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A qualitative assessment of standards and certification schemes applicable to aquaculture in the Asia–Pacific region

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A QUALITATIVE ASSESSMENT OF STANDARDS AND CERTIFICATION SCHEMES APPLICABLE TO AQUACULTURE IN THE ASIA–PACIFIC REGION

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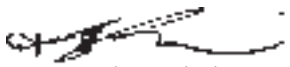
Foreword

At its 29th Session, the Asia–Pacific Fishery Commission (APFIC) recognized that a rapidly emerging issue in the region is the development of certification schemes for fisheries and aquaculture and the potential opportunities and constraints that these might bring to the region. In particular the member countries specifically requested APFIC to review opportunities and constraints with certification schemes as might apply in the APFIC region. This report is made in response to this request.

Aquaculture is currently supplying 45 percent of all fish consumed by humans and the majority of this is produced and consumed in the Asian region. The increasing global demand for seafood products and increasingly limited supply from capture fisheries suggests that aquaculture will continue its impressive growth rate that has been the sub sector's trademark for the last decade. It is crucial that this continued development be undertaken responsibly and it is in the interest of all stakeholders, producers and consumers alike that the development be sound and sustainable. Certification is one tool that can assist consumers in identifying products that are produced according to responsible production practices.

Aquaculture in the Asia–Pacific region is characterized by small-scale operations, with the bulk of the production coming from a mosaic of small-scale farms. It is estimated that in Asia more than 12 million people are directly employed in aquaculture. Therefore it is of utmost importance that the diversity of small-scale farmers be considered as the norm rather than the exception when looking at production and market chains for aquaculture products. It is important that we are sensitive to the needs of the sector when identifying and developing certification schemes, in order to maximize benefits and avoid distortions and barriers to the effective marketing of aquaculture products. As part of this, certification schemes are increasingly including the possibility to certify producers' groups or clusters, in addition to individual businesses. Such approaches are particularly appropriate to the needs of smaller-scale operations and are interesting developments that should be investigated further.

This report is a contribution under the workplan of APFIC and complementary to the work of FAO and its focus is specifically towards the situation of APFIC member countries. The findings of this report were presented at the APFIC Regional Consultative Workshop on Certification Schemes for Capture Fisheries and Aquaculture held in Ho Chi Minh City, Viet Nam in September 2007. This report, together with input from the regional workshop will provide clearer guidance for APFIC members to move forward on certification issues related to aquaculture and also provide a resource document for all stakeholders interested with aquaculture certification schemes in the Region. It should be noted that this work is coordinated with the ongoing work in developing the *FAO Guidelines for Aquaculture Certification*.



He Changchui
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Certification in aquaculture — a growing trend

Recent years have seen markets becoming increasingly stringent towards the quality of food products. Initially, quality criteria addressed mainly food safety issues. However, in response to the concerns expressed by many non-governmental organizations (NGOs) and other stakeholders, product quality increasingly began to include criteria related to environmental and socio-economic sustainability. This trend can be clearly identified by looking at market trends for sustainable products. According to the market watcher Mintel, the amount of ethical and sustainable food and drink products, including fair-trade and organic items, almost doubled in 2006.[1] The trend towards better quality experienced by the overall food sector can also be observed in fisheries and aquaculture products. Sustainability and corporate social and environmental responsibility were key topics discussed at the 2007 Seafood Summit and are likely to play a greater role in the sector.[2]

There is a notable difference between agriculture and fisheries commodities, especially as fisheries products are often much more diverse than those of agriculture in terms of both commodities and production systems. Requirements for quality criteria and the need to cope with this diversity have led, over the past few years, to an overwhelming proliferation of certification schemes. Also the additional potential for further expansion in the number of programmes if other stakeholders involved with the certification of agricultural products[3] were to increase attention in the aquaculture sector has led several Asian countries to express concerns about the potential impact that these certification schemes may have on the supply chain of especially on small-scale producers.

At the 29th Session of APFIC in Kuala Lumpur, August 2006, member countries recommended that APFIC's work should focus on Certification in Fisheries and Aquaculture as one of the emerging issues for the fisheries sector in the region.

This document is part of APFIC's response to its members' request and is aimed at reviewing the voluntary standards and certification programmes applicable to the aquaculture sector in the Asia–Pacific region, in particular looking at the challenges and opportunities of the most important schemes with the objective of advising stakeholders on strategies to maximize the sustainability of the aquaculture sector for all parties involved and especially for small-scale producers.

In an attempt to assess the advantages and disadvantages of different approaches to quality assurance, the criteria for selection of schemes have been kept as inclusive as possible. However, a smaller number of schemes particularly relevant to the aquaculture sector in the Asia–Pacific region were also selected to allow a more detailed qualitative assessment.

Definitions for aquaculture certification

This section describes aquaculture certification and some of the definitions associated with the process of certification. These are taken largely from International Standards Organization (ISO) documents, the WTO Technical Barriers to Trade (TBT) agreement, the FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries and the Network of Aquaculture Centres in Asia–Pacific (NACA) Web site.[4] A list of definitions used in reference documents relevant to aquaculture certification is reported in Annex 1.

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1 Intrafish Media 2007, http://www.intrafish.no/global/news/article125897.ece

2 **Fiorillo, J.** 2007. *Can you compete?* Intrafish Media http://www.intrafish.no/global/news/article126976.ece

3 Please also see: FAO RAP publication 2007/13: A Practical Manual for Producers and Exporters from Asia; – Regulations, Standards and Certification for Agricultural Exports.

4 www.enaca.org/certification

WHAT IS MEANT BY CERTIFICATION?

Certification (in its broad meaning also known as ***conformity assessment***) is a procedure through which written or equivalent assurance states that a product, process or service conforms to specified requirements. Within the aquaculture sector certification can be applied to a process followed by a production unit (e.g. pond, cage, farm, processing plant), a specific product or commodity or to the inputs being applied to the system before or during production. A process of ***testing*** or ***auditing*** (also known as ***inspection***) is generally conducted to assess the degree of compliance of the entity to be certified to specific standards. The process of testing or auditing of an entity is conducted by an ***auditor*** or ***inspecting body***. On many occasions the inspecting body also issues a ***certificate*** to the entity, therefore declaring conformity to the standards and, as such, acting as a ***certification body***. In the context of certification the word ***label*** is also used, often to indicate that a certain product complies with certain standards or it was produced from an entity in compliance with a specific set of standards or regulations. When these standards or regulations indicate a higher level of environmental sustainability, then the word ***ecolabel*** is used frequently, although this term is more often used to describe a label applicable to capture fisheries.

Depending largely on the relationship between the entity being certified and the certification body, the process of certification can be classified as follows:

- ***First Party Certification.*** Conformity assessment is performed by the person or organization that provides the product (e.g. producers, or producer organizations report on their compliance to a set of standards.
- ***Second Party Certification.*** Conformity assessment is performed by a person or organization that has a user interest in the products (e.g. traders, retailers or consumers and their organizations).
- ***Third Party Certification.*** An entity independent from both supplier and consumer organizations conducts the auditing and issues certificates stating that a product or process complies with a specific set of criteria or standards.
- ***Fourth Party Certification.*** Although not mentioned by ISO, fourth party certification is also mentioned by some organizations. This form of certification involves governmental or multinational agencies. The UN Global Compact, for instance, lists environmental, labour and human rights principles for companies to follow. Corporations submit online updates for others (e.g. NGOs) to scrutinize.

In its definition of certification, ISO refers only to third party certification, using the term "conformity assessment" to describe first party and second party certification. However, as the term "certification" is still widely used to indicate other forms of conformity assessment, it will be used in this review in its broader meaning.

Whilst fourth party certification is not widespread, because of the alleged lack of conflicts of interest between certified parties and the certification body, third party certification is generally perceived as the highest form of assurance of compliance to a specific set of standards. For this reason, as will be described hereunder, third party certification is indeed the form of certification most often sought. However, an important criterion to be taken into account when assessing the quality of a certification scheme is the identification of the entity, if any, that recognizes that a certain certification body is suitable for issuing specific certificates: the ***accreditation body***. The word ***accreditation*** is often used incorrectly as a synonym for "certification". However, as defined by ISO, accreditation is "the procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks". Although accreditation can be conducted by any entity, bodies have been established to ensure the quality of the accreditation process and consequently of certification. The International Accreditation Forum, Inc. (IAF) is the world association of conformity assessment accreditation bodies in the fields of management

systems, products, services, personnel and other conformity assessment programmes. As such, membership of the IAF often is perceived as a guarantee of quality of an accreditation body. Similarly, the European cooperation for Accreditation (EA) is also an association of accreditation bodies. The EA is a non-profit organization consisting of 39 European accreditation bodies and representing European accreditation bodies to the IAF.

As stated above, certification is conducted to assess conformity to specific requirements for a product or process. These requirements are generally expressed as ***standards.*** Standards can be either mandatory or voluntary. Examples of mandatory standards are those set by governments that regulate the production or trade of aquaculture products. Although it is sometimes difficult to clearly separate mandatory from voluntary schemes, especially when referring to government-promoted initiatives, this review will focus primarily on voluntary schemes, which are generally designed to distinguish farms or commodities based on quality criteria. It is important to note though, that voluntary schemes frequently require compliance to the law applicable to the entities being certified, although this by no means signifies that compliance with voluntary certification schemes can replace any part of the legal framework of a country.

Statements addressing the quality of a process or product are not always expressed as standards and can have different forms. For example, ***principles*** are statements describing the philosophical basis for production, trading and consumption of a product and are aimed at guiding stakeholders towards improving the sustainability of the sector. Principles can include sets of criteria which provide more details on how to achieve sustainability. Codes of Conduct (CoC) and Codes of Practice (CoP) provide examples of principles, with the latter being more popular to describe principles relevant to a specific commodity as opposed to the CoC which would be covering issues of importance to the sustainability of the sector as a whole. The CoC for Responsible Fisheries developed by FAO to improve the sustainability of the fisheries sector as a whole (i.e. both capture fisheries and aquaculture) is a notable example of a CoC.

The implementation of principles is generally achieved through the development of ***practices***, which generally address issues of importance for a specific commodity and/or production system. Better Management Practices (BMP), Good Aquaculture Practices (GAP), Better Aquaculture Practices (BAP) and others are all examples of practices for the implementation of the principles. BMP, GAP and their counterparts are somehow "indicative", as opposed to standards, either mandatory (e.g. legal documents) or voluntary, which are more "normative"[5] rules for a product or process. Although the terms BMP, GAP and others have been used almost interchangeably to define practices for the sustainability of the aquaculture sector, GAP often refers to practices that address food safety as opposed to BMP that tend to include practices relevant to environmental protection, social responsibility and disease management (see definitions in Annex 1).

Although certification is generally conducted to assess conformity with well-defined standards, this document will review a broader range of schemes, including schemes that assess conformity to principles or general rules targeting quality of aquaculture products or processes. Similarly, schemes that address the sustainability of commodities produced by a country or globally, i.e. do not assess conformity of a specific business, will also be reviewed.

[5] A norm is the reference value of an indicator and is established for use as a rule or as a basis for comparison. By comparing the norm with the actual measured value, the result demonstrates the degree of fulfillment of a criterion and of compliance with a principle.

KEY ELEMENTS OF A TYPICAL CERTIFICATION SCHEME

A typical certification scheme is constituted by the following elements:

- **A standard-setting organization**, in charge of developing standards or coordinating the standard development process, preferably in consultation with a number of stakeholder groups.
- A clearly **defined set of objectives** that the scheme is aiming to achieve.
- A **set of certification standards** that describes the characteristics that a process or product should have to be certified by the scheme.
- A **certification process** (operated for example by one or more certification bodies [CBs]) that assesses conformity of a product or process to the certification standards.

Certification standards are composed of statements sometimes known as "control points". A process or product must comply with these control points before being suitable for certification. Control points that are compulsory for certification can be defined as "critical" or a "major must". Some of the control points however are not compulsory (a "minor must") although a threshold percentage of the complied points has often to be achieved before a certificate is issued. There may also be "recommendations", which are points that are desirable but have very little or no bearing on the certification process.

Assessment of compliance is generally conducted by an inspection body which can report to a separate certification body or issue the certificates directly, therefore acting as certification body. Inspection/CBs are selected generally by the company seeking certification. Different certification schemes have different processes for identifying and accrediting CBs and this should be clearly defined in any certification scheme. Inspections are generally conducted following set schedules but can be supplemented by spot (unannounced) checks.

If the process or product is compliant with the standards a certificate is then issued. This certificate can be used according to the regulations set by the certification scheme (for example claims can be made of compliance with the standards; a label can be used only on packaging throughout the supply chain but not directly on the product; a label stating compliance can be used directly on the product; etc.). A period of certificate validity has also to be clearly stated.

A chain-of-custody has also to be established to ensure that the certified products are kept separate from products not compliant to a specific certification scheme.

OTHER WAYS TO CLASSIFY CERTIFICATION SCHEMES

In addition to differentiating certification schemes based on the degree of independence between the certification body and the party being certified (such as first, second, third party certification), certification schemes can be differentiated or characterized using other criteria such as:

- The **target** of the certification scheme.
- Whether the certified entity is a **product or a process.**

Certification/standards targeting food chain operators versus consumers

Certification schemes can either target the food chain operators (also known as business-to-business, B2B, certification) or the consumers. In the first instance standards are applied within the supply chain and serve to ensure that the process or product being supplied through the chain is produced following the specified standards. The consumers are often unaware of the existence of these certification schemes, therefore they have only a limited opportunity to exert market pressure on products from certified supply

chains. Certification and standards that target consumers are aimed at segmenting the market for the final product by clearly differentiating certified products using labels or marks. Through this mechanism consumers can exert market pressure by paying premium prices for certified products or by not buying uncertified products.

These two categories are very different in the way they operate. Schemes that target food chain operators tend to have clear specifications for raw materials and intermediary and final products. Clear standards are also set for the process to be followed for testing and auditing. These schemes are generally aimed at increasing competitiveness by reducing transaction costs while preserving quality.[6] Most retailer-driven efforts belong to this category (i.e. they are developed primarily to ensure retailers of product/process quality). Contrariwise, schemes targeting consumers tend to differentiate the product based on specific attributes that may induce consumers to pay premium prices. These two categories also focus on different approaches to food quality with food chain operator schemes having a more "holistic" approach than consumer schemes, which often follow an "excellence" approach to quality as explained hereunder.

Process versus product certification

Standards and the certification schemes developed to assess conformity can regulate either the process through which a product is produced or the product itself. Although process certification is meant to influence the quality of the product, process certification does not provide any guarantee about the quality of the product. The ISO points out this difference very strongly, recommending that marks stating the conformity of the business to process standards should not appear on product labels or packaging, because this would give consumers the impression that the product is certified as conforming to a specific set of standards, which in the case of process certification would be untrue.

What is meant by the term "quality"?

In order thoroughly to examine costs and benefits of schemes aimed at differentiating products and processes on the basis of quality criteria, it is important to define the concept of "quality". Following the definition developed by Grunert and used by Burrell *at al.* in their report to the EC,[7] there are two different approaches to food quality. The **holistic approach** refers to quality as inclusive of all the desirable characteristics that a product is perceived to have. On the contrary, the **excellence approach** defines quality only by examining specific characteristics that make a product of better quality or to follow higher standards.

It is also possible to divide food quality into the following categories:

- ***Product-oriented quality*** is the quality assessed according to characteristics of the product, including all the product's physical and organoleptic characteristics (for example texture, nutritional attributes).
- ***Process-oriented quality*** indicates the quality aspects associated with the processes adopted for the production and transformation of the product. These aspects therefore include environmentally and/or socially sustainable processes and practices. Process-oriented quality attributes may or may not have an effect on the product-oriented quality.

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[6] **EC DG JRC/IPTS.** 2006. *Preparatory economic analysis of the value-adding processes within integrated supply chains in food and agriculture — overview of existing studies.* http://foodqualityschemes.jrc.es/en/documents/Overview_existingstudies_final.pdf

[7] **EC DG JRC/IPTS.** 2005. *Food supply chain dynamics and quality certification — final report.* http://foodqualityschemes.jrc.es/en/documents/Finalreport_000.pdf

- ***Quality control*** indicates the quality standards which a specific product or process must comply with to belong to a specific, well-defined, quality category. Standards can be either process or product standards, although quality control differs from product- and process-oriented quality because it focuses on types of "reference" standards. A product can therefore have certain product-oriented quality attributes without necessarily having a specific quality control attribute.
- ***User-oriented quality*** refers to the quality perceived by the user. As such this is a rather subjective measure of quality that may or may not be associated with objectively verifiable product- or process-oriented or quality control attributes.

In the examination of costs and benefits of different certification schemes, the user's perception of quality plays a key role, especially concerning willingness-to-pay for different quality attributes.

Users assess quality by looking at the intrinsic and extrinsic nature of the attributes or based on the knowledge that they have of different attributes. Intrinsic attributes are characteristics directly linked to the product and which cannot be changed (such as shape, taste, production system used, etc.). Extrinsic attributes are not directly linked to the product and can be modified externally, for example price, brand, packing etc. In relation to the knowledge that users have of quality attributes the following distinctions can be made:

- ***Search attributes*** can be identified from the outside and as such the attributes are apparent to the user at the moment at which a product is chosen.
- ***Experience attributes*** are not directly assessable at the moment of choosing a product but after purchasing the product (e.g. taste, etc.).
- ***Credence attributes*** are not assessable when the product is purchased or consumed, but are attributes that the user believes are present because this is stated by a source of information considered to be credible.

In the context of these descriptions, throughout this review the term "quality" will be used to describe any attribute of a product or process including food safety, taste, price or addressing environmental or social sustainability.

Aquaculture certification schemes most often claim improvements in the sustainability of aquaculture production in terms of environmental, social or economic sustainability. These concepts influence most of the quality attributes described above. Sustainability however can be a rather vague concept and its definition requires further discussion.

What is meant by the term "sustainability"?

Different stakeholders have different definitions of sustainability, or sustainable development. The definitions reported by some of the most authoritative organizations are reported below.

The Food and Agriculture Organization of the United Nations (FAO) defines ***sustainable development*** as "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technologically appropriate, economically viable and socially acceptable".

More specifically, FAO defines ***sustainable agriculture and rural development*** as processes that meet the following criteria:

- They ensure that the basic nutritional requirements of present and future generations, qualitatively and quantitatively, are met while providing a number of other agricultural products.
- They provide durable employment, sufficient income and decent living and working conditions for all those engaged in agricultural production.
- They maintain and, where possible, enhance the productive capacity of the natural resource base as a whole, and the regenerative capacity of renewable resources, without disrupting the functioning of basic ecological cycles and natural balances, destroying the socio-cultural attributes of rural communities, or contaminating the environment.
- They reduce the vulnerability of the agriculture sector to adverse natural and socio-economic factors and other risks, and strengthen self-reliance.

FAO also defines a ***sustainable livelihood*** as a livelihood that can cope with, and recover from, stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, whilst not undermining the natural resource base.

The ***United Nations Environment Programme (UNEP)*** defines ***sustainable development*** as development that ensures that the use of resources and the environment today does not compromise their use in the future.

Sustainable development, or sustainability, is defined by the ***World Wildlife Fund for Nature (WWF)*** as an economic activity that meets the needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is based upon three components: economic growth, social progress and environmental protection.

The ***World Summit for Sustainable Development (WSSD)*** held in Johannesburg in 2002 states that ***sustainable development*** is built on three interdependent and mutually re-enforcing pillars — economic development, social development and environmental protection — that must be established at local, national, regional and global levels. This establishes linkages among poverty alleviation, human rights, biodiversity, clean water and sanitation, renewable energy and the sustainable use of natural resources.

The aforesaid definitions share some key concepts such as the long-term environmental, social and economic viability of activities and their ability to deliver quantity and quality outputs now and for generations to come.

Applied to the aquaculture sector this means long-term production of safe aquaculture products with respect to natural resources and in such a way as to deliver socio-economic development not only for local fishery communities, but also for other resource users and globally.

Diverse mechanisms to address or achieve sustainability

Although sustainability aims at achieving long-term balanced positive outcomes for all stakeholders involved, different stakeholders have different priorities while tackling sustainability and, as such, may use certification to promote different approaches to food quality. Differences in stakeholders' motives should be clearly understood to investigate the suitability of different schemes; standards and the related certification scheme should be developed through a true consensus-building process and multistakeholder consultations.

INTERGOVERNMENTAL ORGANIZATIONS

Intergovernmental organizations (IGOs), for example the agencies of the United Nations such as FAO and UNEP, NACA, the Southeast Asian Fisheries Development Center (SEAFDEC), in addition to other international agencies such as the World Bank (WB) and the Asian Development Bank (ADB) and many others tend to tackle sustainability in a broad sense, trying to protect the interests of all the stakeholders involved, often paying particular attention to countries with limited resources and to the poorer sectors of society in these countries.

However, different to international organizations, which generally have a very broad membership base including both countries that are fundamentally producers and countries that mainly consume aquaculture products, regional organizations may be potentially more concerned with protecting the interests of their member countries that may be mainly producers (for example in Asian countries) or consumers (for example in the EU) of aquaculture products.

NON-GOVERNMENTAL ORGANIZATIONS

Non-governmental organizations (NGOs) play an important role in achieving sustainability. Similar to IGOs, NGOs target sustainability broadly. However, although it would appear that NGOs operate without the need to protect the interests of specific groups of stakeholders (or countries), arguably NGOs have to respond to the needs of their members and supporters, who in the case of international NGOs often come from the developed world, as opposed to national NGOs located throughout Asia, Africa and Latin America that often represent primarily the interests of the people in developing countries. Nevertheless, like IGOs, NGOs can be considered relatively independent in their scope. NGOs such as WWF have played a key role in the path towards sustainability, especially in terms of environmental protection and responsible use of natural resources. However, campaigning NGOs have also been criticized for their poorly constructive criticism,[8] which arguably is because they do not gain any benefits from a specific process or sector being or not being in place (i.e. they can argue that a specific sector is unsustainable and should be dismantled without being directly affected by its disappearance); this is both a strength and a weakness of the NGO approach to sustainability.

A special case is the ISO. The ISO is a network of the national standards institutes of 157 countries, with one member for each country. The ISO however is not an IGO, as its members are not delegations from governments. ISO standards tend to aim at sustainability broadly and are discussed in further detail hereunder.

GOVERNMENTS

The views of IGOs are most commonly shared by governments, although governments also have a more specific responsibility to act in the interest and needs of their own citizens and, related to the aquaculture sector, these may vary depending on whether countries are primarily producers or consumers of fishery products.

Countries primarily importing aquaculture products will tend to be more concerned with the interests of consumers. The quality of products, and more specifically their safety, will tend therefore to become a priority. Similarly, governments in producing countries are also interested in tackling sustainability broadly, although they may pay particular attention to protecting the interests of producers, who in some Asian countries represent a high proportion of their citizens. People involved with the fisheries sector in Asian countries frequently have limited resources, therefore their interests may also become a priority for sustainability worldwide.

[8] **Mallaby.** 2004. NGOs: Fighting poverty, hurting the poor. *Foreign Policy,* September/October 2004.

CONSUMERS

Being the end-users, consumers' preferences and perceptions play a key role. Arguably, consumers are most concerned with food quality in terms of taste and safety, although other quality attributes may indeed play a role. Increasingly consumers are interested in the process through which a product is produced, the process-oriented quality, in addition to quality control attributes. Although still at a niche scale, a rising number of consumers require that the product is produced in a socio-economically and environmentally sustainable manner. Environmental sustainability is facing significant consumers' demand. A survey commissioned by the Seafood Choices Alliance, in partnership with WWF, Greenpeace, the Marine Conservation Society and the North Sea Foundation and conducted in three European countries (the United Kingdom, Germany and Spain) showed that 86 percent of consumers would prefer to buy seafood that is labeled as environmentally responsible and that 40 percent are prepared to pay a 5 to 10 percent higher price for such products. The study also identified that 95 percent of the surveyed consumers wanted more information on how to buy sustainable seafood.[9]

Although efforts towards the production of fair-trade fisheries products are still in their infancy, their marketing is likely to follow a similar pattern to environmentally sustainable products.

It must be pointed out that consumers' demand for sustainability is often based on "perceived" as opposed to "true" sustainability (see aforementioned user-oriented quality attributes). Although the difference between them may be small, it is often difficult for consumers to assess the true sustainability of a process and they will base their choices on credence attributes, i.e. basing their requests for sustainable products on the information provided by what they consider credible sources of information. In addition, although a process may be perceived as sustainable when examined in isolation, the assessment of the process on a wider scale may identify areas of concern from a sustainability point of view, i.e. having costs that may be hidden to consumers.

RETAILERS AND TRADERS

Interest in sustainability among retailers and traders generally reflects consumers' demands. In fact, retailers will market not only what the consumers demand, but also what consumers are more likely to buy. The difference between the two may indeed be small, but worth mentioning. In addition, different to consumers, retailers often have a corporate image to protect, and as such they may be more accountable than individual consumers towards protecting true sustainability. It is worth mentioning that retailers are generally the strongest link in the supply chain and largely set the "rules" with which other links in the chain have to comply.

PRODUCERS

Producers view sustainability mainly in terms of long-term ability to produce products efficiently, generally in the greatest quantity possible with the available resources and in a manner to allow their profitable marketing, making the process economically viable. To achieve this, the needs of the consumers, retailers and traders, and their demands for sustainable products, need to be addressed. Producers may also target environmental sustainability as a way to reduce self-pollution, although limiting pollution that does not impact their business is arguably a lower priority.

[9] **WWF.** 2005. *Survey: Europeans prefer responsibly sourced seafood.* http://www.panda.org/news_facts/newsroom/index.cfm?uNewsID=53680

A qualitative assessment of opportunities and costs

The schemes included in this review were identified through personal knowledge, contacts and a thorough Internet search, which started from aquaculture certification material posted on the NACA Web site.[10]

When information was not available on the Web site, e-mail communication was also conducted with the contacts provided on the official Web site or through personal contacts. Information gathered at the FAO/NACA Expert Workshop on Guidelines for Aquaculture Certification held in Bangkok from 27–30 March 2007 was also included in the review, in addition to information from other relevant documents.

Although it would be practically impossible to cover all the possible certification schemes of relevance to the aquaculture sector, an attempt was made to be as inclusive as possible to provide a wide overview of the potential options. Nevertheless, only schemes of relevance to aquaculture production were included in the review, as schemes applicable only to higher levels in the supply chain (e.g. processors) were considered less relevant.

Overview of current aquaculture standards and certification schemes

INTRODUCTION

At present there are at least 30 certification schemes and eight key international agreements relevant to aquaculture certification. At least another nine initiatives were also identified as addressing sustainability issues and creating a framework for differentiating sources of aquatic products in this respect. The main schemes are collated in Annexes 2–9; current standards, objectives, types of certification schemes and types of organizations promoting the scheme have been addressed as far as possible.

The schemes can be broadly split into the groups presented in Table 1.

