

# ROUND TABLE ON ECO-LABELLING AND CERTIFICATION IN THE FISHERIES SECTOR

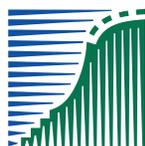
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## Background Paper

ECONOMICS OF MARKET INFORMATION RELATED TO  
CERTIFICATION AND STANDARDS IN FISHERIES



agriculture, nature  
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**THE ECONOMICS OF MARKET INFORMATION RELATED TO**

**CERTIFICATION AND STANDARDS IN FISHERIES**

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## EXECUTIVE SUMMARY

The rapid internationalization and integration of food supply chains has raised consumer concerns over the quality of the foods they buy. Demand for consistent and verifiable high quality in food products has sparked a proliferation of signaling and labelling systems aimed at assuring business partners and consumers alike. A product's quality is determined by its set of intrinsic quality attributes, which include food safety, nutrition, sensory characteristics (e.g., taste), value/function, and how the product was produced (e.g., sustainability of catch or production practices). To the buyer, the intrinsic quality attributes of a product can be search (they can be evaluated prior to purchase), experience (they can be evaluated only after purchase), or credence (they cannot be evaluated even after purchase and use). Standards, certification, and market information are means of assuring the quality of product attributes and then communicating that quality to buyers.

On the bright side, the development of standards, certification, and quality signaling may be a healthy competition to determine who can best provide and communicate quality assurance and sustainability in the supply chain and to consumers. The process of setting and certifying to standards, along with quality signaling to buyers, can address problems of imperfect information on quality and facilitate markets for quality attributes, particularly for credence attributes. It can use market mechanisms to reward desirable practices through product differentiation and potential price premiums as buyers in the supply chain and consumers can better identify and trust in higher quality products. It can be used by governments, consumer groups, non-governmental organizations, and private parties to provide incentives for positive developments on both the supply and demand sides of the market.

On the darker side, standards, certification, and quality signaling may work poorly or incompletely in facilitating markets for quality. For example, they may impose requirements on the production chain that do not actually improve quality because they are not well targeted. They may provide false signals of quality either through poor design or fraud, making it more difficult for buyers to locate products that meet their needs. They may be used strategically by companies, groups of companies, countries, or other parties to disadvantage competing products or to extract payments (e.g., through certification fees that are essentially "pay to play" charges).

In principle, more sustainable fisheries can be promoted by well-designed environmental standards based on significant industry participation, credible labelling backed by independent third-party auditing of compliance, strong retail market take-up, and consumer demand for labeled products. It bears consideration, however, from a political economy perspective, whether eco-labelling as a means of improving ecological outcomes is after all a largely inefficient tool when compared to directly targeting environmental fisheries management problems with environmental policy and fishers' incomes with better management and marketing systems. Government regulators and international bodies face considerable challenges in overseeing and guiding the development of certification and quality signaling systems for fisheries products. A major step in making good decisions is for these parties to delineate which policy goals (e.g., improved fisheries management, ecological protection, supply chain functioning, or consumer protection and information) will be pursued through private and public systems of standard setting, certification, and quality signaling.

## **1. Assuring and Communicating the Quality of Fisheries Products**

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Governments, companies, trade/industry associations, and non-governmental organizations are establishing a growing number of standards for the quality of fisheries products, operating related certification systems, and delivering market information through, for example, business to business (B2B) certificates and consumer labelling. A product's quality is determined by its set of intrinsic quality attributes, which include food safety, nutrition, sensory characteristics (e.g., taste), value/function, and how the product was produced (e.g., sustainability of catch or production practices) (Caswell, Noelke and Mojduszka 2002). These intrinsic quality attributes may be signaled to buyers through extrinsic quality indicators and cues the product carries such as certification, labelling, price and brand name.

Standards, certification, and market information are means of assuring quality and then communicating that quality to buyers. What are the economics of these systems? What are their benefits and costs, and to whom? The answers to these questions are likely to determine whether standards, certification systems, and market information programs proliferate further or develop in a different direction in the future. The answers will also guide the choices and evaluation of government activity in establishing mandatory systems and overseeing the operation of voluntary, private systems.

