM (GlobalG.A.P, 2018). The creation of EurepGAP was driven primarily by increased concerns of food contamination resulting from using fertilizers, antibiotics, dioxins and growth hormones in intensified agricultural practices, with the spread

of mad cow diseases still looming large (Kurek, 2007). In response to growing consumer awareness and new market and public policy demands of food safety and quality, the European Union (EU) instructed retailers to ensure the safety of supplied food items. Recognizing public anxiety and the EU directive, the Euro-Retailer Produce Working Group, composed of global food retailer chains like Ahold, Tesco, Marks & Spencer, began an initiative in 1997 under the acronym EUREP to develop a mode of production via 'audit', and create an independent private certification system and new voluntary standards (Campbell *et al.,* 2005; Kurek, 2007). Though EurepGAP primarily started to grant certification to European fruit and vegetable farmers in 2001, processes leading to the creation of voluntary standards for aquaculture products commenced during this time and resulted in certification program about five years later (GlobalG.A.P, 2018).

2.2.1.3. Competition within organic certifiers

The proliferation of certification standards also facilitated institutional change in evolving accreditation institution, which is generally an independent organization that validates competency, authority or credibility of certification organizations and processors. While the GAA and the EurepGAP, industry and retailer-led alliance respectively, were striving to create new standards for aquaculture certification, organic certifiers such as Naturland, Soil Association and BioGro were offering certification services along with developing more standards. By the end of February 1997, twelve certification bodies were accredited under IFOAM Accreditation Program including the Soil Association, Naturland and BioGro (Auld, 2014). While the Soil Association was historically closely involved in the creation of IFOAM, the IFOAM also continued to revise its accreditation services independently. In March 1997, an International Organic Accreditation Service (IOAS), a distinct legal entity resulting from the separation of IAPB from IFOAM, was formed to administer the IFOAM accreditation program based on its basic standards and principles (IOAS, 2018a). In addition,

the aim of creating this separate entity was to assign the responsibilities of IFOAM accreditation services. Realizing the necessity to harmonize the basic principles of organic aquaculture development, the IFOAM commenced to draft a "Basic Standards for Organic Aquaculture Production" in 1998 (Tacon and Brister, 2002). Only a year later, a label of IFOAM denoting "IFOAM Accredited" was released which was simultaneously used by its accredited certifiers along with their own labels (Commins, 2003).

The progress in developing accreditation programs eventually resulted in the introduction of new organic aquaculture products in various markets. The Soil Association, by 1998, endorsed a number of salmon farms under its "interim" standards with the aim of permitting supermarkets to store organic salmon products (Aberdeen Press and Journal, 1998; Binnie, 1998). Naturland also certified organic mussel farms in 1999 and new products entered into the European markets soon after (Tacon and Brister, 2002).The interests among Scottish producers and markets were also increased, motivated by the Naturland's certification of an Irish Salmon farm and the early certification of crayfish, oysters and salmon by BioGro (both discussed above).

2.2.1.4. Disputes on organics and opportunities for nonorganic development

Though the demand for organic aquaculture products was gradually increasing, there was also mounting controversy that the application of underlying organic principles to fish farming was very difficult and riddled with many inconsistencies if compared with the basic purpose of organic agriculture (Auld, 2014). Even organic certifiers like the Soil Association were cautious regarding the continuation of their activities. It was stated by an official of the Soil Association that "we were treading on very sensitive ground but there was a lot of demand from consumers for a better quality product produced in a better way" (Harris, 1999). Furthermore, according to some critics, the standards of the Soil Association were not properly organic and were marked with inadequate government endorsement (Auld 2014).

Activists also raised questions about organic aquaculture. For instance, an activist of the Friends of the Earth-UK affirmed that "cramming a migratory species, cooped up in cages, fed on a high-energy diet of fast-diminishing resources is hardly in tune with nature" (Edwards, 2000). The legitimacy of organic certifiers' to create standards for aquaculture development was also challenged by the growth of government regulations and rules (Auld, 2014). The evolving constraints of organics, by the end of 1990s, ushered in a window of opportunity for various new initiatives with different ideas and precipitated the rapid development of ongoing nonorganic schemes adopted by the GAA and EurepGAP (see Section 2.2.2).

In this context, another new initiative was jointly adopted by a constellation of actors. In 1999, the WWF, UN-FAO, the World Bank, the United Nations Environment Programme (UNEP) and the Network of Aquaculture Centres in Asia-Pacific (NACA) formed the "Shrimp Farming and the Environment Consortium" which aimed at promoting research to explore the industry's impacts. It also produced a document for better management practices (BMPs) and built consensus around the major impacts and potential ways to address these (WWF, 2007). This project resulted in 44 studies spanned over three years (1999-2002) in 30 countries involving 140 researchers and over 7000 specialists in local, national and regional meetings, with a total cost estimated at US$1 million that was mostly financed by the World Bank and the MacArthur and Avina Foundations (Boyd and McNevin, 2014). The draft principles, criteria, indicators and a wide range of performance levels for better shrimp aquaculture, which were largely posted in the NACA website for stakeholders' feedback, were written by two proponents of the WWF-led consortium: Dr. Jason Clay, Senior Vice President of WWF and Dr. Claude Boyd, Professor of Auburn University.

The WWF's interest in aquaculture commenced in 1994 when the organization conducted a study comparing the impacts of shrimp aquaculture and shrimp trawling, and

concluded that aquaculture was a better and viable option than trawling (WWF, 2007). Besides, the WWF was a key leading organization in creating certification programs for various industries such as Forest Stewardship Council (FSC), created in 1993 and the Marine Stewardship Council (MSC), created in 1996. The World Bank's interests are linked to its development mandate. It also has a long history in financing shrimp development projects, particularly in South Asia, such as a five-year period 'Shrimp Culture Project' starting in1986 in Bangladesh (The World Bank, 1994). However, this partnership between international ENGOs and inter-governmental financial-development institutions was unique, aiming to broadly understand the global affects of a single aquaculture industry and laying the foundations for aquaculture dialogues that eventually resulted in the creation of a new nonorganic certification program a decade later.

2.2.2. Program initiation, proliferation and termination: 2000-2018

By the early 2000s, the transnational aquaculture certification landscape was rapidly changing and increasingly complex and contested. A number of high-profile transnational aquaculture certifications had fully developed by the end of the 1990s, some originating in specific organizations while others formed from specific broad-based coalitions of actors and interests. Six distinct dynamics were apparent by the 2000s. First, organizations focused on organics continued to release new standards generally, including proliferation in organic aquaculture certification standards. Second, the GAA formed an independent body, ACC, to certify BAP aquaculture products and facilities as well as released new standards after reforming their old codes of practice and developed shrimp certification procedures, which were broadly rebuffed by its critics, ISAN. Third, the EurepGAP released its aquaculture certification standards and began to operate the functions under a new name, GlobalG.A.P. Fourth, the WWF commenced a series of aquaculture dialogues, starting with salmon and next extending to different high-value farmed species such as shrimp, mollusks and tilapia.

Fifth, some new initiatives emerged and steadily unfolded their certification standards, in which the GAA has spearheaded the creation of GSA. Sixth, the proliferation of standards and certification initiatives has created growing demand for transnational accreditation services and institution, creating new dynamics of competition over credibility and efficacy. These six dynamics are discussed in more detail below.

2.2.2.1. The growth of IFOAM and Naturland initiatives'

In 2000, the initiative of the global accreditation body, the IFOAM "Basic Standards for Organic Aquaculture Production", was unanimously granted by the General Assembly as a draft aquaculture standard followed by the approval of its final version in 2005 (Auld, 2014). The IOAS also continued to extend its accreditation services. In a context of increasing demand from certification bodies, the IOAS launched the ISO/IEC Guide 65 Accreditation Program in January of 2003 (IOAS, 2018a). By the end of 2005, 36 certification bodies were accredited under IOAS and its total numbers are now over fifty, including the GlobalG.A.P, which accounts for almost half of the certified global aquaculture production (IOAS, 2018b). It is worth mentioning that like IFOAM, a membership organization of major global certifiers (e.g., MSC, ASC and FLO) named International Social and Environmental Accreditation and Labeling (ISEAL) was formed in 2002 which seeks to promote credible sustainability standards through rigorous certification systems across sectors, including aquaculture (Clift and Devisscher, 2018).

Overall, the organic certified production has also been steadily increasing while particular certification alliances and institutions had tended to dominate the global aquaculture industry. In spite of growing criticisms about organic standards (e.g., the Soil Association), the Naturland reinitiated its organic certification process by certifying trout in 2000 followed by shrimp in 2001 (Tacon and Brister, 2002). At the end of 2000, the production of organic aquaculture was estimated 5,000 metric tons (Tacon and Brister, 2002)

which has increased to 50,000 metric tons by2008 followed by 200,000 metric tons in 2013 in which 90 percent of total production was certified under Naturland (Potts *et al.,* 2016). Naturland now leads the certification of organic aquaculture products.

2.2.2.2. The co-evolution of GAA and GlobalG.A.P and the rise of ACC

Regarding the emergence of aquaculture certification, a co-evolution of two competing alliances from different continents, the GAA and EurepGAP, continued to dominate the industry through the early 2000s. The GAA's formation is deeply rooted in the global resistance to aquaculture industry and this organization has been dealt with industries' global problems since its creation in 1997 whereas the EurepGAP is originally tagged with agriculture when it began in 1997 and later on it has moved to aquaculture. The co-evolution follows two separate paths. The following discussions focus on these.

Table 2.1: Emergence and Development of Transnational Aquaculture Certification

Program Name	Year of certification (C)/release of final standards (S)	Year of program termination	Founding actors/institutions	Ideas driving to program initiation	Geographical coverage	Species certification
Soil Association (est. 1946)	Salmon & Trout (C): 1999		British organic pioneers and producers	Addressing the concern about health implications of intensive farming system	Asia, Europe, Australia, parts of South and North America	Salmon, trout, shrimp, cod, sea bass, sea bream, crayfish, tilapia, catfish, milkfish
International Federation of Organic Agriculture Movements (IFOAM) (est. 1972)	Version 2 (S) : 2014 Version 1 (S): 2012 'IFOAM Accredited' used by certifier: 1999		Nature et Progrès UK Soil Association Swedish Biodynamic Association Rodale Institute	Ensure food quality and solution to ecological crisis	Asia, Africa, Australia, Europe Caribbean, South, North and Central America, Oceania	All species for aquaculture
Naturland (est. 1982)	Shrimp (C): 2001 Trout (C): 2000 Mussel (C): 1999 Salmon (C):1996 Carp (C): 1995		Civil society, private sector and producers	Providing credible quality management system and consumer protection, preserving water, soil and air by organic practices	Asia, Caribbean, South and Central America, Africa, Australia, Oceania, Europe	Carp, salmonids, mussels, shrimp, tropical freshwater fish, macroalgae
BioGro (est. 1983)	Crayfish, Oysters (C): 1999 Salmon (C): 1994		NGO activists, civil society	Consumer assurance about organic products, catch markets, producers' compliance with international organic regulations	United States, Europe, Canada, many parts of Asia and pacific	Unavailable
Global Aquaculture Alliance Best Aquaculture Practices (GAA-BAP) (est. 1997)	Sea-bass (C): 2016 Trout (C): 2015 Mussel (C): 2014 Finfish (S):2013 Salmon (C): 2011 Pangasius (C): 2010 Tilapia (C): 2008 Shrimp (C): 2003 Shrimp (S): 2002		An industry alliance: aquaculture producer, feed company, processor, wholesaler, retailer, buyer, input suppliers, shrimp association	An integrated response by industry alliance to ISAN, MAP, aquaculture movement groups, ENGOs, Foundations	Asia, Australia, Europe, North and South America, Oceania, Central America, Caribbean	Shrimp, salmon, tilapia, crustaceans, mollusk, catfish, finfish, pangasius

Global Good Agricultural Practices (GlobalG.A.P.) (est. 1997)	Shrimp (S): 2008 Aquaculture farm (C): 2004 IAAS (S): 2004		Alliance of European food retailers	Responding to the public concern of food safety and quality	Twenty-nine countries of Asia, North, Central and South America, Europe, Australia, Oceania	32 finfish, 6crustaceans and mollusks
Fairtrade Labelling Organizations International (FLO) (est. 1997)	In progress		Seafood fair trade initiators	Improving livelihoods and market access for small-scale producers	Not yet fixed	Standards for shrimp certification in progress
Aquaculture Certification Council (ACC) (est. 2003)	Applying the GAA-BAP standards in certification system	2011	Aquaculture industry-led GAA	Establishing an independent auditor to certify products complying BAP standards	Asia, Australia, Europe, North and South America, Oceania, Central America, Caribbean	Shrimp, tilapia
Friend of the Sea (FOS) (est. 2006)	Overall Aquaculture (S): 2013		Earth Island Institute	Fulfilling consumer demand, market credibility, and environmental commitment	Europe, Asia, North and South America, Africa, Australia, Oceania	Salmon, trout, shrimp, prawn, pangasius crustaceans, mollusk, cod, halibut, caviar
Aquaculture Stewardship Council (ASC) (est. 2010)	Trout (S): 2013 Salmon (S): 2012 Shrimp (S): 2011 Pangasius (S): 2010 Bivalve (S): 2010 Abalone (S): 2010 Tilapia (S): 2009		WWF, Sustainable Trade Initiative (IDH), David and Lucile Packard Foundation	Fulfill the shortcomings of certification programs and build a credible regulatory framework	Asia, Australia, Europe, Oceania, Central America and Caribbean, North and South America	Abalone, bivalves, trout, pangasius, salmon, cobia, shrimp, tilapia
Global Seafood Assurances (GSA) (est. 2018)	Seafood (S): 2018**		Staffs of aquaculture industry-led GAA	Meet marketplace and public expectation	Global	In progress

Source: Information is compiled by the researcher that is described throughout the Chapter 4. Some geographical and species information are sourced from the program websites and Potts *et al.* (2016).

**GSA has released only draft "Seafood Processing Standard" based on BAP standards but species-specific standards are not developed yet.

While organic organizations were competing to refine and expand their programs and certify new species, the endeavor of GAA to initiate new standards for shrimp producers was already finished. The new standards were built on scientific principles using the earlier rules of BMPs (Boyd, 1999) that laid the foundations for creating the Best Aquaculture Practices (BAP) certification standards now administered by the GAA. But the efforts to finalize the new BAP standards took over 3 years and completed its final version for shrimp farms in 2002 because of various review processes and essential revisions aimed at including comments or suggestions, along with ideas about food safety, animal welfare and social responsibility. Finally, the BAP certification program was established in 2003 and the first shrimp farm certified in Belize according to the new BAP standards that year (GAA, 2017). Most NGO representatives, excluding Dr. Jason Clay who was involved in the WWF-led shrimp consortium that drove the creation of aquaculture dialogue, refused to review the BAP certification standards like BMPs that ultimately moved without their endorsement (Boyd and McNevin, 2014). Despite a strong denial by NGOs, the GAA released its first BAP certification standards for shrimp hatcheries in 2004 and began to certify seafood processing plants in Honduras soon after (GAA, 2017).

In a context of credibility challenges, the GAA felt the necessity of an independent body for formal certification of newly created BAP to confirm the basic principles and actions under which the aquaculture products were made and processed. In 2003, recognizing this condition, the GAA formed an independent, nongovernmental and nonprofit corporation in the U.S., the Aquaculture Certification Council (ACC), with a mission to "certify aquaculture facilities that apply best management practices to ensure social and environmental responsibility, food safety, and traceability throughout the production chain." (Lee and Connelly, 2006: 61).Again, similar to the BMPs and BAP standards, the NGOs were critical and refused to acknowledge the ACC as an independent body from the GAA

(Boyd and McNevin, 2014). Lee and Connelly (2006) assert that the separation between the ACC certification and the GAA standard setting process is consistent with the FAO Guidelines for Ecolabelling of Marine Products. However, this newly formed corporation was empowered by the GAA, who assigned an exclusive right on ACC to certify aquaculture products complying with the BAP standards. Similarly, the ACC also declared to actively work with the GAA to uphold the "objectivity and credibility" of the certification process (Washington and Ababouch, 2011). It also sought feedback from various stakeholders and NGOs to assure that their assessment and auditing were transparent and objective.