[10] www.enaca.org/certification

Table 1. The main certification schemes relevant to aquaculture certification

Schemes promoted by retailers	
GLOBALGAP	www.GLOBALGAP.org
Safe Quality Food	www.sqfi.com & www.fmi.org
Carrefour	www.carrefour.com
Schemes promoted by the aquaculture industry	
Global Aquaculture Alliance & Aquaculture Certification Council	www.gaalliance.org www.aquaculturecertification.org
Shrimp Seal of Quality (SSoQ)	?
SIGES – SalmonChile	www.siges-salmonchile.com/proysigesingles/ www.salmonchile.cl
Scottish Salmon Producers' Organisation Code of Good Practice	www.scottishsalmon.co.uk
Schemes promoted by governments	
Thai Quality Shrimp	www.thaiqualityshrimp.com
Certification schemes in China	Safety agri-food certification ChinaGAP[11] Green food standard
Vietnam GAP and CoC programme	
Hong Kong Accredited Fish Farm Scheme	www.hkaffs.org/en/
Certification schemes provided by NGOs	
Marine Aquarium Council	www.aquariumcouncil.org
International Standards Organization	www.iso.org
Organic certification schemes	
International Federation of Organic Agriculture Movements	www.ifoam.org
Naturland	www.naturland.de
Soil Association	www.soilassociation.org
BioGro New Zealand	www.bio-gro.co.nz
Bio Suisse	www.bio-suisse.ch/en/home.php
KRAV	www.krav.se
Fair trade certification schemes	
Alter-Trade Japan	www.altertrade.co.jp
Ethical Trading Initiative	www.ethicaltrade.org
Fairtrade Labelling Organizations International	www.fairtrade.org.uk
Animal welfare and "free-range" schemes	
Freedom food	www.rspca.org.uk
Label Rouge	
Other organizations and schemes which may have relevance to aquaculture certification	
WWF aquaculture dialogues and standards	www.worldwildlife.org/cci/aquaculture.cfm
Marine Stewardship Council	www.msc.org
Seafood Watch of the Monterey Bay Aquarium	www.seafoodwatch.org
Environmental Justice Foundation	www.ejfoundation.org
Federation of European Aquaculture Producers	www.FEAP.info
International Fair Trade Association	www.ifat.org
Swiss Import Promotion Programme	www.sippo.ch

[11] Although ChinaGAP is benchmarked against the GLOBALGAP standards and receives the support of GLOBALGAP, it also received strong support from the government and, as such, it is mentioned among the schemes promoted by governments.

The broad range of certification schemes

There are a number of stakeholders involved in certification and there is a broad range of schemes that covers the range of issues. Some issues are of common interest for stakeholders whereas others are of more specific interest to fewer or single stakeholders. Schemes promoted by stakeholders or stakeholder groups are described hereunder.

SCHEMES PROMOTED BY RETAILERS

Retailers, like most traders, use quality standards to purchase the products they trade. Responding to the requirements of consumers and NGOs, a number of retailers have begun developing standards aimed at ensuring that the products marketed are produced following processes aimed at improving the sustainability of production of specific products. In order to reduce the cost of auditing and certification, and therefore the overall cost of the product so as to ensure continued competitiveness throughout the production chain, in some cases groups of retailers have joined forces and developed standards applicable to all the retailers joining the scheme.

There are several examples of these retailer-promoted schemes although only a limited number are currently also dealing with aquaculture production. Retailer-promoted schemes belong to two main categories depending on whether they target consumers or food chain operators. Examples are given in Annex 2.

SCHEMES PROMOTED BY THE AQUACULTURE INDUSTRY

The aquaculture industry has an interest in promoting aquaculture products in general; better performing practices can serve as a good example for the industry. It is the more organized groups of producers who can agree on and establish industry-led certification schemes. Annex 3 provides examples of industry-driven certification schemes.

SCHEMES PROMOTED BY GOVERNMENTS

Governments in exporting countries in particular have a clear interest in promoting a sustainable aquaculture industry and in promoting it among buyers in both their national markets and other countries. Often the requirements in importing countries are different from the exporting countries' regulations and therefore it is necessary to have certification schemes for export products. A number of examples are given in Annex 4.

There are other governmental programmes. Similar to Thailand, Viet Nam and Hong Kong S.A.R.,[12] other major aquaculture-producing countries (e.g. Indonesia) have also initiated efforts towards the development of practices and standards for the responsible production of shrimp and other aquaculture commodities. However, efforts are generally in early stages although they are on the path to becoming truly developed certification schemes. There are also examples of government-led certification schemes outside the Asia–Pacific region (for example shrimp certification in Brazil).

There are other government thrusts through IGOs and international agreements. These are yet to be linked to true certification schemes and will be examined in more detail hereunder.

[12] Special Administrative Region.

SCHEMES PROMOTED BY NGOs

Non-governmental organizations (NGOs) with interests in conservation, environment, fair trade, etc. are often perceived to develop certification schemes that promote their interest. It is often mentioned that NGO-established schemes are "truly" third party schemes. This depends on the structure of the schemes but it is true that there is often less conflict of interest. Some examples are given in Annex 5.

ORGANIC SCHEMES

Many of the voluntary certification issues originate from the organic movement. In some countries consumers still think about organic certification when they hear talk about certification. The International Federation of Organic Agriculture Movements (IFOAM), which was established in 1972, is a global grassroots umbrella organization and has 750 member organizations.

Government-promoted organic programmes

In addition to NGO organic programmes (reported in Annex 6), which are privately owned, several governments have also developed standards for the production, processing, labeling and marketing of organic products. Government efforts assume a combination of mandatory and voluntary efforts — i.e. in addition to mandatory regulations developed to protect consumers from fraudulent claims, some governments have also developed labels that can be used on a voluntary basis by producers complying with regulations. Conformity to the regulation is conducted by government-accredited CBs or agents.

Some examples of organic government-led efforts, most of which are also largely applicable to the aquaculture sector, are listed hereunder. The list is far from being inclusive of all government efforts towards organic production, it only serves to exemplify some of them.

European Union

Europe has historically led the organic movement, with countries such as France and the United Kingdom playing a key role in this direction. The first set of EU regulation on organic farming was developed in 1991 (EEC N. 2092/91) and came into force the following year. In 1999, additional rules for production, labeling and inspection of the main animal species were also developed (EC N. 1804/1999). According to these regulations, only products that have been produced and processed following the EU regulation on organics can be marketed in the EU as organic. EU member countries were asked to develop national legislation to allow the implementation of these regulations.[13]

In 2000, the European Union also introduced the "Organic Farming–EC Control System" label to be used on a voluntary basis by producers whose products are in compliance with the EU organic regulation.

France

France developed legislation on organic production for the first time in 1981. In 1985, the first state-owned logo for organic products, the Agriculture Biologique (AB) logo, was launched. These early efforts made France a leading country in organic production and it now contains an estimated 40 percent of the European organic land.[14]

The French Ministry of Agriculture has accredited six bodies for issuing certificates for organic plants and animals. The French Government also established a system of financial support to promote the conversion of farms to organic culture.

[13] http://ec.europa.eu/agriculture/qual/organic/index_en.htm
[14] http://www.organic-europe.net

United Kingdom

Like other European countries, the United Kingdom also complies with the EEC N. 2092/91 regulation in setting practices used for organic production, processing and marketing. These are stated in the Statutory Instrument 2004 N. 1604, The Organic Products Regulations 2004. The government and its ministers also receive advice on matters related to organic standards from the Advisory Committee on Organic Standards (ACOS), which is a non-executive non-departmental public body.

United States of America

In the United States, Congress passed the Organic Foods Production Act in 1990, requiring the United States Department of Agriculture (USDA) to develop standards for the production and management of organic products, which were developed under the USDA National Organic Program (NOP). Regulations have now to be implemented. Certification is conducted by USDA-accredited certifying agents and, in the United States, is compulsory only for operations handling more that US$5 000 per year in organic products. Imported products can be exported to the United States as organic only if their compliance to the NOP regulations has been certified by accredited certifiers, of which several are located in countries outside the United States.[15]

Thailand

The National Bureau of Agricultural Commodity and Food Standards (ACFS) of Thailand is currently developing standards for organic shrimp production, with the target of boosting the competitiveness of Thai shrimp on the global market. The standards are expected to be submitted to the Minister of Agriculture and Cooperatives in 2007 for approval.[16]

FAIR-TRADE SCHEMES

The fair-trade movement started in the second half of the twentieth century to promote fairer trade by providing producers with fair prices for their products especially in developed countries. The fair-trade movement became very popular with the introduction of fair-trade labeled products. Currently there are no fair-trade schemes for aquaculture products but there are fair-trade elements in some schemes.

ANIMAL WELFARE AND "FREE-RANGE" SCHEMES

Especially in the salmon industry there has been a focus on animal welfare. However there has been some effort to establish animal welfare schemes for shrimp production as well. Most of these products are only available in European supermarkets. Annex 8 describes two animal welfare certification schemes.

[15] http://www.ams.usda.gov

[16] **ThaiNews.** 2007. *Thai agency expedites drafting of organic marine shrimp production standards.* http://www.thaisnews.com/news_detail.php?newsid=202406

International standards and intergovernmental agreements of relevance to aquaculture certification

FAO CODE OF CONDUCT FOR RESPONSIBLE FISHERIES (FAO CCRF)
www.fao.org

In response to increasing concerns regarding the sustainability of the fisheries sector, FAO developed the Code of Conduct for Responsible Fisheries (CCRF). This non-mandatory document "establishes principles and standards applicable to the conservation, management and development of all fisheries". The CCRF was unanimously adopted by an FAO conference in 1995 and provides a framework for national and international efforts towards the sustainability of the sector. The CCRF relates to several aspects of sustainable fisheries and includes one article (Article 9) on Aquaculture Development. Over the years the CCRF has been voluntarily adopted by several countries and it has, in some cases (such as Thailand) inspired the development of national certification programmes for aquaculture commodities.[17]

CODEX ALIMENTARIUS
www.codexalimentarius.net

The Codex Alimentarius is a collection of food safety standards, codes of practice, guidelines and other recommendations developed under the guidance of the Codex Alimentarius Commission, an intergovernmental body created in 1963 by FAO and the World Health Organization (WHO) to protect consumers' health, ensure fair-trade practices in the food trade and promote coordination of all food standards' work undertaken by IGOs and NGOs.

The development of Codex Alimentarius standards begins with the submission of a proposal for a standard to be developed by a national government or a committee within the commission. The commission or the executive committee decides whether such a standard should be developed as proposed. Upon a favourable decision, a subsidiary body to be responsible for coordinating the standard development process is identified. If necessary, a new subsidiary body (for example a specialized task force) may also be created. Draft standards are circulated to all member governments for comment, which are then considered by the body coordinating the development of the proposed standard. Standards are added to the Codex Alimentarius only when adopted by the Codex Alimentarius Commission. The standard development process generally takes a number of years. Standards are also reviewed regularly following the same procedure used for standard development.

At present there are about 200 Codex Standards, of which several are applicable to fisheries commodities, and over 100 other documents including Codes of Practice and guidelines. A search of the Codex database reveals that there are 21 documents in the "Fish and Fisheries Products" category. *Inter alia* there are 18 standards, two guidelines and the Code of Practice for Fish and Fisheries Products, which also covers the aquaculture sector.

OFFICE INTERNATIONAL DES ÉPIZOOTIES (OIE)
www.oie.int

Office International des Épizooties (OIE) or the World Organization of Animal Health is an inter-governmental organization created in 1924 to address animal health globally through the collection, analysis and dissemination of animal health information, by providing and encouraging international solidarity and by supporting the improvement of legal frameworks for the control of animal diseases. Under the WTO Sanitary and Phyto-Sanitary (SPS) agreement the OIE also safeguards global trade by

[17] Rohana Subasinghe, FAO, personal communication.

developing and publishing health standards applicable to animals and animal products. The OIE has 167 member countries and operates through a process of frequent consultations with its member country representatives.

The OIE's activities on aquatic animal health are largely coordinated by the Aquatic Animal Health Standards Commission which, in addition to promoting aquatic animal health globally, is also in charge of developing generic and specific disease chapters for the Aquatic Animal Health Code and the Manual of Diagnostic Tests for Aquatic Animals. The OIE is also involved in the development of documents on animal welfare.

INTERNATIONAL PRINCIPLES FOR RESPONSIBLE SHRIMP FARMING
www.enaca.org

In continuation of its efforts towards the development of principles for responsible fisheries, in 1999 FAO, in partnership with NACA, the World Bank and WWF, formed a Consortium on Shrimp Farming and the Environment to identify issues around shrimp farming and advise on better management of the sector. The United Nations Environment Programme (UNEP) joined the consortium in 2003 and this resulted in the development of the International Principles for Responsible Shrimp Farming, which address technical, environmental and socio-economic sustainability issues of the shrimp farming sector.

In 2006 the International Principles were endorsed by the 17 governments of the NACA Governing Council and were welcomed by FAO's member governments at the FAO Sub-Committee on Aquaculture in 2006 and at the FAO Committee on Fisheries meeting in 2007.

Over time, members of the consortium have also coordinated several activities towards the conversion of these principles into practice. *Inter alia*, NACA efforts towards the development and implementation of Better Management Practices (BMP) in several countries in the Asia–Pacific region (e.g. India, Viet Nam, Indonesia) generated particularly successful experiences which led the NACA Governing Council to request the development of BMP and standards for the production of aquaculture commodities relevant to the Asia–Pacific region.

ASEAN SHRIMP ALLIANCE

In June 2006, representatives of government institutions in charge of fisheries management from seven of the ten Association of Southeast Asian Nations (ASEAN) countries (i.e. Thailand, Viet Nam, Malaysia, Indonesia, the Philippines, Brunei Darussalam and Cambodia) met to discuss the establishment of an ASEAN Shrimp Alliance with, *inter alia*, the objective of establishing shrimp production standards for ASEAN countries. An agreement was reached to undertake efforts at both government and private sector levels. A detailed proposal including the role of the ASEAN Shrimp Alliance is currently being developed by SEAFDEC and the Thai Department of Fisheries.[18]

UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (UNCLOS)
www.un.org/Depts/los/index.htm

The Convention on the Law of the Sea is an intergovernmental document through which the international community agrees on procedures to regulate all aspects of marine resources and ocean use. The convention, adopted in 1982, was signed by over 160 countries. Although a major focus of the convention is on marine resource exploitation, this document is also relevant to the aquaculture sector, especially when dealing with the interactions between culture and capture fisheries.

[18] http://www.seafdec.net/news/n230606.htm

CONVENTION ON BIOLOGICAL DIVERSITY (CBD)
www.biodiv.org

The Convention on Biological Diversity is an agreement which was signed in 1992 by 150 governments. The convention is dedicated to promoting sustainable development recognizing that biological diversity is important not only for plants, animals, micro-organisms and their ecosystems, but also for people globally as it contributes to food security and provides medicines and a healthy environment in which to live. The convention contains several provisions specific to aquaculture/mariculture, particularly concerning the transboundary movement of aquatic organisms and the control of invasive alien species.

UN GLOBAL COMPACT
www.unglobalcompact.org

The UN Global Compact is a set of principles that the UN requests companies to voluntarily follow and promote to address the following issues: human rights, labour standards, the environment and combating corruption. It comprises ten principles:

Human Rights

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and
- Principle 2: Make sure that they are not complicit in human rights abuses.

Labour Standards

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4: The elimination of all forms of forced and compulsory labour;
- Principle 5: The effective abolition of child labour; and
- Principle 6: The elimination of discrimination in respect of employment and occupation.

Environment

- Principle 7: Businesses should support a precautionary approach to environmental challenges;
- Principle 8: Undertake initiatives to promote greater environmental responsibility; and
- Principle 9: Encourage the development and diffusion of environmentally friendly technologies

Anti-Corruption

- Principle 10: Businesses should work against all forms of corruption, including extortion and bribery.

OTHER SUSTAINABILITY SCHEMES RELEVANT TO AQUACULTURE CERTIFICATION

Currently there are many schemes aimed at improving the sustainability of the aquaculture sector or that are potentially relevant to the aquaculture sector. These schemes either do not have a true certification process or, if they do, the certification process has yet to be applied to aquaculture commodities.

A qualitative assessment of selected certification schemes

The objective of this review is to provide some points for consideration when comparing or evaluating mechanisms for aquaculture certification. Choices of what is best or which approach to certification offers the most benefit is going to be determined by who is making the decisions. Certification which only considers the demands of the consumer will almost certainly be somewhat disadvantageous to the producer and equally, excessive compromises to the producer, will fail to present a credible product for the consumer.

SCHEMES ASSESSED

Out of the more than 30 aquaculture certification schemes identified, ten schemes were selected for a qualitative assessment. Selection of the schemes was based upon the availability of information (especially details on issues covered by the standards) and perceived relevance to countries in the Asia–Pacific region. The schemes assessed were:

1. Global Aquaculture Alliance (GAA)/Aquaculture Certification Council (ACC)
2. GLOBALGAP
3. Naturland
4. Thai CoC
5. SQF
6. IFOAM
7. ISO 9001
8. ISO 14001
9. ISO 22000
10. FLO

Although Fairtrade Labelling Organizations International (FLO) does not yet have standards for aquaculture commodities, it was included in the analysis because it represents a unique example of fair-trade standards. In addition, FLO has repeatedly expressed its interest in developing standards for aquaculture commodities and it would appear likely that FLO standards for aquaculture will be developed in the near future.

ASSESSMENT METHODOLOGY

The methodology used in this publication for the qualitative assessment used a combination of descriptive methods coupled to a simple weighting method (+1 being a benefit, 0 being neutral, -1 being a cost) to indicate the degree of impact. The results are not intended to be used as a quantitative assessment and do not reflect any true comparison between schemes as the schemes are often targeting different objectives. The assessment should not be seen as a traditional economic cost–benefit analysis but more like a qualitative description/ranking of the selected schemes. The assessment does provide a means to evaluate where opportunities and challenges may be derived and allows the discussion of the relative merits of the schemes assessed.

Descriptive analysis

A descriptive analysis of the ten schemes was conducted using a framework which included issues that were:

- Addressed in the Code of Good Practice for Setting Social and Environmental Standards developed by the International Social and Environmental Accreditation and Labelling Alliance

(ISEAL). ISEAL is a membership-based organization that assists the development of social and environmental standards for several sectors including forestry, agriculture, fisheries, manufacturing and textiles.[19]

- Addressed in ISO Guides for standardization or conformity assessment.
- Addressed by the benchmarking system of the Global Food Safety Initiative (GFSI), an initiative promoted by CIES — The Food Business Forum, a global food business network whose retailer members alone generate over US$2 trillion, employ 4.5 million people and operate about 600 000 stores.[20]
- Addressed in the FAO CCRF Chapter 9 on Aquaculture Development.
- Addressed in the FAO/NACA/UNEP/WB/WWF International Principles for Responsible Shrimp Farming.
- Considered by the authors as important additional descriptors of the scheme.

A total of 85 descriptors were used to describe each scheme: overall (25), the inspection process (2), the scheme applicable to producers (6) and the coverage of the scheme (52). The topics covered by the scheme included issues that were either general (5) or associated with food safety (10), the environment (17), aquatic animal health (12), social issues (5) or animal welfare (3).

A list of the descriptors is given in Table 2.

Because ISO 9001 has standards for quality management, a definition of quality had to be provided to describe the issues covered by the scheme. In this context, quality was defined as a process that addressed food safety and both environmental and social sustainability. Similarly, ISO 14001 and ISO 22000 were assumed to address the key issues concerning environmental sustainability and food safety respectively, although they are not detailed directly in the standards themselves.

Evaluation of costs and benefits based on descriptors

In the analyses done in this document, each descriptor was further examined for its impact on different stakeholder groups in terms of costs and benefits. The stakeholders that were grouped together in the analysis included: certified farmers; workers in certified farms; neighbouring farmers; other resource users; traders; processors; retailers; consumers; governments; the environment; animal welfare.

Costs and benefits were categorized as -1 and +1 respectively. Descriptors considering a combination of costs and benefits for a specific stakeholder group were categorized as 0. In general terms, practices to be complied with by producers were considered costs, unless they referred to strategies widely recognized as critical to improve production (e.g. disease control, testing water quality, etc.). Compliance to items included in the standards was most often considered a benefit for consumers as it added quality attributes to the product being consumed. The costs and benefits of each descriptor are reported in Table 2.

The sum total of the qualitative valuing of costs and benefits for each stakeholder group and for each certification scheme analysed was summed to give an overall figure. This method was designed to quantify the impact (whether positive or negative) of each scheme on the different stakeholder groups. The sum of the costs and benefits was also expressed as a proportion (percentage) of the total number of descriptors applicable to each scheme, therefore taking into consideration the fact that schemes for which many descriptors were applicable would also have higher values for costs or benefits.

[19] http://www.isealalliance.org
[20] http://www.ciesnet.com

Table 2. List of the descriptors of the schemes analysed and relative costs and benefits for different stakeholder groups
(please note that a hyphen in the table is equal to not applicable under the current scheme)

DESCRIPTORS	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Processors	Retailers	Consumers	Gov't.	Env.	Animal welfare
ISEAL member	1	1	1	1	–	–	–	–	–	1	–
Benchmarked by GFSI	–	–	–	–	–	1	1	1	1	–	–
Scheme makes reference to international standards	–	–	–	–	–	–	–	–	–	–	–
Is the procedure for standard development & revision documented?	–	–	–	–	–	–	–	–	–	–	–
Were/are all the major stakeholder groups involved in the development/revision of the standard?	1	1	1	1	1	1	1	1	1	1	1
Is there a process for reviewing the standards regularly?	–	–	–	–	–	–	–	–	–	–	–
Is input from stakeholders directly impacted (especially disadvantaged groups) actively sought?	1	1	1	1	–	–	–	–	–	–	–
Is standard development based on the principles of consensus?	1	1	1	1	–	–	–	–	–	–	–
Is there a documented process to address complaints with failures in following the process for standard development and revision?	1	1	1	1	1	1	1	1	1	1	1
Standards publicly available for implementation (even if including a reasonable fee)	1	1	1	1	1	1	1	1	1	1	1
Standards based on measurable/precise criteria	–	–	–	–	–	–	–	–	–	–	–
Product or process standards	–	–	–	–	–	–	–	–	–	–	–
Target of the label: consumer or food chain operators?	1	1	–	–	1	1	1	-1	–	–	–
Link between standard development & certification organizations	–	–	–	–	–	–	–	–	–	–	–
Implemented through third party certification	–	–	–	–	–	–	–	–	–	–	–
Certification body accredited by an internationally recognized accreditation organization or accredited to ISO 65	–	–	–	–	–	–	–	–	–	–	–
Free access to accredited CBs	1	1	–	–	–	–	–	–	–	–	–

Table 2. *(continued)*

DESCRIPTORS	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Processors	Retailers	Consumers	Gov't.	Env.	Animal welfare
Allows for certification of producer groups	1	–	–	–	–	–	–	–	–	–	–
Developed by competent representatives of direct stakeholders	1	1	1	1	1	1	1	1	1	1	1
Scheme has standards for producers	–	–	–	–	–	–	–	–	–	–	–
Scheme has standards for traders	–	–	–	–	–	–	–	–	–	–	–
Scheme has standards for processors	–	–	–	–	–	–	–	–	–	–	–
Scheme has standards for seed suppliers	–	–	–	–	–	–	–	–	–	–	–
Scheme has standards for feed	–	–	–	–	–	–	–	–	–	–	–
Requires compliance to the scheme throughout the supply chain	-1	-1	–	–	-1	-1	-1	1	1	–	–
Inspection process											
Inspection by CB includes water testing/ environmental testing	-1	–	1	1	–	–	–	–	–	1	–
Inspection by CB includes consultation with local communities/assessment of off-site impact	-1	–	1	1	–	–	–	–	–	1	–
General points on producers' standards											
Clearly stated principles	–	–	–	–	–	–	–	–	–	–	–
Quantity of compliance points	-1	-1	–	–	–	–	–	1	–	–	–
Quantity of written documents required	-1	-1	–	–	–	–	–	1	–	–	–
Validity period of certificate/frequency of inspection	–	–	–	–	–	–	–	–	–	–	–
Require records for (minimum time)	-1	-1	–	–	–	–	–	1	–	–	–
Period of compliance before being certified	–	–	–	–	–	–	–	–	–	–	–
COVERAGE OF STANDARDS											
GENERAL											
Compliance to law	-1	0	1	1	1	1	1	1	1	1	1
Internal audit	-1	-1	–	–	–	–	–	1	–	–	–
Performance monitoring	0	–	–	–	–	–	–	1	–	–	–
Performance improvement over time	0	–	–	–	–	–	–	1	–	–	–
Staff training	-1	1	–	–	–	–	–	–	–	–	–

Table 2. *(continued)*

DESCRIPTORS	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Processors	Retailers	Consumers	Gov't.	Env.	Animal welfare
FOOD SAFETY											
Development of food safety policy and manual/system	-1	-1	–	–	–	1	1	1	1	–	–
Use of HACCP approach	-1	-1	–	–	–	1	1	1	1	–	–
Food safety through site selection	-1	-1	–	–	–	1	1	1	1	–	–
GMO	-1	-1	–	–	–	1	1	1	1	–	–
Prohibit use of protein and fat from some species	-1	-1	–	–	–	–	–	1	–	–	–
Preharvest food safety	-1	-1	–	–	–	1	1	1	1	–	–
Pest control	-1	-1	–	–	–	1	1	1	1	–	–
Traceability	-1	-1	–	–	-1	1	1	1	1	–	–
Product testing	-1	-1	–	–	–	1	1	1	1	–	–
Post-harvest food safety	-1	-1	–	–	–	1	1	1	1	–	–
ENVIRONMENT											
Requires environmental risk/impact assessment	-1	-1	1	1	–	–	–	1	1	1	–
Environmental protection during farm siting	-1	-1	1	1	–	–	–	1	1	1	–
Loss of mangrove and sensitive habitats	-1	-1	–	–	–	–	–	1	1	1	–
Environmental impact considered during farm design and construction	-1	-1	1	1	–	–	–	1	1	1	–
Stocking density	-1	-1	1	1	–	–	–	1	1	1	1
Demand on wild stocks for seed/broodstock	-1	-1	–	–	–	–	–	1	1	1	–
Stocking of exotic species	-1	-1	1	–	–	–	–	1	1	1	–
Water exchange/abstraction	-1	-1	1	1	–	–	–	1	1	1	–
Requires testing/record keeping of water quality	1	1	1	1	–	–	–	1	1	1	1
Provides water quality standards to be complied with	-1	-1	1	1	–	–	–	1	1	1	1
Water effluents	-1	-1	1	1	–	–	–	1	1	1	–
Demand for fish protein/oil	-1	-1	–	–	–	–	–	1	1	1	-1
Solid waste management	-1	-1	1	1	–	–	–	1	1	1	–
Chemical/drug disposal	-1	-1	1	1	–	–	–	1	1	1	–
Escapees	0	0	–	–	–	–	–	1	1	1	–

Table 2. *(continued)*

DESCRIPTORS	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Processors	Retailers	Consumers	Gov't.	Env.	Animal welfare
Cumulative impact of multiple operations	-1	-1	1	1	–	–	–	1	1	1	–
Energy efficiency & consumption	-1	-1	–	–	–	–	–	1	1	1	–
AQUATIC ANIMAL HEALTH											
Farm preparation to prevent health problems	1	1	1	–	–	1	1	1	1	1	1
Farm biosecurity	1	1	1	–	–	1	1	1	1	1	1
Responsible use of drugs and chemicals	-1	-1	1	1	–	1	1	1	1	1	1
Antibiotic use	-1	-1	1	–	–	1	1	1	1	1	–
Control on additional not-banned substances	-1	-1	1	1	–	1	1	1	1	1	1
Quality/health status of seed	1	1	1	–	–	1	1	1	1	1	1
Farm management to prevent health problems	1	1	1	–	–	1	1	1	1	1	1
Feed quality	1	1	1	–	–	1	1	1	1	1	1
Overfeeding/FCR	1	1	1	1	–	1	1	1	1	1	1
Monitoring of animal health	1	1	1	–	–	1	1	1	1	1	1
Disease spread to other farms during culture	1	1	1	–	–	1	1	1	1	1	1
Disposal of mortality	-1	-1	1	–	–	–	–	1	1	1	–
SOCIAL											
Development of farmers' group	1	1	1	–	-1	-1	–	–	1	–	–
Other resource users/local communities	-1	-1	1	1	–	–	–	1	1	1	–
Workers' welfare	-1	1	–	–	–	–	–	1	1	–	–
Forced labour	-1	1	–	–	–	–	–	1	1	–	–
Child labour	-1	1	–	–	–	–	–	1	1	–	–
ANIMAL WELFARE											
Animal welfare (stress, etc.)	-1	-1	–	–	–	–	–	1	–	1	1
Protection from wild animals and predators	-1	-1	–	–	–	–	–	1	–	–	1
Application of non-lethal, or humane, methods of predator control	-1	-1	-1	–	–	–	–	1	–	1	1

As more detailed analysis to quantify the size of each cost or benefit or positive score would have required conducting stakeholder interviews, this approach was not adopted. **Therefore an overall negative score does not indicate that the costs exceed the benefits.** However, the scores allow the quantification, for different stakeholder groups, of the number of advantages and disadvantages generated from compliance to the scheme.

