

## Swimming in a slurry of schemes: Making sense of aquaculture standards and certification schemes

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**ABSTRACT:** Growth in the number of certification schemes in the aquaculture industry has been attributed to several factors. The schemes contribute to improved traceability of products, provide healthier stocks, and provide more information to customers' decision-making efforts. There is a wide range of certification schemes and standards available, addressing food safety, environmental impact, animal welfare, and worker conditions, to name a few. The abundance of certification schemes has resulted in concerns about consumers becoming confused with the number of labels and that certification schemes themselves may become a barrier to trade. This paper examines 5 major certification schemes in the aquaculture sector and categorizes them according to their purpose, proprietorship, and process. We investigate what has caused this wave of attention to be given to such a diverse range of issues, exploring how the diversity of these certifications is rooted in their inception and the areas they address.

### 1 INTRODUCTION

By 2050, the world population is predicted to have increased from 7.6 billion people to 9.8 billion (UN 2017). This implies that the need for fish as a source of nutrition will increase, and with that, there will be increased challenges for wild catch and production.

Capture fisheries have become stagnant since the 1980s, while aquaculture of fish and shellfish has more than doubled its growth in the last quarter of the twentieth century (FAO 2016). Salmon is one of the species that has seen spectacular growth, especially in Norway, Chile, Canada, and the UK (FAO 2003).

The growth of aquaculture production plays an important part in international trade and has helped the economy in many developing countries (Prein and Scholz 2014). However, this growth does not come without negative consequences to people or the environment. The “blue revolution” calls for problems to be addressed, such as water pollution, ecosystem degradation, and poor labor conditions. The rapid growth of the salmon farming industry has in many countries raised public concern and critique from stakeholders and politicians regarding social, economic, and environmental impacts. The concerns are both country-specific and/or global, from the effects of aquaculture on biodiversity and wild fish stocks to socio-economic impacts

(e.g. competition for ocean space, land, and property value) (Bush et al. 2013). Asche et al. (1999) categorized salmon farming's sources of environmental problems into three categories: (1) organic material emission; (2) spread of diseases that may affect wild species; and (3) genetic contamination of wild stocks by escapees.

The critiques of salmon aquaculture, combined with a general increased focus on environmental and social issues, have led to a rise in public awareness and a demand for a more sustainable industry (Prein and Scholz 2014). Despite a unified call for ‘sustainability’, there lacks a shared consensus as to what that actually entails and how it can be accomplished (Davidson 2010). With little agreement beyond the common notion of the three dimensions of sustainability: *environmental* (ecosystem and biodiversity), *economic* (long-term business viability), and *social* (social responsibility and community well-being) (World Bank 2014), the road to ‘a sustainable industry’ has become a vague and ambiguous one.

While the main production of salmon aquaculture is found in Norway, Chile, the UK, and Canada, farmed salmon is sold to more than 100 countries worldwide. Stakeholders are therefore not only from the producing countries but from quite a large, global marketplace. With demands for sustainability coming from, and the actual production happening in, very different corners of the

world, there has been an increased need for global consistency in the regulation of the industry (Busch 2011, Stanton 2012).

An effort to achieve this is through the use of global standards, certification schemes, and labeling created by NGOs and retailers (e.g. IKEA, Tesco). These are a form of private governance or 'soft law', which entails that their sanctions do not carry the force of law and are therefore not mandatory (Busch 2011). Certification schemes provide different standards for which the producers can voluntarily choose to comply, and in doing so obtain a certification from the chosen scheme. In Europe, the most prevalent standards in aquaculture are the GLOBALG.A.P. Aquaculture Standard and the Aquaculture Stewardship Council (ASC) standards. In North America, on the other hand, the standards set by Global Aquaculture Alliance, the Best Aquaculture Practice, are widely used (Prein and Scholz 2014).

In recent years, the number of certification schemes for food production and processing has increased significantly, along with a variety of actors involved in the development of these standards. Attempting to cover the many rising challenges in aquaculture, these standards and labels relate to issues such as sustainability, food safety, organic production, etc. As a consequence, the types of schemes, their objectives, and their scope vary considerably (Nadvi and Wältring 2002).

This paper aims to illustrate the multitude of standards existing in the market today. As seen from the literature, there is a wide range of certification schemes and standards available and the arguments for the development of these vary between the need for consumer legitimacy, market demands, quality improvement, etc. This paper explores what has caused this wave of attention given to such a diverse range of issues, which has led to this sea of certifications. By doing a comparison of the *proprietaryship*, *process*, and *purpose* (hereafter referred to as the 3 P's of certification) for 5 major certification schemes in use for salmon aquaculture, we seek to understand how differences in their standards and their focus areas can be related to their origin. What arguments are being used for each certification scheme/standard, and why do they differ in focus and demand for improvement?