The ACC as an independent certification body was governed by a board of directors constituted by twelve members, consisting mainly of seafood producers, buyers, processors, academic institutions and various stakeholders from Asia, Europe, and America. Since their introduction on international markets, the ACC started to apply the GAA-BAP standards in their certification systems and globally certified shrimp farms, hatcheries and processing plants (WWF, 2007). Producers who were certified by the ACC were entitled to use the "BAP certification mark" on their products, indicating the products came from certified aquaculture farms maintaining environmental and social standards (Washington and Ababouch, 2011). Following its formation, the ACC, using the BAP standards, gained significant acceptance from powerful global seafood market players of the U.S.A, Mexico, Europe, and many parts of Asia and South America (Lee and Connelly, 2006). According to Washington and Ababouch (2011), the ACC had certified 38 fish farms and 54 aquaculture processing plants, inspected over 50 fish farms, and accredited 113 independent inspectors and auditors over 30 countries by the end of 2009.

The demand of the ACC scheme rapidly increased with purchasing commitments from major buyers. For example, Darden Restaurants, owner of the Red Lobster seafood restaurant chain, announced that they would only buy the products of farm-raised shrimps

from the ACC certified sources (Bing, 2007). In late 2005, the Wal-Mart committed to source all cultured shrimps complied with the BAP standards that were widely used in the ACC certification system (PR Newswire, 2005; GAA, 2017). The Wal-Mart announcement was highly praised by Conservation International, an ENGO active in supporting changes to the GAA standards (Auld, 2014). A leading seafood media organization soon reported that the ACC "has had great momentum in the farmed shrimp sector, with major buyers, growers and processors coming out in strong support of the standard" (Cherry, 2009). According to the GAA (2012), the ACC had 57retail grocers and restaurateurs that sourced ACC-certified products, including big retailers such as Albertsons, Wal-Mart, Target, Winn-Dixie, Kroger, Ralphs, and Darden Restaurants (see Tran *et al.*, 2013).

In a context of increasing market demand, the ACC was also approached by major retailers to extend its certification schemes to other species. One report noted that Wal-Mart "is reportedly putting pressure on ACC to deliver a salmon standard quickly" (Cherry, 2009). Responding to the retailer demands, the GAA, which assigned an exclusive right on the ACC to use BAP certification standards, soon developed and released standards for tilapia and catfish farms in 2008, and initially began to certify tilapia farm in China soon after (GAA, 2017). At the same time, the development of BAP standards for other species continued with the GAA seeking to maintain overall uniformity within standards while developing specific adjustments for species-specific standards. Overall, the commitments of major retailers and increased market interests fueled the proliferation of more standards and certification schemes.

Meanwhile, EurepGAP took steps in 2003 to develop its standards for aquaculture industry with assistance from European retailers, supermarket companies and producers (Weymann, 2005). Recall that the GAA also formed the ACC the same year as an external independent body to certify its farms and species. In October 2004, the EurepGAP finally

launched an Integrated Aquaculture Assurance Standard (IAAS) in Amsterdam, which was mostly based on the EurepGAP's Integrated Farm Assurance Standard for agriculture, and issued the first certificates to farms (GlobalG.A.P, 2018). The standard was developed in cooperation with the supermarket companies (e.g., Ahold NL), global seafood suppliers (e.g., Fjord Seafood Pieters), fish-feed companies (e.g., Nutreco), and producers (e.g., Scottish Quality Salmon and Stolt Sea Farm). Though GAA and EurepGAP established in 1997, they released their final standards in 2002 and 2004 respectively. The GAA commenced its certification in 2003 whereas EurepGAP in 2004.

A year later, an updated IAAS was released after a long consultative process, focusing on safety, quality, labor and environmental issues for farmed fish (EurepGAP, 2005). When the EurepGAP declared its name change to GlobalG.A.P in 2007, an announcement also came to finalize the shrimp standard after a daylong consultation workshop with key stakeholders in Bangkok (GlobalG.A.P, 2018). The GlobalG.A.P's shrimp standard was finally completed in 2008 (GlobalG.A.P, 2008). As part of updating the aquaculture standards, the GlobalG.A.P declared "voluntary add-on module to its existing food safety, environmental and social requirements with the metrics-based environmental and social standards" in June 2009 (Washington and Ababouch, 2011: 81-82). Early entry of the GlobalG.A.P certified products into international markets was prompted by backing from big retailer groups including Walmart, Whole Foods, Royal Ahold, Carrefour, Sainsbury's, Tesco, Wegmans, Aldi and Asda. The entire Dutch retail sector has arguably played the most significant supportive role in enhancing early uptake of the GlobalG.A.P standard (Cherry, 2009).

By 2015, certified aquaculture production grew to an estimated 6 percent of global production. The GlobalG.A.P accounts for almost half of all certified aquaculture production, representing the world leader in terms of total volume of certified products (Potts *et al.*,

2016). GlobalG.A.P claims it accounts for 2.1 million metric tons aquaculture certified products originating from 32 finfish and 6crustaceans and mollusks species in 29 countries (GlobalG.A.P, 2015a; Weymann, 2018). Its total number of certified producers has risen from 137 in 2010 to 321 in 2017 (GlobalG.A.P, 2017a).

2.2.2.3. The creation and growth of FOS

While the ACC and GlobalG.A.P emerged as transnational aquaculture certification leaders, new initiatives continued to develop. Friend of the Sea (FOS), which is unique as it is the only program covering both aquaculture and wild capture, was developed in the mid-2000s. Its origin can be traced back to early 2001 when a European representative of the Earth Island Institute, Paolo Bray, announced his intention to conduct an initial assessment of the Azorean Tuna Fishery as part of its Dolphin-Safe Project (Auld, 2014). After several years in a state of dormancy, it gained attention and officially launched in 2006 (Kalfagianni and Pattberg, 2013) and the first edition of aquaculture standards developed in 2013 (Potts *et al.,* 2016).By 2018, it had certified 100 aquaculture producers worldwide (FOS, 2018).

Like other programs, the FOS aims at meeting consumer demands for sustainable seafood and environmental commitment, and gaining credibility in the markets. The aquaculture certification programs of FOS is also supported by a large group of producers, retailers, processors, exporters, distributors and importers of thirty-three countries across the world (Mateus, 2018). But the retail markets for FOS certified products appear to be highly concentrated in Italy, Spain and Switzerland. By 2015, it had certified an estimated 750,000 metric tons of seafood, representing one of the largest transnational aquaculture certification initiatives by volume with an average growth rate of 47 percent annually (Potts *et al.,* 2016).The FOS is also engaged in awareness campaigns to raise public consciousness regarding the consumption of certified sustainable seafood.

2.2.2.4. The initiation of aquaculture dialogues and the birth of ASC

Another new transnational aquaculture certification program emerged from a process led by the WWF. Recall that the WWF-led 'Shrimp Farming and the Environment Consortium' conducted a research on exploring the impacts of shrimp industry worldwide in 2002. Building on this process, in 2004, the first species-specific aquaculture dialogue commenced in the Washington, D.C. starting with the Salmon Aquaculture Dialogue (SAD), under the leadership of the WWF's Dr. Jason Clay (Boyd and McNevin, 2014). The dialogues were held in the form of multi-stakeholder roundtable with a goal to create standards to improve the management practices for global aquaculture producers.

Although the WWF's interest initially started with shrimp farming, which was similar to the GAA, it began its standard setting process with salmon but the model spread to other species. The SAD was governed by a nine-member steering committee who consulted with more than 500 stakeholders including producers, ENGOs, seafood buyers, scientists and government representatives to develop a comprehensive salmon standard (Salmon Aquaculture Dialogue, 2012). The committee was composed of representatives from Coastal Alliance for Aquaculture Reform, Canadian Aquaculture Industry Alliance, Marine Harvest Group, Norwegian Seafood Federation, Pew Environment Group, Salmon Chile Skretting, Fundación Terram and WWF. In 2005, the Tilapia Aquaculture Dialogue (TAD) was initiated by a committee constituted by a group of actors from WWF, Regal Springs Trading Company, Sustainable Fisheries Partnership, New England Aquarium, Aquamar and Rain Forest Aquaculture. The committee consulted with more than 200 tilapia producers, wholesalers, retailers, feed manufacturers, ENGOs, and aquaculture associations, and finally released the International Standards for Responsible Tilapia Aquaculture in December 2009 (ASC, 2017a).

The WWF also applied the idea of SAD and TAD to start the Shrimp Aquaculture Dialogues (ShAD). Started in 2007, these dialogues developed standards for responsible shrimp production that were released as the ShAD Standards in December 2011 after various meetings and consulting with more than 400 stakeholders including shrimp producers, E/NGOs, researchers, development organizations, retailers, wholesalers, aquaculture associations, conservationist, government representatives and academics (Shrimp Aquaculture Dialogue, 2011). Likewise, the Pangasius Aquaculture Dialogue (PAD) also started in September 2007 with 638 stakeholders and the final standard was released in August 2010 (ASC, 2012a). The estimated cost of all species-specific dialogues was about US$10 million with most of the funding sourced from the David and Lucile Packard Foundation (Auld, 2014; Boyd and McNevin, 2014).Though the ASC initially targeted 12 aquaculture species (WWF, 2007; 2009), it has now 9 standards for 15 aquaculture species (see: Table 2.1) and a joint ASC-MSC standard for seaweed (ASC, 2019).

The challenge of proliferation remained an issue, however, for some key actors in the transnational aquaculture certification movement. While the WWF continued to lead dialogues for creating new standard-setting and certification processes, it also raised questions about ongoing proliferation of standards. It identified at least 30 aquaculture certification programs operating in the mid 2000s and commissioned a *Benchmarking Study: Certification Programmes for Aquaculture* in 2007, exploring "numerous shortcomings, constraints and challenges with existing certification programmes that need to be addressed" (WWF, 2007: 6). The study explored four major areas of concern (e.g., environmental, social, animal welfare and health, standard development and verification) and found a lack of effective and credible regulatory frame works for existing certification standards that must be addressed for long-term sustainability of this sector. For the WWF, the *Benchmarking Study*

has also provided it with a justification to form credible and effective aquaculture certification programs which shaped the dialogues processes.

Finally, the WWF was also instrumental in the development of the Aquaculture Stewardship Council (ASC), which was launched in 2010 through a partnership with the Netherlands-based Sustainable Trade Initiative (IDH). This institution was the culmination of the WWF's eleven-year efforts in the sector, particularly through its dialogues. In the end, all species-specific standards created through the aquaculture dialogues were transferred to the ASC, which is now responsible for the improvement, management and development of the standards and certification processes.

Though all ASC standards are in compliance with the ISEAL *Code's of Good Practices* and ISO/IEC Guide 59 *Code of good practice for standardization* (ASC, 2018a),it has encountered severe criticisms and formal objections for ShAD. For example,228 individuals and 95 social and environmental NGOs made objections in April 2012 through an open letter, outlining their grievances that the standards are so stringent and rigorous, and most farms could not comply with the certification principles (Boyd and McNevin, 2014).This demonstrates the evolving rift between the major ENGO communities (e.g., Friends of the Earth Malaysia, Mangrove Action Project and New York Climate Action Group) and the aquaculture industry and its promoters. In an open letter, the organizations and individuals, who made protests and organized campaigns and resistance against the process of ShAD and the intention to form the ASC, argued that ShAD was occurred without involving the majority of stakeholders and affected local resource users of shrimp producing nations (An Open Letter to the General Steering Committee of the WWF Shrimp Aquaculture Dialogue, 2012). They claimed that ShAD's participants were those who invested in the growth of shrimp industry and the process of shrimp "certification will do much harm to both Local Resource Users and the coastal marine environment" (Ibid. p.1). Despite a formal

opposition, however, the first ASC certificate was awarded to Vinh Hoan's Tan Hoa pangasius farm of Vietnam in the 11th September 2012 (ASC, 2012c).

The ASC's entry into global consumer markets was spurred by purchasing commitments from powerful retailers and other seafood buyers. By the end of 2013, it has announced that "15 companies, representing 70 percent of global farmed production, are committing that 100% of their production will be certified by the Aquaculture Stewardship Council by 2020" (Clay, 2013). Likewise, a number of retail giants have also entered into partnership with the ASC, including Marks & Spencer, Royal Ahold, METRO Group, Royal Greenland A/S and Edeka (Tran *et al.,* 2013). In 2015, the ASC launched underlying guidelines for restaurants and caterers for using the ASC logo on their menus. In addition, hotel chains are increasingly adopting purchasing commitments for products certified by the ASC. For instance, Hilton Hotel in Singapore is offering ASC certified seafood and Hyatt "has made a global commitment to purchase more than 15 percent of its seafood from […] ASC certified farms" (ASC, 2015). ASC-certified products in markets grew from 88,096 metric tons in 2012 to 688,138 metric tons in 2015 with an average growth rate of 98 percent annually, making it the fastest-growing aquaculture certification scheme in recent years (Potts *et al.,* 2016). By 2018, the ASC now accounted for more than 1.5 million metric tons of certified seafood and 14,082 ASC-certified products sold in 70 countries, with 721 certified farms in 39 countries (ASC, 2018b).

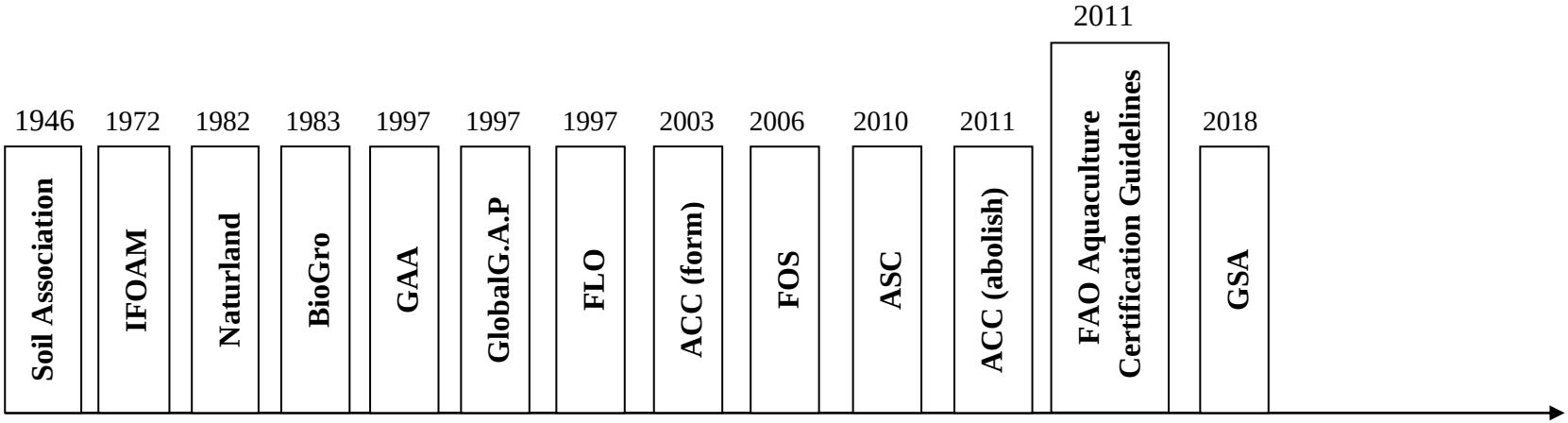

Figure 2.1: Emergence of transnational aquaculture certification organizations, accreditation body and FAO's principles (see: Table 2.1 for details)