Review of additional costs and benefits

Additional information on the costs and benefits of each individual scheme was collected from Web sites. Information collected included the cost of certification of enterprises and the payment of premium prices by stakeholders in the supply chain.

RESULTS OF THE ANALYSIS OF THE CERTIFICATION SCHEMES

Descriptive analysis

The results of the descriptive analysis are reported in Table 3. Details on each scheme can be found in Annexes 2–9.

Table 3. Summary of the descriptive analysis of the ten certification schemes analysed in detail

No.	Descriptors	Results
1	ISEAL member	2 schemes
2	Benchmarked by GFSI	1 scheme
3	Scheme makes reference to international standards	All schemes e.g. ISOs (8), Codex (5), ILO (3)
4	Is the procedure for standard development & revision documented?	8 schemes
5	Were/are all the major stakeholder groups involved in the development/revision of the standard?	2 schemes. Other 3 schemes appeared to have involved most stakeholders
6	Is there a process for reviewing the standards regularly?	8 schemes
7	Is input from stakeholders directly impacted (especially disadvantaged groups) actively sought?	4 schemes
8	Is standard development based on the principles of consensus?	5 schemes. A process to reach a decision although not truly based on consensus adopted by 4 schemes
9	Is there a documented process to address complaints with failures in following the process for standard development and revision?	6 schemes
10	Standards publicly available for implementation (even if including reasonable fee)	All schemes, of which 4 request the payment of a small fee
11	Standards based on measurable/precise criteria	6 schemes use measurable/precise criteria, while 4 schemes use criteria that are partially measurable/precise
12	Product or process standards	9 schemes based on process standards and 1 based on a combination of process and product standards
13	Target of the label: consumer or food chain operators	6 standards target consumers

Table 3. *(continued)*

No.	Descriptors	Results
14	Link between standard development & certification organizations	4 schemes have strong links, other 4 have mild links and only 2 have no links
15	Implemented through Third Party Certification	5 schemes
16	Certification body accredited by internationally recognized accreditation organization or accredited to ISO 65	3 schemes
17	Free access to accredited CBs	3 schemes
18	Allows for certification of producer groups	5 schemes
19	Developed by competent representatives of direct stakeholders	Partially by all schemes although only 4 had true representation of direct stakeholders
20	Scheme has standards for producers	All schemes
21	Scheme has standards for traders	7 schemes
22	Scheme has standards for processors	9 schemes
23	Scheme has standards for seed suppliers	7 schemes
24	Scheme has standards for feed	7 schemes
25	Requires compliance to scheme throughout the supply chain	6 schemes
	Inspection process	
26	Inspection by CB includes water testing/environmental testing	3 schemes
27	Inspection by CB includes consultation with local communities/ assessment of off-site impact	2 schemes
	General points on producers' standards	
28	Clearly stated principles	8 schemes
29	Quantity of compliance points	2 schemes have a high number of compliance points; 8 schemes have an average number
30	Quantity of written documents required	4 schemes require many documents
31	Validity period of certificate/frequency of inspection	When specified mostly 1 year
32	Require records for (minimum time)	2 schemes require 2 years of records, the remainder ask to keep records for 1 year or do not specify
33	Period of compliance before being certified	When specified it is often a full life cycle or 1 year, whichever shorter
	COVERAGE OF STANDARDS	
	GENERAL	
34	Compliance to law	6 schemes. Other 3 schemes request compliance to at least some legal documents
35	Internal audit	7 schemes
36	Performance monitoring	All schemes
37	Performance improvement over time	6 schemes
38	Staff training	8 schemes

Table 3. *(continued)*

No.	Descriptors	Results
	FOOD SAFETY	
39	Development of food safety policy and manual/system	4 schemes
40	Use of HACCP approach	3 schemes
41	Food safety through site selection	3 schemes
42	GMO	4 schemes
43	Prohibit use of protein and fat from some species	3 schemes
44	Preharvest food safety	9 schemes
45	Pest control	6 schemes
46	Traceability	9 schemes
47	Product testing	6 schemes
48	Post-harvest food safety	8 schemes
	ENVIRONMENT	
49	Requires environmental risk/impact assessment	4 schemes
50	Environmental protection during farm siting	6 schemes
51	Loss of mangrove and sensitive habitats	8 schemes
52	Environmental impact considered during farm design and construction	3 schemes
53	Stocking density	5 schemes
54	Demand on wild stocks for seed/broodstock	6 schemes
55	Stocking of exotic species	5 schemes
56	Water exchange/abstraction	7 schemes
57	Requires testing/record keeping of water quality	8 schemes
58	Provides water quality standards to be complied with	3 schemes
59	Water effluents	8 schemes
60	Demand for fish protein/oil	4 schemes
61	Solid waste management	9 schemes
62	Chemical/drug disposal	8 schemes
63	Escapees	7 schemes
64	Cumulative impact of multiple operations	4 schemes
65	Energy efficiency & consumption	6 schemes
	AQUATIC ANIMAL HEALTH	
66	Farm preparation to prevent health problems	4 schemes
67	Farm biosecurity	3 schemes
68	Responsible use of drugs and chemicals	All schemes
69	Antibiotic use[21]	2 schemes
70	Control on additional not-banned substances	3 schemes
71	Quality/health status of seed	3 schemes
72	Farm management to prevent health problems	6 schemes

[21] Refers to schemes specifically covering the use of antibiotics, although other schemes may also have included antibiotic use within the more generic category of drugs and chemicals (item 68).

Table 3. *(continued)*

No.	Descriptors	Results
73	Feed quality	7 schemes
74	Overfeeding/FCR	7 schemes
75	Monitoring of animal health	6 schemes
76	Disease spread to other farms during culture	3 schemes
77	Disposal of mortality	4 schemes
	SOCIAL	
78	Development of farmers' group	2 schemes
79	Other resource users/local communities	7 schemes
80	Workers' welfare	8 schemes
81	Forced labour	8 schemes
82	Child labour	4 schemes
	ANIMAL WELFARE	
83	Animal welfare (stress, etc.)	4 schemes
84	Protection from wild animals and predators	5 schemes
85	Application of non-lethal, or humane, methods of predator control	5 schemes

Evaluation of costs and benefits based on descriptors

The evaluation of costs and benefits based on the descriptors revealed that schemes tended to provide more benefits to consumers (median value 33.5) and governments (median value 32.5), followed by the environment (median value 24) and neighbouring certified farms (median value 22.5), which benefited from the improved management in the certified farms. Other resource users, processors, retailers and animal welfare had approximately the same median value (13–16). Traders had a median value of 3 while certified farmers and their workers had negative median values (-12.5 and -6 respectively), mainly a reflection that compliance to standards generally represents a cost for certified businesses and, in consequence, for their employees.

The highest median value for certified producers was achieved by the Thai CoC (-7), while the lowest median value was obtained by GLOBALGAP, which also had the highest consumer median value (i.e. 50) as a reflection of the number of issues covered by the scheme. The total median values obtained by each scheme ranged between 5 (SQF) and 21 (GLOBALGAP).

When the costs and benefits were expressed as a proportion of the number of descriptors applicable for each scheme, a slightly different picture was observed; the Thai CoC was still the programme that most benefited producers while also having the highest overall median — it was closely followed by most other schemes.

A summary of the analysis based on the descriptors is reported in Tables 4 and 5.

Table 4. Summary of the analysis conducted calculating the sum of the costs and benefits associated with each descriptor

SCHEME	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Pro-cessors	Retailers	Con-sumers	Gov't.	Env.	Animal welfare	Min	Max	Median
Thai CoC	-7	0	25	18	2	16	17	34	33	24	16	**-13**	**27**	**13**
SQF	-8	-6	5	5	3	13	13	17	14	5	5	**-22**	**50**	**21**
ISO 14001	-10	-7	16	15	4	7	7	25	21	22	9	**-19**	**40**	**16**
FLO	-11	-3	24	20	3	13	14	33	32	24	11	**-7**	**34**	**17**
ISO 22000	-11	-4	8	8	3	11	11	19	15	7	5	**-8**	**17**	**5**
IFOAM	-13	-6	29	21	3	18	18	40	37	32	16	**-13**	**40**	**18**
GAA/ACC	-13	-6	17	15	4	13	13	27	25	21	10	**-18**	**43**	**18**
ISO 9001	-18	-9	21	15	3	18	18	43	35	28	15	**-10**	**25**	**9**
Naturland	-19	-10	24	18	3	16	16	40	35	30	15	**-12**	**20**	**8**
GLOBALGAP	-23	-17	25	19	3	21	21	50	41	31	18	**-11**	**33**	**14**
Minimum	**-22**	**-16**	**5**	**5**	**2**	**7**	**7**	**17**	**14**	**5**	**5**	-22	**17**	**5**
Maximum	**-7**	**0**	**29**	**21**	**4**	**21**	**21**	**50**	**41**	**32**	**18**	-7	**50**	**21**
Median	**-12.5**	**-6**	**22.5**	**16.5**	**3**	**14.5**	**15**	**33.5**	**32.5**	**24**	**13**	-12.5	**33.5**	**15**

Table 5. Summary of the analysis conducted calculating the proportion between the costs and benefits associated with each descriptor and the total number of descriptors applicable to each scheme

SCHEME	Certified farmers	Workers	Neighb. farmers	Other resource users	Traders	Pro-cessors	Retailers	Con-sumers	Gov't.	Env.	Animal welfare	Min	Max	Median
Thai CoC	-34%	-16%	45%	39%	11%	34%	34%	71%	66%	55%	26%	-34%	71%	34%
SQF	-34%	-25%	39%	30%	5%	33%	33%	78%	64%	48%	28%	-34%	78%	33%
ISO 14001	-35%	-19%	44%	33%	6%	30%	30%	74%	65%	56%	28%	-35%	74%	30%
FLO	-14%	0%	51%	37%	4%	33%	35%	69%	67%	49%	33%	-14%	69%	35%
ISO 22000	-29%	-21%	18%	18%	11%	46%	46%	61%	50%	18%	18%	-29%	61%	18%
IFOAM	-22%	-10%	49%	36%	5%	31%	31%	68%	63%	54%	27%	-22%	68%	31%
GAA/ACC	-33%	-17%	39%	28%	6%	33%	33%	80%	65%	52%	28%	-33%	80%	33%
ISO 9001	-28%	-19%	44%	42%	11%	19%	19%	69%	58%	61%	25%	-28%	69%	25%
Naturland	-40%	-17%	27%	27%	10%	40%	40%	67%	53%	23%	17%	-40%	67%	27%
GLOBALGAP	-22%	-6%	49%	41%	6%	27%	29%	67%	65%	49%	22%	-22%	67%	29%
Minimum	**-40%**	**-25%**	**18%**	**18%**	**4%**	**19%**	**19%**	**61%**	**50%**	**18%**	**17%**	**-40%**	**61%**	**18%**
Maximum	**-14%**	**0%**	**51%**	**42%**	**11%**	**46%**	**46%**	**80%**	**67%**	**61%**	**33%**	**-14%**	**80%**	**35%**
Median	**-31%**	**-17%**	**44%**	**34%**	**6%**	**33%**	**33%**	**69%**	**64%**	**50%**	**27%**	**-31%**	**69%**	**30%**

ADDITIONAL EVALUATION OF COSTS AND BENEFITS

GLOBALGAP (www.globalgab.org)

Costs

The GLOBALGAP Web site reports the following fees to be paid by producers or groups of producers:

- A certification fee charged by the certification body.This fee is set by the CBs approved by GLOBALGAP, which compete price-wise, therefore CB certification fees are defined as free market prices and are not fixed by GLOBALGAP itself.
- Annual GLOBALGAP registration fees of €5 per grower.
- A certification licence fee of €20 for each completed inspection.

CBs pay GLOBALGAP:

- €300 for the first application.
- €3 000 — annual CB base licence fee (€2 500 for GLOBALGAP members).
- Certification licence fee of €20 for each certificate and each underlying inspection.
- The €5 registration fee collected from each producer (per year) — then paid to GLOBALGAP.

The detailed analysis of the schemes revealed several requirements that would prove difficult to comply with by small-scale producers, especially those in the Asia–Pacific region. Examples of such requirements are the high number of written documents required, the high number of control points and the need for registration of home-mixers of feedstuff and others. Health management is also to be conducted under the supervision of a veterinarian, which at present would be difficult for most small- and medium-scale aquaculture enterprises in Asia.

Benefits

GLOBALGAP reports a wide range of benefits such as:

- Reduced food safety risks using HACCP[22]-based reference standards.
- Reduced cost by avoiding the proliferation of buyer requirements and shifting of GLOBALGAP retailer and food service members towards supplying products from GLOBALGAP approved sources.
- Avoiding excessive regulatory burdens.
- Achieving global harmonization.
- Increasing the integrity of farm assurance schemes worldwide by defining and enforcing a common level of auditor competence, a common level of verification and action on non-compliances and by harmonizing interpretation of compliance criteria.

GLOBALGAP declares that certification does not lead to better prices for producers. This is partly because GLOBALGAP labels do not appear on product packaging and are used only in business-to-business transactions. However, products from GLOBALGAP farms are at least sometimes presented to consumers in separate areas from ordinary products, therefore allowing consumers to distinguish products produced by GLOBALGAP-compliant businesses. It has also been reported that premium prices are

[22] Hazard Analysis and Critical Control Points.

currently being paid for GLOBALGAP certified shrimp.[23] Benefits to the producer from being GLOBALGAP certified also include the fact that certified farmers are preferred producers, they obtain access to a larger market and they are paid promptly. In addition, owing to the wide coverage of the scheme, GLOBALGAP compliance leads to a range of external benefits for the environment, local communities and animal welfare.

Safe Quality Food Institute (www.sqfi.com and www.fmi.org)

Costs

No information could be gathered on the cost of certification as mainly this is available with accredited CBs and largely dependent on the size and type of farm.

Although the analyses of the schemes based on descriptors showed that the scheme did not have a very high number of costs for producers, the benefits for consumers were also relatively limited. In fact, consumers' benefits were largely restricted to food safety, although the scheme may change significantly with the introduction of the voluntary modules for environmental and social responsibility. Detailed analysis of the scheme revealed a number of critical costs for small-scale producers, including the development of a policy manual and the use of the HACCP system, which requires a great deal of capacity or consultation with external specialists and, as such, would be impractical for small-scale producers.

Benefits

The Safe Quality Food Institute (SQFI) reports the following benefits associated with the SQF scheme.[24]

- Food Marketing Institute (FMI) members (who own the SQF scheme) are reported to be increasingly requesting their suppliers for SQF-certified products.
- Research conducted about a decade ago indicated that SQF-certified suppliers (particularly in the produce and animal production sectors) improved profits because of higher production of premium grades.
- In some sectors, mainly in the wheat industry, consumers are willing to pay higher prices for SQF products.

GAA/ACC (www.gaalliance.org and www.aquaculturecertification.org)

Costs

According to the ACC Web site, to be certified, facilities have to pay: (1) A US$500 processing fee. (2) An inspection fee to certifiers (most recently to be paid directly to the ACC) composed of two parts — (i) a daily consultation rate which can vary from US$400 to US$800/day depending on the country in which the facility is located. Generally certifiers are said to spend several days evaluating a shrimp farm or facility and to decide whether the facility meets the requirement for certification. (ii) Actual expenses encountered by the ACC certifier, including the cost of travel, lodging, meals and communications (fax, Internet, etc.).

For processing facilities there is also a Pay Program Participation Fee, based on the amount of finished products exported from the facility in the last calendar year.

[23] Erwin Roetert, consultant to GLOBALGAP, personal communication.
[24] Paul Ryan, Director of SQFI, personal communication.

Plant exported:

- < 1 000 tonnes of finished products: Min. US$2 000
- > 1 000 tonnes of finished products: US$2/tonne (max. US$8 000)

Recertification costs to the business annually: US$1 000 for a processing fee and certifier-related fees for site inspection and review.

To increase the independence of the certification process, from January 2007 fees are to be paid directly to the ACC, which then compensates certifiers.

Benefits

Although so far there are no reports of better prices being paid for ACC-certified products, in 2005 Wal-Mart, the largest retailer in the world, entered into a partnership with GAA and ACC by declaring that all the foreign shrimp suppliers should be certified as compliant to BAP. In early 2006, Darden Restaurants declared their intention to require GAA certification from their shrimp suppliers and, with the acceptance of ACC-certified products also by Lyons Seafood Ltd. (one of the major seafood suppliers in the United Kingdom); this scheme seems to be rapidly establishing itself in the market place.[25] External benefits such as environmental protection and social sustainability would also appear to be associated with compliance with the scheme although no actual evidence is available yet.

Thai Quality Shrimp (www.thaiqualityshrimp.com)

Costs

A study conducted in 2002 and published by the Office of Agricultural Economics (2004) indicated that, although the size of harvests in CoC and non-CoC farms was very similar (i.e. 4 175 and 4 137 kg/ha respectively), the size of shrimp at harvest was, on average, larger in CoC ponds (55 vs 67 shrimp/kg). However, the profits per farm appeared to be slightly higher in non-CoC farms as a reflection of a higher proportion of farmed area; CoC ponds had an almost double reservoir/treatment pond area.

The application of the Thai quality standards would appear to be suitable to Thai shrimp producers. However, the applicability of these standards to systems in countries where shrimp farming is dominated by smaller scale producers (e.g. Viet Nam, Bangladesh, India, etc.) would appear to be limited as some of the requirements (e.g. establishment of a water treatment system, etc.) would be extremely demanding.

Benefits

The Thai Department of Fisheries declares that compliance with the Thai shrimp quality programme leads to the following benefits: premium prices, minimized environmental impact, improved sustainability of the sector and less conflict with NGOs, in addition to better acceptance of the product by buyers.

At the time when the study was conducted, prices for CoC shrimp were frequently reported to mirror those of non-CoC products, except in the case of differences in size, although reports are now emerging that CoC shrimp faces premium prices within Thailand and this may result in increased financial profits for farmers.[26]

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[25] *Outlook meetings spark synergy between shrimp and fish sectors.* http://aquafeed.com/article.php?id=1767&sectionid=1

[26] Pornlerd Chanratchakool, personal communication.

ISO 9001 (www.iso.org)

Costs

The cost of certification for ISO 9001:2000 varies greatly depending on the company's current quality management system, the size and complexity of the organization and the quality objectives of the company (i.e. what quality attributes the company is targeting). According to the ITC Executive Forum,[27] small companies that implement ISO 9000 without external support and using the ITC 5-Step Approach and ISO 9000 Implementation Manual and Forms Collection may be certified for as little as US$2 000.

Benefits

There are several internal benefits to be achieved through the implementation of a quality management system such as that covered by the ISO 9001 standard, including more efficient management and reduced costs associated with failures. External benefits include increased confidence by consumers (here meaning the parties purchasing the products) and potentially better prices paid at different levels throughout the supply chain, although no evidence of premium prices is as yet available.

ISO 14001 (www.iso.org)

Costs

Because of the diversity of the companies and the wide range of potential environmental impacts, it is difficult to provide a schedule of costs associated with ISO 14001 certification. Typically the evaluation of environmental aspects it is said to take three to six months. An additional three months are required to set objectives and targets and to complete the documented procedures. Further, the system must be running for at least three months before the certification audit, hence a nine- to 12-month period is usually required to achieve ISO 14001 certification.

Benefits

Many benefits have been reported to be associated with the implementation of ISO 14001. These include increased profits because of a reduction in wastes and inefficiencies, encouraging recycling, improving employees' health and consequently employees' efficiency. ISO 14001 is also likely to be appealing to "green consumers" seeking environmentally friendly products and therefore eliciting the payment of premium prices. Through the improvement of the environment, implementation of ISO 14001 has also been reported to bring social benefits.[28]

ISO 22000 (www.iso.org)

Costs

As for the implementation of other ISO standards, the cost of implementing ISO 22000 standards is dependent on the company type, size and complexity of operation.

Benefits

Like other standards, the consumers are the major beneficiaries from the implementation of ISO 22000. Benefits are arguably even higher in the case of ISO 22000 because of the strong food safety focus of this

[27] **ITC Executive Forum.** *An introduction to ISO 9000:2000.* www.intracen.org/execforum/ef2005/quality_assurance_challenge_papers/Intro-ISO9000_Day4Sess1.pdf

[28] *ISO 14000 environmental management systems – benefits.* http://www.trst.com/iso1-frame.htm

scheme. ISO 22000 is reported to also bring a number of benefits to businesses, developing countries and other stakeholders.

In fact, *inter alia*, ISO 22000 allows businesses to demonstrate their commitment to food safety; improves internal and external communication; demonstrates control of known food hazards; brings continuous improvement of the organization's food safety management system; and benefits developing countries by delivering technological expertise delivered by the standards, which are said to represent an international consensus, and through the decision-making framework developed via ISO 22000 implementation.[29]

IFOAM (www.ifoam.org)

Costs

Information collected from three IFOAM-accredited CBs identified that the average cost of certification ranges from US$300 to over US$2 000 per year (the latter figure associated with Norwegian aquaculture).[30] IFOAM also states its interest in the development of standards and certification systems that are sufficiently innovative and cost efficient to address the constraints of small-scale businesses, especially in developing countries.[31] The differences in the cost associated with certification that appear to exist in different countries would appear to address these needs, with the cost of certification for Thai farmers being almost ten times lower than those faced in Nordic countries.

Benefits

The IFOAM Web sites list several benefits associated with organic aquaculture and the IFOAM approach. They are, *inter alia*:

- Integration of wild biodiversity, agrobiodiversity and soil conservation.
- Elimination of the use of chemical fertilizers, pesticides and genetically modified organisms (GMOs), therefore benefiting both human health and the environment.
- Water conservation.
- Sustainable use of biodiversity.
- Reduction of external inputs.
- Restoration of the environmental balance.
- Implementation of organic farming within the local socio-economic, climatic and cultural settings.

Products certified by IFOAM-accredited CBs are also known to receive premium prices. Analysis of the scheme descriptors also showed that compliance to IFOAM standards was associated with many benefits for consumers for a reasonably low number of costs to the producers. As the only organic scheme with membership of ISEAL, IFOAM is also likely to provide increased credibility when compared with other such schemes.

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[29] **Pattron, D.D.** *Significance of ISO 22000 to the food industry.* www.foodhaccp.com/onlinecourse/ISO22000.ppt

[30] Hagai Raban, Agrior, personal communication; Jan-Widar Finden, Debio, personal communication; Weena Krutngoen, Organic Agriculture Certification Thailand, personal communication.

[31] http://www.ifoam.org/about_ifoam/standards/ics.html

Naturland (www.naturland.de)

Costs

According to information produced in 2001, the certification fee to achieve Naturland certification comprises three items: an annual inspection cost, a membership fee and a licence fee as follows:

- Annual inspection cost: US$150 to 350.
- Membership fee: US$1/small-scale farmer (if organized in groups) or US$2/ha for large-scale farmers. Minimum fee of US$250.
- Licence fee:
  - 1 percent of net sale price on all organic sales to Europe.
  - 0.5 percent for sales to other countries.
  - 0.1 percent for domestic sales.

Experiences from the certification of a shrimp farmer group in Viet Nam show that the initial certification for a group would cost approximately US$90/farm (although groups with 1 000 farmers or more would pay about US$60–70/farm). The price would be lower (US$70–80/farm) in subsequent years.[32]

In 2004, the Naturland programme was criticized by the Swedish Society for Nature Conservation (SSNC) on allegations that Naturland shrimp farming projects in Ecuador and Indonesia did not follow Naturland standards, that the certification system was not working adequately and that Naturland standards did not contribute to shrimp farming sustainability. The allegations were all contested by Naturland, which provided information to prove that SSNC claims were unsubstantiated.

Benefits

Like other organic programmes, Naturland offers a range of benefits in terms of environmental and social sustainability. In Viet Nam, a project implemented with the support of SIPPO led to a premium price of 20 percent for Naturland certified shrimp to be sold primarily in Switzerland. A total of 5 percent of the premium was re-invested to cover the cost of certification for the following year, while the remaining 15 percent was distributed throughout the supply chain, with farmers allegedly receiving 5 percent.[33] This initiative, started about three years ago, is still ongoing although recent exchanges among several of the players involved in this activity indicate growing concerns regarding the viability of this effort.[34]

Fairtrade Labelling Organizations (www.fairtrade.org.uk)

Costs

As reported on the FLO-CERT Web site, the cost of obtaining FLO certification varies depending on whether the organization comprises producers or organizations of producers. Organizations of producers are asked to pay the following:

- An application fee (for the first year): €250.
- An initial certification fee is charged at the first inspection and based on the time taken to evaluate the organization; about €1 400 for organizations with less than 50 members and up to €3 000 for organizations with up to 1 000 members.

[32] Philippe Serene, personal communication.
[33] Olivier Muller, SIPPO, personal communication.
[34] Philippe Serene, personal communication.

Renewing FLO certificate costs is lower as farmers are requested to pay the annual fee, in addition to any cost for follow-up inspections, if any.

Benefits

FLO certification would appear to bring a number of social and environmental benefits at a relatively limited cost for producers. In addition, the FLO Web site also reports examples in which producers obtained a premium price for FLO-certified products and this was sometimes used by the producer organization to implement community projects.

Other analyses of certification schemes

A study commissioned by the European Commission reviewed the certification schemes available for food sold in European countries.[35] Although the study covered only some of the quality schemes examined in this review (for example it excluded organic programmes) and was focused on the European context, it examined the whole supply chain and, as such can provide some useful information on different schemes of relevance to the aquaculture sector. In this EC study, pros and cons were grouped into five categories based on whether they concerned fair competition, environmental protection, consumer information, rural development and food chain competitiveness. An extract from the results obtained from the study is given in Table 6.