Demand for standards, certification, and market information comes from several sources. Governments demand standards in order to protect consumers and markets. They may also see standards and certification as a means of increasing returns to fisheries for responsible practices, thus improving fishery management and sustainability. The fisheries products supply chain (wild catch/farm production, processing, food service/retail) demands standards and certification in order to assure quality and support quality differentiation in international trade and domestic markets. Consumers demand certification and labelling for product attributes (e.g., how the product was sourced/produced/processed, safety, nutrition, sustainability/eco-friendliness) that they value. Finally, non-governmental organizations and industry groups may demand standards and certification to promote specific practices and product attributes in fisheries markets.

Standards, certification, and market information are supplied by governments, supply chain participants (companies, groups of companies, third-parties), and non-governmental organizations. The systems offered by these groups are overlapping. We offer economic approaches to understanding the increasingly complex set of standards, certification systems, and market information programs in fisheries markets. These approaches can then be used to evaluate the likely benefits and costs of different systems and to inform the policy choices of governments regarding the establishment and operation of government and private systems.

## **2. Concepts for Thinking about Markets for Standards, Certification, and Quality Signaling**

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Discussion of markets for standards, certification, and market information can be confusing because they have several dimensions. Here we present concepts for thinking about these systems that help in sorting through their complexity. To be more precise, we will use the term quality signaling to refer to the various formats in which market information about standards and certification can be communicated. Examples of quality signaling include exchange of information on certification between businesses within a supply chain, brand names, and consumer product labelling. Public information campaigns (e.g., web based lists of products to seek and avoid) are also examples of these systems as their operators define standards for products, evaluate them, and communicate their findings to buyers.

### **2.1 *Main Elements of Certification Systems***

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It is useful to take a step back and look at the overall structure of certification systems. These systems are made up of standards, certification, and quality signaling. These systems have a hierarchy. Standard setting is necessary for certification systems to operate—certification takes place based on conformance to a standard. Market information (in a variety of formats) then communicates that the product is certified as being in conformance with the standard.

We will be describing and analyzing certification systems along several dimensions:

- Type of scheme.
- Owner of scheme.
- Geographic scope.
- Regulation (regulatory oversight).
- Standards.
- Standard setting organization.
- ISO standard classification (type I, II, or III).
- Certification of attributes.
- Attributes certified.
- Signaling mechanism.

Certification systems can be private and voluntary, public (governmental) and mandatory, or a hybrid of private and public elements. The parties responsible for the different parts of the system may be governments, business groups (e.g., trade or industry associations), companies, or non-governmental organizations. All three parts of the system (standards, certification, and quality signaling) may be done by a single party. Another alternative among many is that standard setting is done by one party (e.g., a government agency), while certification is by third-party firms, and consumer labelling is done by the selling company.

### **2.2 *Imperfect Information and Market Failure as Motivations for Certification***

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Say you are in the market for fishery products. Is the fish or seafood you are about to buy from a sustainable fishery, captured or farmed in a responsible manner, safe, and nutritious, and does it meet taste preferences? How is a buyer, whether a member of the product supply chain or the final consumer, to know? And how creditable is what the buyers think they know about the product? Standards, certification, and related quality signaling function to answer these questions.

Economists use the concept of “imperfect information” to think about markets for products. If everyone has perfect information (on price and quality attributes such as eco-friendliness, safety, and nutritional value), then every buyer selects exactly the mix of price and quality that he or she wants from the market offerings or does not buy if none of the offerings is desirable. This exact match between buyer and seller does not occur if information is imperfect. For example, say a group of consumers prefers to buy wild-caught fishery products and is willing to pay a premium for them. However, information on the geographical source and production/catch method is not available for the products they are considering. The consumers make a choice based on available information and may overpay (if they overestimate the quality) or fail to buy (if they underestimate the quality) relative to the ideal, “perfect information” situation.