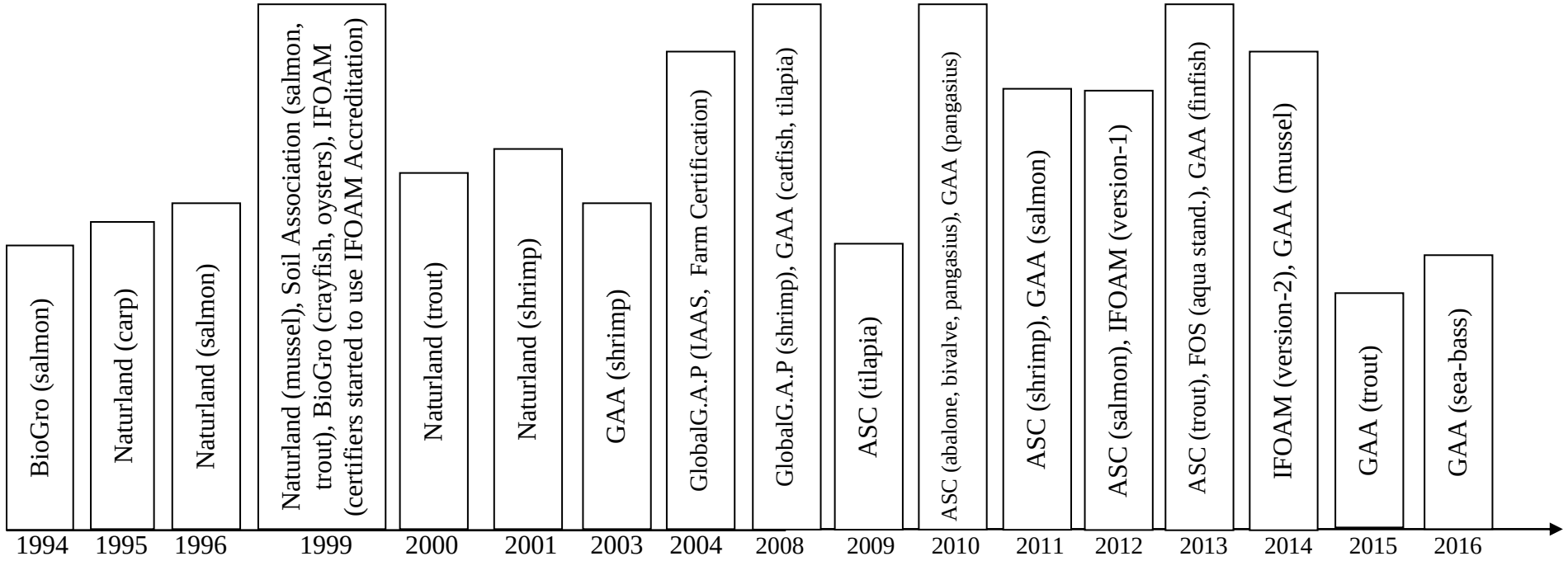

Figure 2.2: Development of species-specific standards and beginning of species certification by various organizations (see: Table 2.1 for details)

2.2.2.5. IFOAM's initiatives, the creation of FLO and termination of ACC

Despite widespread support for the ASC, competition nevertheless continued, including a growing role of social considerations of aquaculture production and certification. For organic certification, IFOAM released two versions of its aquaculture standards: version-1 developed from 2010 to 2012 followed by version-2 from 2012 to 2014 (Potts *et al.*, 2016). For non-organic certification, the GAA and ASC were joined by the Fairtrade Labelling Organizations International (FLO), which proclaimed to develop fair-trade standards for shrimp farming by early 2011. The FLO's idea to develop a fair-trade seafood initiative can be traced to a German Fair Trade Initiative on the South Indian Federation of Fishermen Societies, which was adopted in a Seafood Fair in Bremen, Germany in March 2000 (Mathew, 2004; Kurien, 2000). In 2011, the FLO justified the necessity of creating a shrimp standard this way: "many smallholder shrimp farmers face difficulties in gaining access to markets and in maintaining sustainable development of their livelihoods. This project seeks to develop standards for fair trade certification of smallholder shrimp farming and organizations which will enable them to maintain livelihoods and produce in a more socially and environmentally responsible manner" (Auld, 2014: 213). Despite a latent interest and conducting two rounds of consultation for creating a draft standard, the FLO has not yet able to develop any certification standard for aquaculture producers, though it has various standards for multiple products notably cocoa and coffee (FLO, 2018).

The recent dynamics shaping the transnational aquaculture certification landscape illustrate how the process was contested, with key actors facing numerous and changing challenges. While programs strive for market capture and partnerships (e.g. with retailers), ongoing scrutiny and criticism by some NGOs continued, particularly for industry-dominated programs like the ACC. Some, for instance, claimed that "there was opportunity for conflicts of

interest among ACC, its auditors, and program participants. The BAP program was not considered to be third-party certification by the NGOs because of the way ACC was organized and operated" (Boyd and McNevin 2014: 307). In the face of confrontation with NGOs, the ACC was eventually dissolved in 2011 and the GAA turned into a sole standard-setting institution for its BAP certification program, and continued to release new standards and certify farms. In the year of the ACC termination, the GAA released its BAP certification standards for salmon farms and certified the first salmon farm in Canada (GAA, 2017). In 2013, the BAP certification standards for mussel, finfish and crustacean were finally released. One year later, the GAA certified its first mussel farm and mussel processing plant in Canada.

After disbanding the ACC, which was the sole external auditor and certifier for verifying compliance with BAP standards, the GAA developed a partnership with three accredited certification bodies (e.g.Global Trust, Société Générale de Surveillance and National Sanitation Foundation) to audit the BAP certification. The program also complies with the best practices identified by the Global Sustainable Seafood Initiative (GSSI) and Global Food Safety Initiative (GFSI), which points to the program's efforts to demonstrate harmonization (see below). By October 2018 about2,155 facilities were certified to the BAP standards, including 1,451 farms, 372 processing plants, 217 hatcheries and 115 feed mills (BAP, 2018a). Total certified aquaculture production from 1,451 farms was 1.5 million metric tons (MMT) in 2018 which grew from1.2 MMT in 2017 from 1,137 certified farms. Globally, the GAA developed partnerships with over 150 retailers, restaurants and foodservice brands to source BAP certified seafood items, including Ahold Delhaize, Albertsons, ASDA, Carrefour, Darden Restaurants, Harvey's Restaurant, Red Lobster, Rain Forest Aquaculture, Sainsbury's, Sobeys, Tesco, and Walmart (BAP, 2018b) .

2.2.2.6. GAA's role in the formation of GSA

In addition to the development of accreditation organization, other networks and organizations have emerged to address the challenges and issues associated with the proliferation of standards and certifications. A recent significant initiative consists of Global Seafood Assurances (GSA), which officially launched at Seafood Expo Global in Brussels, Belgium on April 25, 2018 to meet market and public expectations by providing credible supply chain assurance for farm-raised seafood (GAA, 2018a). The GAA spearheaded the formation of GSA and promised to initially finance its operations. Three executive members of the GAA have taken the leadership of the GSA, including Wally Stevens, former promoter of the NFI; Jeff Fort, CEO of Delta Blue Aquaculture industry and former staff of the ACC; and Bill Herzig who served the NFI, Darden Restaurants and hosted the first meeting of the GAA in 1997 (GSA, 2019). Wally Stevens has justified the need of creating the GSA (GAA, 2018a):

> Currently, there are gaps in both aquaculture and fisheries certification, and the purpose of GSA is to fill those gaps and provide credible assurances to the marketplace that farmed and wild seafood is responsibly produced throughout the entire production chain. We need to fill the gaps while linking the various silos of certification together. What we need is comprehensive representation.

Thus, the GSA is addressing the challenge of multiple certification programs by offering a service to work collaboratively with existing standard holders and with buyers and producers. While not originally a formal standard-setting or certification body, it appears the GSA is evolving into a more formal standard-setting and certification organization. It has announced that it will house and administer an existing UK-based certification program for wild-caught fisheries. The GSA has developed a draft 'Seafood Processing Standard' covering wild caught and aquaculture processing and based on the BAP standards (GAA, 2018a; GAA, 2018b). As the standard development of new organization is still in progress, the number of species-specific programs has steadily been released, the demand of certified seafood in global markets is

growingly expanding and the certifiers are receiving an increased support from market forces, it seemingly appears that more proliferation in aquaculture certification is due and the sector would endure more fragmentation and criticisms if no effective consolidation occurs at program level.

2.3. Program-level harmonization and consolidation

The proliferation of transnational aquaculture certification programs over time has created a significant amount of confusion among producers, retailers, and consumers over making decisions to choose a credible scheme for identifying and improving responsible aquaculture production practices. During the third session of the FAO's Committee on Fisheries (COFI) held in India from 4-8 September 2006, a request was made by the Members of the Sub-Committee on Aquaculture to develop an all-inclusive framework for credible aquaculture certification schemes because:

> The emergence of a wide range of certification schemes and accreditation bodies was creating confusion amongst producers and consumers alike and thus the necessity for a more globally accepted norms for aquaculture production, which could provide better guidance, serve as basis for improved harmonization and facilitate mutual recognition and equivalence of such certification schemes. (FAO, 2006: 2).

Recognizing the necessity to avoid confusion, the FAO (2011a) developed an international guideline on aquaculture certification after a long consultative process with governments, industry and civil society that was approved in the 29th Session of COFI in 2011.The FAO indicates that this guideline should be followed by NGOs, governments, intergovernmental organizations, private sectors, civil society and other stakeholders engaged in the operation of aquaculture certification. While FAO's guideline was in progress, a number of institutional responses came from non-organic certifiers to harmonize their schemes. On February 2009, GAA and GlobalG.A.P signed an agreement at the Seafood Summit in San Diego to harmonize their farm audits and certification standards (Fiorillo, 2009). With an aim to create robust standards and avoid confusion and duplication, these two certifiers decided to

develop a “joint checklist approach” that would meet the requirements of these institutions and benefit producers, retailers and buyers.

Following the cooperation with GAA, GlobalG.A.P formed another partnership and signed a memorandum of understanding (MoU) on the 24th June of 2009 with WWF, just prior to the creation of the ASC, “to create checklists, guidance documents and training materials for auditors” and “to accurately measure if aquaculture’s impacts on the environment are minimized”(Bonello, 2009). According to this new partnership, GlobalG.A.P decided to create “a voluntary add-on module” to its own standards harmonizing with the metrics-based standards created by the Aquaculture Dialogues. This collaboration was designed to benefit retailers and producers who anticipated a cost-effective standard and harmonization of diverse schemes.

Another example of program-level cooperation was initiated with the signing a MoU, on the 23rd April of 2013 by three competing institutions, i.e. ASC, GlobalG.A.P and GAA. The MoU identified six key areas that need to be jointly harmonized: common feed standards, auditing process, chain of custody, information technology platforms, removing duplication, and strengthening the products’ objectivity and accuracy (GlobalG.A.P, 2013; 2014).Based on the agreement, GAA, GlobalG.A.P and the ASC have drafted an “agreed combined checklist” and decided to carry out species-specific “combined audits” jointly performed by: ASC and GlobalG.A.P (shrimp, salmon and pangasius), ASC and GAA (pangasius), and GlobalG.A.P and GAA (finfish and crustaceans) (GlobalG.A.P, 2015b). The GAA now urges to extend cross-sector cooperation in sourcing sustainable feed for aquaculture farms (Evans, 2018).

These new partnerships serve the interests of certification institutions by harmonizing various initiatives and are designed to benefit buyers, retailers and producers who seek an all-inclusive and cost-effective program. Though inter-institutional cooperation is meant to refine

program standards, avoid duplication, improve certification process, products' integrity and address environmental impacts, their joint collaborative measures are not focused on the evolving social, economic problems and the promotion of affected local communities. Rather the social, economic and community related issues have been specifically considered by individual agency through integrating various principles and criteria into the aquaculture certification standards that are broadly examined in the next Chapter Three.

2.4. Conclusion

This chapter advanced an empirical analysis of the emergence and evolution of transnational aquaculture certification schemes that predominantly intend to drive the industry towards socially and ethically responsible practices. Based on an extensive review of gray literature and scholarly publications, this chapter explored seven major driving forces: government failures to check the collapse of wild fisheries, socio-environmental controversies around and global resistance to industrial aquaculture, worldwide concerns for food safety and quality, fragile role of governments, rise of sustainable seafood movement, and growth of seafood production, trade and markets. These key dynamic forces originated around three decades ago and played decisive role in the creation, evolution and proliferation of eleven transnational certification programs to address environmental, social and ethical problems in aquaculture development.

With respect to the emergence of diverse transnational certification schemes, the political economy (PE) approach sheds light on the pattern of involvement and interactive role of a plethora of non-state actors, institutions, organizations, associations, philanthropic foundations, human rights' activists, market forces, international networks and alliances in the creation, evolution and development of eleven transnational certification programs and standards over time. The PE insight helped to identify the underlying ideas and interests driving the programs'

initiation and advancement. The credit for initial efforts to create a global certification program goes to the organic pioneers who began an organic movement through IFOAM, which gained significant momentum in the early 1990sand applied the idea of organic food farming to aquaculture production. Though Soil Association adopted the first initiative for developing organic aquaculture standards in 1988, it began to certify in 1999. BioGro commenced the first organic aquaculture certification in 1994 followed by Naturland in 1995. The IFOAM appeared as a full-fledged organic accreditation body in 1990 to advance the uniformity among numerous organic aquaculture certifiers, including Soil Association, BioGro and Naturland who were later accredited by the IFOAM. The IFOAM also drafted its own standards in 1998 and approved in 2005. These developments mark the growing competition in the transnational aquaculture certification landscape.

While the products of organic certifiers were entering the global seafood markets, the sector witnessed further proliferation in programs and standards assume a coordinated response emerged from retailers, industry actors and ENGOs, who commenced nonorganic certification schemes as part of ongoing competition and alternative approach of organic initiatives. In 1997, two competing alliances were emerged and co-evolved: the GAA, which began certification in 2003, was created by a plethora of actors from aquaculture industry based on the idea of an integrated response to the NGO coalition and aquaculture resistance groups whereas the EurepGAP, which commenced certification in 2004 and converted to GlobalG.A.P in 2007, was created by a consortium of giant food retailers based on the idea of ensuring global food safety. These large retailers have instrumental role in the development of certification programs and standards over time (Ponte, 2012; Foley and Havice, 2016; Thorlakson *et al.,* 2018). Though FLO established in 1997 with an idea of promoting small-scale producers' livelihoods and

market access, it has excluded from ongoing competition of the certification agencies as it is not developed any standard or program to date. Based on the idea of creating an independent auditor, the GAA formed ACC in 2003, which rapidly gained significant access to global seafood markets but eventually dissolved in 2011 in the face of NGO criticisms. The birth of ASC in 2010 was the culmination of the WWF's Aquaculture Dialogue efforts. Despite protests and formal objections by NGOs and civil society, it began certification in 2012 and shortly emerged as one of the leading certifiers. One-year after of ASC's certification, FOS, originally formed in 2006, released its aquaculture standards. Finally, the GSA, created by industry actors in 2018, has recently joined in the race of creating standards and programs. Though a number of transnational certification schemes have evolved overtime, Naturland and GlobalG.A.P are the most dominant agencies in terms of the total certified aquaculture production. The findings explored that despite competition and struggle for program initiation, major nonorganic certifiers (i.e., ASC, GAA and GlobalG.A.P) have entered into cooperation and partnership for their own sake. Though collaboration happens, competition is still going on and more proliferation in aquaculture certification landscape is due and the sector would witness more fragmentation and criticisms.

CHAPTER THREE: SOCIAL, ECONONIC AND COMMUNITY-ORIENTED PRINCIPLES OF AQUACULTURE CERTIFICATION

This chapter examines the nature and extent of social, economic and community-oriented principles and criteria included in prominent transnational aquaculture certification programs. Although eleven initiatives have stood out in the rise and evolution of transnational aquaculture certification programs, this chapter deals with the principles of nine programs as two key organizations have been excluded from the study (the Aquaculture Certification Council has dissolved and Fairtrade Labelling Organizations International has not yet released any standard for aquaculture). The next section examines the broader context and driving forces for the inclusion of social principles in transnational aquaculture certification, while the subsequent section examines the specific standards, principles, criteria, and norms of organic and nonorganic aquaculture certifiers. Through this examination, this chapter identifies the extent to which certification incorporates principles such as freedom, justice, equality, responsibility and fairness in aquaculture practices and the degree to which there is convergence or divergence among aquaculture certification principles and criteria. Finally, the findings are situated in a broader context of sustainable seafood assessments through engagement with the sustainability framework of the Canadian Fisheries Research Network (CFRN), which provides a method to compare the social, economic and community-focused principles of aquaculture certification programs with the social and economic pillars of the CFRN framework.