[35] **EC.** 2005. *Food supply chain dynamics and quality certification.* Final report. (DG JRC/IPTS).

Table 6. Results obtained from the analysis of pros and cons of different schemes certifying food products sold on the European market[36]

Scheme	Attribute type	Pros	Cons	Pros/Cons
ISO 9001	Fair competition	4	0	**3.50**
	Environment	0	1	
	Rural development	4	1	
	Consumer information	2	1	
	Food chain competitiveness	4	1	
	Total	**14**	**4**	
ISO 14001	Fair competition	4	0	**5.33**
	Environment	2	0	
	Rural development	4	1	
	Consumer information	2	1	
	Food chain competitiveness	4	1	
	Total	**16**	**3**	
ISO 22000	Fair competition	3	1	**2.17**
	Environment	2	0	
	Rural development	3	2	
	Consumer information	1	2	
	Food chain competitiveness	4	1	
	Total	**13**	**6**	
GLOBALGAP	Fair competition	1	3	**0.89**
	Environment	2	0	
	Rural development	2	2	
	Consumer information	1	2	
	Food chain competitiveness	2	2	
	Total	**8**	**9**	
Label Rouge	Fair competition	3	1	**5**
	Environment	1	1	
	Rural development	4	0	
	Consumer information	3	0	
	Food chain competitiveness	4	1	
	Total	**15**	**3**	

[36] Modified from **EC DG JRC/IPTS.** 2005. *Food supply chain dynamics and quality certification – final report.* http://foodqualityschemes.jrc.es/en/documents/Finalreport_000.pdf

Discussion

TRENDS IN AQUACULTURE CERTIFICATION

This review highlighted a number of important trends concerning aquaculture certification:

- The number of schemes being developed for the certification of aquaculture products is increasing over the years. This is a result of both the establishment of new schemes all together (e.g. the ACC) and of schemes involved primarily with other sectors expanding also to the aquaculture sector (e.g. GLOBALGAP, IFOAM, etc.). This pattern follows the same lines observed in the food sector as a whole, with the numbers of schemes growing very rapidly over the years and with Europe alone hosting products certified under several dozens of schemes.[37]
- Already existing schemes are expanding to more and more aquaculture commodities. Major entry points into aquaculture certification are shrimp and salmonids, although standards are now expanding further in scope covering an increasing number of aquaculture commodities.
- Standards are increasingly expanding in scope, with for example an increasing number of schemes originally aimed at improving food safety expanding to other areas of sustainability (e.g. environmental and social sustainability).
- Standard-setting organizations are increasingly consulting with a wide range of stakeholders, putting an increasing amount of effort into developing fora for directly impacted communities to express their views.
- To allow small-scale producers to access certification, schemes are increasingly including the possibility to certify producers' groups or clusters, in addition to individual businesses.
- The aforesaid trends are largely driven by an increasing demand for certified aquaculture products, which follows the overall trend of the food business.

These trends have been leading to many standards targeting the same commodities and similar aspects of sustainability, often creating a very confusing panorama for producers.

SHOULD FARMERS SEEK CERTIFICATION?

Because of the often very large numbers of control points, achieving certification appears to come at a heavy cost for producers. It is frequently stated by the standard-setting organizations that complying with standards often leads to better management, hence a decrease in the farm operations cost. These experiences were also observed through the adoption of BMP, which are generally aimed at increasing sustainability without necessarily requiring a formalized conformity assessment process.[38] Although this is supported by an increasing amount of evidence and has elicited several efforts in the Asia–Pacific region (e.g. NACA-promoted projects in India and Viet Nam), conformity assessment frequently requires relatively large financial inputs to be paid by farmers.

It is also often declared that farmers will have to obtain certification to be able to conserve a place in the market. Although it is clear that the market for certified products is increasing rapidly, it is also true that, with few exceptions (e.g. GLOBALGAP certified salmon), the market for certified aquaculture products is still a niche market, which only a few and relatively larger producers appear to be able to access. A detailed examination of the schemes also revealed that the requirements of most schemes (i.e. all the

[37] **EC.** 2005. *Food supply chain dynamics and quality certification.* Final report. (DG JRC/IPTS).

[38] **Corsin, F., Mohan, C.V., Padiyar, A., Yamamoto, K., Chanratchakool, P. & Phillips, M.J.** In press. Codes of practice and better management: a solution for shrimp health management? *In* M.B. Reantaso, C.V. Mohan, M. Crumlish & R. Subasinghe, eds. *Diseases in Asian Aquaculture VI.* Fish Health Section, Asian Fisheries Society.

schemes examined with the potential exception of organic programmes) are well beyond the possibilities of most producers, especially small-scale farmers in the Asia–Pacific region. This is also witnessed by the geographical distribution of certified farmers and processors in some schemes (e.g. GAA/ACC). In fact, although certified processors seem to be homogeneously distributed in major aquaculture-producing countries, the distribution of certified farms appears to be strongly biased towards American businesses, with Asian farmers being poorly represented. In view of the increasing global demand for fisheries products, it would appear that demand for uncertified products will also be increasing, meaning that uncertified products will continue to have a place in the market for quite some time, of course provided they are in compliance with the requirements set by international and bilateral agreements (especially concerning food safety).

It is possible that standards will become less strict, therefore becoming more accessible to a wider range and number of producers and becoming a type of "minimum acceptable standard". This scenario however appears to be unlikely and, looking at the trends described, it is to be expected that schemes will increase the number of control points even further, perhaps incorporating more strongly animal welfare (which is now being addressed also by the OIE) and the cost of externalities such as energy consumption (now addressed by six out of ten schemes), air pollution and others.

What then are the incentives for farmers to obtain certification and not simply to use standards as a way to improve their management practices without seeking formalized certification? It would appear that formalized certification is an aspiration only for farmers responding to the requirements of the direct buyers of their products. In this case, farmers would consider the costs and benefits of complying with a certain scheme requested by the buyer and acting accordingly. During these considerations, farmers would also have to consider the risk of producing a product that targets compliance with a specific scheme, but failing to pass inspection. Because of the costs and risks that farmers face when complying with a certification scheme, compliance will most likely have to be driven by a system of premium prices paid to farmers to compensate them for their efforts. A number of successful examples have been witnessed in the agriculture sector but also in aquaculture, with organic and fair-trade products facing proportionally higher market prices, therefore pulling farmers towards compliance.

Based on this discussion, it would appear that targeting certification blindly, i.e. farmers seeking compliance to certification schemes without a direct link with the market would be an expensive and, generally speaking, poorly rewarding strategy. This strategy would have an even lower applicability if schemes did not lead to premium prices.

The process of deciding whether to comply with a certain certification scheme or not will be even more challenging for small-scale producers, who are often resource-limited and whose livelihoods are often more vulnerable. For small-scale farmers, establishing a direct link with the market would be in most cases almost impossible. Farming systems in the Asia–Pacific region are in fact dominated by networks of traders which are making quality assurance and traceability huge challenges for all the stakeholders involved. It would therefore appear that for small-scale producers to have access to and benefit from a certification scheme they would have to be part of more direct supply chains. This approach would most likely be possible for small-scale producers only if they are part of farmers' organizations. The development of farmers' groups for small-scale producers has been receiving increasing attention over the past years. Experiences on the development of aquaclubs in India proved particularly successful at developing a mechanism for improved management, information sharing and at improving relationships with other links in the supply chain.[39] The development of farmers' groups is being encouraged by a number of schemes (two in this review), with some schemes, e.g. FLO, actually operating only through

[39] **Padiyar, P.A., Phillips, M.J., Bhat, B.V., Mohan, C.V., Ravi, B.G., Mohan, A.B.C. & Sai, P.** In press. Cluster level adoption of better management practices in shrimp (*P. monodon*) farming: an experience from Andhra Pradesh, India. *In* M.B. Reantaso, C.V. Mohan, M. Crumlish & R. Subasinghe, eds. *Diseases in Asian Aquaculture VI.* Fish Health Section, Asian Fisheries Society.

the certification of farmers' groups. Because of the many benefits to be achieved by small-scale producers through their participation in farmers' groups, this approach should continue to be promoted broadly.

WHAT IS THE BEST APPROACH?

There is no doubt that improving the sustainability of the aquaculture sector is of outmost importance not only for stakeholders in aquaculture but also for other stakeholders relying on the same resources as the aquaculture sector. The practices contained in most certification standards appear to tackle this objective, although for some schemes the requirements appear to be too demanding, the number of control points are at times very high (therefore making conformity assessment also more expensive) and/or are sometimes heavily biased towards the interests of the consumers, more than those of the producers. Standards are most often developed through a process that excludes some of the stakeholder groups directly impacted by the standards and, when multistakeholders fora are used, the process of standard development is most often not fully consensus-based.[40] The detailed analysis of the schemes most relevant to the Asia–Pacific region revealed that IFOAM was the only scheme currently applicable to the aquaculture sector and was developed using both a multistakeholder and consensus-based approach. Therefore to truly tackle sustainability there appears to be the need for the development of harmonized standards that are a true equilibrium between the interests of all the stakeholders involved. In this context, the adoption of practices recommended by ISEAL, ISO and the FAO/NACA guidelines for aquaculture certification currently under development appear to be extremely important. Such standards should be more inclusive rather than exclusive; they should address the needs of the largest proportion of producers and therefore they should develop a mechanism to drive towards sustainability, rather than differentiating "better" from "worse" producers. This concept of "inclusiveness" is particularly important. As stated earlier, all the certification schemes currently applicable to aquaculture are niche schemes and, as such, they cannot target the broad sustainability of the sector. Therefore, any comparisons and detailed assessments of the strengths and weaknesses of different schemes would seem to have only marginal use.

In addition to the development and promotion of schemes that truly target sustainability, it is also worth exploring different options for assessing conformity to standards. At present, third party certification appears to be the most common mechanism to assess conformity. However there are other potential approaches that could be adopted that some schemes (e.g. IFOAM) have been exploring.

The use of government officers to implement inspections would appear to be a more cost effective strategy than third party certification although arguably less credible because of the links that government has with producers and their direct interest in having many certified enterprises. Fully supported government schemes however run the risk of being accused of providing subsidies to farmers. In addition, because governments are both in charge of certifying the process and the products being marketed (or exporters), their programmes may be more vulnerable to criticism if products produced within the scheme show major compliance failures (e.g. they contain residues of banned antibiotics) as opposed to schemes that certify the process solely and, as such, are not also responsible for the quality of traded products. For these reasons, it may be best for government institutions to be involved in voluntary certification schemes through a cost-sharing mechanism (see hereunder).

The approach used by some WWF offices and the Monterey Bay Aquarium is also particularly interesting. Although they do not allow differentiating between individual producers, they classify commodities (based also on their geographic location) depending on the degree of sustainability associated with their production. In this respect this "traffic light" approach resembles the process used by the MSC to certify sustainable fisheries, although it lacks a true process of assessing sustainability through field surveys or similar studies. Using standards developed through a true process of consensus to conduct such field assessments would allow the certification of areas and commodities instead of single enterprises. This

[40] See Annex 5 for the ISO definition of consensus.

approach would also allow taking into account the wider impact of the sector in a specific area, an impact that is dependent not only on compliance by the farmers but also includes, *inter alia*, the development of aquaculture plans, the availability of services for producers and compliance to regulations by input suppliers. This mechanism would allow the development of "sustainable aquaculture zones" which could then be certified as sustainable and used by buyers to source their aquaculture products. This approach would of course run the risk of non-compliant individuals potentially jeopardizing the certified status through compliance failures, although peer pressure and the involvement in this process of a wide range of stakeholders would reduce this risk. These sustainable aquaculture zones could be potentially as big as whole countries making the cost of conformity assessment relatively negligible for individual stakeholders.

The development of a system similar to the Carrefour Quality Line system would also appear to reduce costs for producers. Farmers would be requested to produce products following a set of standards requested by retailers. Suppliers would then work with farming communities to ensure their compliance to the standards and would then source the product from compliant producers and bring it to the retailers. This approach however would require products to be of homogeneous quality and have a recognizable trait that makes the product "special" on the market. At this level, the establishment of a mechanism to market aquaculture products that have been produced following sustainable aquaculture practices (e.g. BMP) in buffer zones within Marine Protected Areas (MPA) would appear worthwhile exploring.

Certification is a mechanism to increase the credibility of claims related to quality. The development of relationships between farmers and consumers (or their organizations) that are based on trust may also be an approach worth exploring following the experiences of the Participatory Guarantee System encouraged by IFOAM. Although workable in situations in which producers and consumers are members of the same community (e.g. for products that are targeting the domestic market), in most situations in which markets are located away from the areas in which products are grown (which is most often the case in the aquaculture sector), intermediaries capable of ascertaining the quality of products, whether this is based on actual standards or not, will be needed for this mechanism to work.

It must be pointed out that all of the aforementioned approaches would be more effective if they were linked to a system of premium prices to be paid through the supply chain, but most importantly to the producers, who are critical to the achievement of the quality attributes requested.

SHARING COSTS AND BENEFITS

Certification costs are often borne by the producers, although if a scheme requires certification throughout the production chain, all the links will have to pay the costs associated with certification. The development of cost-sharing mechanisms to assist producers, especially those who are small scale, to comply with standards should also be explored further, especially when compliance to standards brings benefits to a wide range of stakeholders.

Governments often benefit from compliance to standards because of their responsibility in ensuring the quality of exported products or to improve the sustainability of their respective national aquaculture sectors through environmental protection or protecting the interests of local communities. In Asian countries, voluntary quality standards have become, to a great extent, a strategy aimed at addressing compliance with the law, which is often difficult to enforce in view of the extremely large number of both registered and unregistered producers. In fact, voluntary government-led efforts addressing the broad sustainability of the sector appear to be more common in Asian countries than in Europe or North America, where governments are more focused on the development of legislation (which is more easily enforceable) and voluntary organic schemes. Establishing a system entirely supported by government institutions would however be vulnerable to subsidy accusations. However, governments would be justified in devoting efforts to promoting environmental protection, which, unless there is a risk of self-pollution, is arguably a lower priority for farmers.

Because of the often very diverse and dynamic supply chains, processors often access the quality (especially in terms of drug residues) of products using postharvest assessments. The compliance to preharvest standards by farmers would reduce the risk encountered by processors, therefore potentially reducing the need for postharvest tests. For this reason, processors would have the necessary incentive to support farmers to comply with standards addressing preharvest quality attributes. This approach seems to be of increasing importance in view of the increasing requirements for traceable products and the increasingly stringent importation requirements that have occasionally led to the establishment of strict conditions for the importation of fisheries products. The mechanism through which processors support farmers' compliance could simply be through the payment of premium prices; other forms (e.g. supplying extension services etc.) may be necessary for this approach to work so supply chains should often be shortened. Once again, the establishment of farmers' groups would allow a more direct marketing of products, also serving this level.

Within this cost-sharing mechanism, the producers would then focus on implementing practices that directly benefit production, e.g. health management, water quality monitoring within the farm, etc.

Through a cost-sharing partnership among governments, processors and producers, compliance to standards would become relatively cheaper (in terms of resources) for producers, therefore improving the chances of compliance. Interest in the establishment of this mechanism has been expressed already in some countries (e.g. Viet Nam) and, if these initial ideas were to be piloted, experiences should be carefully examined to maximize the number of stakeholders who would benefit.

Recommendations

Based on the previous discussion, the following recommendations are made for different stakeholder groups.

Standard-setting organizations should:

- Develop standards following guidelines produced by FAO/NACA, ISEAL and ISO especially in terms of transparency, consensus building and the participation of stakeholders directly impacted by the standards.
- Where possible, encourage the development of standards that are more balanced towards small-scale producers (i.e. less demanding in terms of requirements and number of control points).
- Aim at developing standards that are based on performance improvements more than mere compliance (or lack of compliance) to a set of prescriptive requirements.
- Increase the inclusiveness of standards to target a higher proportion of producers therefore addressing the sustainability of the sector instead of the sustainability of only a very limited number of producers. To avoid becoming less strict, schemes could develop a system of step-wise certification, with different steps being associated with an increasing number of control points being complied with.
- Increase efforts towards harmonization (and preferably benchmarking) of different schemes to reduce the costs of compliance to different schemes and to ensure that consistent messages are delivered to the stakeholders involved (particularly producers).
- Develop programmes for the dissemination of standards for implementation regardless of the process of certification associated with standards' implementation.

Inspection and CBs should:

- Operate following ISO guides (and the FAO aquaculture certification guidelines when finalized) on conformity assessment, especially in terms of ensuring independence from the supply chain and other forms of conflicts of interest.

Governments should seek to:

- Promote the development of and participate in cost-sharing mechanisms (in conjunction with other stakeholders, e.g. producers, processors, etc.) for the assessment of conformity to certification standards.
- Promote the development of "sustainable aquaculture zones" that can be recognized by buyers as targeting sustainability broadly and at every stakeholder level.
- Focus on those aspects of standards' implementation that are targeting the reduction of externalities of aquaculture production (e.g. environmental and social impact, etc.), while at the same time developing legislation that addresses mandatory requirements for aquaculture production.
- Disseminate and promote BMP that address sustainability broadly and, as such, are beneficial to the aquaculture sector regardless if they are linked to a certification scheme.
- Support producers, especially small-scale farmers in the process of identifying schemes that bring the most profits (i.e. have an established market chain and premium price mechanism).

Retailers should:

- Be prepared to pay a premium price for products produced following standards that also address environmental and social sustainability. In fact, compliance to criteria that address these so-called externalities has a cost for producers and this cost should be built into the price of the products, therefore requiring higher prices for such products.

Consumers and consumer organization should:

- Be prepared to pay a premium price for products produced following standards that also address environmental and social sustainability.
- Seek information on the meaning of different certification schemes to promote responsible consumption of aquaculture products more strongly.

Processors and traders should:

- Be prepared to support, through premium prices, products that have higher quality and a lower risk of rejection.
- Participate in cost-sharing schemes that support producers to comply with schemes that address the sustainability of the sector.
- Where possible create relationships with producer organizations to establish stable market links that can improve traceability and accountability.

Producers should:

- Adopt BMP approaches to address the sustainability of the sector.
- Respect legal requirements, especially concerning the planning and management of aquaculture areas.
- Carefully evaluate (and if necessary seek assistance) in the identification of certification schemes that can bring true benefits in terms of both quantity and quality, especially focusing on the schemes that can ensure a better price.

Annex 1. Definitions of relevance to aquaculture certification

Definition	Description	Reference
Acceptance or Acceptance of conformity assessment results	Use of a conformity assessment result provided by another person or body	ISO 17000
Accreditation	Procedure by which an authoritative body gives formal recognition of the competence of a certification body to provide certification services, against an international standard	Global Food Safety Initiative Guidance Document. 2004.
	Procedure by which a competent authority gives formal recognition that a qualified body or person is competent to carry out specific tasks	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO/IEC Guide 2:1996, 12.11)
	Third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks	ISO 17000
Accreditation body	Agency having jurisdiction to formally recognize the competence of a certification body to provide certification services	Global Food Safety Initiative Guidance Document. 2004.
	Body that conducts and administers an accreditation system and grants accreditation	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, 17.2)
	Authoritative body that performs accreditation Note: The authority of an accreditation body is generally derived from government	ISO 17000
Accreditation system	System that has its own rules of procedure and management for carrying out accreditation. Note: accreditation of CBs is normally awarded following successful assessment and is followed by appropriate surveillance	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, paragraph 17.1)
Attestation	Issue of a statement, based on a decision following review (5.1), that fulfilment of specified requirements has been demonstrated Note 1: The resulting statement, referred to in this International Standard as a "statement of conformity", conveys the assurance that the specified requirements have been fulfilled. Such an assurance does not, of itself, afford contractual or other legal guarantees. Note 2: First party and third party attestation activities are distinguished by the terms 5.4 to 5.6. For second party attestation, no special term is available	ISO 17000

Definition	Description	Reference
Audit	Systematic and functionally independent examination to determine whether activities and related results comply with a conforming scheme, whereby all the elements of this scheme should be covered by reviewing the suppliers' manual and related procedures, together with an evaluation of the production facilities	Global Food Safety Initiative Guidance Document. 2004.
	A systematic and functionally independent examination to determine whether activities and related results comply with planned objectives	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on Codex Alimentarius, Principles for Food Import and Export Certification and Inspection, CAC/GL 20)
	Systematic, independent, documented process for obtaining records, statements of fact or other relevant information and assessing them objectively to determine the extent to which specified requirements are fulfilled Note: Whilst "audit" applies to management systems, "assessment" applies to conformity assessment bodies as well as more generally	ISO 17000
Auditor	Person qualified to carry out audits for or on behalf of a certification body	Global Food Safety Initiative Guidance Document. 2004.
Aquaculture	The farming of aquatic organisms in inland and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated	FAO Online Glossary of Aquaculture (www.fao.org/fi)
Aquaculture, extensive	Production system characterized by (i) a low degree of control (e.g. of environment, nutrition, predators, competitors, disease agents); (ii) low initial costs, low-level technology and low production efficiency (yielding no more than 500 kg/ha/yr); (iii) high dependence on local climate and water quality; use of natural waterbodies (e.g. lagoons, bays, embayments) and of natural often unspecified food organisms	FAO Online Glossary of Aquaculture (www.fao.org/fi)
Aquaculture, intensive	System of culture characterized by (i) a production of up to 200 tonnes/ha/yr; (ii) a high degree of control; (iii) high initial costs, high-level technology and high production efficiency; (iv) tendency towards increased independence of local climate and water quality; (v) use of artificial culture systems	FAO Online Glossary of Aquaculture (www.fao.org/fi)

Definition	Description	Reference
Aquaculture, small-scale	An aquaculture system with small annual production (max one tonne per unit and 10 tonnes total), made of one or more small production units; family or communally run; low to moderate input levels and limited external labour. Own food supply may be a motive	FAO Online Glossary of Aquaculture (www.fao.org/fi)
Benchmark	Procedure by which a food safety-related scheme is compared to the GFSI Guidance Document	Global Food Safety Initiative Guidance Document. 2004.
Certification	Procedure by which accredited CBs, based on an audit, provide written or equivalent assurance that food safety management systems and their implementation conform to requirements Procedure by which a third party gives written or equivalent assurance that a product, process or service conforms to specified requirements. Certification may be, as appropriate, based on a range of inspection activities which may include continuous inspection in the production chain Third-party attestation related to products, processes, systems or persons Note 1: Certification of a management system is sometimes also called registration Note 2: Certification is applicable to all objects of conformity assessment except for conformity assessment bodies themselves, to which accreditation is applicable	Global Food Safety Initiative Guidance Document. 2004. Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, 15.1.2 and Principles for Food Import and Export Certification and Inspection, CAC/GL 20) ISO 17000
Certification body	Provider of certification services, accredited to do so by an accreditation body Competent and recognized body that conducts certification. A certification body may oversee certification activities carried out on its behalf by other bodies	Global Food Safety Initiative Guidance Document. 2004. Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, 15.2)
Certification document	Document indicating that a supplier's quality system conforms to specified quality system standards and any supplementary documentation required under the system	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO 227 (paragraph 3.3))

Definition	Description	Reference

Certification scheme	Scheme consisting of a certification standard and certification system as related to specified processes to which the same particular scheme applies. The certification scheme should contain the following items (amongst others):
	• a standard
	• a clearly defined scope
	• a certification system, including:
	  ○ requirements for the qualifications of auditors
	  ○ a statement of approximate duration and frequency of visits
	  ○ the minimum content of the audit
		Global Food Safety Initiative Guidance Document. 2004.