## 2 BACKGROUND

Certification and labeling are one type of signal or attribute giving the consumer the opportunity to evaluate a product before purchase/consumption (Chen et al. 2015). FAO differ between ecolabels, and food safety and quality standards (Washington and Ababouch 2011). Ecolabels, also referred to as 'best practice' labels, focus on responsible aquac-

ulture practices, procurement policies of retailers/brand owners, and support to consumers in their purchasing decisions. The food safety standards are schemes that provide assurance in the quality and safety of products and the processes involved.

Numerous reasons for the emergence of such certification schemes have been identified, seen both from consumers, market actors (e.g. retailers), and producers. One argument focuses on a lack of sufficient regulation, arguing that these certification schemes have emerged where the public regulation is perceived as inefficient or ineffective in their response to food safety, quality, and environmental sustainability (Washington and Ababouch 2011).

For the retailers and companies selling seafood, labels are also viewed as a mechanism to reduce risk related to negative publicity concerning production practices (Boyd and Nevin 2011). Achieving trust from consumers and supporting producer legitimacy are an important part of certification schemes (Bush et al. 2013). Summarized by Morris (1997), the possibility to improve the image and/or sales of a company, in addition to encouraging firms to account for the environmental impact of their production, are important arguments to support certification schemes.

Certification usually provides product traceability, standardization among global suppliers, and transparency of production processes (Washington and Ababouch 2011). Standardization can be seen as a form of risk management that extends a company's liability to a third-party Certification Body (CB), thus, allowing the company to claim due diligence in the event of a predicament (Busch 2011). In addition to allocation of risk, certification may also deter "real and/or perceived risks along the food chain" (Stanton 2012: 247).

Nevertheless, there are uncertainties about the certification schemes' consequences for sustainability. There is little scientific proof that shows a reduction of negative environmental impacts by certified farms compared to noncertified farms (Boyd and Nevin 2011). Though it might be likely to reduce impact on a farm level, this may not contribute to an overall improvement in sustainability (Tlustý & Thorsen 2017). Questions have also been raised as to whether the increased demand for documentation and record-keeping of the aquaculture companies through these schemes actually are making the production more sustainable (Bush et al. 2013).

Another concern regarding certification schemes is that they may act as a barrier to trade for smaller companies or companies from developing countries who cannot afford the costs and documentation requirements of standards originating in the industrialized countries (Busch 2011).

Although private standards are not legally required, international markets demand that companies comply with supposedly voluntary stand-

Table 1. Various schemes and their characteristics.