3.1. The contexts of incorporating social, economic and community-oriented principles

Over the last three decades, the number of aquaculture certification schemes and species-specific standards has proliferated with an increasing market demand of certified seafood worldwide. With the evolution of various schemes, aquaculture certification institutions have sought to address diverse environmental and social challenges in aquaculture production. Issues include resistance among local community groups and nongovernmental organizations (NGOs) (Stonich and Bailey 2000; Vandergeest and Unno, 2012; Boyd and McNevin, 2014), lack of explicit connection between the programs' goals and expected ecological outcomes (Kaiser and Edwards-Jones, 2006; Ward, 2008; Bush *et al.,* 2010; Baumgartner *et al.,* 2016), lack of legitimacy, objectivity and fairness (Hatanaka, 2010), overlapping and conflicting principles in certification standards (Schouten *et al.,* 2016; Tlusty *et al.,* 2016), lack of applicability for small-scale producers and low income communities (Jonell *et al.,* 2013), standards' cultural barriers (Baumgartner *et al.,* 2016), and a lack of consideration of socioeconomic impacts of aquaculture (Tlusty *et al.,* 2016; Oxfam, 2018).

Despite collaboration and efforts at harmonization, little effort has focused on social issues. Early partnerships, agreements and collaborations among the aquaculture certifications institutions to harmonize certification efforts focused on the auditing process, chain of custody and certification standards, avoiding duplication, reinforcing credibility of certified products, developing joint checklists, documents and training materials, sourcing sustainable feed, and minimizing environmental impacts (Bonello, 2009; Fiorillo, 2009; GlobalG.A.P, 2013; 2014; 2015b; Evans, 2018). However, no collaborative initiative has emerged to resolve the adverse socioeconomic problems and promote the aquaculture industry within an ethically and socially responsible manner. Instead, socioeconomic issues tend to be addressed by individual

certification institutions. The socioeconomic problems of the industrial aquaculture more broadly, and certification programs more specifically can be examined in two ways: first, in terms of the evolving problems in the industry for which certification programs develop principles and criteria to address and second in terms of the evolving problems faced by certification programs and certified farms at the level of implementation. Though the following discussion examines these two patterns of socioeconomic problems, this thesis looks primarily at the first way.

In general, the aquaculture industry has been criticized for its negative impact on socioeconomic issues though it has significant contribution to rural development and poverty alleviation etc. During the 1980s and 1990s, aquaculture operations in some regions of the world resulted in the massive displacement of small-scale fishermen and producers, loss of forest-dependent livelihoods, expropriation and marginalization of surrounding communities, privatization of open-access resources, limited employment opportunities, low wage rate and skewed distribution of benefits (Smith and Pestafio-Smith, 1985; Bailey, 1988; Primavera, 1991; Muluk and Bailey, 1996). The impacts of intensive aquaculture production on local communities, coastal livelihoods, social networks and socio-cultural settings are well documented (Barrett *et al.,* 2002; Primavera, 2006; Orchard *et al.,* 2015; Osmundsen and Olsen 2017). Industrial aquaculture has also increased elite capture of local resources adversely affecting the accessibility and entitlement of the poor (Bene *et al.,* 2016). Export-oriented shrimp aquaculture generates mass protests, severe resistance, small-scale movement, confrontation, social tension and violent conflicts among local communities, vested interest groups and absentee land owners (Pokrant, 2014; Afroz *et al.*, 2017; Akber *et al.*, 2017). Likewise, it is also responsible for criminal activities, land grabbing, illegal land acquisition, forcibly eviction,

marginalization, social exclusion and dispossession of poor peasants and small landowners by the businessmen, powerful producers and local politicians who are involved in the production process (Adnan, 2013; EJF, 2014; Bhari and Visvanathan, 2018). Aquaculture is also linked to the disappearance of customary occupations and loss of traditional skills (Bhari and Visvanathan, 2018).

Moreover, the industry's reputation has been seriously plagued by various employment related issues such as wage discrimination, forced labor, child labor, bonded labor, slave labor, unpaid work, labor exploitation, job insecurity, hazardous work, occupational injuries and fatalities, human trafficking, harassment, abuse, violence at workplace, unhealthy, unsafe and vulnerable working environments. These issues have been identified in diverse regions in Australia, Bangladesh, Cambodia, Canada, Chile, India, Ireland, New Zealand, Norway, Philippines, Vietnam and the United States (Rico *et al.,* 2013; Hishamunda *et al.,* 2014; Nuruzzaman *et al.,* 2014; Ali *et al.,* 2016; Amaravathi *et al.,* 2016; Verité, 2016; Knott, 2016; Knott and Neis, 2017; Levin, 2017; Roxas *et al.,* 2017; Marschke *et al.,* 2018; Nakamura *et al.,* 2018; Bosma *et al.,* 2018; Little *et al.,* 2018; Holmen *et al.,* 2018; Holen *et al.,* 2018a; Holen *et al.,* 2018b; Mitchell and Lystad, 2019). The evolving problems of aquaculture development seriously question the industry's socially and ethically responsible manner. In context of industry's growing problems, Oxfam International, who participated in the aquaculture dialogues and contributed to the creation of the ASC, has called for "urgent improvements on social aspects such as fair contracts for farmers, decent labor rights in the industry, and effective and transparent stakeholder consultation including farmers, workers, communities, and civil society" (Oxfam, 2018: 2).

The negative impact of aquaculture production persuaded experts involved in standard-setting process of earlier programs (e.g., Naturland, GAA, EurepGAP) to consider the inclusion of social principles in aquaculture certification programs, but the early phase of aquaculture certification development focused on environmental issues. Although the first certification of aquaculture began by BioGro in 1994, the standards of these programs were focused on principles and criteria involving consumer safety, food quality and ecological integrity (see Table 2.1). The introduction of the idea of "social responsibility" and "labor" related principles into the aquaculture certification landscape primarily commenced in the BAP and Integrated Aquaculture Assurance Standard (IAAS) standards of GAA and EurepGAP in 2004 and 2005 respectively (see Chapter Two). Naturland began to apply its "social standards" to all farmers and processors including aquaculture in 2005 (Naturland n.d).

Despite incorporating social principles in certification systems, problems (i.e., depriving local communities of customary rights, affecting small-scale farmers, conflicts between resource users, and labor issues) of aquaculture development remained at the level of implementation and outcomes (Belton *et al.,* 2010; Jonell *et al.,* 2013). For example, that two large certified salmon aquaculture operators in Australia, Tassal Limited (Tasmania-based salmon aquaculture company, which is the first company in the world achieving full 'gold standard' of the Aquaculture Stewardship Council) and Petuna Seafoods (a Tasmania-based seafood company operating capture and aquaculture production, which has attained the Global Aquaculture Alliance-Best Aquaculture Practices certification) have been subjected to severe criticisms by individuals, environmental NGOs (e.g., Environment Tasmania) and local community groups due to lack of transparency, environmental problems and creating socioeconomic impacts (Vince and Haward, 2017). The Environment Tasmania and local communities have been opposing

aquaculture operations in Tasmania's East Coast and mobilizing organized large protests against salmon farming industries because of impacts on communities and environmental damage (Vince, 2018; Vince and Howard, 2019).

Moreover, the ASC's shrimp standard faces various technical, social and cultural objections in Indonesia by smallholders, individual farmers, surrounding communities, social organizations and environmental NGOs due to rural frictions, high payments, English language barriers, poor incentives for farmers, and mistrust which has resulted from formal written contract between producers and buyers to meet the requirements of certification (Schouten *et al.*, 2016). In addition, third-party aquaculture certification schemes like the Friend of the Sea (FOS) are increasingly criticized for unsustainable practices, overlooking operations, weak monitoring and enforcement mechanisms, ineffective complaint procedures, and lack of credibility, transparency and traceability (Brad *et al.* 2018). The programs of major certification institutions such as Naturland, International Federation of Organic Aquaculture Movement (IFOAM), ASC and GAA-BAP have also been increasingly criticized for weak consideration of socioeconomic problems and poor enforcement of social responsibility principles (Baumgartner *et al.,* 2016; Belton *et al.,* 2010; Brunner 2014; Censkowsky 2014; Ha *et al.,* 2013; Hatanaka 2010; Oxfam, 2018; Schouten *et al.,* 2016).

Despite the incorporation of social principles into certification standards, there remain significant questions about the nature, extent, characteristics and efficacy of socioeconomic principles and criteria in transnational aquaculture certification programs. Some assessments suggest that the industry's widespread problems imply that socioeconomic issues are not rigorously addressed by major aquaculture certification organizations such as ASC (Tlusty *et al.,* 2016; Oxfam, 2018). Moreover, the FAO has urged the aquaculture certifiers to better consider

the emerging social problems such as workers' safety, labor rights, child labor, sharing benefits, equity, and promoting the livelihoods of local communities (FAO, 2011a, 2011b). It also advised that the consultation with and adequate participation of non-state actors including local communities in aquaculture development are required and it stresses on a "social licence" approach to foster social performance and socially responsible practices (FAO, 2017). These increasing pressures from academics, intergovernmental and development organizations have significantly driven certification bodies to refine and restructure the principles on socially responsible aquaculture production which are incorporated in their current standards, which, it should be noted, often change over time.

3.2. Social, economic and community-oriented principles of aquaculture certification

This section delineates social, economic and community-focused principles which are integrated into certification standards of nine agencies. Social principles broadly aim to address forced labor, bonded labor, child labor, human trafficking, discrimination and exploitation, and to advance equality, fairness, social justice, freedom, employee's benefits and facilities. Economic principles incorporate working hours, wages, employment terms and conditions, employment and migrant worker policy. The community-focused principles intend to promote community relations, community values and rights, welfare of local communities, and minimizing impacts and conflicts with local communities.

3.2.1. Social principles

3.2.1.1. No forced, bonded and child labor, and human trafficking

With respect to the abatement of worldwide concern on inhuman labor practices in aquaculture industry, the transnational organic and nonorganic certification bodies have included various principles in their standards and norms. The Soil Association, the oldest

organic certifier and credited with adopting the first initiative to develop organic aquaculture standards, currently includes a principle on "forced and child labour" under the employment category that states "not use forced or involuntary labour or child labour that interferes with their education" (Soil Association, 2018a: 47). Likewise, IFOAM, an international umbrella organization based in Germany that provides organic accreditation and certification services, specifies that "operators shall not use child labor" (IFOAM, 2017: 65) in organic production and processing including aquaculture. People under 13 are considered as children according to the IFOAM norms of organic production (Ibid). Notably, the IFOAM's definition of the age of a child is not in compliance with the International Labour Organization's (ILO) Article 2 of the convention on the "C182 - Worst Forms of Child Labour Convention" (no.182), which states that all persons under the age of 18 shall be recognized as child (ILO, 1999).Regarding the abatement of child labor in organic aquaculture, Naturland, a Germany-based international association involved in organic aquaculture certification, also affirms that "no children shall be employed on operations" (Naturland, 2018b: 13).

Though IFOAM and Naturland stand against the practice of child labor in organic aquaculture, both organizations permit the work of children on family and neighboring farms if this kind of practice does not jeopardize children's health, safety, education, moral and psychosocial development (Naturland, 2018b; IFOAM, 2017). While the Soil Association, IFOAM and Naturland incorporate child labor considerations in their standards, BioGro, a New Zealand-based organic certification body, does not include any principle on child labor. Rather it states that "children employed by licensees must be provided with educational opportunities" (BioGro, 2009a: 29).

Like organic certifiers, nonorganic aquaculture certification bodies also include provisions in their standards to address child labor in the aquaculture industry. The Global Seafood Assurances (GSA), a newly emerged nonorganic body launched in Belgium, sets a provision on the employers' practice of child labor and specifies that the operators:

> […] shall comply with local child labor laws regarding minimum working age, or the age of compulsory education, or, the ILO Minimum Age Convention 138 [which] states the minimum age shall be 15, local law of minimum age of 14 may apply if it is in accordance with developing nation's country exceptions under this convention (Principle A2 6.1, GSA, 2018: 50).

This GSA's provision on the minimum age of a person employed in aquaculture industry is compliant with the ILO's Article 2 (3) and Article 2 (4) of the "C138 - Minimum Age Convention" (no. 138), which state that the minimum age shall not be under 15 years and this can be relaxed a minimum age of 14 for the countries whose economy and educational opportunities for the children are inadequately developed (ILO, 1973). Regarding the improvement of responsible labor practices, the ASC also sets a criterion for the effective abolition of child labor. For the ASC, no person shall be employed in the aquaculture industry less than 15 years of age and the child is defined as any person under 15 years of age (ASC, 2017a:31; 2017b:52; 2018c:31).

The ASC's definition of the age of child is non-compliant with the ILO's Article 2 of the convention on the "C182 - Worst Forms of Child Labour Convention" (no.182), which states that all persons under the age of 18 shall be recognized as child[9] (ILO, 1999).However, the ASC sets

[9] There are variations regarding the age of children (for employing in aquaculture farm) sets by the certification agencies. To be considered as a child, IFOAM sets the age under 13 whereas ASC defines any person less than 15 years of age. The age of child sets by IFOAM and ASC is not compliant with the ILO's Article 2 of the convention on the "C182 - Worst Forms of Child Labour Convention", which states that all persons under the age of 18 shall be recognized as child (ILO, 1999). Though GSA doesn't specify the age of children, it only sets minimum age of employing people in aquaculture farms that is compliant with the ILO's Article 2(3) and Article 2(4) of the "C138 - Minimum Age Convention" (ILO, 1973). Also, the ASC's minimum age is compliant with the ILO's Article 7 of the "C138 - Minimum Age Convention". These are two different conventions: one is related with children and another is about minimum age. Though GSA is a recently formed certifier, it sets provision for the operators that shall comply with Minimum Age Convention 138 of 1973 instead of the Worst Forms of Child Labour Convention 182 held in 1999.

an exception of developing nations' local minimum age law allowing minimum age 14 years based on the ILO Convention 138 of Article 7 (ASC, 2012a; 2012b; 2012d; 2013; 2014; 2016; 2017c; 2017d; 2018c). The ILO's Article 7 of the "C138 - Minimum Age Convention" (no. 138) states that national regulations may allow the employment of person 13 to 15 years of age on light work (ILO, 1973).The ASC states that "child labor does not include children helping their parents on their own farm, provided that working does not jeopardize their schooling or health" (ASC, 2012a: 42). In addition, the ASC specifies that children "shall never be exposed to work or working hours that are hazardous to their physical or mental well-being" (ASC, 2017a: 31).

Similar to the ASC and GSA, other nonorganic bodies such as Friend of the Sea (FOS), GAA and GlobalG.A.P are also incorporating principles on child labor issue. The FOS, an international organization founded by the Earth Island Institute covering both aquaculture and fisheries certification, stipulates that "child labour should not be used in a manner inconsistent with ILO conventions and international standards" (Principle 57, FOS, 2014:4). The FOS's provision is very strategic because it, like other certifiers, does not specify either the age of child and the minimum age of employment for children or the conventions of ILO. The key provisions in the standards of the GlobalG.A.P (Global Good Agricultural Practice), an independent aquaculture certification body founded by the European retailers operated internationally, states that "children below the age of 15 are not employed" and children employed in family farms "are not engaged in work that is dangerous to their health and safety, jeopardizes their development, or prevents them from finishing their compulsory school education" (GlobalG.A.P, 2017b: 13).

Likewise, the GAA-BAP (one of the leading international nonorganic aquaculture certification organizations formed by the industry-led alliance) principle 3.2/3.9 specifies that operators "shall not engage in or support the use of child labor [and] shall comply with national

child labor laws regarding minimum working age or ILO Minimum Age Convention 138" that shall be 15 years old (BAP, 2016a:4; BAP 2016b:5; BAP, 2017:7). The GAA extends that this ILO rule shall be relaxed for the local law in developing nations if they set minimum age at 14.The GAA's provision on the minimum age of children is also compliant with the ILO's Article 2(3) and Article 2 (4) of the "C138 - Minimum Age Convention", which state that the minimum age shall not be under 15 years and this can be relaxed a minimum age of 14 (ILO, 1973). However, eight certification agencies except BioGro are incorporated various provisions to child labor in aquaculture sectors (see Table 3.1).