Information drives the production and marketing of quality in markets. Imperfect information can lead to what economists refer to as “market failures.” Market failures occur when there is demand for products of a particular quality but the market does not provide them because of a lack of information or of market mechanisms to serve that demand (Akerlof 1970). For example, consumers may be willing to pay for fishery products with higher quality profiles but only if they can be assured of the quality levels. A market failure occurs (the higher value market will not exist) if sellers cannot credibly assure quality. Standards, certification, and labelling can correct this kind of market failure. Market failures are clearly market opportunities as creation of standards, certification, and quality signaling systems can successfully differentiate products in the market.

A second important example of market failure is where the demand is societal rather than consumer driven. For instance, epidemiological data may link foodborne illness to a particular type of fishery product. Consumers may not make this connection because it is difficult to link particular incidents of foodborne illness to specific foods. The market may fail to give incentives to companies to produce safer products because of the consumers’ lack of awareness and the inability of liability systems to identify and punish companies that sell unsafe products. Government regulatory activity in setting and enforcing standards, creating or overseeing certification systems, and creating or overseeing market information may give voice to the societal demand for safety and correct this type of market failure. Similarly, it may give voice to societal demands for sustainability and other values. Private parties such as non-governmental organizations are also in the business of shaping and giving voice to consumer and societal demands.

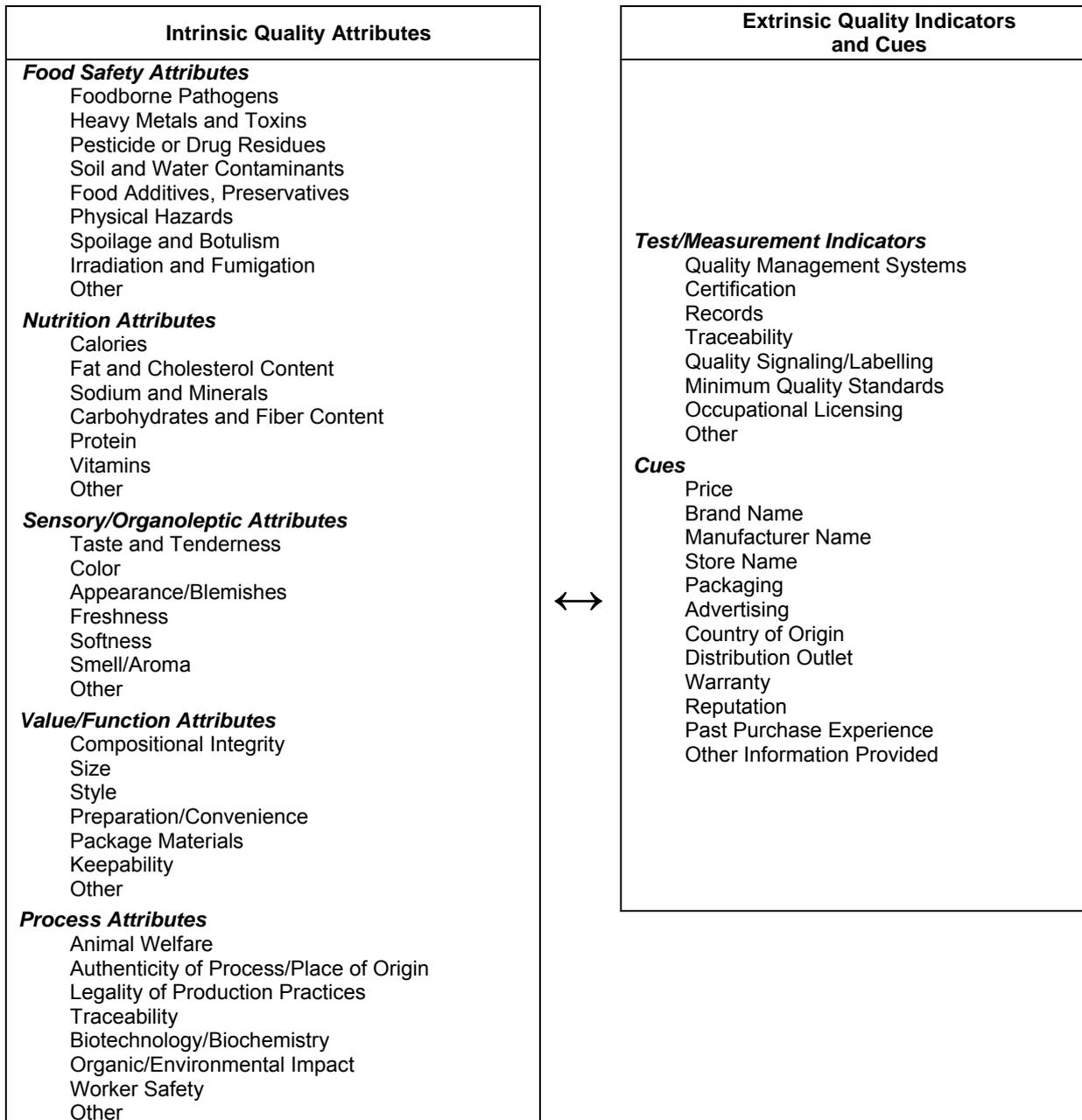
Worldwide, market failure based on imperfect information is a major driver for developing standards, certifications systems, and quality signaling programs. The key to understanding these developments is to recognize that any particular system will likely be trying to do several things at once—facilitating and shaping consumer demand, inducing the production of quality, differentiating products, and managing the market.