Scheme and relevant standard	Origin	Year*	Objectives	Q S S	E	AW	3rd party	Stakeholders	Coverage
GLOBAL-G.A.P. Aquaculture Standard	European retailers (EUREGAP-1997)	2004	Safe, sustainable agriculture worldwide. We set voluntary standards for the certification of agricultural products around the globe—and more and more producers, suppliers and buyers are harmonizing their certification standards to match.	*	*	*	IAF	Board: 5 retailers, 5 producers, NTWG: 41 countries Aqua.TC: 7 retailers, 7 producers (1 Asian) 2 Certification Body (observers) Focus groups: may be non-member, Board-approved Public: 2 public consultation periods	Producers must source compound feed and hatchery level from reliable suppliers. Farm level. (Also offers standards to entire chain of custody, feed manufacturers).
ASC - Salmon Standard	Salmon Aquaculture Dialogues (2004, WWF and IDH)	2012	To transform aquaculture towards environmental sustainability and social responsibility using efficient market mechanisms that create value across the chain.	*	(*)	*	ASI	ASC Board: 2 Industry rep (recruit 2 more), 4 non-industry TAG: 3 industry, 4 non-industry, 3 other TWG: 1 industry, 4 non-industry, 1 other SC: 10 industry, 5 non-industry Public: public consultation/complaints	Salmon standard from feed to farm level. (Also offers standards to entire chain of custody).
IFS - Food Standard	Retailer federation and industry companies International Food Standard (2003)	2003	To establish a common standard with a uniform evaluation system, work with accredited certification bodies and qualified auditors for IFS Food, ensure comparability and transparency in the entire supply chain, and reduce costs and time for both manufacturers and retailers.	*			IAF or EA recognized AB	TC: 15 retailers, 4 CBs, 6 Manufacturers, and NWG: national retailers (IT, CHL, FR, GER, USA, ES) EWG: retailers and experts RC: retailers, industry, and CB	Only covers processing or handling of products during primary packaging.
BAP - Aquaculture Standard, Salmon Farms	Global Aquaculture Alliance (1997, Farmers)	2004	Achievable, science-based and continuously improved global performance standards for the aquaculture supply chain that assure healthful foods produced through environmentally and socially responsible means.	*	*	*	IAF	GAA Board: 20 members SOC: 4 conservation/social NGOs, 4 academia/regulators, 4 industry TC: 4 conservation/social NGOs, 4 academia/regulators, 4 industry Public: 60 days public comment	Salmon standard from feed (BAP-certified feed mills or declares compliance to BAP feed mill standards 3.1. & 3.3.) to farm level.
RSPCA - Welfare standard for farmed Atlantic salmon	RSPCA Animal Welfare and Rescue (1824)	2002	For all farm animals to have a good life and be treated with compassion and respect. To give people a higher welfare choice by ensuring animals are farmed to RSPCA welfare standards.	*			RSPCA Assured assessor, UKAS, ISO17065	STAG: 24 experts for the salmon standards (RSPCA specialist, farms, consultants, veterinarians, RSPCA field staff, and tech/field operations of Freedom Food Ltd). By selection, WCG: retailers, food companies, livestock farmers, farming associated industries, veterinarians, agricultural economists, environmentalists, and relevant individuals/orgs. By selection.	Salmon standard covers all aspects of the fish's life including health, diet, environment, handling, and slaughter. Feeds produced according to UK & EU legislation.

S = Social, QS = Food Quality and/or Safety, E = Environment, AW = Animal Welfare

\*Year refers to the year the specific standard was launched.

(The Food Ethics Council and Pickert 2014, ASC 2017, IFSA 2017, RSPCA Assured 2017, GLOBAL.G.A.P. 2017)

ards (Stanton 2012). Private standards that have become industry norm no longer provide a real choice for suppliers to comply with in order to participate or remain in a specific market. Hence, private schemes become “de facto mandates” as demarcation between mandatory requirements and voluntary standards becomes obscure (Casey 2009, Stanton 2012).

From the perspective of the consumer, the large amount of certification schemes, standards, and labels available may contribute to confuse and complicate the purchase decision, as well as negatively influence their attitude towards the food producers and owners of the label in use. It has also been shown that many consumers do not know the content of each label so that decisions are often made on other characteristics and heuristics (Grunert 2005). Research shows consumers might prefer sustainable seafood; however, they do not pay much attention to this when buying seafood (Alfnes 2017).

### 3 METHODS

This paper is based on an analysis of documents from a range of certification schemes, the content of their different standards, and literature on certification. The chosen method is aimed to provide a comparison of a selected number of certification schemes and their origin, motivation for establishment, and content of their standard(s). The selected standards are established at different times, some of them are aquaculture and salmon specific, while others are not, and they differ in their focus on sustainability and/or animal welfare. Common for all is their relevance to salmon aquaculture production. The selection of schemes and standards is also based on their prevalence in the major nations of salmon aquaculture production. To illustrate the muddled sea of certifications in which production companies find themselves, the choice of standards in this study is also meant to reflect the diversity of focus areas, motivation, and actors involved. After gathering data and categorizing them according to characteristics (see Table 1), the background for the inception of these schemes was also analyzed (see Figure 1). The following information, unless otherwise specified, comes from the websites of these schemes.

## 4 STANDARDS AND CERTIFICATION SCHEMES

### 4.1 ASC

Established in 2009, the Aquaculture Stewardship Council (ASC) originated from the Aquaculture Dialogue, a multi-stakeholder roundtable founded



Figure 1. Development of schemes.

by the World Wide Fund for Nature (WWF) in 2004 (WWF Norge 2016). WWF and The Sustainable Trade Initiative (IDH, includes businesses, trade unions, NGOs, and Dutch Ministries for stimulating sustainable trade) from the Netherlands worked together in establishing the Aquaculture Stewardship Council in 2010 (IDH 2017).

ASC is the only aquaculture certification scheme that is recognized as a full member of the ISEAL Alliance Code of Good Practice for Setting Social and Environmental Standards. Also, the organization develops standards that are in line with FAO guidelines. ASC partners with the Global Aquaculture Alliance (GAA) and GLOBALG.A.P., and is supported by various suppliers, producers, retailers, and food brands. Any stakeholder or individual can raise issues regarding a certification of a facility as the certification documents are available online.