With respect to the abatement of forced and involuntary labor, the IFOAM's provision stipulates that "operators shall not use forced or involuntary labor or apply any pressure such as retaining part of the workers' wages, property or documents" (Principle 9.3, IFOAM, 2017: 64). Naturland specifies that to achieve organic aquaculture certification, operators shall avoid forced labor and any form of involuntary work, and the operators "shall not retain any part of the workers' salaries, benefits, property, or documents in order to force workers to remain on the operation" (Naturland, 2018b:13). The Soil Association and BioGro similarly state that the operators and their certificate holders "must not use forced or involuntary labour" (BioGro, 2009a: 29; Soil Association, 2018a: 47) in the organic aquaculture production system.

Similar to the organic certifiers, nonorganic bodies also set provisions on the worst forms of labor practices such as forced labor, bonded labor and prison labor. The GSA's (2018) principles (A2 5.2—A2 5.3) strictly prohibit any form of coercion, debt bondage, forced labor, indentured labor, prison labor, human trafficking and bonded labor. The ASC's criterion referring to "forced, bonded or compulsory labor" firmly states that certified farms shall include

no incidences of forced, bonded and compulsory labor and no evidence of "the inability of a worker to freely leave the workplace and/or an employer withholding original identity documents of workers are indicators that employment may not be at-will" (ASC, 2012a:43; 2012b:30; 2012d:27; 2013:39; 2014:54; 2016:42; 2017a:32; 2017b:53; 2017c:41; 2017d:32; 2018c:32). The criterion further specifies that "employees shall always be permitted to leave the workplace [and] employers are never permitted to withhold original worker identity documents" (ASC, 2017a: 32).

In addition, the ASC asks for verification that workers shall clearly understand employment contracts, that labor is totally unforced and farm policies shall designate that their production practice "is not using forced, bonded or compulsory labor forces" (ASC, 2017b: 53). The GAA-BAP principles' are also similar to those of the ASC and GSA. These state that no worker shall engage in forced, bonded, indentured and prison labor, including snatching identity documents and forbidding them to leave the premises (BAP, 2016a; 2016b; 2017). In addition, GlobalG.A.P includes provisions that there will be no forced labor in its certification system worldwide (GlobalG.A.P, 2017b; 2019). Though the FOS does not set any specific criterion like other certifiers regarding forced labor, an annual report claims that "a high level of social accountability is required, including a ban on […] forced labor" (FOS, 2016: 5). Apart from FOS, eight certifiers have included diverse provisions to address forced and bonded labor in aquaculture industry (see Table 3.1). In addition, though human trafficking is a persistent problem in aquaculture sectors (Levin, 2017; Nakamura *et al*., 2018), only three certifiers such as the ASC, GSA and GAA-BAP refer the issue of human trafficking (see Table: 3.1) without stating any specific principle regarding the definition and extent of this issue.

3.2.1.2 Equality, fairness, non-discrimination and social justice

Referring to the promotion of fairness, equality and justice, IFOAM's (2017) requirement states that "operators shall provide their employees and contractors equal opportunity and treatment, and shall not act in a discriminatory way" (p.64). The IFOAM's norms for organic production includes a "social justice" principle (2017: 63-66), which incorporates a series of requirements (i.e. involuntary work, forced and child labor, discrimination, disciplinary actions, terms and conditions of employment, wages and benefits which are analyzed in the preceding and following sections) that must be followed by the accredited organic certification bodies, producers and processors. Finally, IFOAM (2017) specifies that if operators expect to receive certification, they must not engage in "interference, intimidation and retaliation" (p.64).

The fairness principle of IFOAM denotes that organic farming "should conduct human relationships in a manner that ensures fairness at all levels and to all parties – farmers, workers, processors, distributors, traders and consumers" (IFOAM, n.d.). In this principle, fairness means "equity, respect, justice and stewardship" of the people and other living creatures. The fairness principle for organic aquaculture also stresses on providing good quality of life and reducing people's poverty. Regarding equal treatment and opportunities, Naturland (2018b) includes a requirement that "all workers, irrespective of their sex, skin colour or religion receive the same pay and have the same opportunities for work of the same nature and same degree of responsibility" (p.13). It also specifies that "all workers are considered to enjoy the same rights and working conditions, including social benefits and other privileges for work of the same nature and same degree of responsibility" (Naturland, 2018c: 4). Like IFOAM, the BioGro also stipulates that all organic producers who are certified by the BioGro must have a policy on "social justice" and the "BioGro will not certify production that involves or is based on

violations of basic human rights" (BioGro, 2009a: 29). It further states that BioGro's certificate holders operating production facilities in New Zealand and other countries must not "act in a discriminatory way" (BioGro, 2009a: 29). While three organic certifiers incorporate principles of equality and fairness, the Soil Association does not include any provision regarding these issues.

Similar to the organics, nonorganic certifiers have also pledged to incorporate principles of fairness and equality. In principle A2 8.2, the GSA (2018) states that employers shall not discriminate against workers in terms of recruitment, discipline, compensation, hiring, promotion, training, termination and retirement based on their color, race, religion, age, gender, heritage, ethnic origin, nationality, maternity, sexual orientation, disability, political identity and other individual traits. This certifier also specifies that workers shall be treated with dignity, respect and equality. The ASC's criterion on "discrimination" refers to unequal treatment of employees and workers based on particular characteristics (i.e., age, sex, race, origin, religion and gender) and equality in payment, benefits, promotion, job security, training and same hierarchical position. In order to meet certification requirements, all operators shall demonstrate:

> […] their commitment to equality with an official anti-discrimination policy, a policy of equal pay for equal work, as well as clearly outlined procedures to raise/file and respond to a discrimination complaint in an effective manner (ASC 2012a:45; 2012b:30; 2012d:27; 2017b:54; 2018c:33).

It goes on to specify that anti-discrimination policies shall be comprehensive and pro-active, which shall encompass respecting maternity rights and avoiding pregnancy tests. All workers shall be treated with respect and dignity. The ASC standards allow "positive discrimination" (i.e. special opportunity to promote disadvantaged groups through affirmative action) to the employees. In addition, the GAA's certification standards also require that the operators shall provide "equal opportunity" in terms of recruitment, compensation, promotion, termination, training and retirement regardless of age, gender, race, pregnancy, faith and sexual orientation (BAP, 2017). The GlobalG.A.P (2019) vows that labor practices in aquaculture sectors shall be

"transparent and non-discriminative" (p.83) and compliant with the ILO's convention 111 on discrimination.

Though GlobalG.A.P does not define discrimination in aquaculture sectors, the ILO's "C111-Discrimination (Employment and Occupation) Convention" defines discrimination as any form of preference based on sex, color, race, religion, origin and political identity that impairs the "equality of opportunity or treatment" in occupation (ILO, 1958). It appears that the ASC's and GSA's principle on discrimination are also compliant with this ILO convention. While four nonorganic and three organic certifiers intend to advance fairness, equality and non-discrimination in the aquaculture industry, FOS, like Soil Association, still does not incorporate any principle on these (see Table: 3.1).

3.2.1.3. Freedom of association, right to organize and collective bargaining

With an aim to incorporating considerations of workers' rights, aquaculture certification agencies include provisions on collective bargaining, right to organize and freedom of association in their recent standards. Regarding workers' rights, the Soil Association delineates in principle 40.2.11 that all firms and industries shall comply with the core standards of the ILO with a particular importance on the employees' "freedom to associate", "right to organise" and "right to bargain collectively" (Soil Association, 2018b: 26). By "freedom of association", the ILO's convention 87 means that workers shall have the right to establish and join organization, federation or confederation with their own choosing, and shall have the right to organize, constitute rules, elect representatives, form administration and arrange programs in full freedom (ILO, 1948). By "collective bargaining", the ILO's convention 154 (Article 2) refers to any form of negotiation that occurs between employers and workers to regulate relations and determine working conditions and terms of employment (ILO, 1981).

The IFOAM's (2017) norms of practice include provision for workers' welfare and the collective organization of employees. Principle 9.4 affirms that organic aquaculture operators shall not inhibit the rights "to organize and to bargain collectively" of their producers, suppliers, contractors, farmers and employees (p.64). Like the Soil Association and IFOAM, Naturland (2018b:13) also denotes that "all workers have a right to freedom of association and collective bargaining, and are at liberty to exercise this right. No one shall be discriminated against because of his or her membership in a trade union" (principle 3) and they shall have "freedom to accept or reject employment" (principle 2). Similarly, BioGro states that all certified organic operators must ensure workers' freedom to associate, right to organize and bargain collectively. Just as the organic certifiers tend to aim to promote workers' freedom of association and right to organize, the three nonorganic bodies reviewed also include similar provisions. The GSA (2018: 51) standard indicates that employers

> […] shall respect the rights of workers to associate, organize, and bargain collectively without prior authorization from management [and] shall not interfere with, restrict, or prevent such activities and shall not discriminate against or retaliate against workers exercising their right to representation in accordance with international labor standards. (Principle A2 9.1).

The ASC's standard states that workers at certified farms shall not be prohibited from forming and accessing trade union or similar organization. All certified operators shall ensure that

> Workers interested in collective bargaining or joining a union or worker organization of their choice are not subjected to discrimination. When rights are restricted, the company should make it clear to workers that they are willing to engage workers in collective dialogue through a representative structure and that they will allow workers to freely elect or choose their own representatives (Criterion 4.6.1; ASC, 2014: 63).

GAA principles (3.32-3.33) similarly stipulate that "workers shall have the right to collective bargaining" and "a written worker grievance process" shall be available to all employees allowing nameless reporting to authority without any trepidation (BAP, 2016a; 2017). The GlobalG.A.P (2019) also stipulates similar provisions into their aquaculture

certification standards. While all organics and four nonorganic agencies incorporate principles promoting workers' freedom and the right to organize and bargain, the FOS remains silent on these provisions (see Table 3.1).

3.2.1.4. Workers' health and safety measures

Globally, the aquaculture industry is criticized for widespread occupational injuries, fatalities, accidents, diseases, illness, and respiratory problems (Holen *et al.,* 2018a; Holen *et al.,* 2018b; Holmen *et al.,* 2018; Little *et al.,* 2018; Mitchell and Lystad, 2019). To address these problems, aquaculture certification bodies incorporate various provisions in their standards. The IFOAM's (2017) principle 9.13 suggests that the "operators shall provide appropriate safety training and equipment to protect workers from noise, dust, sunlight and exposure to chemicals or other hazards in all production and processing operations" (p.66). It further confirms that operators are prohibited from requiring their workers to work while those workers are suffering from illness and require medical treatment. Naturland's "health and safety" sub-principle-6 is similar to the IFOAM's principle for workers' health and safety. This certifier requires that health, safety and hygiene at the workplaces shall be secured by the employers who must have a written policy on safety if they employ over 10 workers (Naturland, 2018b). While the IFOAM and Naturland incorporate workers' health and safety provisions, the Soil Association and BioGro still do not set any similar provision in aquaculture certification standards.

As part of improving the protection during work, the GSA (2018) specifies that operators shall provide safe and protective equipment (e.g., gear, gloves, eye protection and boots) and clothing (e.g., insulated wear for refrigerated areas) to workers. Its *medical care* principle states that operators shall provide "first aid kits" and "medical care for employees, including access to or communication with medical authorities in case of emergencies or accidents" (p.24).The

GSA's standard also indicates that operators shall also arrange a training program for workers and maintenance personnel to effectively operate machinery, equipment, hazardous chemicals, fuels and toxic substances. Regarding the safety at workplaces, the GSA's (2018: 47) certification requires that operators shall

> […] ensure proper measures for fire protection and prevention in all work, rest, dining, and where applicable, housing areas. This includes but is not limited to: adequate numbers of functioning fire extinguishers; emergency exits and evacuation routes that are clearly marked, properly lit and kept clear and unlocked while employees are present; proper training and enforcement for handling of flammable liquids and chemicals; and procedures to prevent fires during such activities as welding. (Principle no: A2 2.4)

The GSA's (2018) safety-related principles also encompass emergency fire alarms, warning signs, emergency shut-off switches, evacuation drills, secondary exits, and an emergency response plan. These specifications suggest that a 'senior management person' shall be assigned to investigate, register and resolve workplace health injuries and safety hazards, which are widely evident in aquaculture sectors.

Referring to industry-wide injuries and fatalities, the ASC's criterion on "work environment health and safety" requires companies to put in place procedures to identify the underlying causes of accidents, injuries and fatalities, and take "corrective action" to avoid the chance of similar incidences. Effective training on health and safety practices and preventive actions (e.g. Personal Protective Equipment) are required to address occupational hazards. The employers shall also prove that "they are insured to cover 100 percent of worker costs when a job-related accident or injury occurs" (ASC, 2017b: 55; 2017c: 43; 2017d: 34; 2018c: 34). The FOS's standard requires the provision of "healthcare" and "safety measures" for all workers in order for operators to achieve its aquaculture certification (FOS, 2014). To ensure safe practices in the workplace, the "Workers' Health, Safety, and Welfare" principle AF 4 of GlobalG.A.P are divided into five sub-principles: health and safety (AF 4.1), training (AF 4.2), hazards and first

aid (AF 4.3), protective clothing and equipment (AF 4.4), and worker welfare (AF 4.5). In the provision of 'Health and Safety', sub-principle AF 4.1.1 states that the producers shall have "a written risk assessment" during the entire production process to minimize hazards at workplaces that "shall be reviewed and updated annually and when changes that could impact workers' health and safety (e.g. new machinery, new buildings, new plant protection products, modified cultivation practices, etc.) occur" (GlobalG.A.P, 2019: 11). Such hazards can arise from electricity, farm machinery, fires, fuel storage, extreme temperature and organic fertilizers. To advance workers' health and safety, it instructs that farms "shall also include accident and emergency procedures as well as contingency plans that deal with any identified risks in the working situation" (sub-principle AF 4.1.2, p. 11).

In addition, producers shall build farm infrastructures, equipment and facilities in such a way that can address potential health hazards at workplaces. With respect to providing training to the employees, GlobalG.A.P.'s *Aquaculture Module* specifies a list of areas (see sub-principle AQ 4.1.1) stating that all workers employed in designated aquaculture industry shall receive health and safety training on chemical handling, first aid, emergency procedures, boat handling, machinery operation, personal hygiene, swimming, driving and entrance into confined spaces and enclosed areas (GlobalG.A.P, 2019).To verify hygiene practices among the workers, training shall include necessity of hand cleaning, 'confinement of smoking', use of protective clothing and covering an injured part with waterproof bandage. To avoid fatalities and accidents, the "Hazards and First Aid" principles (AF 4.3.1—AF 4.3.3) stipulate that "permanent accident procedures shall be clearly displayed in accessible and visible location(s)" and "permanent and legible signs shall indicate potential hazards" (p.13). The predominant language of the workforce shall be used in the instructions to make the procedures easier to understand. The procedures

shall include the farm's map, key contacts, a list of emergency phone numbers, emergency exits, location of fire extinguishers and nearest communication facilities, and emergency cut-off gas, electricity and water supplies (GlobalG.A.P, 2019). The warning signs of potential hazards shall indicate the location of fuel tanks, workshops, waste pits and fertilizers or chemical storage. Finally, complete first aid kits and a trained individual "shall be available and accessible at all permanent sites" and "in the vicinity of fieldwork" (Principle AF 4.3.4—AF 4.3.5, p.14).

The GlobalG.A.P also sets provision to provide "protective clothing and equipment" to farm workers that shall include rubber boots, footwear, waterproof clothing, rubber gloves, face masks, respiratory equipment, life jackets, eye and ear protection devices. Like other nonorganic certifiers, the GAA denotes that operators shall provide basic training on health, personal hygiene, contamination risks and safety measures, including aquatic safety and use of equipment. An emergency response plan shall be developed to address specific risks and occupational accidents (BAP, 2014; 2016a; 2016b; 2017). Except BioGro and Soil Association, other certifiers have inserted various principles on workers' health and safety (see: Table 3.1).