### ***2.3 Using Search, Experience, and Credence Attributes to Understand Markets for Certification***

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Based on Lancaster’s (1971) alternative characterization of consumer demand, economists have gained the most leverage in understanding markets for standards, certification, and quality signaling through thinking of products as bundles of attributes. Figure 1 extends Caswell (2006) to show the intrinsic quality attribute space for fisheries products. Note that major categories of quality attributes include food safety, nutrition, sensory/organoleptic, value/function, and process (e.g., geographical source, method of catch/production). The attributes each have value to the consumer and as a bundle the attributes determine the buyers’ perception of quality and willingness to pay (the price they are willing to pay for the product).

**Box 1. Attribute space for fisheries products**



Source : Adapted from Caswell (2006)

Buyers have different levels of information on and motivations to learn about the quality of attributes. Price is usually much easier to determine than quality because many quality attributes may be difficult for the buyer to judge. Obtaining sufficient information about quality takes time and effort and hence involves search costs (Nelson 1970, 1974). The benefit of gaining more information will be greater the higher is the product's value. Gaining more information has an opportunity cost that varies, for example, based on a consumer's socio-demographic profile (e.g., income). As a result, a buyer's willingness to pay for information and the marginal cost of obtaining it will differ.

The buyer's information search process is further complicated by differences in quality across products and the possibility of information asymmetry where the seller knows the quality better than does the buyer. The degree of information asymmetry in markets varies by product and by product attribute (Nelson 1970, Darby and Karni 1973). To the buyer, the intrinsic quality attributes of a product can be search (they can be evaluated prior to purchase), experience (they can be evaluated only after purchase), or credence (they cannot be evaluated even after purchase and use).

The existence of imperfect and asymmetric information can give some sellers an incentive to misrepresent the quality of their products in order to sell lower quality products as higher quality products at higher prices. Akerlof (1970) described this phenomenon of adverse selection and moral hazard and named it the 'lemons problem'. He used the example of used car markets to emphasize how important credible information is to the functioning of markets when credence attributes are present. Consumers may not be able to distinguish lower and higher quality used cars based on credible information because of credence attributes such as how the car was driven and how well it was maintained. In this case, the market for higher quality used cars can collapse because buyers are not willing to pay more for higher quality cars because they cannot distinguish them from lower quality products (the lemons). In turn, sellers cannot obtain premiums for truly higher quality products, hence lacking incentives to offer them. Ultimately, the overall quality in the market will decrease as only lower quality products are offered for sale. The lemons problem is created by asymmetry in information between sellers (who know quality) and buyers (who do not). Improving information through standards, certification, and quality signaling can help to solve the lemons problem by assuring buyers of quality. Their willingness to pay higher prices for higher quality in turn compensates the companies that provide higher quality products to the market.