There are currently 8 aquaculture standards that cover 12 different species: abalone, bivalves (clams, mussels, oyster, scallop), freshwater trout, pangasius, salmon, shrimp, tilapia, seriola, and cobia. The ASC Salmon Standard was developed in 2012 by over 500 participants (WWF Norge 2016). The scope of the ASC standard for salmon includes: compliance with national and local laws and regulations, habitat, biodiversity and ecosystem, health and genetic integrity of wild populations, responsible use of resources, managing disease and parasites responsibly, socially responsible development and operations, and community involvement. The review of the standards is conducted regularly to ensure that the standards are compatible with new scientific developments and practices. The ASC supervisory board is composed of representatives from academia, NGOs, and the industry while its Technical Advisory Group (TAG) consists of a group of invited technical experts. The Technical Working Groups (TWG) and Steering Committees also meet and guide ASC standard development.

### 4.2 GLOBALG.A.P

EurepGAP was initiated by European retailers in 1997 with the goal of establishing a generic stand-

ard for Good Agricultural Practice (GAP) (Kalfagianni and Pattberg 2013). Prior to its establishment, European supermarket chains started various “Integrated Crop Managements” (ICMs) as an effort to gain consumers that preferred ‘sustainable products’ (Casey 2009, Kalfagianni and Fuchs 2012). The suppliers struggled with achieving the many ICMs of different supermarkets. As a way of harmonizing these agricultural processes, Eurep-GAP was born and was renamed to GLOBALGAP in 2007 as the standard became widespread in the international scene (Kalfagianni and Fuchs 2012).

The GLOBALG.A.P. Aquaculture module was included in GLOBALG.A.P. in 2004 and covers the entire production chain of a variety of farmed fishes, crustaceans, and mollusks from suppliers (brood-stock, feeds, seedlings) to the various activities, such as faring, harvesting, processing, and post-harvest handling operations (Prein and Scholz 2014). GLOBALG.A.P. is a business-to-business standard, and is classified by FAO as both a standard and a code (Washington and Ababouch 2011). The scope of the certification for the aquaculture module includes site management, reproduction, chemical compounds, occupational health and safety, fish welfare, management and husbandry, sampling and testing, feed management, pest control, environmental and biodiversity management, water usage and disposal, harvesting and post-harvest operations, holding and crowding facilities, slaughter activities, depuration, post-harvest mass balance and traceability, and social criteria.

In addition to certification, GLOBALG.A.P. also has a consumer label called GGN (GLOBALG.A.P. Number) for certified aquaculture products that are in accordance with GLOBALG.A.P. (GGN 2017). Feed that includes captured fish should come from fisheries that adhere to the FAO Code of Conduct for Responsible Fisheries.

GLOBALG.A.P. members elect the Board (5 producers and 5 retailers), which guides the Secretariat, the Technical Committees (one, out of eleven representatives, is from Asia in the Aquaculture group), and Focus Groups (voluntary members and non-members). The Secretariat gives directions to the Benchmarking Committee, Certification Body Committee, Integrity Surveillance Committees, and the National Technical Working Groups (41 countries). The Technical Committees give direction to the respective Focus Groups. National Technical Working Groups are responsible for translating the national interpretation guidelines and local adaptation of the standard. There are two public consultations or rounds for submitting comments by interested parties within a period of 40 to 60 days.

### 4.3 RSPCA

The Royal Society for the Prevention of Cruelty to Animals (RSPCA) is an animal welfare charity

organization in England and Wales. The RSPCA Assured label which replaced the Freedom Food label in 2015, is an ethical food label established by the RSPCA. A report from The Food and Ethics Council and Pickett (2014) identified three drivers for farm assurance schemes. Firstly, the 1980s and 1990s in the UK were overcast by a number of highly publicized food scares such as with BSE in cattle and reports uncovering salmonella-infected egg production. In addition to the aim of restoring consumer confidence, the Food Safety Act in 1990 introduced the requirement of retailers’ due diligence which assigned food safety responsibility to retailers. A third reason for farm assurance schemes to proliferate during this time was the desire to promote responsible farming and animal welfare (The Food Ethics Council and Pickett 2014).