Notably, the health and safety principles of GlobalG.A.P and GSA are more comprehensive and specific than other certifiers. These principles of aquaculture certification standards are matched with the "health and well-being" element of social pillar of the CFRN framework, focusing occupational safety of workers.

3.2.1.5. Facilities at workplace and employee benefits

With respect to the improvement of facilities and benefits for workers, aquaculture certification agencies are incorporated diverse requirements and principles in their standards. For organic certifiers, the Soil Association (2018b) focuses on "a fair and adequate quality of life, work satisfaction and working environment" (p.6) as part of its definition of socially responsible

practices in the aquaculture industry. IFOAM (2017) recommends its organic operators that "permanent employees and their families should have access to education, transportation and health services" (p.64). To improve the quality of workers' living standards, the operators seeking IFOAM's certification need to verify that they are providing, or workers have access to, "habitable housing and access to potable water; to sanitary and cooking facilities and to basic medical care" (IFOAM, 2017, principle 9.14, p.66). Naturland's (2018b) certification requires that "all workers, employees and their families shall have access to drinking water, food, accommodation and basic medical care" (p.13). The operators shall provide basic social benefits to the workers such as maternity, sickness leave, retirement, education and professional training (Naturland, 2018b). Likewise, BioGro stipulates a provision requiring operators provide proof of "educational opportunities" for the children if they are employed by the organic operators (BioGro, 2009a).

Similar to organic certifiers, standards of nonorganic agencies also underscore the improvement of facilities and benefits for workers. In the 'staff facilities' (principle-3.1), the GSA (2018) avows that all operators shall provide potable water, meals, housing facilities (adequate space, heating, cooling, sinks, shower, pest control and ventilation), toilet facilities, sanitary food preparation and storage areas for their workers. Regarding the facilities, aquaculture operators "shall provide safe, healthy and clean conditions in all designated work, rest, dining, and, where applicable, housing areas, and shall establish and follow a clear set of procedures that ensures occupational health and safety" (GSA, 2018: 23). The GSA also specifies a set of workers' benefits in its principles (A2 3.2—A2 3.3) that are required by local or national laws and shall be provided by the operators, including maternity leave, paid sick leave, health insurance, holiday payment, and overtime payment. The ASC standards include a criterion

on “living conditions for employees accommodated on the farm”, which states that farms shall “provide clean, sanitary and safe living quarters with access to clean water and nutritious meals” (ASC, 2016: 51; 2017a: 36; 2017c: 48). All farms shall also provide separate toilet and sanitary facilities for men and women if they employ over 10 workers. It goes on to specify that workers’ benefits shall encompass respecting maternity rights and benefits such as maternity leave and avoiding pregnancy tests.

Table 3.1: Convergence and divergence of social principles of transnational aquaculture certification

Categories	Key certification principles	Organic				Nonorganic					
		IFOAM	**Naturland**	**BioGro**	**Soil Association**	**ASC**	**GSA**	**GAA**	**GlobalG.A.P**	**FOS**	**Number**
Social	No forced and bonded labor	+	+	+	+	+	+	+	+	-	**8/9**
	No child labor	+	+	-	+	+	+	+	+	+	**8/9**
	Human trafficking	-	-	-	-	+	+	+	-	-	**3/9**
	Equality, fairness, non-discrimination	+	+	+	-	+	+	+	+	-	**7/9**
	Social justice	+	-	+	-	-	-	-	-	-	**2/9**
	Workers' health and safety	+	+	-	-	+	+	+	+	+	**7/9**
	Facilities at workplace	+	+	-	+	+	+	+	+	+	**8/9**
	Employee benefits	+	+	+	-	+	+	-	+	+	**7/9**
	Exploitation, abuse, harassment	-	-	-	-	+	+	+	-	-	**3/9**
	Disciplinary practices	-	-	-	-	+	+	+	-	-	**3/9**
	Freedom of association, right to organize, collective bargaining	+	+	+	+	+	+	+	+	-	**8/9**
	Number	**8**	**7**	**5**	**4**	**10**	**10**	**9**	**7**	**4**	

Note: The sign "+" signifies convergence (principles that are similar and integrated to standards) whereas"-" indicates difference (principles that are differed and not integrated to standards) of social principles of nine certification agencies

GlobalG.A.P's (2019) aquaculture module adds a specific requirement on workers' facilities to the "Health and Safety" principle AQ 4.2. These are toilets, drinking water, clean food storage, hand-washing facilities, eating places, habitable living places and rest areas, which shall be provided by the operators (sub-principle AQ 4.2.1, p.47). In addition, the operators shall provide social benefits (i.e., bonus payment, assisting professional development, child care, compulsory school education for employees' children) as part of good social practice (GlobalG.A.P, 2017b). The operators seeking GAA-BAP certification shall provide various facilities such as safe drinking water, hand-washing space, toilets, first aid kits, basic medical care and access to medical authorities, housing with adequate space, heating, ventilation, cooling and trash bins (BAP, 2014; 2016a; 2016b; 2017). While these certifiers are clearly incorporating specific principles on workers' facilities and benefits, the FOS aquaculture certification standard still does not set any explicit provision; rather it just states "workers should be […] provided benefits and working conditions according to national laws and regulations" (Criterion 56; FOS, 2014: 4).Except BioGro, all organic and nonorganic certifiers have included workers' facilities at workplace (see Table 3.1). However, these principles of aquaculture certification standards are aligned with "health and well-being" element of the social pillar of the CFRN framework, which encompasses basic services including medical care, housing, education and daycare.

3.2.1.6. Exploitation, abuse, harassment and disciplinary practices

In order to address the problem of exploitation, abuse and harassment in the aquaculture industry, certification bodies set specific provisions in their standards. The ASC (2012a) identifies that abuse of workers through forcing them to work overtime is a widespread issue in many parts of the world, which often causes higher fatigue-related accidents. Regarding this, ASC (2012b: 32; 2017a: 35) states that "a certified aquaculture operation shall never employ

threatening, humiliating or punishing disciplinary practices that negatively impact a worker's physical and mental health or dignity". The ASC's farm certification standards refer to "mental abuse" through the "intentional use of power" in isolation, intimidation, racial or sexual harassment and threat of physical force (2012b; 2017a). Referring to disciplinary practices, the criterion 4.7.1, "disciplinary actions in the work environment", specifies that employers shall not be engaged in verbal abuse, corporal punishment, physical and mental coercion, and basic wage deductions or fines shall not be acceptable as part of disciplining workers (ASC, 2014; 2016; 2017c). If any disciplinary action is required, "progressive verbal and written warnings" shall be used in transparent and fair way (ASC, 2017c:46).

Likewise, GSA's (2018) certification requirement specifies that employers shall provide a written document to their workers describing disciplinary measures and grievance procedures. No workers shall be subjected to the sexual abuse, bullying, physical or verbal harassment, and to the "pregnancy or virginity testing, force the use of contraception, or reduce wages after maternity leave" (GSA, 2018; principle A2 8.5, p.51). Nobody shall be terminated for pregnancy. These imply that the GSA's certification principles seek to address problems related to gender violence and injustice in the aquaculture sector. Besides, this certification body sets a requirement that employers must have "an established complaints and remediation systems to handle cases and allegations of sexual harassment, bullying […]" (GSA, 2018: 51; principle A2 8.6). The employers shall also not deduct wages as part of disciplinary action. Like GSA, BAP's certification also specifies that operators shall not be allowed to charge from regular wages as part of disciplinary actions. In addition, the workers shall not be subjected to any form of harassment, bullying and maltreatment (BAP, 2017). In sum, while three nonorganic certifiers (i.e., ASC, GSA and GAA) incorporate specific provisions to address exploitation, abuse and

harassment, all organic (i.e., IFOAM, Naturland, Soil Association and BioGro) and two nonorganic (i.e., FOS and GlobalG.A.P) bodies still do not set any principles or requirements regarding these issues (see Table 3.1).

3.2.2. Economic principles

3.2.2.1. Working hours, overtime and wages

With respect to the working hours and overtime, IFOAM (2017) states that "employees shall be granted the right to take at least one day off after six consecutive days of work. Operators shall not force workers to work more than the contracted hours and the national or regional sectorial legislation. Overtime shall be remunerated in the form of supplementary payments or time off in lieu" (Principle no 9.7, p.64). Referring to workers' wages, IFOAM (2017) sets the following provision that shall be followed by accredited bodies and certifiers during certification:

> Operators shall pay employees wages and benefits that meet legal minimum requirements of the operation's jurisdiction or, in the absence of this minimum, the sectorial benchmark (Principle no 9.10, p.65)

Like IFOAM, Naturland states that wages of the workers shall be paid according to the official national minimum wage of that designated country or aquaculture industry. In absence of national minimum wage, it shall be based on the "collective bargaining" agreement and workers shall be paid in cash or any other manner what they prefer (Naturland, 2018b). Regarding overtime work, requirement 7.5 states that "an annual limit of working hours or a mutual agreement on overtime requirements in the peak period is necessary" (Naturland, 2018c:4). While IFOAM and Naturland incorporate a number of principles on working hours, wages and overtime, two organic certifiers, Soil Association and BioGro, still do not set any requirement on these aspects (see Table 3.2). Like organic certifiers, however, GSA (2018) sets a provision on minimum wage rate in the principle A2 3.1 stating that

> […] workers are paid at least the legal minimum wage or the wage rate established by an employment contract or collective bargaining agreement, whichever is higher. Regular wages and compensation shall cover the workers' basic expenses and allow for some discretionary funds for use by workers and their families (p.48).

To address labor exploitation in the aquaculture industry, GSA (2018) has included a number of provisions on "working hours" in the principle A2 4.1—A2 4.2 stating that the regular work (excluding overtime) shall not exceed 48 hours and overtime hours shall not exceed 12 hours per week. The operators shall provide "a rest day after six consecutive days worked" (p.49) and not terminate any worker for denial to work overtime. It is also stated that "all work, including overtime, shall be voluntary, and shall not be under threat of any penalty or sanctions" (principle A2 5.1; GSA, 2018:49). Likewise, the ASC's criterion on "working hours and overtime" stipulates that the maximum number of regular weekly working hours shall be 48 hours (8 hours/day) with one full day-off (including two nights) in every week, and all overtime work shall be paid at a premium (rate of higher payment than regular work rate) and not exceed a maximum of 12 hours per week (ASC, 2012a; 2013; 2014; 2016; 2017b; 2017c; 2017d; 2018c). The criterion also asserts that overtime work should be limited and voluntary, and occurred on an exceptional basis. The GSA and ASC set similar provisions on the total duration of working hours and overtime periods per week. The criterion on "fair and decent wages" states that all certified operations shall prove "their commitment to fair and equitable wages by having and sharing a clear and transparent mechanism for wage setting […] that tracks wage-related complaints and responses" (ASC, 2013: 41; 2014: 61; 2017c: 44). The operators shall meet the country's legal and industry's minimum wage requirement for regular and overtime work.

For improving responsible labor practices, the FOS denotes that "workers should be paid wages […] according to national laws and regulations" (Criterion 56; FOS, 2014: 4). The operators expecting to receive FOS certification are required to "pay the workers adequate

salaries compliant at least with minimum legal wages" (Requirement 11.1.2; FOS, 2014:19), which can be varied depending on the country. Besides, GlobalG.A.P (2019) sets a provision on "working hours and breaks" stating that "[…] regular weekly working hours do not exceed a maximum of 48 hours. During peak season (harvest), weekly working time does not exceed a maximum of 60 hours" (Principle 11, p.88). In this regard, GlobalG.A.P's weekly working hours are also similar to the GSA and ASC principles on maximum working hours per week. To ensure workers' payment, GlobalG.A.P (2017b) specifies that employers are required to show sufficient records of the regular salary transfer and workers' receive copies of pay slips during the last 24 months that shall indicate that "payments are made in accordance with the working contracts" (p.11). Moreover, wages and overtime payments recorded on the pay slips shall comply with collective bargaining agreements, contracts and national labor regulations on minimum wages. Similar to the ASC and GSA, the GAA specifies that "all work, including overtime, must be voluntary" (BAP, 2014: 6). Moreover, the minimum wage rates, working hours and overtime payments shall comply with local and national labor laws.

Table 3.2: Convergence and divergence of economic principles of transnational aquaculture certification

Categories	Key certification principles	Organic				Nonorganic					
		IFOAM	**Naturland**	**BioGro**	**Soil Association**	**ASC**	**GSA**	**GAA**	**GlobalG.A.P**	**FOS**	**Number**
Economic	Working hours, overtime and wages	+	+	-	-	+	+	+	+	+	**7/9**
	Employment terms and conditions	+	+	-	-	+	+	+	+	-	**6/9**
	Employment policy	+	+	-	+	-	-	-	-	-	**3/9**
	Working contract	-	+	-	-	+	-	-	+	-	**3/9**
	Migrant worker policy	-	-	-	-	-	+	+	-	-	**2/9**
	Job termination policy	+	-	-	-	-	-	-	-	-	**1/9**
	Number	**4**	**4**	**0**	**1**	**3**	**3**	**3**	**3**	**1**	

Note: The sign "+" signifies convergence (principles that are similar and integrated to standards) whereas"-" indicates difference (principles that are differed and not integrated to standards) of economic principles of nine certification agencies

3.2.2.2. Employment terms and conditions

With an aim to promote responsible labor practices, the aquaculture certification organizations also include an array of underlying terms and conditions of employment in their standards. According to IFOAM's (2017) principle 9.11, the operators shall provide a written terms and conditions of employment to all employees, whether they are permanent or temporary. These include wages, method of payment, location, job pattern, working hours, holiday payment, overtime system, workers' freedom of association and leave employment, sickness benefits, timely payment, disciplinary practices, health and safety procedure, maternity and paternity leave. Likewise, Naturland's (2018c) sub-principle 7.1 requires employers applying to certification to provide "a written contract of employment" to all workers that shall contain basic terms and conditions of employment such as job description, scope, limits and pattern of work, method and amount of remuneration. The conditions of employment for all workers "have at least to comply with the respective higher of the requirements of national regulations" (p.4).Though IFOAM and Naturland integrated various terms of employing workers, the aquaculture certification standards of Soil Association and BioGro still do not set such mandatory requirements (see Table 3.2). Similar to the organic certifiers, GSA's (2018) certification requires that employers shall also provide a written document on the conditions of employment to their workers such as basic rights, wages, benefits, working hours, compensation, social security, disciplinary measures, authorized deduction from wages and grievance procedures. Like GSA, the GAA-BAP standards also stipulate that all farms shall provide written terms and conditions of job to all workers, including temporary, seasonal, and contracted/subcontracted, prior to their hiring or during employment. These terms and conditions shall include details of wages, hours, benefits, rights, disciplinary measures, compensation,

grievance procedures, labor-related issues, and authorized deduction from payment (BAP, 2014; 2016a; 2016b; 2017).

Regarding employment conditions, ASC's certification standards underscore "worker contracts" between employer and worker that shall be clear, fair and transparent, and signed by both parties to avoid conflicts, confusion and misunderstandings. The contracts shall state general provisions on working hours, wages and overtime policy, date of joining, notice period, farm safety protocols, salary policy, insurance policy, disciplinary measures, probation period, rights and obligations of both parties (ASC, 2014). The workers shall have a printed copy of their contracts. Referring to the contract policy, Criterion 4.9 specifies that:

> Farms with more than five hired workers shall follow formalized paper-based contract and policy procedures. On farms with fewer workers, where farmer and workers engage in verbal contracting practices, confidential interviews with the farm owner, worker(s) and the surrounding community (e.g., a local schoolteacher, in the event of children working on the farm) may be necessary to validate whether fair and transparent (i.e., verbal) contracting is taking place. (ASC, 2014: 68).

For GlobalG.A.P (2017b), the employers seeking aquaculture certification are also required to show "working contracts" to the assessors, which shall "correspond with the applicable legislation and/or collective bargaining agreements" (p.10) and contain basic terms and conditions, including job description, regular working hours, wages, period of employment, legal status and working permit for non-national employees. The written contract shall also be signed by both employer and employee, reflecting "no contradiction to the self-declaration on good social practice" (p.10). However, there is a resemblance between the working contracts of ASC and GlobalG.A.P in terms of signing it by both parties during the agreement. While four nonorganic certifiers include various employment terms and conditions in their farm certification standards as part of advancing responsible labor practices, FOS does not state anything (see Table 3.2).