Certification standard	A normative document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context Document approved by a recognized organization or arrangement, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory under international trade rules. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method	Global Food Safety Initiative Guidance Document. 2004. Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on TBT agreement, Annex 1, paragraph 2)
Certification system	A system that has its own rules of procedure and management for carrying out certification	Global Food Safety Initiative Guidance Document. 2004.
Chain of Custody	The set of measures which is designed to guarantee that the product put on the market and bearing the ecolabel logo is really a product coming from the certified fishery concerned. These measures should thus cover both the tracking/traceability of the product all along the processing, distribution and marketing chain, as well as the proper tracking of the documentation (and control of the quantity concerned)	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005.
Code of Practice	Document that recommends practices or procedures for the design, manufacture, installation, maintenance or utilization of equipment, structures or products Note: A code of practice may be a standard, a part of a standard or independent of a standard	ISO Guide 2

Definition	Description	Reference
Complaint	Expression of dissatisfaction, other than appeal, by any person or organization to a conformity assessment body or accreditation body, relating to the activities of that body, where a response is expected	ISO 17000
Conforming scheme	A food safety management scheme that has successfully completed the Benchmark Procedure	Global Food Safety Initiative Guidance Document. 2004.
Conformity assessment	Any activity concerned with determining directly or indirectly that relevant requirements are fulfilled. Note: typical examples of conformity assessment activities are sampling, testing and inspection; evaluation, verification and assurance of conformity (supplier's declaration, certification); registration, accreditation and approval as well as their combinations Demonstration that specified requirements relating to a product, process, system, person or body are fulfilled Note 1: The subject field of conformity assessment includes activities defined elsewhere in this International Standard, such as testing, inspection and certification, as well as the accreditation of conformity assessment bodies Note 2: The expression "object of conformity assessment" or "object" is used in this International Standard to encompass any particular material, product, installation, process, system, person or body to which conformity assessment is applied. A service is covered by the definition of a product	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, 12.2) ISO 17000
Conformity assessment body	Body that performs conformity assessment services Note: An accreditation body is not a conformity assessment body	ISO 17000
Conformity assessment procedures	Any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled. Conformity assessment procedures include, *inter alia*, procedures for sampling, testing and inspection; evaluation, verification and assurance of conformity; registration, accreditation and approval as well as their combinations	Agreement on Technical Barriers to Trade (TBT)

Definition	Description	Reference
	Explanatory note: Conformity assessment procedures include, *inter alia*, procedures for sampling, testing and inspection; evaluation, verification and assurance of conformity; registration, accreditation and approval as well as their combinations	
Conformity assessment scheme or Conformity assessment programme	Conformity assessment system related to specified objects of conformity assessment, to which the same specified requirements, specific rules and procedures apply Note: Conformity assessment schemes may be operated at international, regional, national or subnational levels	ISO 17000
Conformity assessment system	Rules, procedures and management for carrying out conformity assessment Note: Conformity assessment systems may be operated at international, regional, national or subnational levels	ISO 17000
Consensus	General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments Note: Consensus need not imply unanimity	ISO Guide 2
Declaration	First party attestation	ISO 17000
Equivalence or **Equivalence of conformity assessment results**	Sufficiency of different conformity assessment results to provide the same level of assurance of conformity with regard to the same specified requirements	ISO 17000
Evaluation	Examination of production facilities, in order to verify that they conform to requirements	Global Food Safety Initiative Guidance Document. 2004.
First party conformity assessment activity	Conformity assessment activity that is performed by the person or organization that provides the object Note: The first, second and third party descriptors used to characterize conformity assessment activities with respect to a given object are not to be confused with the legal identification of the relevant parties to a contract	ISO 17000
Inspection	Examination of a product design, product, process or installation and determination of its conformity with specific requirements or, on the basis of professional judgement, with general requirements	ISO 17000

Definition	Description	Reference
	Note: Inspection of a process may include inspection of persons, facilities, technology and methodology	
International standard	Standard that is adopted by an international standardizing/standards organization and made available to the public	ISO Guide 2
International standardization	Standardization in which involvement is open to relevant bodies from all countries	ISO Guide 2
Mandatory standard	Standard, the application of which is made compulsory by virtue of a general law or exclusive reference in a regulation	ISO Guide 2
Non-conformity	Deviation of product or process from specified requirements, or the absence of, or failure to implement and maintain, one or more required management system elements, or a situation which would, on the basis of available objective evidence raise significant doubt as to the conformity of what the supplier is supplying	Global Food Safety Initiative Guidance Document. 2004.
Peer assessment	Assessment of a body against specified requirements by representatives of other bodies in, or candidates for, an agreement group	ISO 17000
Procedure	Specified way to carry out an activity or a process	ISO 17000
Process standard	Standard that specifies requirements to be fulfilled by a process, to establish its fitness for purpose	ISO Guide 2
Product	Result of a process	ISO 17000
Product standard	Standard that specifies requirements to be fulfilled by a product or a group of products, to establish its fitness for purpose Note 1: A product standard may include in addition to the fitness for purpose requirements, directly or by reference, aspects such as terminology, sampling, testing, packaging and labeling and, sometimes, processing requirements Note 2: A product standard can be either complete or not, according to whether it specifies all or only a part of the necessary requirements. In this respect, one may differentiate between standards such as dimensional, material and technical delivery standards	ISO Guide 2
Provision	Expression in the content of a normative document, that takes the form of a statement, an instruction, a recommendation or a requirement	ISO Guide 2

Definition	Description	Reference
	Note: These types of provision are distinguished by the form of wording they employ; e.g. instructions are expressed in the imperative mood, recommendations by the use of auxiliary "should" and requirements by the use of the auxiliary "shall"	
Reciprocity	Relationship between two parties where both have the same rights and obligations towards each other Note 1: Reciprocity can exist within a multilateral arrangement comprising a network of bilateral reciprocal relationships Note 2: Although rights and obligations are the same, opportunities emanating from them can differ; this can lead to unequal relationships between parties	ISO 17000
Recognition	Recognition of conformity assessment results; acknowledgement of the validity of a conformity assessment result provided by another person or body	ISO 17000
Recommendation	Provision that conveys advice or guidance	ISO Guide 2
Regulation	Document providing binding legislative rules, that is adopted by an authority	ISO Guide 2
Requirement	Provision that conveys criteria to be fulfilled	ISO Guide 2
Sampling	Provision of a sample of the object of conformity assessment, according to a procedure	ISO 17000
Second party conformity assessment activity	Conformity assessment activity that is performed by a person or organization that has a user interest in the object Note 1: Persons or organizations performing second party conformity assessment activities include, for example, purchasers or users of products, or potential customers seeking to rely on a supplier's management system, or organizations representing those interests Note 2: The first, second and third party descriptors used to characterize conformity assessment activities with respect to a given object are not to be confused with the legal identification of the relevant parties to a contract	ISO 17000
Specified requirement	Need or expectation that is stated Note: Specified requirements may be stated in normative documents such as regulations, standards and technical specifications	ISO 17000

Definition	Description	Reference
Standard	Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method Explanatory note: The terms as defined in ISO/IEC Guide 2 cover products, processes and services. This Agreement deals only with technical regulations, standards and conformity assessment procedures related to products or processes and production methods. Standards as defined by ISO/IEC Guide 2 may be mandatory or voluntary. For the purpose of this Agreement standards are defined as voluntary and technical regulations as mandatory documents. Standards prepared by the international standardization community are based on consensus. This Agreement covers also documents that are not based on consensus Document established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given condition Note: Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits	Agreement on Technical Barriers to Trade (TBT) ISO Guide 2
Standardization	Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context Note 1: In particular, the activity consists of the processes of formulating, issuing and implementing standards Note 2: Important benefits of standardization are improvement of the suitability of products, processes and their services for their intended purposes, prevention of barriers to trade and facilitation of technological cooperation	ISO Guide 2
Standardizing body	Body that has recognized activities in standardization	ISO Guide 2

Definition	Description	Reference
Standard-setting organization or arrangement	Organization or arrangement that has recognized activities in standard setting	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO Guide 2, paragraph 4.3)
Surveillance	Systematic iteration of conformity assessment activities as a basis for maintaining the validity of the statement of conformity	ISO 17000
Technical regulation	Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method Explanatory note: The definition in ISO/IEC Guide 2 is not self-contained, but based on the so-called "building block" system	Agreement on Technical Barriers to Trade (TBT)
Technical specification	Document that prescribes technical requirements to be fulfilled by a product, process or service Note 1: A technical specification should indicate whenever appropriate, the procedure(s) by means of which it may be determined whether the requirements given are fulfilled Note 2: A technical specification may be a standard, a part of a standard or independent of a standard	ISO Guide 2
Testing	Determination of one or more characteristics of an object of conformity assessment, according to a procedure Note: "Testing" typically applies to materials, products or processes	ISO 17000
Testing standard	Standard that is concerned with test methods, sometimes supplemented with other provisions related to testing, such as sampling, use of statistical methods, sequence of tests	ISO Guide 2
Third party	Person or body that is recognized as being independent of the parties involved, as concerns the issue in question	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005. (Based on ISO/IEC Guide 2:1996)

Definition	Description	Reference
Third party conformity assessment activity	Conformity assessment activity that is performed by a person or body that is independent of the person or organization that provides the object, and of user interests in that object Note 1: Criteria for the independence of conformity assessment bodies and accreditation bodies are provided in the International Standards and Guides applicable to their activities Note 2: The first, second and third party descriptors used to characterize conformity assessment activities with respect to a given object are not to be confused with the legal identification of the relevant parties to a contract	ISO 17000
Unit of Certification	The "unit of certification" is the fishery for which ecolabeling certification is called for. The certification could encompass: The whole fishery, where a fishery refers to the activity of one particular gear-type or method leading to the harvest of one or more species; a sub-component of a fishery, for example a national fleet fishing a shared stock; or several fisheries operating on the same resources. The certification applies only to products derived from the "stock under consideration". In assessing compliance with certification standards, the impacts on the "stock under consideration" of all the fisheries utilizing that stock or stocks over their entire area of distribution are to be considered.	Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries, FAO. 2005.

Annex 2. Schemes promoted by retailers

GLOBALGAP
www.GLOBALGAP.org

GLOBALGAP is a private sector body that sets voluntary standards for the certification of a wide range of agricultural products, including aquaculture commodities. Although GLOBALGAP membership now includes retailers, producers and associate members (with retailers and suppliers equally represented), GLOBALGAP was initiated in 1997 by a group of retailers belonging to the Euro-Retailer Produce Working Group (EUREP). Efforts were led by British retailers and supermarkets in continental Europe and were aimed at addressing consumer concerns towards food safety, environmental sustainability and labour welfare, in addition to reducing costs for producers by providing a single set of standards accepted by a wide range of retailers. For this reason, EUREP developed harmonized standards and procedures following so-called Good Agriculture Practices (GAP).

GLOBALGAP governance is by a Board, presently composed of eight members (four retailers and four suppliers) which sets the overall activity plan for the organization, although the day-to-day work is supported by a GLOBALGAP Secretariat based in Germany (c/o FoodPLUS). In addition, there are three other entities which are key to the implementation of the GLOBALGAP scheme:

- Technical and Standards Committee
- Certification Body Committee
- National Technical Workgroups

The Technical and Standards Committee is constituted and elected by GLOBALGAP members who are said to have the necessary technical expertise to review, evaluate and approve the following: GLOBALGAP Standard documents, including the general regulations of the GLOBALGAP scheme; schemes willing to receive GLOBALGAP benchmarking; National Technical Working Group Interpretation Guidelines (see hereunder). The Technical and Standards Committee also provides technical support as required by accreditation authorities and acts as a consultative body on any technical matters of interest to GLOBALGAP. Depending on needs, the Technical and Standards Committee can also invite external technical expertise. It is expected that in 2007 the Technical and Standards Committee will be replaced by so-called Sector Committees, which were established by the GLOBALGAP Board in March 2006. Within this new structure, there will be Sector Committees for individual commodities and these will be represented into three higher level committees (All Crops, All Livestock and All Aquaculture committees), which will be represented into a single All Farm Committee. The Sector Committees will also be elected by GLOBALGAP members and are expected to work independently from the GLOBALGAP Board, although any standards and procedures developed by these committees will require approval by the Board.

The Certification Body Committee is composed of experts employed by GLOBALGAP-approved CBs and has the main function of linking GLOBALGAP with the approved CBs in order to benefit from experiences contributed by the CBs. The Certification Body Committee operates independently from the Technical Standard Committee or Sector Committees but it is supported, and its activities are facilitated by the GLOBALGAP Secretariat. The Certification Body Committee can propose revisions to the GLOBALGAP standards and procedures. Proposals are then to be reviewed by the Technical Standard Committee/Sector Committees.

The establishment of National Technical Workgroups represents an attempt by GLOBALGAP to liaise more closely with national experts with respect to legal and structural issues in order to better understand and address the challenges and needs of producers. These workgroups are in charge of developing Interpretation Guidelines that supply the necessary guidance on the above issues to GLOBALGAP. Guidelines are submitted to the Technical and Standards Committee/Sector Committees for revision and approval.

In addition, commodity specific working groups are also established to develop so called Species Modules and submit them to the Technical Standard Committee/Sector Committees for their consideration (see hereunder for more information on modules specific to the aquaculture sector).

GLOBALGAP members also established FoodPLUS, a non-profit limited company based in Germany defined as the "Global Body for GLOBALGAP Implementation" and, as such, responsible for facilitating GLOBALGAP activities, serving as the legal owner of the normative documents and hosting the GLOBALGAP Secretariat. Compliance to the GLOBALGAP standards is assessed by CBs that have received GLOBALGAP approval. Approval can be given only to bodies that have applied to an Accreditation Body for ISO Guide 65/EN 45011 with GLOBALGAP Scope. Accreditation bodies must be part of either the European cooperation for Accreditation (EA) multilateral agreement on Product Certification or members of the International Accreditation Forum, Inc. (IAF), which have been subject to a peer evaluation in the product certification field and have a positive recommendation in its report. Accreditation Bodies should also be signatories of the Memorandum of Understanding (MoU) between IFA/EA and FoodPLUS. CBs assess compliance using GLOBALGAP checklists and perform at least one announced inspection and at least 10 percent unannounced inspections per year.

GLOBALGAP Certification can be issued to individual farms or to farmers' groups. Farmers' groups willing to be certified must fulfil a set of requirements including conducting regular internal inspections. At present, GLOBALGAP is also developing guidance documents for smallholders to assist the process of group certification.

At present there are almost 100 bodies accredited to issue GLOBALGAP certificates, of which three are reported on the GLOBALGAP Web site as providing certification for aquaculture commodities. In addition, there are another six CBs awaiting accreditation to certify aquaculture producers, but which are allowed to issue non-accredited-GLOBALGAP certificates for aquaculture commodities and which are accepted by GLOBALGAP members. These nine CBs are based in Europe (6), Latin America (2) and New Zealand (1).

GLOBALGAP also set up a benchmarking process, through which standards from other certification schemes can be recognized as equivalent to the GLOBALGAP standards. Several countries have now developed and benchmarked their standards with GLOBALGAP giving origin to ChinaGAP, MexicoGAP and others.

GLOBALGAP standards are process (and not product) standards and address food chain operators only, therefore GLOBALGAP labels cannot be visible on the packaging of the product itself, although GLOBALGAP products are at least sometimes sold in separate recognizable areas within supermarkets. GLOBALGAP standards are available for primary producers and feed manufacturers. GLOBALGAP Chain of Custody also provides standards for all businesses gaining legal ownership of products produced by GLOBALGAP certified businesses.

GLOBALGAP standards cover a wide range of agricultural commodities ranging from fruit and vegetables to livestock. In 2003, GLOBALGAP initiated efforts for the certification of aquaculture through the GLOBALGAP Integrated Aquaculture Assurance (IAA). IAA members include major players in the food business such as Ahold, TESCO, Metro Group, McDonald's Europe, COOP Switzerland and others. IAA standards applicable to aquaculture businesses were issued for the first time in 2004 and have recently (March 2007) been revised, together with the overall GLOBALGAP standards' structure. Under the new structure there are All Farm Base standards which are relevant to the whole GLOBALGAP scheme. Aquaculture Base standards are specific to the aquaculture sector. In addition, the scheme also includes species-specific standards. So far the only such standards issued concern the farming of salmonids. However, working groups have been established and meetings are being held to also produce standards for shrimp, tilapia and *Pangasius* fish (*tra* and *basa* fish), in some cases with separate modules for different culture systems. Trial pilot audits of farms have also been planned to assess conformity to the

draft shrimp standards in Indonesia and for the *Pangasius* standards in Viet Nam. GLOBALGAP standards for shrimp are expected to be launched by the end of 2007.[41]

GLOBALGAP also engaged in dialogue with a wide range of stakeholders to develop a set of Good Risk-based Agricultural Social Practices (GRASP), which would provide standards that address social responsibility issues more directly. In addition, discussions with NGOs have also identified the need to include social control points and compliance criteria, which, in the draft shrimp module, are now included as a Social Annex.

So far, the only GLOBALGAP certified aquaculture commodities are salmonids with an estimated one-fifth of global salmon production being certified or in the process of implementation. Interest to receive GLOBALGAP certification has been expressed by some trout farmers, although certificates have yet to be issued.[42]

SAFE QUALITY FOOD

www.sqfi.com and www.fmi.org

The Safe Quality Food (SQF) Program is a fully integrated food safety and quality management protocol developed by the SQFI, an originally independent entity located in Australia, which is now owned by the FMI. The FMI is a US-based organization conducting programmes in research education, industrial relations and public affairs on behalf of its 1 500 members, food retailers and wholesalers with combined annual sales of about US$340 billion. As such, the SQF Program is expected to be the programme used by these retailers to ensure the quality of the products they trade, although this is not always the case.

The SQF Program is still managed by the SQF Institute, which became a division within the FMI. The SQFI Technical Committee is the body in charge of reviewing the SQF standards and supporting documents. The committee is composed of technical experts drawn from the food industry (including members from major retailers such as Wal-Mart and Ahold, the US National Restaurants Association), academic institutions and others. The SQFI also expressed its intention to invite representatives from WHO, FAO and the US Institute of Food Technologists to participate in the Technical Committee. Technical sub-committees have also been established to provide guidance on specific sectors of the food industry (e.g. for egg production, for fresh produce, etc.).

Certification for compliance to SQF standards is conducted by CBs that have been licensed by the SQFI. At present there are eight licensed CBs listed on the SQFI Web site, based mainly in the United States and Australia, although some (e.g. SGS) operate in a wide range of countries worldwide. Only CBs that meet the requirements of ISO Guide 65 are eligible for being licensed by the SQF Program in addition to being compliant with the SQF General Requirements. Audits are conducted by SQF auditors who work for a licensed CB, have been trained in HACCP and SQF and have been registered by the SQFI as SQF auditors.

There are two sets of standards produced within the SQF Program, SQF 1000 for producers and SQF 2000 for processors, both of which are said to be based on the Codex Alimentarius HACCP Guidelines. The SQF standards (both SQF 1000 and SQF 2000) have been successfully benchmarked to the requirements of the Global Food Safety Initiative of CIES — The Food Business, although this does not mean that they are accepted by all the individual CIES retailers, which are the only entities that can decide whether to accept a specific standard or not.

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[41] **Garbutt.** 2007. *An introduction to EurepGAP: facilitating trade through safe and sustainable agriculture.* Presentation given at the Expert Workshop on Guidelines on Aquaculture Certification, held in Bangkok from 27 to 30 March 2007.

[42] Valeska Weymann, GLOBALGAP Technical Manager Tea, Coffee, Integrated Aquaculture Assurance, personal communication.

Both SQF 1000 and SQF 2000 standards are structured into a three-level system of compliance, with only businesses reaching Level 3 being authorized to use the SQF trademark. The SQF trademark can be used directly on the product generated from a SQF-certified business and, as such, the scheme targets consumers directly. In addition to these two sets of standards, there are also two voluntary modules for Responsible Social Practice (Employee Care) and Responsible Environmental Practice that are currently being developed in collaboration with WWF.[43] A Food Defence voluntary module has also been drafted and it is to be released within 2007, while an Animal Welfare module is planned but has yet to be drafted. The completion of voluntary modules is not necessary to obtain SQF certification.

The SQF Program has been implemented by more than 5 000 businesses worldwide and for a wide range of food commodities ranging from fruit, vegetables, meat and aquaculture products.

According to the SQFI Web site, at present there are 80 SQF-certified companies involved with the aquaculture sector. Of these, 76 are certified for SQF 2000 standards (i.e. for processors) and only four are SQF 1000 producers, all of which are located in Viet Nam and produce mostly *Pangasius* fish, with one of these being a farmers' union. Personal communications with the SQF Institute[44] however indicated that SQF 1000 certificates have also been issued to Australian salmon and to oyster farms and salmon farms in Canada and Chile, partially through the "Salmon of the Americas" project. SQF 1000 certification efforts appear to be ongoing also in Indonesia. SQF 2000-certified businesses (also according to the Web site) are located mainly in Australia (35), Republic of Korea (29), Viet Nam (5), Japan (5) and other countries (2). None of the aforementioned SQF-certified businesses obtained certification for a voluntary module.

CARREFOUR

www.carrefour.com

Carrefour is the largest retailer in Europe and the second largest in the world, second only to Wal-Mart. Originally based in France, in 2005 Carrefour operated more than 12 000 stores located in 30 countries and declared sales of almost €100 billion (approximately US$130 billion). In 1985 Carrefour began producing its own-brand products and retailing them in addition to products under other brand names. In 1992 Carrefour initiated the development of so-called Carrefour Quality Lines (CQL), which are certification schemes through which products are identified on the basis of specific quality attributes and marketed with labels indicating their ownership to the scheme (consumer-oriented certification). CQL cover different aspects of the broad sustainability targets of Carrefour that include safety, environmental protection and the socio-economic development of the regions where Carrefour operates. In 1997 Carrefour also introduced the Carrefour Bio line for organic products, later replaced by the Carrefour Agir label, developed in harmony with the France AB organic government label. Products under the Carrefour organic label are certified by ECOCERT, an independent certification body. Gradually, Carrefour also began promoting fair-trade products and developed CQL based on fair-trade criteria.

Over the years the number of CQL increased rapidly and by 2005 Carrefour had a total of 363 CQL of which 70 were developed in 2005 alone.

Carrefour declares that CQL and the overall approach to sustainability are developed through dialogue and partnership with its stakeholders conducted at different levels; interactions with NGOs such as WWF have been reported.

In recent years several activities have been conducted for the responsible development of the fisheries sector. CQL promoting so-called "responsible trade" for shrimp produced in countries such as Brazil and Madagascar were developed.

[43] Kai Robertson, Director of Agriculture, WWF US, personal communication.
[44] Paul Ryan, Director of SQFI, personal communication.

Carrefour Thailand developed a CQL for shrimp in partnership with a vertically integrated company that currently supplies all the Carrefour stores of Thailand with fresh quality shrimp.[45] The CQL *Udang Harimau* promoted by Carrefour Malaysia was developed to market *Penaeus monodon* grown in a fully integrated system and with complete absence of antibiotics and growth promoters.[46]

Fish quality lines that include criteria governing site selection, stocking density, water replacement and effluent testing and management were developed. In 2004, Carrefour initiated a Responsible Fishing approach that promotes sustainable fisheries management, starting with the launching of the Responsible Fishing Cod, followed by four additional Responsible Fishing products of frozen fillets (catfish, dab, redfish and halibut). Discussion is currently ongoing for the development of a CQL for *Pangasius* from Viet Nam.[77]

[45] Carrefour Thailand Web site: www.carrefour.co.th
[46] Carrefour Malaysia Web site: http://www.carrefour.com.my/cb_cql_udang.html
[47] Anne-Laurence Huillery, Anova Foods, Viet Nam, personal communication.

Annex 3. Schemes promoted by industry

GLOBAL AQUACULTURE ALLIANCE AND AQUACULTURE CERTIFICATION COUNCIL

www.gaalliance.org and www.aquaculturecertification.org

The Global Aquaculture Alliance (GAA) is an international, non-profit trade association founded in 1997 by a wide range (59 funding members) of companies involved with aquaculture production or the food business in general and mostly based in the Americas. GAA's mission is to promote environmentally responsible aquaculture to meet world food needs. The vision of GAA is to develop and encourage aquaculture systems suitable to environmental and community needs, improve systems' efficiency, promote effective and coordinated government regulation and trade policies and disseminate widely the importance of sustainable aquaculture. To achieve its goal, the GAA established the Responsible Aquaculture Program to "encourage the culture of safe, wholesome seafood in an environmentally and socially responsible manner" and for "the efficiency and long-term sustainability of the aquaculture industry". The Responsible Aquaculture Program began with the development of Guiding Principles for Responsible Aquaculture that state the direction of activities to be undertaken by companies and individuals engaged in aquaculture towards reaching environmental, economic and social sustainability. As part of the programme, the GAA also published Codes of Practice for Responsible Shrimp Farming, which provide technical guidance on shrimp farming and also include, in addition to ten Individual Codes of Practice, a Review of Responsible Shrimp Farming covering fundamentals of shrimp farming, environmental and social issues and management. Following the publication of the Codes of Practice, the GAA also developed a set of quantitative BAP standards for responsible shrimp farming.

The Codes of Practice were prepared (as stated on the GAA Web site) by Dr Claude Boyd and other members of a technical committee. Technical committees, one for each BAP standard, comprise technical experts and representatives of stakeholders interested in or impacted by the standards. Individuals and organizations to be involved in the technical committees are invited directly by the GAA, which targets having representatives from national industry associations (4), industry supplier associations (2), academic, regulatory or financial groups (2), conservation NGOs (2) and the GAA itself (2) within each technical committee. The role of the technical committees is to develop and review standards and to take into consideration comments submitted by stakeholders outside the committee. The cost for participation in committee meetings is covered by the committee members' themselves. A GAA standard development coordinator works with committee chairpersons to coordinate committee activities.

The assessment of conformity to BAP standards is conducted solely by the Aquaculture Certification Council (ACC), an organization with the mission of certifying aquaculture businesses that apply practices which ensure social and environmental responsibility, food safety and traceability. Until recently the link between the GAA and ACC was very strong, with the President of GAA also being on the board of directors of the ACC, although this is not the case anymore, indicating a trend towards increasing independence between the two organizations. The ACC operates by training and "accrediting" ACC certifiers worldwide. Certifiers can be self-employed individuals, company representatives, associations or institutions. It is also stated that ACC certifiers should be free from conflict of interests for their certification activities. Training courses for certifiers generally last five days and instruct participants on all the three sets of GAA BAP standards, i.e. for shrimp hatcheries, farms and processors. Certification is generally issued to individual businesses, although dialogue has been initiated to allow certification of farmers' groups, therefore facilitating access to the scheme by small-scale producers. [48] The BAP trademark belongs to the GAA and is licensed to the ACC for use on BAP-certified facilities. The

[48] **Boyd, C.E., Limsuwan, C. & Fegan, D.** 2006. Working group recommends certification revisions for shrimp farm clusters. July/August 2006 *Global Aquaculture Advocate*.

trademark can appear on retail packaging and, as such, products from BAP-certified establishments are recognizable to consumers.

Although the GAA/ACC scheme does not require certification throughout the supply chain (i.e. hatchery–farm–processor), a three-star label can be used for products that have been hatched, grown and processed in establishments complying with the GAA standards.

According to the ACC Web site, at present BAP-certified facilities include:

- Six three-star (of which four are in Latin America, one is in Viet Nam and one in Madagascar).
- 52 processing plants (46 in Asia, five in the Americas and one in Madagascar).
- 38 farms (three in Asia, 33 in the Americas and two in Madagascar).
- 20 hatcheries (three in Asia, 15 in the Americas and two in Madagascar).

In addition to shrimp standards, the GAA also initiated activities towards the development of standards for tilapia, channel catfish and *Pangasius* fish.[49] Standards are expected to be issued in September 2007 and within 2007 the ACC will start to certify tilapia, catfish and possibly *Pangasius*. The GAA expanded the scope of the shrimp-processing standards to other aquaculture commodities and standards are now been published in their draft form for comments.[50] The GAA is also producing standards for feed mills which, when complete, will allow the development of four-star labels (i.e. for products that have been hatched, farmed, fed and processed in ACC-certified businesses).

SHRIMP SEAL OF QUALITY (SSOQ)

The Shrimp Seal of Quality (SSOQ) was initiated in 2001 as part of the second phase of the USAID-funded Agro-based Industry and Technology Development Project (ATDP II). Originally intended to be implemented in close collaboration with the Government of Bangladesh, which co-funded the project,[51] it eventually developed into a private sector initiative promoted mainly by project staff and shrimp processors.[52] The SSOQ began with the development of BMP for shrimp farmers and continued with the development of standards applicable to every step in the shrimp supply chain including hatcheries, farms, processors, feed mills and traders. In addition, guidelines for the application of the standards to specific stakeholders (e.g. farmers, processors etc.) were also developed. SSOQ standards cover several sustainability aspects including food safety, quality assurance, traceability and environmental and social responsibility.

The establishment of the SSOQ certification scheme was also supported by the ACC through training courses and regular inputs provided to the development and implementation of the programme. At its peak the SSOQ involved almost 300 farmers, covering an area of almost 1 000 ha,[53] although currently the programme is only marginally operational. In fact with the termination of USAID ATDP II, programme activities within the scheme were significantly reduced, although efforts supported by the WorldFish Center allowed the continuation of at least some aspects of the programme. The scheme is expected to be further supported through an additional five-year USAID-funded programme.

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[49] **DiPietro, B.** 2006. *GAA developing "responsible aquaculture" standards for salmon, tilapia, catfish.* IntraFish www.intrafish.no/global/news/article119672.ece

[50] George Chamberlain, GAA, personal communication.

[51] **Kabir, K.** 2005. *Shrimp Seal of Quality, integrated approach to addressing challenges of Bangladesh's shrimp industry.* Presentation given at the World Bank/USAID Post IAMA Workshop, 29–30 June 2005, Dhaka, Bangladesh.

[52] Glen Bieber, consultant to the ATDP II project, personal communication.

[53] **Bieber, G.** 2005. *SSOQ Farm Production Program*.