Priding itself as being the only farm animal welfare scheme in the UK, the RSPCA welfare standards examine all aspects that are vital to an animal’s welfare, such as farm management, husbandry practices, healthcare, living conditions, nutrition, transport, and humane slaughter. The RSPCA welfare standards include beef cattle and calves, chickens, ducks, hatcheries, laying hens, dairy cattle and calves, pigs, pullets, salmon, sheep, trout, and turkey. Meetings with the Standards Technical Advisory Group (STAG) are conducted by RSPCA once a year for each species to ensure effective accumulation of the latest scientific, veterinary, and industry information. STAG members include retailers, food companies, farming associated industries (e.g. manufacturing), veterinarians, environmentalists, or organizations and individuals advising the RSPCA Farm Animals Department on standard development. STAG membership is by invitation only. Membership for the Wider Consultation Group (WCG) is by invitation only by the Farm Animals Department of RSPCA. RSPCA Assured currently covers more than 140 million salmon. Major retailers in the UK offer more than 2,000 RSPCA Assured products.

### 4.4 IFS food standard

The International Featured Standards (IFS), originally called the International Food Standard, was established in 2003. IFS is an association of retailers and industrial companies that aims to set harmonized standards for their producers, logistics companies, brokers, and agents. Since their expansion, they now have 8 standards for food products and services published in five primary languages (English, German, Spanish, French, and Italian). The IFS Food Standard deals with food safety and quality of the product and the processes of food packing and processing companies. The standard is recognized by the Global Food Safety Initiative (GFSI). The scope of the standard includes sen-



ior management responsibility, quality and food safety management system, resource management, planning and production processes, measurements analysis and improvements, and food defense and external inspections.

Retailers that require suppliers to have IFS certification include Aldi, Lidl, and Metro (Bureau Veritas 2017). The IFS certification is also sought after by retailers from their suppliers in the French and German markets (Washington and Ababouch 2011).

The IFS Technical Committee (TC) is composed of representatives from retailers (17, many from Germany, Italy, France, and Spain), industry (6 manufacturers, 1 food service), and certification bodies (4 from Europe). The TC is responsible for content and requirements of the standards. National Working groups (NWG) from Italy, France, Germany, Chile, USA, and Spain are responsible for supporting and providing the TC technical information to the International Working Group. Examination Working Groups (EWGs) are composed of retailers and experts. A Review Committee is represented by retailers, industry, and CBs. They discuss experiences and discuss changes of requirements of the audit report and training.

#### 4.5 BAP

The Global Aquaculture Alliance (GAA), a non-profit organization attending to issues related to advocacy, education, and leadership in responsible aquaculture, is the owner of the BAP certification scheme. GAA was established in 1997 by shrimp farmers as a response to criticisms from Greenpeace in the 1990s and a global moratorium demanded by NGOs and community organizations in Choluteca, Honduras (Lee and Connelly 2006). According to Aguayo and Barriga (2016), BAP standards were led by the industry corporate actors and there was no participation by stakeholders not belonging to the industry (Aguayo and Barriga 2016).

BAP is an aquaculture standard that promotes codes of conduct through best management practices (Lee and Connelly 2006). The standards are continuously improved through efforts from the Technical Committee, Standards Oversight Committee (SOC) comprised of experts in environmental conservation, the academia and the industry, and comments from the public, which are available on their website. The BAP consumer eco-label includes a star rating system that shows the level of integration in the food chain, with one star meaning the product is produced by a BAP-certified processing plant while a 5-stars label means that the product has been produced only by BAP-certified facilities (processing plant, farms, hatchery, and feed mill). The standard covers community property rights and regulatory compliance, community relations, worker safety and employee

relations, sediment and water quality, fishmeal and fish oil conservation, control of escapees, predator and wildlife interactions, storage and disposal of farm supplies, animal health and welfare, biosecurity and disease management, control of potential food safety hazards, and traceability.

BAP standards are continuously updated. The GAA is responsible for coordinating the development of the standards. The technical details are developed by the Technical Committee (TC) under the guidance of the Standards Coordinator from GAA and subject to the review and approval from the Standards Oversight Committee (SOC). The 12-member SOC should consist of equal numbers of representatives from academia, conservation groups, and industry groups. After the SOC has reviewed the document (and modified, if needed), the changes are published for a 60-day comment period where the public can participate. The SOC carefully considers all the public comments for possible inclusion in the final draft. The draft is then submitted for approval by the SOC and the GAA Board of Directors before the standard is implemented.