3.2.2.3. Employment policy

Employment policy is also incorporated into various aquaculture certification standards. For organic certifiers, the Soil Association clearly states that "if you have 10 or more workers you must have a policy that ensures you comply with legal requirements for human rights and labour relations" (Soil Association, 2018c: 47). The operators expecting IFOAM's certification are required to have an employment policy and keep records if they operate the production and processing with more than 10 employees (IFOAM, 2017). Like Soil Association and IFOAM, Naturland's standard also specifies that employers must have a policy on social security and wages if they employ over 10 workers and make this policy available to them. While three organic certifiers (i.e., IFOAM, Soil Association and Naurland) have specific provisions on employment policy for more than ten workers, BioGro and other nonorganic certifiers do not incorporate any principle regarding this (see Table 3.2).

With respect to the welfare of migrant workers, GSA (2018) sets a principle (A2 7.4) noting that the operators shall bear the expenses of "recruitment and placement" of migrant workers without imposing any charges or fees. In addition, GAA states that the farms "shall only employ legally documented workers, whether nationals or migrants" (Principle 3.12, BAP, 2017:7). It is also worthwhile to note that GSA and GAA are the only certifiers among organic and nonorganic who set specific provision on migrant workers (see Table 3.2).These two certifiers also stipulate that workers shall have the right to terminate or dismiss their employment after informing the employers and reasonable notice (GSA, 2018; BAP, 2014). Regarding job termination, IFOAM's (2017) principle 9.6 signifies that "operators shall have […] a system of warning before any suspension or dismissal. Workers dismissed shall be given full details of

reasons for dismissal" (p.64). Whereas the worker's right to leave job is specified by GSA and GAA, notification before job dismissal is stated by IFOAM.

3.2.3. Community-oriented principles

3.2.3.1. Respecting the rights of indigenous people

Both organic and nonorganic certifiers include some provisions regarding respect of Indigenous peoples' rights. For the organic certifier IFOAM (2017: 64), its standard indicates that:

> Operators should respect the rights of Indigenous peoples, and should not use or exploit land whose inhabitants or farmers have been or are being impoverished, dispossessed, colonized, expelled, exiled or killed, or which is currently in dispute regarding legal or customary local rights to its use or ownership.

Naurland's sub-principle on "human rights" states that aquaculture practices shall comply with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Referring to fundamental rights of Indigenous people, sub-principle1 indicates that:

> A product created under conditions violating basic human rights, under gross violation of social justice or infringing Indigenous land and water rights cannot be traded as a product certified by Naturland (Naturland, 2018b: 13).

While IFOAM and Naturland underscore the rights of Indigenous communities within their aquaculture certification systems, BioGro and the Soil Association still have not included any provision regarding Indigenous peoples (see Table 3.3). For the nonorganic certifier ASC, its criterion 7.2 specifies that farms seeking ASC certification verify "respect for Indigenous and aboriginal cultures and traditional territories" (ASC, 2017b: 61). It also specifies effective consultation with Indigenous communities and bodies functioning as territorial governments, and the necessity of agreements with Indigenous governments about operating in Indigenous territories consistent with the UNDRIP (ASC, 2016). As the rights of Indigenous communities are very complex, these shall be respected by the aquaculture production units, according to this principle. Moreover, the GAA-BAP certification requires that farms shall be in compliance "with

laws protecting the resources of Indigenous peoples" (Principle 1.4, BAP, 2016a:2; 2016b: 3). The ASC and GAA are the only nonorganic certifiers that specify the rights of Indigenous communities (see Table 3.3).

3.2.3.2. Respecting community values and customary rights

The standards of some aquaculture certification organizations underscore values and customary rights of local communities. Naturland's sub-principle on "human rights" advocates respect for people working and living around the certified operation sites. It states that aquaculture practices shall comply with the local legal requirements and respect the peoples' human rights (Naturland, 2018b). IFOAM's (2017) norms of organic production also emphasize "history, culture and community values" (p.9).Referring to the customary rights of local communities, GlobalG.A.P's (2019) aquaculture certification requires that operators shall prove that "the farming activities do not prevent access to drinking water for the local community" (Principle AQ 10.1.2, p.70) and that "coastal communities are allowed to fish in a well-defined area around aquaculture infrastructures" (Principle AQ 10.1.3, p.70).

Some certification programs emphasize compliance with existing regulations and customary community rights with jurisdictions where aquaculture operations take place.The BAP standards state under the "Community: Property Rights and Regulatory Compliance" that "current documents shall be available to prove legal land and water use by the applicant […] to prove all business and operating licenses have been acquired […] to prove compliance with applicable environmental and other regulations for construction and operation" (Principle 1.1—1.3, BAP, 2014: 4; 2016a: 2; 2017: 5). In the "community: property rights and regulatory compliance" category, GAA states that "farms shall […] provide current documentation that demonstrates legal rights for land use, water use, construction, operation, and waste disposal"

(BAP, 2017: 4). This provision was developed in response to the practice of some operators that built aquaculture farms/hatcheries in water bodies/coastal lands which were located at poorly regulated undeveloped areas under government control and to which the producers' rights to develop aquaculture are legally denied as "this land may be occupied by landless people or used by coastal communities for hunting, fishing and gathering" (BAP, 2014: 4).

While GlobalG.A.P and GAA incorporate community rights and values in their farm certification system, other nonorganic certifiers such as GSA, ASC and FOS still do not set any explicit provisions on community rights and values (see Table 3.3)..However, the principles of GlobalG.A.P, GAA and IFOAM certification standards related to community rights and values are aligned with "sustainable communities" element of the social pillar of the CFRN framework, which asserts that promoting civic culture, values and norms of local communities are integral parts of the sustainable management of fishery resources.

Table 3.3 Convergence and divergence of community-oriented principles of transnational aquaculture certification

Categories	Key certification principles	Organic				Nonorganic					
		IFOAM	Naturland	BioGro	Soil Association	ASC	GSA	GAA	GlobalG.A.P	FOS	Number
Community	Rights of indigenous people	+	+	-	-	+	-	+	-	-	4/9
	Community values and customary rights	+	+	-	-	-	-	+	+	-	4/9
	Welfare of local communities	+	-	-	-	+	-	-	-	-	2/9
	Building community relations	-	-	-	-	+	-	+	-	-	2/9
	Resolving conflicts with communities	-	-	-	-	+	-	+	-	-	2/9
	Minimizing impacts on communities	+	-	+	-	+	-	+	+	-	5/9
	Number	**4**	**2**	**1**	**0**	**5**	**0**	**5**	**2**	**0**	

Note: The sign "+" signifies convergence (principles that are similar and integrated to standards) whereas"-" indicates difference (principles that are differed and not integrated to standards) of community-oriented principles of nine certification agencies

3.2.3.3. Welfare of local communities

Some transnational certification organizations set requirement related to the welfare of local communities. For the organic certifier IFOAM, certifiable organic aquaculture development shall contribute to the enhancement of rural development and the wellbeing of "the local and wider community" (IFOAM, 2017: 64). For the nonorganic certifier ASC, community-oriented principles also refer to development. Criterion 7.15 indicates "preferential employment for local communities", which underscores a principle for operators to privilege employing people from local communities before hiring workers from outside the communities or migrant workers (ASC, 2012a). The provision further states that if farms do not employ local residents, an explanation shall be required to justify not employing workers from surrounding communities and hiring people from outside the region. In this regard, the ASC's shrimp standard (ASC, 2014:40-41) asserts that

> Farms shall document evidence of advertising positions to people living within daily traveling distance from the farm before hiring people who cannot travel to and from home on a daily basis. Proof of dated job opening advertisements in surrounding villages, by means of either/or signposts, billboards or ads in local magazines or newspapers. […] Farms that hire most of their workforce from distant areas need to be able to demonstrate that vacancies are first communicated to the surrounding community.

This criterion promotes opportunities for workers living in communities surrounding aquaculture farms. While IFOAM and ASC inserted requirements for the wellbeing of the local community, other organic and nonorganic certifiers still do not include provisions for the advancement of surrounding communities where aquaculture operates (see Table 3.3). However, the community welfare principle of IFOAM and ASC's certification standards is consistent with the social pillar of the CFRN framework focusing on the promotion of "individual and collective well-being" (Stephenson *et al.,* 2019: 8) for sustainable local communities. Likewise, the

economic pillar of the CFRN framework also underscores sustainable livelihoods and economic benefits, including employment opportunities.

3.2.3.4. Building community relations

Another set of social principles concerns building relationships with surrounding local communities. The ASC's criterion on "community relations and interaction" specifies that the construction and operation of aquaculture farms require meaningful consultation with communities to mollify concerns related to the blockage of access to vital resources such as land, water and fishing grounds (ASC, 2012b; 2017b). The ASC's farm certification standard also indicates that regular consultations, meetings and dialogues can significantly build "trusting relationships" with surrounding communities. The meetings shall occur at minimum bi-annually with elected representatives of affected local communities wherein the agenda shall be set by the community negotiators (ASC, 2017c). Likewise, the GAA-BAP standards specify in the "Community: Community Relations" category that "farms shall strive for good community relations and not block access to public areas, common land, fishing grounds or other traditional natural resources used by local communities" (BAP, 2017: 5). It also specifies that the relevant management authority shall adopt a "cooperative attitude" toward local communities and try to accommodate customary uses of coastal resources. According to the BAP certification program, the operators "shall be good neighbors within local communities and cooperate with other rightful users of land and water to minimize conflicts" (BAP, 2016b: 4) and "to earn community acceptance" (BAP, 2016a: 3).

With a view to promoting community approval for aquaculture development, the GAA-BAP standard specifies that operators "shall demonstrate dialogue with local native peoples" (Principle 2.5, BAP, 2016a: 3). While the ASC and GAA-BAP's aquaculture certification

programs integrate provisions for relations with local communities, other certifiers such as GSA, GlobalG.A.P, FOS, IFOAM, Naturland, BioGro and Soil Association still do not set any requirements for building relations with surrounding communities where aquaculture operates(see Table 3.3). However, the principle of ASC and GAA-BAP's certification standards on community relation is consistent with the social pillar of the CFRN framework which specifies social networks with local communities.

3.2.3.5. Resolving conflicts with communities

Aquaculture development has often fueled conflicts, protests, resistance, and violence in some parts of the world (see Section: 3.1). In a context of these problems, some certification organizations set various requirements in their farm certification system for the operators seeking third-party certification. The ASC standard specifies that operators shall identify, avoid and resolve conflicts and disputes with local communities and residents through an open and transparent way. Such conflicts can arise from the spread of noise, light and odor originating from the production units within or near communities. These issues shall be minimized by the aquaculture farms through appropriate mechanisms such as "decommissioning of abandoned production units" (ASC-MSC, 2018:56). With an aim to address conflicts between producers and local communities, the standard indicates that a credible and verifiable "conflict resolution policy" shall be developed by the farms and all complaints from communities should be resolved by the production unit within 12 months (ASC-MSC, 2018). For example, the shrimp standard states that "at least 50% of the conflicts shall be resolved within one year from the date of being filed, and a total of 75% in the period between two successive audits" (ASC, 2014: 39).Regarding conflict resolution between community and industry, the GAA-BAP's standards state that the farm owners:

> […] shall demonstrate interaction with the local community to avoid or resolve conflicts through meetings performed annually or more often, committees, correspondence, service projects or other activities (Principle 2.3, BAP 2016a:3).

The BAP standards also specify that the operators shall record all disputes and conflicts with communities and shall undertake necessary measures to resolve them. For example, the BAP standards emphasize building Area Management Agreements (AMAs) among farms that shall provide "a means for communication with the local community" (BAP, 2016a: 3). During the assessment and inspection of fish-farms/hatcheries, the auditors shall verify the compliance with good neighbor standards through "examination of maps that define public and private zones; inspection of fences, canals and other barriers; and interviews with local people and farm workers" (BAP, 2017:5). Though aquaculture operations face conflicts around the world, only two nonorganic certifiers (i.e. ASC and GAA-BAP) set mandatory requirements for the operators to resolve conflicts with local communities while other certification institutions have not set provision for conflict resolution(see Table 3.3)..

3.2.3.6. Minimizing the impacts on local communities

With a view to minimize negative impacts of aquaculture development on communities, both organic and nonorganic certifiers have created detailed sets of provisions to address the evolving problems. The organic certifier IFOAM (2017) includes a specification to minimize the impacts of aquaculture operations on the local communities. Similarly, BioGro's principle 4.5 (a) of the Module 6 entitled "location of production units" stipulates that "construction and operation of the production unit must not have a significant adverse effect on the surrounding […] local communities in accordance with regulatory and industry requirements" (BioGro, 2009b: 6). For the nonorganic certifier, ASC certification requires that operators must verify that the impacts of aquaculture development on surrounding communities, landowners and other ecosystem users

are identified, evaluated and addressed through an open, fair and transparent process (ASC 2012a). In this regard, for example, the shrimp standard states that:

> Farm owners shall commission or undertake a participatory Social Impact Assessment (p-SIA) and disseminate results and outcome openly in locally appropriate language. Local government and at least one civil society organization chosen by the community shall have a copy of this document. The p-SIA process and document includes a participatory (shared) impact and risk analysis with surrounding communities and stakeholders. (ASC, 2014: 37-38).

For the ASC, this p-SIA process constitutes verification of "transparency of communication" with stakeholders and impartiality of assessment. The certified farms shall also share information with neighboring communities about likely health and safety risks and potential changes in access to local resources (ASC, 2016). For FOS, while the "social accountability" principles do not incorporate the impacts on local community in farm certification processes, an annual report on the sustainability certification specifies adding "the effect on the local community regarding access to drinking water and fishing areas" (FOS, 2016: 8) to its social standards. To reduce the effects of aquaculture development on local communities, the GlobalG.A.P standard specifies that "waste water resulting from washing of contaminated machinery […] should be collected and disposed of in a way that ensures the minimum impact on the […] nearby communities" (Principle AF 6.2.5; GlobalG.A.P, 2019: 18). Concerning the increased salinity resulting from aquaculture, the principle AQ 9.1.7 states that "documented evidence shall be available that the […] local communities have been informed if salinization takes place" (p.67).

The provision AQ 9.4.3 denotes that producers shall compensate surrounding local communities if they are being affected by aquaculture development. Likewise, GAA-BAP certification requires that farms shall undertake "sanitary measures" to check odors from affecting nearby residents and "repair" machinery to evade noises perturbing surrounding communities (BAP, 2017). Despite growing impacts of aquaculture development on local

communities, four certification organizations—Soil Association, Naturland, FOS and GSA—have not yet set provisions comparable to those of IFAOM, BioGro, ASC, GlobalG.A.P, and GAA to address the evolving effects of aquaculture on surrounding communities (see Table 3.3).

In summary, in order to address the evolving social, economic and community related problems of aquaculture development, transnational certification bodies, both organic and nonorganic, have incorporated various principles, criterions and provisions in their certification standards. In general, a range of social principles were identified that broadly promote equality, fairness, freedom, social justice, responsible labor practices, workers' rights, benefits, health and safety etc. Some programs incorporate social considerations far more explicitly and extensively, while other programs have included far less in the way of substantive social considerations and criteria. The incorporation of various principles and specific criterions, however, varies across the programs. Social justice was the least identified principle for two certifiers, IFOAM and BioGro, whereas no forced and bonded labor, facilities at workplace, freedom of association, right to organize and collective bargaining were most commonly identified social principles stipulated by eight agencies (see Table 3.1). Human trafficking is only incorporated by ASC, GSA and GAA in which ASC and GSA are the top agencies who have included ten social principles out of eleven (see Table 3.1). Moreover, while the incorporation of social principles are generally oriented towards resolving widespread problems of aquaculture, some significant social issues (i.e., criminal activities, forcibly eviction, marginalization, social exclusion and dispossession of poor peasants etc. see Section 3.1) that result from some aquaculture development are not addressed by transnational aquaculture certification programs.