SIGES – SALMONCHILE

www.siges-salmonchile.com/proysigesingles/
www.salmonchile.cl

SalmonChile is the association of the Chilean salmon industry and includes all the main salmon producers and processors in Chile. Funded in 1986, SalmonChile's goal was to represent and unify the salmon industry's efforts on technical, legal, research, environmental and market aspects. It now includes 71 companies (of which 25 are producers), representing approximately 80 percent of the total national production. In response to market trends and international regulations, SalmonChile defined its mission as follows: "To make the Chilean Salmon Industry perceived by the domestic and international public opinion as a socially responsible industry, which produces a superior product with sustainable environmental and economical development". To this end, SalmonChile assigned the Salmon Technological Institute (INTESAL), SalmonChile's research institute, the task of developing a system for achieving the stated mission and therefore giving a competitive edge to the Chilean aquaculture industry. In 2002 INTESAL initiated the development of an Integrated Management System (SIGES), a management tool aimed at standardizing salmon production and processing systems in order to achieve fish health, quality, food safety, environmental sustainability and occupational safety and health. As part of SIGES, sets of regulations and standards for both producers and processors were developed and were included in the Manual of Regulations and Best Practices. Because of the focus of the Chilean aquaculture industry, SIGES is designed to be applicable especially to Chilean salmonid aquaculture. After SIGES development, INTESAL also undertook the role of managing the system, a role which is still ongoing.

INTESAL also developed a Manual of Audits, which sets the regulations and procedures to be followed during auditing. Companies willing to participate in the SIGES scheme are asked to perform internal audits following the SIGES standards, after which they undergo an external audit conducted by an independent organization. A number of CBs have been identified by INTESAL as suitable for assessing the degree of compliance of companies to SIGES standards, including SGS Chile Ltda, Bureau Veritas Quality International and IMO Chile S.A.

According to the SIGES Web site, 25 companies are currently associated with SIGES, of which 17 are actually participating in the programme.

SCOTTISH SALMON PRODUCERS' ORGANIZATION CODE OF GOOD PRACTICE

www.scottishsalmon.co.uk

The Scottish Salmon Producers' Organization (SSPO) is a newly expanded trade organization for the Scottish salmon industry responsible for supporting its members in addressing political, legal and technical issues. The new SSPO for the first time brought together salmon producers from different parts of Scotland (i.e. the Shetlands, the Orkneys and Western Isles and the mainland) and now includes 21 companies, as well as incorporating the Scottish Quality Salmon programme. As an entry requirement for membership in the SSPO, the association created the Code of Good Practice for Scottish Finfish Aquaculture (CoGP). The CoGP was developed by an industry-based CoGP Working Group in consultation with a range of governmental and non-governmental organizations including the Scottish Executive Environment and Rural Affairs Department, the Scottish Environment Protection Agency and WWF Scotland in addition to local authorities and the public and sets the standards that SSPO members have to comply with. The CoGP is designed to address food safety, traceability, fish health, environmental protection and animal welfare. The SSPO CoGP sets standards for process, and not product, certification.

Farm auditing and reporting is coordinated by an industry-appointed Lead Certification Body approved by the UK Accreditation Service (UKAS). This role is now played by Food Certification Scotland (FCS). FCS was also appointed to conduct the initial inspection of all the farms willing to join the scheme in 2006, although farm audits are to be conducted by UKAS-approved inspection bodies chosen directly by farmers.

Annex 4. Schemes promoted by governments

THAI QUALITY SHRIMP

www.thaiqualityshrimp.com

In response to problems in the production and marketing of shrimp, in 1998 the Department of Fisheries (DoF) of the Government of Thailand initiated efforts towards the improvement of shrimp quality throughout the production chain. With the initial support of World Bank consultants, efforts were conducted though a close collaboration between the DoF and other stakeholders for the outlining of the shrimp Code of Conduct (CoC). Regulations for the implementation of the CoC were also developed for hatcheries and farms (Section I issued in 2002) and for traders/distributors and processors (Section II, issued in 2003). CoC standards are said to have been developed in accordance with the FAO CoC for Responsible Fisheries (Article 9 on aquaculture development) as well as Codex Alimentarius and ISO 14001 standards for environmental management. The Thai Quality Shrimp scheme is structured around two levels of compliance, i.e. Good Aquaculture Practice (GAP) that focuses on individual businesses (hatcheries or farms) and aims primarily at ensuring food hygiene and safety and the CoC, which addresses the whole supply chain and also includes considerations for environmental sustainability. CoC standards are available for hatcheries, farmers, traders/distributors and processors. CoC businesses must also comply with the relevant Thai standards for feed and chemicals. In 2004 the Q-Mark labeling programme was developed to identify farms which follow CoC standards throughout the supply chain.

Inspection of establishments is conducted directly by the DoF, which is also in charge of issuing certificates, therefore acting simultaneously as a standard developer, inspection body and certification body. CoC-certified processors must submit CoC documents to the DoF proving that the products supplied were handled by CoC businesses throughout the supply chain. Applications are reviewed by a DoF committee and, only if approved, the processor is allowed to apply the "Q-Mark" label on the retail packaging. GAP standards are applicable to all the aquaculture species cultivated in Thailand. However, different inspection checklists have been produced for different commodities and types of system.

The CoC standards under the Thai Quality Shrimp scheme are strictly speaking process standards, although the DoF is also in charge of certifying products to assess compliance to the legal requirements by both Thailand and the importing country.

At present Thailand has 125 CoC-certified shrimp hatcheries and 149 CoC shrimp farms. GAP certification is reported to cover most of the shrimp sector in the country (1 061 and 20 437 GAP-certified hatcheries and farms respectively).[54] In addition, GAP have also been applied to farms and/or hatcheries of other aquaculture commodities including freshwater prawns (1 373 farms), finfish (247 and 202 marine and freshwater farms respectively), crabs (64 farms), molluscs (19 farms) and frogs (12 farms).[55]

CERTIFICATION SCHEMES IN CHINA

Although efforts on quality control have been ongoing in China for several years, in 2003, a Quality Safety Regulation entered into effect to regulate several quality aspects including general operations, inputs (water, feed, drugs) and environmental protection, in addition to traceability.[56] At about the same time, efforts were also initiated to develop voluntary schemes for aquaculture certification. In addition to schemes focused on organic aquaculture, the following are worth mentioning.

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[54] Malinee Witchawut (Department of Fisheries, Thailand) personal communication.

[55] **Department of Fisheries.** 2007. *Thailand experiences in aquaculture certification.* Presentation given at the Expert Workshop on Guidelines on Aquaculture Certification, held in Bangkok from 27 to 30 March 2007.

[56] **Liu, J.** 2007. *China aquaculture: safety and quality report.*

Safety agri-food certification is a scheme developed by the Centre for Agri-food Quality and Safety (CAQS) of the Ministry of Agriculture. The scheme was formally established in 2003 and it is implemented through three centres of which one is dedicated to fisheries products with 68 provincial level agencies and over 3 000 inspectors.

ChinaGAP is a scheme which was initiated in 2003 by the Certification and Accreditation Administration (CNCA), a government agency that is under the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ), which is directly under the State Council of the People's Republic of China. GAP standards for a wide range of commodities were issued in 2005 and began implementation in 2006. Standards have been developed along similar lines to GLOBALGAP, with which a MoU was also signed to benchmark the ChinaGAP standards to the GLOBALGAP scheme. Different from GLOBALGAP, however, products produced in ChinaGAP-certified farms are labeled as such. ChinaGAP standards for the aquaculture sector now include an overarching aquaculture base module in addition to another 15 commodity/system-specific modules relevant to several fish species (including tilapia and carp), shrimp, crabs and turtles.[57]

The Green food standard scheme is also promoted by the Ministry of Agriculture through its Green Food Development Center, which is under the Green Food Administration Office. Green food standards are not organic standards, although the two share some similarities. The Green food standards address issues related to the environment, fertilizers, pesticides and other chemicals and set maximum dosages for each. Farms compliant to these standards can market products as "Green foods" on the domestic market. At present there are almost 5 000 certified producers, of which 230 are producers of fisheries products.

VIETNAM GAP AND CoC PROGRAMME

Adapting the Thai experiences to the Vietnamese context and with the initial support of the USDA, in 2003 the National Fisheries Quality Assurance Veterinary Directorate (NAFIQAVED) of the Ministry of Fisheries (MOFI) initiated the development of a programme aimed at improving the quality of Vietnamese shrimp, as well as promoting environmental and social sustainability.[58] In 2004 the programme was expanded with MOFI funds to include a total of five coastal provinces, although efforts in a less structured way also occurred in other provinces. Similar to the Thai programme, the Vietnamese scheme is based on two levels, a GAP level focused on food safety and environmental protection and a CoC level addressing the quality of the inputs to the farming system and social responsibility. Standards were developed by NAFIQAVED in consultation with a range of national and international shrimp experts and with representatives of the shrimp industry.

Both inspection and certification are conducted by NAFIQAVED officials in collaboration with local (provincial) authorities. Although at this stage standards are voluntary, the GAP and CoC standards are expected to be applied to all the shrimp farms of Viet Nam within 2008 and 2009 respectively.

By the end of 2006 the GAP/CoC programme covered approximately 450 hectares of culture area. Efforts towards the development of standards for shrimp hatcheries and for other aquaculture commodities (e.g. *tra*/*basa* fish, tilapia, etc.) are ongoing. As GAP and CoC are relatively demanding and difficult to be implemented by small-scale producers, in 2007 NAFIQAVED initiated efforts towards the development of BMP standards to be applicable to more extensive farming systems. The intention to reach some sort of equivalence between the Vietnamese GAP/CoC scheme and GLOBALGAP has also been expressed by some Vietnamese stakeholders.[59]

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[57] **Liu, J.** 2007. *Aquaculture certification system in China.* Presentation given at the Expert Workshop on Guidelines on Aquaculture Certification, held in Bangkok from 27 to 30 March 2007.

[58] Nguyen Tu Cuong, Director of NAFIQAVED, Ministry of Fisheries, personal communication.

[59] Nguyen Tu Cuong, Director of NAFIQAVED, Ministry of Fisheries, personal communication.

HONG KONG ACCREDITED FISH FARM SCHEME

www.hkaffs.org/en/

In response to increased competition with imported aquatic products and reduced consumer confidence in seafood products, in 2005 the Agriculture, Fisheries and Conservation Department (AFCD) of the Government of the Hong Kong Special Administrative Region of China developed the Accredited Fish Farm Scheme (AFFS). The primary focus of AFFS is to support locally grown aquatic products on the Hong Kong market by promoting the implementation of GAP and hygiene standards. The scheme is managed by the AFCD, which is also responsible for conducting farm inspections, providing ongoing technical support and issuing certificates.

Standards have been developed for environmental management of both saltwater and freshwater systems and feed and animal health management. The scheme includes compliance to traceability requirements.

Successful certification of farms within the AFFS requires compliance to process standards as ascertained during bimonthly inspections. Only if fish spent all their life cycle in an accredited farm can it be certified as an Accredited Fish Farm (AFF), requiring detailed record keeping of fish stocks held in the farm at any time and strict compliance to traceability. In addition to being based on process standards, the AFFS also requires that aquaculture commodities satisfy product standards before a farm can be successfully certified as an AFF. Fish from AFF farms are individually tagged with a unique serial code, which allows the traceability of every fish.

Aquaculture products produced under the AFFS are marketed by the Fish Marketing Organization (FMO), a self-financing non-profit organization established through a government ordinance, although without a true governmental role. Following FMO terms of reference, profits made by the FMO through marketing have to be used to promote the local fisheries industry.

At present the scheme includes 65 certified farms, which produce a wide range of marine finfish commodities (20 species) for a total production of more than 40 tonnes. Pompano (*Trachinotus blochii*) is by far the main commodity produced by certified farms, accounting for more than one-third of the total production. Other important commodities are cobia (*Rachycentron canadum*) and grey mullet (*Mugil cephalus*), which together account for almost one-quarter of the production.[60]

[60] Dr Chow Wing-kuen (Agriculture, Fisheries and Conservation Department, Hong Kong SAR) personal communication.

Annex 5. Schemes promoted by NGOs

MARINE AQUARIUM COUNCIL

www.aquariumcouncil.org

The Marine Aquarium Council (MAC) is an international non-profit organization. It was set up by a multistakeholder group. The group was a type of initiative or coalition of conservation groups, industry personnel and public aquariums that were interested in developing standards and certification for marine ornamental fishery and trade. The WWF was one of the NGOs involved in the development process and it was used to promote the sustainable development of the aquarium industry.[61] The MAC includes a network of over 2 500 partners from conservation groups, the aquarium industry, hobbyists and governments. The MAC established a certification scheme to ensure the sustainability of capture, culture and trade of marine ornamentals.

The development of MAC Core Standards was initiated in 1999 and, through a process of multistakeholder consultations, led to the publishing of the standards in 2001. A Standard Committee has also been established to coordinate the revision of the standards as needed. The MAC is also a partner of the ISEAL, therefore it witnesses the quality of the standard development process followed by the MAC.

There are four MAC core standards which cover the whole supply chain for ornamentals. These are:

- The Ecosystem and Fishery Management (EFM) Core Standard addresses habitat and stock management issues to ensure the responsible selection of the area from which ornamentals are to be collected.
- The Collection, Fishing and Holding (CFH) Core Standard addresses issues associated with the harvesting, handling, holding, packaging and transportation of aquatic ornamentals.
- The Handling, Husbandry and Transport Core Standard covers the handling of marine life during export, import and retail. It also covers issues related to chain of custody.
- The Mariculture and Aquaculture Management Core Standard addresses issues related to the farming of marine organisms; it is still a draft, undergoing formal review.[62]

Conformity assessment is conducted by independent CBs that have been accredited under the supervision of the MAC Accreditation Committee and in compliance with ISO Guide 60 standards (Conformity assessment/Code of Good Practice). At present, there are six accredited CBs listed on the MAC Web site.

According to the MAC Web site, currently MAC has certified:

- 17 collection areas located in the Philippines (9), Fiji (5) and Indonesia (3).
- 16 collectors from the same three countries (8, 5 and 3 respectively).
- 19 exporters in the Philippines (10), Indonesia (6), Fiji (2) and Singapore (1).
- 15 importers located in Europe (9), the United States (4), Canada (1) and Singapore (1).
- Eight retailers in the United States (4), France (2), Philippines (1) and Singapore (1).
- Three culturists based in the United States (2) and the United Kingdom (1).

[61] **WWF.** 2007. *The Marine Aquarium Council.* http://www.worldwildlife.org/conservationfinance/projects/maq.cfm

[62] Ron Lilley, Marine Aquarium Council, personal communication.

INTERNATIONAL STANDARDS ORGANIZATION
www.iso.org

The International Standards Organization (ISO) is an NGO constituted by a network of the national standards institutes of 157 countries, with one member per country. Although its structure may resemble that of an intergovernmental organization, ISO members are not delegates of their countries, although its structure has made the ISO arguably the most authoritative organization for standardization.

The ISO's operation relies on many committees and bodies. Its strategic direction is decided by the General Assembly which is composed of ISO members and operates with a "one-member one-vote" mechanism. Only national standardization institutions can become ISO members. However, although individuals or enterprises are not eligible for membership, they can contribute to ISO activities and to the development of standards. The ISO Council (acting like a board of directors within a company) is responsible for submitting proposals to the General Assembly. Overall ISO operations are managed by a secretary-general based in the ISO Central Secretariat in Geneva, Switzerland.

The development of standards generally is initiated by the industry itself, which raises the need for a standard to be proposed by an ISO member, who then submits the proposal for discussion and, if necessary, leads to the initiation of the standard development process. The task is assigned to an existing technical committee although new committees can be established if the need should arise (e.g. new sectors, etc.). At present there are about 200 technical committees in operation including committees on food products, environmental management, water quality, soil quality and market, opinions and social research. The work of the technical committees is assisted by working groups and sub-committees; for example within the Food Products Technical Committee there are about 20 such entities. Technical committees, and even more so their working groups and sub-committees, are highly specialized and receive strategic guidance from three general policy development committees: CASCO (conformity assessment), COPOLCO (consumer policy) and DEVCO (developing country matters). These committees allow the technical committees to develop standards that are aligned with the broader market and stakeholder needs. Technical committees are generally comprised by sector experts, often the experts that raised the need for the standards and who were selected by ISO members in their countries, and may also include government officials, environmentalists, consumer associations, academics etc. Draft standards developed by the technical committees are submitted as drafts to other ISO members for review. ISO members can disseminate the draft standards widely within their countries to elicit the views of a wide range of stakeholders. Following additional discussion among ISO members the standard is then finalized and published. The ISO also invites members of the public to submit comments on the work of the technical committees through its Web site, which, *inter alia,* reports the work plans of the committees for public review.

Interestingly, the ISO is not directly involved in the process of assessing conformity to ISO standards. This means that any individual or institution can inspect and certify establishments and products for conformity to ISO standards, without necessarily having been accredited by any authoritative body to perform this task (although conformity assessment for ISO standards does not authorize certified businesses to use the ISO logo). Nevertheless, the ISO has developed a wide range of standards for performing different steps in conformity assessment. Some of the most relevant standards are:

ISO/IEC Guide 7:1994	Guidelines for drafting of standards suitable for use for conformity assessment
ISO/IEC Guide 23:1982	Methods of indicating conformity with standards for third party certification systems
ISO/IEC Guide 28:2004	Conformity assessment: Guidance on a third party certification system for products

ISO/IEC Guide 59:1994	Code of good practice for standardization
ISO/IEC Guide 60:2004	Conformity assessment: Code of good practice
ISO/IEC Guide 62:1996	General requirements for bodies operating assessment and certification/ registration of quality systems
ISO/IEC Guide 65:1996	General requirements for bodies operating product certification systems
ISO/IEC Guide 66:1999	General requirements for assessment and accreditation of certification/ registration bodies of environmental management systems (EMS).
ISO/IEC Guide 67:2004	Conformity assessment: Fundamentals of product certification
ISO/IEC Guide 68:2002	Arrangements for the recognition and acceptance of conformity assessment results
ISO/IEC 17000:2004	Conformity assessment: Vocabulary and general principles
ISO/PAS 17001:2005	Conformity assessment: Impartiality — principles and requirements
ISO/PAS 17002:2004	Conformity assessment: Confidentiality — principles and requirements
ISO/PAS 17003:2004	Conformity assessment: Complaints and appeals — principles and requirements
ISO/PAS 17004:2005	Conformity assessment: Disclosure of information — principles and requirements
ISO/IEC 17011:2004	Conformity assessment: General requirements for accreditation bodies accrediting conformity assessment bodies
ISO/IEC 17020:1998	General criteria for the operation of various types of bodies performing inspection
ISO/IEC 17021:2006	Conformity assessment: Requirements for bodies providing audit and certification of management systems
ISO/IEC 17024:2003	Conformity assessment: General requirements for bodies operating certification of persons
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories
ISO/IEC 17030:2003	Conformity assessment: General requirements for third party marks of conformity
ISO/IEC 17040:2005	Conformity assessment: General requirements for peer assessment of conformity assessment bodies and accreditation bodies

To assist the conformity assessment process, the ISO also provides a directory of accreditation and CBs worldwide, specifically for the most common ISO 9001 and ISO 14001 standards.

From 1947 to date the ISO has published more than 16 000 standards covering a wide range of sectors, including the food industry. Most ISO standards are highly specific to the production of particular products. However, the ISO has also produced generic standards such as ISO 9000 and ISO 14000 families of standards (mainly ISO 9001:2000 and ISO 14001:2004), which are standards to be applied by organizations to improve the quality and environmental management of the processes adopted respectively and, as such, they are also applicable to the aquaculture sector. The recently issued ISO 22000:2005 standard, concerning the management of food safety issues, is relevant to any organization involved in any aspect of the food chain and, as such, it too concerns the aquaculture sector.

In addition to the aforementioned standards, the ISO has also initiated activities towards the development of standards for social responsibility. Discussion on the development of standards for social responsibility was initiated in 2004 and it is still ongoing. To this end, an ISO Working Group on Social Responsibility was established with the target of drafting these standards, which are expected to be published in 2008 as ISO 26000. At the request of the Norwegian ISO Representative, in February 2007 the ISO also decided to establish a technical committee (ISO/TC 234) to develop standards for fisheries and aquaculture. The ISO standards are expected to cover several aspects of aquaculture sustainability including environmental protection, animal health and welfare, employee welfare and traceability. National fisheries and aquaculture standards developed by Norway will be suggested as a draft for the development of the ISO standards. The ISO standards will be developed to be complementary with the work conducted by other organizations such as the Codex Alimentarius, FAO, WHO, OIE and others.[63]

Because of the approach adopted by the ISO towards conformity assessment to ISO standards, it is not possible to know how many ISO-compliant aquaculture businesses there are globally. The ISO conducts regular surveys to assess the status of implementation of its ISO 9000 and ISO 14000 standards. ISO surveys indicate that the number of businesses certified for standards within the ISO 9000 family in the "agriculture and fishing" category increased from 610 in 1998 to 2 381 in 2002 globally. The number of ISO 14001 certified "agriculture and fishing" businesses followed a similar trend, rising from 16 in 1998 to 532 in 2002.[64] Although the ISO surveys most likely underestimate the number of certified businesses, the aforesaid data would seem to indicate that ISO certification of agriculture and fishing businesses globally is still limited.

[63] **Standards Norway.** 2007. *Fisheries and aquaculture — new field of standardisation in ISO.* www.standard.no/pronorm-3/data/f/0/15/25/4_2401_0/Faktaark_fisheries_march_2007.pdf

[64] **ISO.** 2002. *The ISO survey of ISO 9000 and ISO 14001 certificates.*

Annex 6. Organic schemes

INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENTS
www.ifoam.org

IFOAM is a global grassroots umbrella organization which, since its establishment in France in 1972, has grown to include 750 member organizations involved with organic agriculture production and operating in 108 countries. Although strictly speaking IFOAM is not a true certification scheme, in addition to other efforts towards organic agriculture, it provides standards that organic certification schemes should include and, as such, it is considered in this section. IFOAM's mission is "leading, uniting and assisting the organic movement in its full diversity" and its goal is "worldwide adoption of ecologically, socially and economically sound systems that are based on the Principles of Organic Agriculture", indicating a broader interest in the food safety focus often perceived when referring to organic production. The principles of organic aquaculture include the following:

- The principle of health to sustain and enhance the health of soil, plants, animals, humans and the whole planet.
- The principle of ecology to work with, emulate and help sustain living ecological systems and cycles.
- The principle of fairness to promote relationships that ensure fairness with regard to the common environment and life opportunities.
- The principle of care to protect the health and well-being of current and future generations and the environment.

More detailed principles are also included in IFOAM standard documents.

IFOAM's broad interest in sustainability is also represented by its partnership with IUCN, the International Fair Trade Association (IFAT) and ISEAL. In addition, IFOAM engages with a wide range of international organizations and it has observer status or is otherwise accredited by the following international institutions: The United Nations General Assembly; FAO; the United Nations Conference on Trade and Development (UNCTAD); the Codex Alimentarius Commission (FAO and WHO); the World Trade Organization (WTO); the United Nations Environment Programme (UNEP); the Organization for Economic Cooperation and Development (OECD); and the International Labour Organization of the United Nations (ILO).

The IFOAM General Assembly represents the foundation of the organization and it is comprises all of IFOAM's members. IFOAM membership is open to any entity predominantly involved with the organic movement including producers, processors, traders, retailers, certifiers, consultants and researchers. The General Assembly elects the IFOAM World Board (composed of ten members) which decides on issues yet to be decided at the General Assembly and sets up official committees and groups. *Inter alia*, IFOAM operates through the three Organic Guarantee System (OGS) committees. The Organic Guarantee System is aimed at providing a market guarantee of the integrity of organic claims, fostering equivalence among participating certifiers. The three Organic Guarantee System committees are: the Norms Management Committee, focusing on the process and management of the OGS; the Standards Committee, in charge of developing the IFOAM Basic Standards, which include the rules and regulations for organic production and processing and form the basis for IFOAM accreditation; and the Criteria Committee, which develops the IFOAM Accreditation Criteria (IAC) that are IFOAM accreditation programme requirements for the operation of organic certification programmes.

The IFOAM Basic Standards are structured as "standards for standards" and, as such, they provide a framework for CBs and standard-setting organizations to develop their own more detailed certification

standards that take into account specific local conditions. Standards to be developed in accordance with IFOAM standards are meant to be process and not product standards, although products are clearly labeled as organic. The IFOAM standards are revised regularly (latest revisions in 2002 and 2005) through a process of public consultation with IFOAM members and other key stakeholders, after which if standards receive ratification by the IFOAM General Assembly they come into force. In addition, a procedure for urgent standard revision is also available. The aforesaid process is in compliance with the Code of Good Practice for Setting Social and Environmental Standards, produced by ISEAL.

Through a system of third party certification, the OGS allows CBs to become IFOAM accredited so that they can certify operators (e.g. producers) to label products with the IFOAM seal to be recognizable to consumers. Accreditation of CBs is not conducted directly by IFOAM, but by the International Organic Accreditation Service Inc. (IOAS), which is a non-profit organization operated independently by IFOAM. To be accredited, CBs have to use certification standards that meet the IFOAM Basic Standards and, as such, they are, or have strong links with, a standard-setting organization (e.g. Bioland, Debio, National Association for Sustainable Agriculture Australia etc.).[65] CBs also have to comply with the IFOAM accreditation criteria, which are requirements for how certification is conducted. It is important to point out that, although as stated by IOAS some of IFOAM's certifier members or their operators may be using their IFOAM membership to denote some sort of recognition, IFOAM membership does not constitute IFOAM accreditation or recognition. By January 2007 there were 34 IFOAM-accredited CBs (ACBs), eight of which can issue certificates to aquaculture businesses. The list of ACBs includes Naturland and the Soil Association (see hereunder), although the scope of IFOAM accreditation does not include certification for compliance to Naturland or Soil Association standards, meaning that a producer certified for compliance to the Naturland standards is not necessarily also compliant to the IFOAM Basic Standards. This is particularly the case for aquaculture, which is not one of the scopes for which Naturland and the Soil Association receive accreditation. Since the late 1990s IFOAM ACBs have been organized in the ACB Group which supports its members and affects public policy on issues relating to certification and accreditation through education and sharing of ideas.

To address the fact that the agriculture sector of several countries is composed of many small-scale producers, IFOAM established a system for Smallholder Group Certification. Through this mechanism, small-scale farmers with similar farming practices and who market collectively can be certified together. Farmers set up an Internal Control System (ICS) implemented by internal "inspectors" (e.g. better farmers) who inspect all the farms. IFOAM ACBs then audit the ICS though visits to a specified number of farms and the evaluation of the ICS. At present more than 50 percent of the IFOAM ACBs (i.e. 18/34) are accredited for "Grower Groups" certification.

As clearly stated in a position paper, IFOAM also supports organic agriculture broadly for its contributions to farmers and society in general, including non-certified forms of organic agriculture. In addition, IFOAM recognizes other forms to guarantee compliance to organic standards such as self-declaration or participatory guarantee systems which are quality-assurance initiatives that use their own written standards, often based on IFOAM's Basic Standards. These alternatives, which generally include a process of verification of compliance are seen by IFOAM as suitable for local markets where producers, traders and consumers are not separated by anonymous relationships.

IFOAM Basic Standards can be applied to the production, processing and marketing of crop, livestock and wild products. These include fruit and vegetables, grains, beans, oil crops, honey, livestock, textile crops and others. The latest version of the Basic Standards (2005) includes a chapter specific to aquaculture. In addition, IFOAM also established an Aquaculture Group to pursue IFOAM's objectives within the area of aquaculture and capture fisheriesand representing its members both inside and outside IFOAM.