## 5 DISCUSSION

Figure 1 shows a diagram illustrating how standards are established for different purposes and through diverse processes by distinct proprietors. As discombobulating as the figure seems, the reality is far more confounding. This can be explained by the many different stakeholders involved, with their various motives, interests, and desires to tackle the array of challenges that salmon aquaculture is facing. Despite running the risk of confusing the consumers, and at worst, resulting in label indifference, the schemes continue to evolve with a goal of making themselves distinct from the others while aiming to expand their terrain.

To give a more orderly and comprehensive understanding of the differences and similarities that characterize these schemes and their standards, we here provide a summary divided into the 3 Ps of certification: *purpose*, *proprietorship*, and *process*. Purpose refers to the needs and interests that have motivated the development of the different standards. Proprietorship deals with the owner(s) of the scheme. Process involves how the standards were developed and which actors were involved.

### 5.1 Purpose

Each standard was established with a purpose in mind. Some were intended to cover very specific issues, such as the IFS Food Standard and the RSPCA, while others were meant to be more general and all-encompassing. In the latter category, the GLOBALG.A.P. Aquaculture standard and

the BAP Aquaculture standard are similar in that they both cover aspects of food safety and quality, social, environment, and animal welfare. However, GLOBALG.A.P. was initiated to unify several schemes required by suppliers to provide consumers with sustainable products, while the BAP certification was developed as a response to criticisms from environmental groups and NGOs. The ASC Salmon Standard, also in the latter category, differs as it is a species-specific scheme with less focus on food safety, and was developed as a response to increased focus on the environment and social responsibility of the aquaculture industry. As with many of the more general standards, the IFS Food Standard was also aimed at providing a unified standard for suppliers; however, its focus is on general food safety and quality. The RSPCA Assured was established to improve animal welfare and, therefore, focuses more or less only on concerns regarding this issue.

### 5.2 Proprietorship

GLOBALG.A.P. and IFS schemes were both established by retailers while the ASC and RSPCA standards were both initiated by non-governmental organizations. Of the five schemes, only the BAP Aquaculture Standard was started by producers. Certification is performed by third-party certification bodies, except for RSPCA, which differentiates itself by certifying farms using their own RSPCA Assured assessors. A majority of these private schemes are mostly owned by retailers and NGOs, which means that they are able to exert power over the producers by demanding that these requirements be met if they are to be recognized as suppliers. Moreover, the schemes come from developed countries and Northern markets, tipping the scales in favor of large companies (Belton et al. 2011).

### 5.3 Process

The development of standards for the different schemes is similar in the sense that they are including different stakeholders and expert groups. Some schemes try to balance the number of representatives from the different stakeholder groups, such as BAP and GLOBALG.A.P. Not all the schemes, however, include public consultation. The IFS scheme, for instance, does not mention any public consultation nor does it say anything about NGO participation. Other schemes only include participants by invitation, such as the RSPCA, selecting the experts for consultation and standard development. Furthermore, the documents stating how many of each stakeholder group should be included in a Technical Group does not apply in practice (e.g. GLOBALG.A.P. and ASC).

According to Fuchs et al. (2011), the retailer-dominated private standards, such as IFS, are

dominated by the standard owner. The food industry and certification bodies play only a consultative role, while civil society is not provided with a voice. They categorize GLOBALG.A.P. as a standard that provides an equal partnership between the retailers and producers through elections, and certification bodies only act as associate members, while civil society and the NGOs may participate in the annual meetings. Despite the seemingly equal opportunities for stakeholders to take part in representing their group, in reality, not all of the stakeholders afford to take part in the development process as this requires a lot of time and resources.

## 6 CONCLUDING REMARKS

As has been shown here, there are countless challenges that follow the proliferation of certifications, standards, and labels in the aquaculture industry. Increasing pressure from both public and private regulatory agencies is causing a continuous build-up of demands for production companies. Since standards purposely differ from one another in some ways and overlap in other aspects, there is often a need to comply with more than one standard. This entails that the new standards which emerge do not replace others, but add yet more layers.

Having just one all-encompassing standard could possibly curtail certification-related work for producers and strengthen consumers' trust in labeling; but would this be attainable? Based on our findings in this study, it is unlikely to happen. This can be attributed to numerous explanations. For one, the different certification schemes are in competition with each other, as certifications, standards, and labels have become big business. Furthermore, the standards are created at different times and continue to be adapted and revised, making a potential unification difficult to achieve. Most importantly, the endeavor to improve the aquaculture industry, currently under the banner of sustainability, is pulling in many different directions. The numerous challenges that the industry is facing are subject to trade-offs and political priorities, as many of them run counter to each other. In order for the standard to cover everything, it would necessarily go against itself.

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