In the economic category, job termination policy is a least incorporated principle stated by only IFOAM whereas working hours, overtime and wages are the most included principle stated by seven certification schemes (see Table 3.2). Policy for migrant workers is only stipulated by GSA and GAA. IFOAM and Naturland have included the most principles in the economic category. In the community category, minimizing community impacts' is the most included principle whereas community welfare, community relations and resolving conflicts with communities are the least identified principles (see Table 3.3). Though the ASC and GAA have included the most community-related principles, Soil Association, GSA and FOS have none (see Table 3.3). With respect to community-focused principles, non-organic labels perform marginally better over organic.

Overall, aquaculture certification principles appear to overlap and converge the most on certain issues such as child labor, forced labor, health and safety, rights and benefits, freedom of association, collective bargaining, working hours, overtime and wages. Social, economic and community-oriented principles are included in certification programs in more varied ways. Despite convergence on a variety of principles, however, the nature and extent of social considerations across the transnational aquaculture landscape is also characterized by differences and exclusions (as some social issues are not considered by certifiers).

3.3. Conclusion

This chapter advanced an empirical analysis of the social, economic and community-focused principles across transnational aquaculture certification landscape. Though a plethora of transnational certification schemes have emerged over time to promote socially and ethically responsible aquaculture development, the sector, in general, is still plagued by major problems, including labor exploitation, discrimination, forced labor, child labor, accidents, affecting

communities, and coastal livelihoods. Besides, certified farms have been subjected to severe criticisms by individuals, ENGOs and local communities for creating socioeconomic problems. In the context of industry's widespread problems, certification bodies have come under pressures by international NGOs, intergovernmental organization, academics and media to improve socioeconomic issues. Responding to pressures from a range of actors, certification agencies have incorporated an assemblage of principles in their standards to advance socially and ethically responsible aquaculture.

Based on an extensive review of prominent standards and certification agencies, the chapter identified substantive incorporation of a variety of social, economic and community related principles and considerations into certification programs and variations across programs. With respect to examining the social, economic and community-oriented principles of aquaculture certification initiatives, the chapter also pointed to how the CFRN framework sheds light on how various prominent elements of the social domain are included and excluded in transnational aquaculture certification programs. Social issues such as sustainable communities, health and well-being and ethical issues and economic issues such as sustainable livelihoods, distribution of access and benefits and regional economic benefits to community that constitute pillars of this fisheries sustainability model are similar to some of the principles and criteria cutting across the transnational aquaculture certification landscape. In general, many prominent principles of aquaculture certification standards are aligned with the social and economic pillars of the CFRN framework, which was developed for sustainable fishery management. Though the social and community-focused principles of aquaculture certification schemes are well-matched with the underlying elements (i.e., sustainable communities, ethical issues, health and well-being) of the social pillar of the CFRN model, the economic principles (i.e., working hours,

wages, overtime, employment policy, employment terms and conditions) of certification are relatively less aligned with the core elements of the CFRN's economic pillar. For instance, the CFRN's economic viability and prosperity elements do not have equivalents in the economic principles promoted by some aquaculture certification programs. Other economic elements such as sustainable livelihoods and economic benefits to community are, however, promoted in several transnational aquaculture certification programs. Despite some convergence and divergence within the aquaculture sector and between aquaculture certification and the CFRN framework, the social and economic pillars of the CFRN model are in general similar to the social, economic and community-oriented principles of some prominent transnational aquaculture certification programs.

This chapter also reflects that social, economic and community-focused principles and criterions are varied across the programs. While social justice and human trafficking are the least focused issues in certification standards, the certifiers perform best over the principles on forced and bonded labor, facilities at workplace, workers' rights and freedom. Nonorganic certifiers are more prioritizing on the social issues than organic agencies. Policy on migrant workers and job termination are the most neglected issues in economic principles though working hours, overtime and wages are viewed as best. Regarding community-oriented principles, organics perform worst than the nonorganic certifiers.

CHAPTER FOUR: CONCLUSION

Over the past four decades, the aquaculture sector around the world has undergone substantial change including rapid growth and expansion. This thesis identifies several key driving forces of change. First real and perceived collapses in wild fish stocks and a global stagnation in the capture production since the late 1980shas provided a significant incentive for industry and government to invest in aquaculture development. Moreover, increased consumers' demand and expanded global seafood markets have also provided a strong impetus for the swift growth in industrial aquaculture worldwide. Though it has been viewed as a substitute for dwindling wild stocks and meeting the increased demand of fish for human consumption, intensive aquaculture practices have led to adverse social and environmental repercussions that have sparked intense criticisms from civil society, Environmental Nongovernment Organizations (ENGOs), philanthropic foundations and consumers.

Likewise, the intergovernmental United Nations Food and Agriculture Organization (UN-FAO) has called for the development of effective governance for the aquaculture sector, while broader changes in global society called into question the efficacy of government regulation and promoted the ability of markets as mechanisms of change and reform. The related rise in neoliberalism has also facilitated the rise of private audit systems as a form of governance, contributing to a broader shifting in governance mechanisms from state to the private sphere (Larner and Heron, 2004; Busch and Bain, 2004; Parlee and Wiber 2015). The growth of private regulation and retailers' power in various commodity sectors also signifies the reduction in state regulation (Burch and Lawrence, 2004). These criticisms and structural pressures forced the industry towards change and reform.

In this context, ENGOs, civil society, producers, retailers, various institutions and associations embraced market-based approaches to address problems in aquaculture. Certification and eco-labeling, linked to standards and best practices, emerged as a preferred instrument to promote socially and ethically responsible aquaculture and incentivize the supply chains to source sustainable seafood items from certified operators. Drawing on gray literature and scholarly publications, this thesis has enhanced our understanding of the changing landscape of transnational aquaculture certification programs that are explicitly designed to address an array of social, economic, environmental and related issues through standards with specific principles and criteria. In Chapter Two, this thesis explored the emergence and evolution of diverse transnational aquaculture certification initiatives, which have been developed over time and space.

As part of examining the broader landscape, the thesis answered the question why certification programs have emerged for aquaculture by identifying a collection of actors, institutions and ideas linked to key motivations driving the rise of aquaculture certification programs. Seven key driving forces originated around three decades ago. These dynamic forces essentially created a space for the emergence and development of transnational certification programs to address environmental, social and ethical problems in aquaculture development.

A plethora of non-state actors – ENGOs, civil society, aquaculture farms, feed companies, aquaculture business groups, corporation, agrochemical companies, producers, input suppliers, seafood retailers, consumer groups, agro-industry, scientists, academics, wholesale buyers, processors, supermarket chains, hotel and restaurant chains – have played pivotal roles in the rise and evolution of transnational certification programs generally and the creation of codes of practice, standards and principles for the aquaculture operators specifically. Moreover, the

contested and collaborative interactions and behaviors of diverse institutions, organizations, associations, philanthropic foundations, human rights' activists, international networks and alliances have also facilitated the emergence and development of various certification initiatives in this sector. The interactive engagement of numerous stakeholders eventually resulted in eleven transnational certification programs, nine of which were examined in detail in chapter three of this thesis to delineate the nature and extent of social principles and criteria in the rise and evolution of transnational aquaculture certification. The evolution of transnational aquaculture certification is marked by global proliferation and competition in the 1990sand by various degrees of ongoing competition and homogenization in the 2000s.

The credit for initial efforts to create a global certification program goes to the organic pioneers' who were united to form an organic movement through International Federation of Organic Agriculture Movements (IFOAM), which gained significant momentum in the early 1990s. The IFOAM eventually appeared as a full-fledged organic accreditation body in 1990 to advance the uniformity among numerous organic aquaculture certification agencies, namely Soil Association, BioGro and Naturland who continued their operations during this period. IFOAM began to draft organic aquaculture standards in 1998, which were approved in 2005 and the first final version released in 2012. While IFOAM was drafting its standards for aquaculture certification bodies, other organic agencies commenced the development of species-specific aquaculture certification programs: BioGro in 1994 (salmon), Naturland in 1995 (carp) and Soil Association in 1999 (Salmon and Trout). These developments illustrate the growing competition in the transnational aquaculture certification landscape. While the products of organic certifiers were entering the global seafood markets, non-organic certification programs emerged as the sector witnessed further patterns of proliferation.

For non-organic certification, the Global Aquaculture Alliance (GAA), formed by a coalition of industry actors and allies in response to a growing global resistance to aquaculture, developed the first initiative, Best Aquaculture Practices (BAP), to address broader social and environmental controversies facing industrial aquaculture. Simultaneously, widespread public concerns of food safety and quality across Europe encouraged a group of European food retailers, constituted as a retailer alliance, to create new voluntary standards and an independent certification system, now named as Global Good Agricultural Practice (GlobalG.A.P). Both industry alliances formed in 1997, with the development of certification and standards processes occurring over the next decade: the GAA commenced to certify fish farms in 2003 whereas GlobalG.A.P released its first standards in 2004. Although GAA formed an independent certification body, Aquaculture Certification Council (ACC), in 2003, to carry out formal assessment and certification of applicant aquaculture facilities against the BAP program, it eventually disbanded in 2011 in the wake of ongoing non-governmental organizations' (NGOs) criticisms and confrontations.

While ACC was still active in the mid-2000s and as the GAA and GlobalG.A.P expanded their standard setting and certification activities, the World Wildlife Fund (WWF) initiated a series of Aquaculture Dialogues in 2004 to create standards for different farmed species. The WWF's endeavor was the largest and biggest initiative regarding the participation of a wide range of non-state actors, institutions, organizations and government delegates. Finally, the birth of Aquaculture Stewardship Council (ASC) in 2010 was the culmination of the WWF's Aquaculture Dialogue efforts, despite severe criticisms and formal objections by some social and environmental NGOs. Although there was still criticism, ASC commenced its certification in 2012 and entered into partnership with giant retailers and companies who committed to sell its

certified products. While the WWF dialogues for standard-setting processes continued, a new certification organization, the Friend of the Sea (FOS), launched in 2006 and released its aquaculture standards by2013.

Despite the competition between and within organics and non-organics, the landscape remains in flux with patterns of competition and harmonization continuing. Though a number of transnational aquaculture certification schemes have evolved overtime, Naturland from organic and GlobalG.A.P from nonorganic are the most dominant agencies in terms of the total certified production. In spite of being a new certifier, ASC's total volume of production is also equal to GAA. The Fairtrade Labelling Organizations International (FLO) announced intentions to create aquaculture standards by 2011 but nothing has developed yet. Former leaders of the GAA spearheaded the creation of Global Seafood Assurances (GSA) in 2018. Despite competition, the major nonorganic agencies (i.e., ASC, GAA, GlobalG.A.P) have entered into collaboration and partnership to harmonize auditing processes, chain of custody, certification standards and to reinforce credibility of certified products. But the organic certifiers appear to be less interested in collaboration and harmonization.

In addition to providing an understanding of the changing landscape of transnational aquaculture certification, this thesis enhanced understanding of the nature and extent of social, economic and community related principles and criteria in prominent transnational aquaculture certification programs. Responding to pressures from a range of actors calling for action and change in the industry, certification agencies have incorporated an assemblage of principles in their standards to address social, economic and community related problems.

Based on an extensive review of the standards of different certification agencies, Chapter Three examines the social, economic and community-focused principles of nine leading

programs. In social category, common labor related principles focus on eliminating forced labor, child labor, bonded labor and human trafficking. The issue of trafficking in persons is only specified by three nonorganic agencies, ASC, GSA and GAA. Broadly, transnational certification programs tend to emphasize social principles regarding the advancement of fairness at all levels (e.g., employments, wages, and benefits), respect, justice, human rights, equal opportunity and treatment to the workers employed in the industry. Most programs (except Soil Association and FOS) indicate that farms wishing to achieve certification shall not demonstrate discrimination against workers, except certain forms of "positive discrimination" to promote disadvantaged groups and affirmative action. Both organic and nonorganic bodies, except the FOS, specify that employers must ensure the rights to organize, freedom of association and to bargain collectively. With the exception of BioGro and Soil Association, other certifiers specify provisions to improve workers' health, safety and hygiene practices at workplaces. Facilities and benefits for industry's workers also remain at the heart of social requirements of certification systems. In short, ASC and GSA have incorporated the most social principles whereas Soil Association and FOS have included the least.

The economic principles of certification agencies tend to focus on the fair and minimum legal wages, working hours and overtime. The GSA, ASC and GlobalG.A.P specify fixed maximum hours for regular work and overtime. It also specifies that operators shall provide working contracts, employment terms and conditions to all employees along with must have specific policy on employment and migrant workers. Only IFOAM's standard includes a policy on job termination. Though IFOAM and Naturland have covered most of the economic principles, Soil Association and FOS have covered the least number of issues. BioGro includes nothing. To obtain a certificate, the operators must verify the rights and values of Indigenous

people and surrounding communities are not undermined. Mechanisms for community advancement, good relations with communities, conflict resolution and minimizing effects on communities are specified more many of the certification programs. However, the community related principles are highly neglected by the certifiers in terms of social and economic categories.ASC and GAA have focused on the most community-oriented principles whereas Soil Association, GSA and FOS don't have any provision on the community. In sum, transnational certifiers have performed worst on the community-oriented principles.

However, they (with significant variations and similarities) endeavor to address the industry's evolving problems and promote socially and ethically responsible practices by placing an array of social, economic and community-oriented principles in their certification standards, which are incumbent for the aquaculture operators if they strive for certification. These principles are dynamic and shaped by the socioeconomic landscape of aquaculture development. Through an array of principles which have set in certification standards, transnational certifiers have significant opportunity to contribute to the amelioration of socially and ethically responsible aquaculture production as the operators are obliged to comply with these social, economic and community-oriented provisions if they seek third party certification. It entirely relies on the certifiers to check the full compliance with these principles before granting a certification to the aquaculture operators. As this research is partly built on an in-depth review of certification principles set in the standards of diverse agencies, there is also a potential for examining whether the certified farms (as some are criticized for socioeconomic impacts) and farms entered into certification process are compliant with the principles of respective aquaculture certification schemes.

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APPENDIX

Core sustainability objectives and potential performance indicators for the Canadian Fisheries Research Network framework

Objectives	**Candidate performance indicators**
Pillar: Economic	
Economic viability and prosperity	Historical fishing levels Economic Sustainability Index Technological impacts Realized catch relative to potential target harvest Market price relative to private marginal cost of production Output Number of fisheries that fishing enterprises participate Net profit of enterprises Bankruptcy rate Investment, stock/flow in fishery Availability of capital Number of enterprises dependent upon one fishery Proportion of investment stock Human demographics Experience and education of fishermen Availability of fishermen with required education Distribution and means of compensation for fishermen

	Social mobility Amount of labor force in industry organization Presence/absence of legislation to control market failure
Distribution of access and benefits	Number of reallocations across stakeholder groups Proportion of realized compensation relative to fair market value Proportion of realized allocation relative to potential allowed allocation Loss of income from reallocation of access rights Sum of seafood harvesting being contested by stakeholder groups Per cent control of each stage of the value chain Income disparity
Regional economic benefits to community	Distribution of catch income by sector Distribution of access by fisheries participants Number of major changes to access conditions over time Value of fishery-related public and private infrastructure Natural capital stocks
Sustainable Livelihoods	Livelihood Index Employment in harvesting and processing Unemployment rate Employments gains vs. losses Evidence of subjective perception of the viability of livelihoods

Pillar: Social	
Sustainable Communities	Social capital (e.g., shared values and norms, social networks, participation in social institutions) Informed citizenry Civic culture Individual and collective well-being OECD Better Life Index, Genuine Progress Index, Gross National Happiness and Human Development Index) within the local population) Self determination, attachment to place and social mobility Proportion of population below the poverty line
Ethical Fisheries	Specific attention to well-being and equity Adherence to standards of conduct in code of conduct and management plans Individual and collective well-being
Health and well-being	Social factors (e.g., suicide rate, infant mortality rate, unemployment rate and migration rate) Proportion of population below the poverty line Availability of affordable services (education, housing, day care and medical care) to population Proportion of seafood caught within community on

	Sum of seafood caught by local population Occupational safety

Please note that though CFRN (Stephenson *et al*. 2018; 2019) has four pillars of sustainability indicators, Chapter Three relates to Social and Economic pillar of this framework. That's why the indicators of Social and Economic pillar of CFRN framework have attached.