[65] Because standards that have been accepted through the IFOAM OGS (e.g. Bioland, Debio, National Association for Sustainable Agriculture Australia etc.) are very similar to the IFOAM Basic Standards and operate following IFOAM procedures, they are not included in this review as this would bias the analysis towards the IFOAM scheme.

Table A1. IFOAM-accredited certification bodies that have aquaculture scope

Certification body	Countries of operation	No. of certified aquaculture farms	Accredited for grower groups	No. of certified groups	Aquaculture commodities within the scheme	Production (tonnes)
Agrior	Israel	2 + 1 fish feed mill	no	NA	Tilapia, carp, red drum, sea bass, sea bream, *Ulva* and *Ulea* seaweed	400[66]
AgriQuality Ltd.	New Zealand, Vanuatu, Cook Islands, Malaysia		yes			
Bioland e.V.	Germany, Austria, Belgium, France, Italy, Netherlands, Switzerland		no			
Debio	Norway	3	no	NA	salmon, trout, cod	trout 0.5 salmon 120 cod 600[97]
Instituto Biodinamico	Brazil, Argentina, Bolivia, Mexico, Paraguay, Uruguay		yes			
Istituto per la Certificazione Etica e Ambientale	Italy, Lebanon, Turkey		yes			
National Association Sustainable Agriculture Australia	Australia, Timor-Leste, Indonesia, Malaysia, Nepal, New Zealand, Papua New Guinea, Samoa, Sri Lanka, Solomon Islands		yes			
Organic Agriculture Certification Thailand	Thailand	1 (not under the IFOAM-accredited scheme)	yes	0	nile tilapia and butter fish	8 000 litres (fish sauce)[68]

[66] Hagai Raban, Agrior, personal communication.
[67] Jan-Widar Finden, Debio, personal communication.
[68] Weena Krutngoen, Organic Agriculture Certification Thailand, personal communication.

The eight CBs IFOAM accredited to certify aquaculture establishments operate in a wide range of countries. Some of their details are reported in Table A1. Information provided by three of them indicates that aquaculture certification by IFOAM ACBs is still in early stages.

On the retail side, several national organic retailer associations have united into the IFOAM Organic Retailer Association, which in addition to representing its member interests internationally also has the purpose of "gradually developing a system of Organic Retailers Standards concerning assortment, handling, storage and labeling of products and qualification, education and social issues of the retail participants".

NATURLAND
www.naturland.de

Naturland (Association for Organic Agriculture) was founded in 1982 in Germany with the objective and mission of "conserving the environment and maintaining the natural basis of life by means of organic farming in all fields of agriculture". Like IFOAM, therefore, Naturland includes environmental and social responsibility in the concept of organic aquaculture. Naturland promotes organic agriculture worldwide developing and contributing to the development of standards, encouraging research, promoting improvements especially in social conditions in agriculture and in trade, through education and awareness raising. Naturland is an IFOAM ACB and as such can certify businesses using standards that have been accredited through the IFOAM OGS procedures. In addition, Naturland also sets its own standards and certification schemes that are outside the purview of IFOAM accreditation. Naturland membership is open to all Naturland certified businesses. Naturland is organized on a regional and federal basis, with members electing delegates to take part in the Assembly of Delegates, which elects the Naturland Board of Directors, determines the policy and objectives of the association, elects the members of the Standards Committee in addition to ratifying modifications to standards upon recommendations of the Standards Committee. The Standards Committee is in charge of drafting and updating Naturland standards following the fundamental principles of organic aquaculture.

Compliance to Naturland standards is assessed through annual and occasional random inspections conducted by independent organizations. Inspections are generally conducted by the Institute for Marketecology (IMO) although other inspection bodies can and have been used to perform this task. Bodies performing inspections however do not issue certificates (i.e. they are not actual Naturland ACBs), as this task is conducted by the Naturland Certification Committee. Although part of the overall Naturland organization, the deliberations of this committee are independent and based on compliance to Naturland standards alone. The Certification Committee operates through three sub-committees (i.e. domestic production, international production, processing), which review inspection reports and issue Naturland certificates. Naturland certification authorizes the use of the Naturland logo on products, which therefore makes them recognizable to consumers. On special occasions the Certification Committee can allow a producer to deviate from Naturland standards, provided this deviation is justified, for a limited period of time and the overall management according to standards is not affected.

To improve the management of organic businesses and ease the process of inspection and certification, Naturland has entered a number of initiatives that use IT solutions. E-TQM is a tool that allows inspected businesses to improve their position when cooperating with inspection and CBs, by allowing businesses to generate the necessary documentation that forms the basis for certification more easily. Similarly, e-Cert is software covering the whole scope of work performed by inspection bodies and certifiers and allegedly allows the inspection procedure to be run five times faster than using regular methods. The adoption of e-Cert is also said to reduce the cost of inspections. To assist small-scale producers in complying with certification requirements Naturland also produces extension material on the development of internal inspection systems.

Naturland has developed standards for the production of a wide range of commodities including fruit, vegetables, honey, livestock and for forest management. In 1995, standards for aquaculture production were initialized, first for pond aquaculture, then for salmonids and mussels and other cold water species and in 1999 for shrimp. The Naturland Standards for Organic Aquaculture (latest version issued in 2005) now include specific regulations for a range of aquaculture commodities such as:

- Pond culture of carp (*Cyprinus carpio*) and its accompanying species.
- Culture of trout, salmon and other salmonids in ponds and net cages.
- Rope culture of mussels (*Mytilus edulis* spp.).
- Pond culture of shrimps (*Penaeus vannamei* spp.).
- Culture of tropical freshwater fish (Siamese catfish *Pangasius* sp., milkfish *Chanos chanos,* tilapia *Oreochromis* sp., arapaima *Arapaima gigas* spp.) in ponds and net cages.

Naturland Standards for processing of agriculture and aquaculture products are also available (latest version issued in 2006).

A number of projects aimed at assisting producers in complying with Naturland standards and benefiting from implementation of organic aquaculture are also being conducted in several countries (e.g. Viet Nam, Bangladesh, India), often in partnership with the Swiss Import Promotion Programme (SIPPO) and with COOP Switzerland, where the certified products are marketed.

Of approximately 45 000 Naturland members listed on the Naturland Web site for 2005, less than 2 percent (i.e. 824) are involved with aquaculture, the majority (i.e. 99 percent, 816/824) are shrimp farmers in Viet Nam. In a different section, the Naturland Web site also states that aquaculture commodities in more than 20 countries are produced according to Naturland standards including trout in Germany, France and Spain, salmon in Ireland, shrimp in Ecuador, Peru, Brazil, Viet Nam, Thailand and Indonesia, tilapia in Israel, Ecuador and Honduras as well as *Pangasius* in Viet Nam. Other sources confirm the popularity of the Naturland aquaculture standards reporting a plan to produce 20 000 tonnes of Naturland organic tilapia in China.[69] In addition, preliminary discussion to convert regular shrimp farms in India and Bangladesh into Naturland organic-certified entities has also been conducted.[70] In spite of these signs of expansion, a comparison of recent figures with 2003 data[71] showed that several Naturland shrimp farms and hatcheries in Ecuador and Peru are no longer certified and the number of aquaculture members in Indonesia and Viet Nam has also decreased. This may not be accurate due to the lack of updated information in parts of the Naturland Web site, which also reports that the overall trend in the number of certified agriculture farms is reported to have more than doubled between 1999 and 2005.

SOIL ASSOCIATION

www.soilassociation.org

The Soil Association is a UK-based body which plays a key role in the campaigning and certification of organic food and farming. The association was founded in 1946 by a group of farmers, scientists and nutritionists with the mission to "create an informed body of public opinion about these links and to promote organic agriculture as a sustainable alternative to intensive farming methods". The association has been conducting several activities aimed at supporting organic farming not only for its food safety benefits but also to address animal welfare issues and environmental sustainability (most recently conducting initiatives on climate-friendly food and farming).

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[69] **IntraFish Media.** 2006. *HQ expands organic tilapia farming.* http://www.intrafish.no/global/news/article113416.ece

[70] http://www.sippo.ch

[71] **Naturland.** 2003. *Shrimp from certified organic aquaculture.* Naturland e.V.: Information to Consumers. April 2003.

Standards are produced by eight independent standard committees (including an Aquaculture Standard Committee) composed of Soil Association members and licensees, researchers and experts. Draft standards are circulated to all members and licensees for consultation and receive final approval by the elected Soil Association council. The Soil Association also contributes to the development of other organic standards at the national, EU and international levels.

Certification for conformity to standards is conducted solely by the Soil Association Certification Ltd., a company in charge of conducting both inspections and certification of producers, processors and suppliers. Certification is offered for all Soil Association standards and both within the United Kingdom and internationally. All the profits generated through the process of certification are passed on to the Soil Association.

Soil Association Standards have been developed for a wide range of commodities. Standards for the aquaculture sector are included in a general aquaculture chapter and five species-specific chapters for the following commodities: Atlantic salmon; trout and arctic char; shrimp; bivalves; carp.

The Soil Association operates primarily in the United Kingdom, where 70 percent of the organic produce (which includes fruit and vegetables, meat products and wood) are said to be Soil Association certified. By March 2007 there were 45 Soil Association-certified businesses. These are salmon and trout hatcheries, producers and processors, accounting for production in 2005 of 3 050 tonnes of salmon and 460 tonnes of trout.[72] Although all Soil Association-certified aquaculture businesses are located in the United Kingdom, Soil Association Certification Ltd. also offers certification for shrimp and mussel producers outside the country.

BIOGRO NEW ZEALAND

www.bio-gro.co.nz

BioGro is New Zealand's leading organic certification scheme and it is owned by the New Zealand Biological Producers and Consumers Council Inc. (NZBPCC), a non-profit society that was founded in 1983 and which, in addition to the BioGro logo, trademark and standards, also owns BioGro New Zealand Ltd. (the certification arm of the scheme) and Organic Certification New Zealand Ltd., which supplies training and other support to organic agriculture in New Zealand. The BioGro certification scheme comprises three components: (1) IFOAM accredited, (2) non-IFOAM accredited and (3 defined as "domestic".

The IFOAM-accredited standards were first published in 1984 and are now posted on the BioGro Web site in their 2001 version although standards are reviewed annually. An additional six Standards Changes and seven Technical Bulletins were also produced from 2002 to 2005 and represent modifications to the standards that must be taken into account during the certification procedures. The process of review depends on the changes made to the IFOAM standards and on the input received by organic consumer organizations. The BioGro Standards include an aquaculture module containing standards for the overall sector, finfish, shellfish and crustacean farming and processing. However, aquaculture is not reported by IOAS as one of the scopes for which BioGro is IFOAM accredited and, as such, is not included among the eight CBs listed in the earlier IFOAM section.

Auditing of businesses to assess conformity to BioGro Standards is conducted by BioGro auditors who conduct both annual and random inspections. In addition to certification for primary producers, the IFOAM-accredited scheme includes certification for processors, exporters, input manufacturers, pack-houses, distributors, retailers and service providers.

[72] Peter Bridson, Aquaculture Program Manager of the Soil Association, personal communication.

The non-IFOAM-accredited and domestic schemes follow a similar path to the IFOAM-accredited scheme, although adherence to the BioGro standards and the auditing process can be relatively less thorough. The non-IFOAM-accredited scheme is meant for businesses exporting to countries where organic labeling is not regulated and markets where IFOAM accreditation is not required and for the EU and United States for products outside the scope of their respective organic labeling regulations. Contrariwise, the domestic scheme is designed for businesses targeting the domestic market only. The cost of certification is lower for these two schemes outside the IFOAM accreditation system.

BioGro is reported to certify over 700 operations in New Zealand, including primary producers, processing plants, input suppliers,exporters and retailers, trademarking over NZ$100 million (approximately equal to US$70 million) worth of products every year. As of March 2007 the only aquaculture businesses certified by BioGro belong to the non-IFOAM-accredited scheme. These are two mussel producers, two seafood processors and two seafood exporters.

BIO SUISSE

www.bio-suisse.ch/en/home.php

Bio Suisse is the umbrella association of Swiss organic farming organizations and producers and includes more than 30 organizations and about 6 300 farms, with an alleged 11 percent of the Swiss farmland being cultivated to Bio Suisse standards.

Bio Suisse operates through a Steering Committee composed of five to nine members, most of whom are said to be organic farmers. The president and new members of the Steering Committee are elected by the Assembly of Delegates, which comprises 100 delegates elected by the Bio Suisse members. The Steering Committee is the Bio Suisse strategic decision-making body and, among other tasks, issues job descriptions for the label commissions (LC) and the technical commissions in addition to electing the presidents of the technical commissions.

The responsibility of developing and revising standards lies with the Assembly of Delegates, with the support of the technical commissions, which address issues specific to different sectors. The Bio Suisse standards include a set of annexes (e.g. on permitted substances, etc.), which are amended by the LC.

Bio Suisse standards cover not only organic farming but also processing and marketing of organic products. Conformity to Bio Suisse standards is assessed by inspection bodies authorized by Bio Suisse; they are selected among bodies that have been accredited by the Swiss accreditation authority. The Bio Suisse Web site reports four such bodies, including the IMO. The three LCs (LC Production, LC Import and LC Processing Marketing) decide on the awarding of the Bud label, which can be applied to products to indicate compliance to the Bio Suisse standards. Interestingly only businesses with a Swiss partner (e.g. importers) can apply for Bio Suisse certification.[73]

Bio Suisse also allows for inspection and certification of cooperatives, projects and producer groups based on criteria set by Naturland, IFOAM and FVO (Farm Verified Organic).

Following a two-year long cooperation with fish breeders, farmers, animal welfare organizations and fish experts from Switzerland and abroad, in 2000 Bio Suisse adopted standards for organic aquaculture. Standards refer to the farming of organic fish (trout, salmon, carp etc.), although approval for shrimp and mussels may also be obtained if a number of conditions including compliance with the Naturland standards (or equivalent) are met.

Bio Suisse certified aquaculture products now include salmon and trout in Europe and *Pangasius* in Viet Nam.

[73] Thomas Sporrer, SIPPO, personal communication.

KRAV
www.krav.se

KRAV is an association that promotes organic farming. It is composed of 28 members who are said to represent the interests of producers, traders, processors and consumers in addition to protecting the environment and animal welfare. Although the focus of its activities is in Sweden, KRAV supports international activities towards organic farming through its interactions with IFOAM and the European Union.

Standards are developed and revised by KRAV sometimes following several rounds of comments and are approved by the KRAV Board of Directors. KRAV standards are applicable to farming and all links in the supply chain including distributors, processors and restaurants.

The assessment of conformity to KRAV standards is conducted by an authorized inspection body, which is also authorized to issue certificates on behalf of KRAV, of which there are presently almost 50, located in 22 countries across the world including Japan, Thailand and Australia.

The KRAV scheme offers a wide range of labels to differentiate products based on the amount of organic material contained, to label production inputs, for export and for wild production. In addition, because KRAV standards are included in the IFOAM accreditation programme, the "IFOAM accredited" mark can also be applied if certification is issued by a CB which is IFOAM accredited for using KRAV standards (presently only Aranea Certifiering AB, Sweden). However, as the only IFOAM-accredited CB using KRAV standards is not accredited for aquaculture, KRAV certification for aquaculture products is issued outside the scope of IFOAM accreditation.

KRAV standards are said to be developed for the conditions of Nordic countries although exceptions can be made for situations in which the standards are not applicable and if those exceptions fulfil IFOAM standards and EU regulations for organic production. KRAV standards cover several production sectors including crops, livestock, apiculture and aquaculture. Although KRAV aquaculture standards contain specific parts for salmonids, perch and blue mussels, they can be applied broadly to production in freshwater, brackish water and marine environments and are suitable for carnivores, omnivores and herbivores in all their life cycle stages.

Between 2001 and 2005, KRAV was engaged in a project that led to the development of standards for capture fisheries, now an integral feature of KRAV standards. Several KRAV-certified aquaculture commodities are currently been produced, primarily in Europe including salmon, trout and Arctic char.[74]

[74] **Scialabba, N.E. & Hattam, C.** 2002. *Organic agriculture, environment and food safety.* FAO Environment and Natural Resources Series No. 4.

Annex 7. Fair-trade schemes

FAIRTRADE LABELLING ORGANIZATIONS INTERNATIONAL
www.fairtrade.org.uk

Fairtrade Labelling Organizations International (FLO) is a non-profit association of 20 member organizations that promote and market fair-trade FLO-labeled products in their countries; it operates in 15 European countries in addition to Australia, New Zealand, the United States, Canada, Mexico and Japan.

FLO standards are produced by the FLO Standard Committee in which stakeholders from the FLO's member organizations, producer organizations, traders and external experts are represented. As stated by the FLO, standards not only ensure socially responsible production and trade, but, according to the policy of the fair-trade initiative they also guarantee a fair price to producers and provide a premium price that producers have to invest in socio-economic and environmental development. Generic standards are available for both producers and traders of fair-trade products.

The so-called Standard Principles are applicable to all producers and highlight the socio-economic and environmental development scope that fair-trade standards aim to address. These Standard Principles are supported through the implementation of the producers' Generic Standards that have been developed for both small farmers' organizations and for hired labour situations. In addition, there are other rules and standards that producers must comply with. These are commodity-specific standards (over 20 sets of standards for both small farmers' organizations and hired labour situations); the scope of countries, which indicates the only countries in which fair-trade certification can be achieved and includes most countries in Africa, Asia and Latin America; a list of prohibited materials; contract production standards for cotton in India and Pakistan and rice in India. A single set of FLO trader standards is also available. Trader standards consist of a few general rules to be followed by traders to ensure fair prices to producers.

All the tasks related to the inspection and certification of producers and distribution are coordinated by FLO-CERT GmbH, which operates independently from other interests.

In 2005, the FLO's certified sales amounted to approximately €1.1 billion worldwide, a 37 percent year-to-year increase, benefiting approximately one million workers and farmers in 58 developing countries in Africa, Asia and Latin America. Although the Generic Standards are theoretically applicable to any food commodities, to date there are no specific standards for the production and trade of aquaculture commodities and, as such, no FLO-certified aquaculture products. Nevertheless, the FLO has declared its intention to develop standards for fair-trade shrimp and fish on several occasions.[75]

ALTER-TRADE JAPAN
www.altertrade.co.jp

Alter-Trade Japan (ATJ) is a Japanese grassroots trading company established in 1989 through the joint investment of consumers' cooperatives and organic trading organizations and as a consequence of activities conducted by the Japan Committee for Negros Campaign (an NGO). After beginning activities in the Philippines, in 1992 ATJ started the importation of "Eco-shrimp" produced in extensive traditional farms in Indonesia. Activities were expanded further until Alter-Trade Indonesia was established in 2003. Although not strictly a certification scheme, ATJ has been involved in the establishment of fair-trade arrangements, linked also to Naturland organic certification.

[75] John Arnold, FLO, personal communication.

INTERNATIONAL FAIR TRADE ASSOCIATION
www.ifat.org

The International Fair Trade Association (IFAT) is a non-profit organization that claims to be the global network of fair-trade organizations. Its mission is to improve the livelihoods and well-being of disadvantaged people. IFAT operates through three levels: IFAT membership, an elected executive committee and the IFAT secretariat, which supervises day-to-day activities. In 2004 IFAT launched the FTO Mark, a label that can be used only by organizations complying with the IFAT standards. The FTO Mark is not applicable to individual businesses and cannot be used to label products. However, it can be used on headed paper, Web sites, posters and other promotional material used by the organization. Although primarily focused on fair-trade issues, IFAT standards also promote transparency, accountability, capacity building, gender equity, better working conditions and environmental sustainability. Compliance to the IFAT standards is assessed through a three-step monitoring process that involves a combination of self-assessment, mutual review between trading partners and external verification performed every year on a random number of organizations. More than 150 organizations are registered within IFAT; they deal with the trading of a wide range of commodities. However, it would appear that, so far, none of them trades fisheries products.

ETHICAL TRADING INITIATIVE
www.ethicaltrade.org

The Ethical Trading Initiative (ETI) is an alliance of companies, NGOs and trade union organizations with the target of promoting and improving the implementation of codes of practice that address working conditions throughout the supply chain. The ETI was set up in 1998 in response to concerns on the working conditions adopted by suppliers (typically from developing countries) of goods produced for export.

In this context, the ETI Base Code and the Principle of Implementation were developed. These documents aimed to set the basic philosophy for ETI work and to provide a generic standard for company performance with regard to setting better working conditions. In 2002 a Prawn Working group was set up to implement a project aimed at identifying and developing a strategy to address the social impact of the shrimp farming and fishing industry in India. Following project implementation, the group concluded that ETI members should undertake individual action with their suppliers and partners to address improvement in the working conditions of employees involved with the sector.

Annex 8. Animal welfare and "free-range" schemes

FREEDOM FOOD
www.rspca.org.uk

The Freedom Food scheme was established by the Royal Society for the Prevention of Cruelty to Animals (RSPCA), a UK-based charity established almost 200 years ago. Overall RSPCA management is coordinated by a council, which consists of 25 members directly elected by the society's members. Freedom Food claims to be the only UK farm assurance scheme targeted at improving farm animal welfare.

Freedom Food standards are developed directly by the RSPCA in consultation with producers and a range of technical experts. Standards are now available for both producers and haulers and abattoirs and have been developed for a wide range of commodities. In 2006, Freedom Food standards for the production of farmed salmon were also issued, covering every aspect of the salmon life cycle from eggs to juveniles, to adults and slaughter. Although the main focus is on animal welfare, standards also contain a section on the "Wider Environmental Impact" addressing predator control, escapees and other issues.

At present Freedom Food salmon is the only aquaculture commodity covered by the scheme and can be purchased only by UK supermarkets.

LABEL ROUGE
www.synalaf.com

The Label Rouge programme was started in France about 40 years ago by a group of producers with the support of the French Government, which officially created and formalized the Label Rouge scheme. The programme was initially focused on the production of poultry of superior quality (both in terms of taste and food safety), through free-range practices (low stocking density), use of selected breeds and other methods.[76]

Standards are developed and revised by a group of specialists and are then examined by the "reference examination" section of the National Commission of Labels and Certification for Agricultural and Food Products, which includes representatives from producers, processors, distributors and consumers. Standards receiving a favourable opinion from the Commission receive approval from the Ministry of Agriculture and Fishing. Certification is conducted by independent CBs accredited by Association chargée de l'accréditation des laboratoires, organismes certificateurs et d'inspection (COFRAC) the official accreditation agency of the French Government.[77]

From earlier efforts on French poultry, Label Rouge expanded to certifying poultry and a range of other commodities abroad. The Label Rouge certification of shrimp from Madagascar was one of the first efforts conducted outside France. Label Rouge standards for shrimp were developed by a working group including a wide range of specialists (also involving Institute français de la recherché pour l'exploitation de la mer [IFREMER]), producers, processors and others). The shrimp standards were then submitted to the commission for its evaluation, review and approval. As efforts towards shrimp standard development are largely supported by producers, standards are not freely available and can be obtained only upon request to the Madagascar shrimp businesses involved in the development of the standards.[78]

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[76] **Fanatico, A. & Born, H.** 2002. *Label Rouge: pasture-based poultry production in France.* http://www.attra.ncat.org/attra-pub/labelrouge.html

[77] **Label Rouge.** 2007. *Seafood and aquaculture products of excellence.* Brochure presented at the European Seafood Exposition 2007, 24–26 April 2007.

[78] Eric Bernard, WWF Madagascar, personal communication.

In addition to shrimp from Madagascar, there is now a wide range of Label Rouge-certified aquaculture products including salmon products from Scotland, Norway and Ireland, farmed bass from the Mediterranean, oysters and scallops from France and farmed turbot.

Annex 9. Other schemes which may have relevance to aquaculture certification

WWF AQUACULTURE DIALOGUES AND STANDARDS
www.worldwildlife.org/cci/aquaculture.cfm

Over the years, the World Wildlife Fund for Nature (WWF) has conducted several efforts towards the sustainability of the aquaculture sector. In addition to being one of the partners in the Consortium on Shrimp Farming and the Environment, WWF is hosting aquaculture dialogues to identify the most significant impacts, criteria, indicators and standards for the certification of sustainable aquaculture. Dialogues have been initiated for a wide range of aquaculture commodities traded globally (including salmon, trout, shrimp, tilapia, catfish, *Pangasius*, bivalves, seaweed and others). Standards, which are said to be developed in compliance with the ISEAL Code of Good Practice and the FAO guidelines for aquaculture certification, are expected to be completed between 2007 and 2008. The development of an independent system of certification to hold and assess conformity to the aquaculture dialogue standards is also ongoing, with standards to be hosted either by an existing organization (e.g. the Marine Stewardship Council) or a new body (e.g. the Aquaculture Stewardship Council).[79] A number of WWF offices (e.g. Netherlands, Sweden, Hong Kong SAR, Indonesia, South Africa) have also developed guidelines for responsible consumption of fisheries products (including from aquaculture) using a "traffic light approach", i.e. categorizing commodities into green, yellow or red with decreasing degrees of sustainability. The criteria used to classify commodities, however, are often different for different countries and efforts are currently ongoing to harmonize the traffic light approach with the aquaculture dialogue standards being developed.

MARINE STEWARDSHIP COUNCIL
www.msc.org

The Marine Stewardship Council (MSC) is an independent non-profit organization that targets environmentally responsible fisheries. The MSC has developed standards to certify sustainable and well-managed fisheries. In February 2006, Wal-Mart declared its willingness to source all wild-caught fresh and frozen fish for the North American market from MSC-certified fisheries, therefore ensuring market support to the MSC programme. To date, the MSC has been dealing only with the certification of capture fisheries although its future involvement in the certification of sustainable aquaculture commodities cannot be excluded. The MSC's involvement in aquaculture was also explored by WWF in its efforts to identify a suitable host for the standards developed through the aquaculture dialogues.[80]

SEAFOOD WATCH OF THE MONTEREY BAY AQUARIUM
www.seafoodwatch.org

The Monterey Bay Aquarium (MBA) is a non-profit organization established in 1984 to inspire the conservation of the oceans. As part of its mission, the MBA established the Seafood Watch programme, which is designed to raise consumer awareness about sustainability issues associated with capture and farming of fisheries commodities. Following well-defined criteria, the MBA divides commodities into three categories using a traffic light approach similar to the one adopted by some WWF offices: green (best choice), yellow, (good alternative) and red (avoid).

A total of 20 of the 158 commodities listed within the Seafood Watch programme are marked as "farmed". The majority (i.e. 14) are listed as best choice, while two (*Pangasius* and tilapia from Central America) are

[79] Jason Clay, WWF US, personal communication.
[80] Jason Clay, WWF US, personal communication.

considered good alternatives and the remaining four (crayfish, salmon, shrimp and tilapia from China) are commodities to be avoided. In agreement with interested retailers in the United States, Sustainable Fisheries Advocates, a non-profit organization founded in 2002, initiated FishWise, a project through which these retailers can have all their fisheries commodities (including aquaculture items) labeled as green–yellow or orange following the Seafood Watch categories.[81] The fisheries products labeled by FishWise since 2003 amount to about US$7 million.[82]

ENVIRONMENTAL JUSTICE FOUNDATION
www.ejfoundation.org

The Environmental Justice Foundation (EJF) is a non-profit organization that targets sustainability through the protection of the environment, human rights and the social needs of communities. To address concerns arising from shrimp farming, the EJF has a Draft Protocol for Sustainable Shrimp Production and a Consumer Guide to Prawns.

FEDERATION OF EUROPEAN AQUACULTURE PRODUCERS
www.FEAP.info

The Federation of European Aquaculture Producers (FEAP) is an association of producers currently composed of 28 National Aquaculture Producer Associations from 23 European countries and representing production of almost 1.5 million tonnes of finfish products worth more than €3 million (more than US$4 million). In order to increase the sustainability of European aquaculture, in 2000 FEAP adopted a Code of Conduct that was developed by experts and producers in collaboration with a wide range of stakeholders. Among other documents, the code is said to have been developed with specific reference to the FAO CoCRF. The code is expected to serve as the basis for the development of national level codes of practice. Adoption of the code's principles is voluntary although encouraged by FEAP. So far, there is no system to assess compliance to the principles stated in the code.

SWISS IMPORT PROMOTION PROGRAMME
www.sippo.ch

The Swiss Import Promotion Programme (SIPPO) is mandated by the Swiss State Secretariat for Economic Affairs (SECO) to promote exports to Switzerland and the European Union. SIPPO has been collaborating with Naturland, COOP Switzerland and stakeholders in Ecuador, Viet Nam, Bangladesh and other countries to help shrimp farmers obtain Naturland organic certification. Although strictly speaking SIPPO is not a standard-setting organization, in 2002 it produced the "International Standards for Organic Aquaculture: Production of Shrimp". These standards are said to be based on the Naturland standards and do not appear to differ significantly from them. They would seem to be the only standards produced by SIPPO and do not appear to have links to any system of farm auditing and certification.

[81] http://www.fishwise.org
[82] Tobias Aguirre, FishWise, personal communication.

Annex 10. Qualitative descriptions of the 10 aquaculture schemes assessed

No.	Description of scheme	GAA/ACC	GLOBALGAP	Naturland	Thai CoC	SQF	IFOAM	ISO 9001	ISO 14001	ISO 22000	FLO
1	ISEAL member	No	No	No	No	No	Yes	No	No	No	Yes
2	Benchmarked by GFSI	No	No	No	No	Yes	No	No	No	No	No
3	Scheme makes reference to international standards	CODEX, refers to "ISO-approved laboratories"	EN45011/ ISO 65; ISO 14001; other ISO guides	IFOAM, ILO, EU regulation on organics	CODEX, FAO cocrf, ISO 14001	CODEX, ISO standards	CODEX, ISO standards, ILO	ISO 14001	ISO 9001	ISO 9001, CODEX	ILO
4	Is the procedure for standard development & revision documented?	Yes	Yes, but documents on new set up and operation conflict slightly	Not readily available	Partially, maybe more information in Thai	Not in very detailed manner	Yes	Yes	Yes	Yes	Yes
5	Were/are all the major stakeholder groups involved in the development/ revision of the standard?	Not extensively	Partially for species modules, less so for aquaculture module	Yes, as part of projects	Partially	Not extensively as standards not specific to aquaculture	Partially	Not extensively as standards not specific to aquaculture	Not extensively as standards not specific to aquaculture	Not extensively as standards not specific to aquaculture	Yes, although not yet for aquaculture
6	Is there a process for reviewing regularly the standards?	Revision is done but process not clear	Yes	Revision is done but process is not clear	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Is input from stakeholders directly impacted (especially disadvantaged groups) actively sought?	No	No	Yes, as part of projects	Yes, indirectly	Not extensively as standards not specific to aquaculture	Yes	Not extensively as standards not specific to aquaculture	Not extensively as standards not specific to aquaculture	Not extensively as standards not specific to aquaculture	Yes, although not yet for aquaculture

No.	Description of scheme	GAA/ACC	GLOBALGAP	Naturland	Thai CoC	SQF	IFOAM	ISO 9001	ISO 14001	ISO 22000	FLO
8	Is standard development based on the principles of consensus?	Partially, as there is a process for technical committees to reach a decision, although it may not be consensus based	Partially, although GLOBALGAP has final say	Partially, although Naturland has final say	Partially, although DoF has final say	Not specified	Yes	Yes	Yes	Yes	Yes
9	Is there a documented process to address complaints with failures in following the process for standard development and revision?	Partially, but mainly for complaints on the standards	Yes	?	?	Partially, only a method to address complaints from consumers	Yes	Yes	Yes	Yes	Yes
10	Standards publicly available for implementation (even if including reasonable fee)	Yes	Yes	Yes	Yes, but only in Thai	Yes	Yes but subject to payment of a fee	Yes but subject to payment of a fee	Yes but subject to payment of a fee	Yes but subject to payment of a fee	Yes
11	Standards based on measurable/precise criteria	Yes	Yes	Partially	Not possible to assess as actual standards in Thai only	Yes	Partially	Yes	Yes	Yes	Partially
12	Product or process standards	Process	Process	Process	Process/ product	Process	Standards for process standards	Process	Process	Process	Process
13	Target of the label: consumer or food chain operators	Consumers	FCO	Consumer	Consumer	Consumer	Consumer	FCO	FCO	FCO	Consumer

No.	Description of scheme	GAA/ACC	GLOBALGAP	Naturland	Thai CoC	SQF	IFOAM	ISO 9001	ISO 14001	ISO 22000	FLO
14	Link between standard development & certification organizations	Strong	Mild	Strong but independent inspection	Strong	Mild	Nil	Mild	Mild	Nil	Strong
15	Implemented through third party certification	No, many certifiers involved with producers/ buyers	Yes	Yes	No, as certification body linked to producers	Yes	Yes	Advised but not guaranteed	Advised but not guaranteed	Advised but not guaranteed	Yes
16	Certification body accredited by internationally recognized accreditation organization or accredited to ISO 65	No	IAF/EA	No	No	IAF/ISO 65	Not specified	Advised but not guaranteed	Advised but not guaranteed	Advised but not guaranteed	ISO 65
17	Free access to accredited CBs	No	Yes	No	No	Yes	Yes	Advised but not guaranteed	Advised but not guaranteed	Advised but not guaranteed	No
18	Allows for certification of producer groups	No, but efforts are ongoing	Yes	Yes	?	Yes	Yes	Possible	Possible	Possible	Yes
19	Developed by competent representatives of direct stakeholders	Yes, but some direct stakeholders not included	Yes, although appears biased towards high resource cage aquaculture	Yes	Yes	Yes, but aquaculture experts maybe limited as standards not sector-specific	Yes	Yes, but aquaculture experts maybe limited as standards not sector-specific	Yes, but aquaculture experts maybe limited as standards not sector-specific	Yes, but aquaculture experts maybe limited as standards not sector-specific	Yes, although not yet for aquaculture
20	Scheme has standards for producers	Yes	Yes	Yes	Yes	Yes	Yes	Yes, since not sector specific	Yes, since not sector specific	Yes, since not sector specific	Yes
21	Scheme has standards for traders	No	Yes	No	Yes	No	Yes	Yes, since not sector specific	Yes, since not sector specific	Yes, since not sector specific	Yes, in producers standards but separate standard in preparation

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22	Scheme has standards for processors	Yes	Yes	Yes	Yes	Yes	Yes	Yes, since not sector specific	Yes, since not sector specific	Yes, since not sector specific	No
23	Scheme has standards for seed suppliers	Yes	No, but modules are under development for some species	Yes, but only for some species	Yes	No	Yes	Yes, since not sector specific	Yes, since not sector specific	Yes, since not sector specific	No
24	Scheme has standards for feed	Not yet, but under development	Yes	Yes	Yes, by requiring compliance with GMP	No	Yes	Yes, since not sector specific	Yes, since not sector specific	Yes, since not sector specific	No
25	Requires compliance to scheme throughout the supply chain	Not necessary, but promoted	Yes, but sometimes excluding early stages	Yes, but not essential	Yes for Q-Mark, but not necessary for lower levels	Yes	Yes	Not necessary	Not necessary	Not necessary	Yes
	Inspection process										
26	Inspection by CB includes water testing/env. testing	Yes, including examination of salt-sensitive vegetation	No	Yes	?	?	Possible, type of inspection based on risk of each operation	Dependent on certification body selected	Dependent on certification body selected	Dependent on certification body selected	?
27	Inspection by CB includes consultation with local communities/ assessment of off-site impact	Yes	No	?	?	?	Possible, type of inspection based on risk of each operation	Dependent on certification body selected	Dependent on certification body selected	Dependent on certification body selected	?

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	General points on producers standards										
28	Clearly stated principles	Yes	Yes	Partially, refers to organic principles. Standards called "principles of management"	Yes with reference to FAO cocrf	Not specified	Yes	Yes, included in the ISO 9000 series	Yes, included in the ISO 14000 series	Not directly	Yes
29	Quantity of compliance points	Average	High	Average	?	Average	Average	High	Average	Average, and proportional to size of business	Average
30	Quantity of written documents required	Average	High	Average	Average	High	Average	High	Average	High	Average
31	Validity period of certificate/ Frequency of inspection	1 year	3 yrs but yearly inspection	1 year	1 year	1 year	Frequency of inspection based on risk of each operation. Not less than once every 3 yrs.	Not specified	Not specified	Not specified	1 year
32	Require records for (minimum time):	1 year	2 yrs (5 yrs for feed records)	Not specified	?	2 yrs	Not specified	Not specified	Not specified	Not specified	Not specified
33	Period of compliance before being certified	Possibly 1 year following available records	Full life cycle or 6 mo, whichever shorter	Animals to spend at least 2/3 of their lives	?	Possibly 2 yrs following available records	At least one life cycle or 1 year, whichever shorter	Not specified, but possibly nil	Not specified, but possibly nil	Not specified, but possibly nil	Not needed. Also allows for retrospective certification

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	COVERAGE OF STANDARDS										
	GENERAL										
34	Compliance to law	Yes	Yes	Partially, but only some laws specified (land use, food safety, workers' welfare)	Yes	Partially, specifically for food safety	Only concerning laws that make some organic practices illegal	Yes	Yes, not only env. law	Yes, partially concerning food safety	Yes
35	Internal audit	Not necessary but requires record keeping	Yes, documented	Yes for groups	Not necessary but requires record keeping	Yes	Not specified	Yes	Yes	Yes	Yes, including a formalized internal control system
36	Performance monitoring	Yes, FCR, health	Yes, growth, residues, health	Yes, health, effect of management practices...	Yes, looking at FCR, health, etc.	Yes, food safety	Yes, health, behaviour, water quality	Yes, as part of overall compliance monitoring	Yes, as part of overall compliance monitoring	Yes, as part of overall compliance monitoring	Yes, especially in terms of social & env. benefits
37	Performance improvement over time	Partially, only from first certification and after 5 yrs. Also improve water quality	Not necessary	Not necessary	Partially as collects information on previous crop	Not necessary	Not necessary	Yes as part of using the Plan-Do-Check-Act methodology	Yes as part of using the Plan-Do-Check-Act methodology	Yes	Yes, through "progress requirements"
38	Staff training	Not directly	Yes	Yes	Yes for farmers but not for workers	Yes	Not directly	Yes	Yes	Yes	Yes, mainly in hired labour standards
	FOOD SAFETY										
39	Development of food safety policy and manual/system	Not required	Yes, contingency plan also	Not required	Not directly but need to submit SOP for farm	Yes	Not required	Yes, indirectly if food safety is a quality attribute	Not required	Yes	Not required
40	Use of HACCP approach	No	Yes	No	Not strictly	Yes	No	No	No	Yes	No

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41	Food safety through site selection	Not directly but maybe through compliance to law	Yes	Not directly but maybe through compliance to law	Yes	Yes	Not directly	Not directly, unless dealing with expansion	Not directly	Not directly, unless dealing with expansion	Not directly
42	GMO	Not prohibited, but need to record if GMO	Prohibited GMO feed must be declared	Prohibited including feed	Not prohibited	Not prohibited	Prohibited, including feed, vaccines, probiotics… from GMO	Not prohibited, unless considered a quality attribute	Not prohibited, unless env. management system requires control	Not prohibited	Prohibited, including GMO inputs
43	Prohibit use of protein and fat from some species	Not directly but maybe through compliance to law	Yes	Yes, if untreated	Not directly but maybe through compliance to law	Not directly but maybe in the food quality plan or modules being developed	Yes	Not directly, unless a quality attribute	Not directly but maybe through compliance to law	Not directly, unless considered a food safety hazard, or in compliance with law	Not directly
44	Preharvest food safety	Yes	Yes	Yes	Yes	Yes	Yes	Yes, indirectly if food safety is a quality attribute	Not directly	Yes	Partially
45	Pest control	Yes but not critical	Yes	Not directly	Not directly, but requires proper storage	Not directly but maybe through food safety plan & compliance to law	Yes	Yes, indirectly if food safety is a quality attribute	Not directly	Yes, indirectly though hazard identification and management	Yes, covering the use of pesticides
46	Traceability	Yes	Yes	Yes, indirectly to prove organic status. Also for collection of mussels	Yes	Yes	Yes indirectly to prove organic status, especially GMO-free	Yes	Not directly	Yes	Yes, for proving GMO-free status

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47	Product testing	Yes	Yes	Not necessary but can be required	Yes	Yes	Not necessary but maybe performed by inspection body	Yes, indirectly if food safety is a quality attribute	Not necessary, unless env. management system requires control	Yes indirectly as part of monitoring critical limits for monitoring	Not directly
48	Post-harvest food safety	Yes, but not critical	Partially (deals with ice quality and quality of means of transportation)	Yes	Yes	Yes, indirectly through food safety plan	Partially, as need to preserve organic status and animal welfare	Yes, indirectly if food safety is a quality attribute	Not directly	Yes, especially since standards applicable at all levels	Not directly
	ENVIRONMENT										
49	Requires env. risk/impact assessment	Not necessary	Yes	Not necessary	?	Not directly but maybe in the modules being developed	Not necessary	Yes, indirectly if env. protection is a quality attribute	Yes, indirectly	Not directly	Yes, indirectly
50	Environmental protection during farm siting	Yes	Yes, in compliance with ISO 14001	Yes, also require conservation of ecosystem function	Yes	Not directly but maybe in the modules being developed	Yes, also requires maintaining part of the farm to facilitate conservation	Not directly unless expansion	Not directly, unless expansion or organization certified before establishing site	Not directly	Yes, indirectly, as requires identification of buffer zones etc. to conserve biodiversity
51	Loss of mangrove and sensitive habitats	Yes, but only since 1999 and for allowable reasons and replantation of area 3-times as large	Yes indirectly through development of env. plan	Yes, also requests reforestation of farm to reach 50%	Yes, farms should not be in mangrove areas; also promote replantation	Not directly but maybe in the modules being developed	Yes, prohibiting clearing of primary ecosystem	Yes, indirectly and only for management if env. protection is a quality attribute	Yes, but only through management, not during siting	Not directly	Yes, through ecosystem protection and encouraging regeneration of natural ecosystems

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52	Environmental impact considered during farm design and construction	No	Not directly but maybe through development of env. plan	Partially, as covers suitable design and construction material	Partially, as requires good design	Not directly but maybe in the modules being developed	Yes, also covering impact on human & animal welfare	Not directly unless expansion	Not directly, unless expansion or organization certified before establishing site	Not directly	Not directly, unless expansion
53	Stocking density	No	Yes, cannot exceed max load depending on carrying capacity	Yes, for animal welfare and use of natural feed. Also set species-specific thresholds	Yes, should be appropriate to system/ conditions. Also set max densities for *P. Monodon* and *P. Vannamei*	Not directly but maybe in the modules being developed	Yes, should not compromise animal welfare	Not directly unless considered as affecting quality attributes	Yes, if identified as needing addressing	Not directly, unless considered a food safety hazard	Not directly, but maybe when identifying env. impacts
54	Demand on wild stocks for seed/ broodstock	Yes, requires only hatchery post larvae	Not directly but maybe through development of env. plan	Yes, with objective of reaching independence from wild	Not directly, only through stocking density	Not directly but maybe in the modules being developed	Yes, indirectly, by minimizing env. impact during harvest of wild animals	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly, unless considered a food safety hazard	Yes, use of wild organisms to be done assuring sustainability
55	Stocking of exotic species	Yes, but dependent on law	Not directly but maybe through development of env. plan & compliance to law	Yes, species naturally occurring are preferred	Not directly but maybe through compliance to law	Not directly but maybe in the modules being developed	Partially, recommends locally adapted & regionally established	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly, unless considered a food safety hazard	Not directly, but maybe when identifying env. impacts
56	Water exchange/ abstraction	Not directly, only collect information on water use; yes but not critical for groundwater	Yes, but dependent on law	Yes	Yes, to be minimized	Not directly but maybe in the modules being developed	Yes, to be minimized	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly	Yes, to be minimized

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57	Requires testing/ record keeping of water quality	Yes	Yes	Yes	Yes	Not directly but maybe in the food quality plan or modules being developed	Yes	Yes, indirectly if env. protection is a quality attribute	Yes, indirectly as part of monitoring	Not directly, unless considered a food safety hazard	Yes, to monitor effluents
58	Provides water quality standards to be complied with	Yes	Yes in species module and only some variables	No	Yes, through compliance to law	No, but maybe in the modules being developed	No	No	No	No	No
59	Water effluents	Yes, including testing of effluent water	Yes, but dependent on law	Yes, including testing of effluent water	Yes, also requires water treatment before discharge	Not directly but maybe in the modules being developed	Yes, to be minimized. Also recommend recycling	Yes, indirectly if env. protection is a quality attribute	Yes, indirectly as part of monitoring	Not directly	Yes, indirectly by addressing organic waste contamination of water
60	Demand for fish protein/oil	Not directly, only collect info	Yes, but only recommended	Yes, encourage reduction	?	Not directly but maybe in the modules being developed	Not directly, also promote feed that respond to physiological needs	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly	Not directly
61	Solid waste management	Yes, also addressing avoidance of borrow pits and piles of soil	Yes, also including a farm waste management plan	Yes, requiring re-usage of organic matter	Yes, also requires sludge pond	Not directly but maybe in the modules being developed	Yes, indirectly by minimizing release of waste	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Yes, as disposal of wastes	Yes, also encourages recycling
62	Chemicals/drugs disposal	Yes	Yes, requires disposal by authorized person	Not directly, but less applicable as limited use of chemicals/ drugs	Yes	Not directly but maybe in the modules being developed	Yes, also for the use of cleaning compounds	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Yes, as disposal of wastes	Yes, through correct use, handling, storing & disposal

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63	Escapees	Yes, indirectly as it requires screens in inlet and outlet	Yes, requires measure that ensures there are no escapees	Yes	Yes	Not directly but maybe in the modules being developed	Yes	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly	Not directly, but maybe when identifying env. impacts
64	Cumulative impact of multiple operations	Not directly, but maybe through compliance to law; also collect info on adjacent farms but no standard included	Partially, indirectly through compliance to law. Also through stocking density in compliance with carrying capacity	Not directly, but less applicable as generally less intensive systems	Not directly but maybe through compliance to law	Not directly but maybe in the modules being developed	Not directly but less applicable as generally less intensive systems	Yes, indirectly if env. protection is a quality attribute	Yes, indirectly as part of env. assessment	Not directly, unless considered a food safety hazard	Yes, indirectly by addressing native habitat preservation
65	Energy efficiency & consumption	No	Yes, but only recommended	Yes, also require record keeping	No	Not directly but maybe in the modules being developed	Yes	Yes, indirectly if env. protection is a quality attribute	Yes, if identified as needing addressing	Not directly	Yes, especially for non-renewable sources
	AQUATIC ANIMAL HEALTH										
66	Farm preparation to prevent health problems	No	Not directly but maybe through development of Veterinary Health Plan	Yes	Yes	Not directly but maybe in the modules being developed	Yes, indirectly while preventing health problems	Yes, indirectly if animal health is a quality attribute	Not directly, unless disease identified as env. impact	Not directly, unless considered a food safety hazard	Not directly, unless disease identified as env. impact
67	Farm biosecurity	Not directly but maybe through compliance to law	Yes, also disinfection at points of entrance	Not directly	Not directly but maybe through compliance to law	Not directly but maybe in the modules being developed	Yes, indirectly while preventing health problems	Yes, indirectly if animal health is a quality attribute	Not directly, unless disease identified as env. impact	Not directly, unless considered a food safety hazard	Not directly, unless disease identified as env. impact

No.	Description of scheme	GAA/ACC	GLOBALGAP	Naturland	Thai CoC	SQF	IFOAM	ISO 9001	ISO 14001	ISO 22000	FLO
68	Responsible use of drugs and chemicals	Yes	Yes, to be prescribed by a veterinarian	Yes, but conventional medicine allowed only for vertebrates & in consultation with veterinarian	Yes	Partially, but only concerning food safety	Yes, but conventional medicine allowed only for vertebrates & in consultation with veterinarian	Yes, indirectly if animal health/food safety is a quality attribute	Yes, if identified as needing addressing from env. point of view	Yes, indirectly if considered a food safety hazard	Yes, also minimize chemical use and move towards organic practices. Also need written evidence that chemicals are needed
69	Antibiotic use	Not prohibited	Not prohibited	Controlled, prohibited for invertebrates. Use for vertebrates through consultation with veterinarian and double withdrawal period	Not prohibited	Not prohibited	Controlled, prohibited for invertebrates. Use for vertebrates through consultation with veterinarian and double withdrawal period	Not prohibited, unless antibiotic-free is a quality attribute	Not prohibited, unless identified as env. impact	Not prohibited, unless identified as a food safety hazard	Not prohibited but use to be minimized and move towards organic practices
70	Control on additional not-banned substances	No	No	Yes	No	No	Yes	Not necessary, unless a quality attribute	Not necessary, unless identified as env. impact	Not necessary, unless identified as a food safety hazard	Yes, but not yet specific to aquaculture
71	Quality/health status of seed	Not directly, only concerning the use of hatchery seed	Yes but only for eggs, also maybe through development of Veterinary Health Plan	Not directly	Yes	Not directly but maybe in the modules being developed	Not directly	Yes, indirectly during purchasing process	Not directly, unless quality/ health identified as env. impact	Not directly, unless considered a food safety hazard	Not directly

No.	Description of scheme	GAA/ACC	GLOBALGAP	Naturland	Thai CoC	SQF	IFOAM	ISO 9001	ISO 14001	ISO 22000	FLO
72	Farm management to prevent health problems	Partially, keeping water quality	Yes, also through the development of Veterinary Health Plan	Yes, requiring identification of practices that lead to health problems	Yes	Not directly but maybe in the modules being developed	Yes, indirectly while preventing health problems	Yes, indirectly if animal health is a quality attribute	Not directly, unless disease identified as env. impact	Not directly, unless considered a food safety hazard	Not directly, unless disease identified as env. impact
73	Feed quality	Only marginally, discouraging uncooked feed & advising ACC on feed although not in standard	Yes, also requires certification of feed	Yes, also request compliance with Naturland or IFOAM standards	Yes, also through compliance to law	Not directly but maybe in the food quality plan or modules being developed	Yes, also set standards	Yes, indirectly during purchasing process	Not directly, unless feed quality identified as env. impact	Not directly, unless considered a food safety hazard	Yes, but only referring to contamination of feed with pesticides
74	Overfeeding/FCR	Only collect information	Yes, requires calculation of feed doses	Yes, need at least 50% natural production & FCR monitoring	Yes, requires good feed management & FCR monitoring	Not directly but maybe in the modules being developed	Yes, feed efficiently	Yes, indirectly if env. is a quality attribute	Yes, indirectly and if identified as needing addressing from env. point of view	Not directly, unless considered a food safety hazard	Yes, indirectly and if identified as needing addressing from env. point of view
75	Monitoring of animal health	Not directly but maybe through compliance to law	Yes, to be conducted by a veterinarian	Yes	Yes	Not directly but maybe in the modules being developed	Yes	Yes, indirectly if animal health is a quality attribute	Yes, indirectly as part of monitoring	Not directly, unless considered a food safety hazard	Not directly
76	Disease spread to other farms during culture	Not directly but maybe through compliance to law	Yes, also requiring authority notification	Not directly	Yes, also through effluent water treatment	Not directly but maybe in the modules being developed	Not directly	Not directly	Not directly, unless disease spread identified as env. impact	Not directly	Yes, indirectly though management of waste to reduce spread of diseases
77	Disposal of mortality	Not directly but maybe through compliance to law	Yes	Only removal, not disposal	Not directly but maybe through compliance to law	Not directly but maybe in the modules being developed	Yes, indirectly by minimizing release of waste	Not directly	Not directly, unless identified as env. impact	Not directly, unless considered a food safety hazard	Yes, indirectly through disposal of hazardous/ organic wastes

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	SOCIAL										
78	Development of farmer's group	Not directly	Not directly although allows group certification	Not directly although allows group certification	Yes, including standards for their operation	Not directly but maybe in the modules being developed	Not directly although allows group certification	Not directly, unless a quality attribute	Not directly	Not directly	Yes, including standards for their operation
79	Other resource users/local communities	Yes, also requiring consultation	Only considering access to resources	Yes, mainly concerning access to resources	Yes, requiring consultations, employing local workers	Not directly but maybe in the modules being developed	Yes indirectly, respecting indigenous peoples	Yes, indirectly if social issues are a quality attribute	Not directly, but maybe as interested parties to be consulted	Not directly	Yes, reducing off-site impacts, supporting other community activities
80	Workers' welfare	Yes, covering health, housing, living conditions…	Yes, in the All Farm module	Yes, covering housing, living conditions…	Yes	Not directly but maybe in the modules being developed	Yes	Yes indirectly referring to suitable work environment	Not directly but maybe through compliance to law	Yes indirectly referring to suitable work environment	Yes, also requiring social benefits
81	Forced labour	Yes indirectly through workers' welfare and compliance to law	Yes indirectly through workers' welfare and compliance to law	Yes indirectly through workers' welfare and compliance to law	Yes indirectly through workers' welfare and compliance to law	Not directly but maybe in the modules being developed	Yes	Yes indirectly referring to suitable work environment	Not directly but maybe through compliance to law	Yes indirectly referring to suitable work environment	Yes
82	Child labour	Not directly but maybe through compliance to law	Not directly but maybe through compliance to law	Yes with conditions, indirectly through compliance to IFOAM social standards & through compliance to law	Not directly but maybe through compliance to law	Not directly but maybe in the modules being developed	Yes with conditions	Yes, indirectly if social issues are a quality attribute	Not directly but maybe through compliance to law	Not directly	Yes with conditions

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	ANIMAL WELFARE										
83	Animal welfare (stress, etc.)	No	Yes	Yes	No	Not directly but maybe in the modules being developed	Yes, also controls mutilations	Yes, indirectly if animal welfare is quality attribute	Not directly	Not directly, unless considered a food safety hazard	Not directly
84	Protection from wild animals and predators	Not directly	Yes, subject to risk assessment	Yes	Yes but only through the inlet	Not directly but maybe in the modules being developed	Yes	Yes, indirectly if animal welfare is quality attribute	Not directly	Not directly	Not directly
85	Application of non-lethal, or humane, methods of predator control	Yes but not critical	Yes	Yes, but not critical	Not required	Not directly but maybe in the modules being developed	Not required	Yes, indirectly if animal welfare is quality attribute	Yes, if identified as needing addressing	Not directly	Not directly but perhaps through protection of native habitats

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