More broadly, certification systems can improve the information environment for search and experience attributes as well as for credence attributes. For example, a certification system can assure buyers about the cooking qualities of a product (an experience attribute) through setting and auditing standards. Overall, though, certification systems have the most scope for effect in the case of credence attributes. For example, a certification system can assure that a fishery product was caught in a particular place and way, produced/processed in a specific way, and has particular safety and nutritional characteristics. This assurance, if reliable, supports markets for higher quality products and protects against fraud.

**Box 2. The bottom line: The promise and perils of certification systems**

Certification systems can address problems of imperfect and asymmetric information in markets for product quality. They can allow markets for quality attributes to develop more fully through giving buyers more confidence in product quality and, through price, rewarding companies for providing higher quality. Certification systems can also be used for other purposes, for example, to misrepresent (inflate) quality, to disadvantage rival products, or to exercise governmental or market power. In practice, the benefits and costs of certification systems, and to whom they accrue, depend upon how the systems are structured and operated.

### **3. The Economics of Standards, Certification, and Quality Signaling of Fisheries Products**

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Standards, certification, and quality signaling for fisheries products are developing simultaneously on several fronts. It can look chaotic and may be chaotic. The questions are the same whether a fisher or a fish farmer, a company in the supply chain, a trade group, the consumer, a governmental agency, a non-governmental organization, or a third-party certifier: What are the benefits and costs of these systems, who gains, does anybody lose, and could the systems function better (and how do we measure better)?

On the bright side, the development of standards, certification, and quality signaling may be a healthy competition to determine who can best provide and communicate quality assurance and sustainability in the supply chain and to consumers. The process of setting and certifying to standards, along with quality signaling to buyers, can address problems of imperfect information and facilitate markets for quality attributes, especially for credence attributes. It can use market mechanisms to reward desirable practices through product differentiation and potential price premiums as buyers in the supply chain and consumers can better identify and trust in higher quality products. It can be used by governments, consumer groups, non-governmental organizations, and private parties to provide incentives for positive developments on both the supply and demand sides of the market.

On the darker side, standards, certification, and quality signaling may work poorly or incompletely in facilitating markets for quality. For example, they may impose requirements on the production chain that do not actually improve quality because the requirements are not well targeted. They may provide false signals of quality either through poor design or fraud, making it more difficult for buyers to locate products that meet their needs. They may be used strategically by companies, groups of companies, countries, or other parties to disadvantage competing products or to extract payments (e.g., through certification fees that are essentially “pay to play” charges).

Any certification and quality signaling system is likely to be a mix of the bright and darker sides. The evidence to date is not sufficient to evaluate the economic benefits and costs of certification and quality systems for the fisheries industries in any comprehensive way. However, the experience to date (discussed in more detail below) and developments in other food markets clearly suggest the central factors that will affect the size and incidence of the benefits and costs of these systems.

The discussion of certification and quality signaling in the fisheries industries has been dominated by eco-labelling. Going forward, the focus on ecologically related attributes may be challenged, or added to, by an increasing emphasis on other product attributes. Therefore it is important in considering the economic benefits and costs of certification to focus thinking on a full suite of attributes rather than only on those related to ecological sustainability. In the area of sustainability itself, these additional attributes of concern may include social and economic sustainability as is done in many concepts of fair trade. They may also include food safety and nutritional attributes. Below we discuss several central factors that should be considered in evaluating the economic benefits and costs of standards, certification, and quality signaling.

#### ***3.1 Regulatory Context for Evaluating Certification and Quality Signaling Systems***

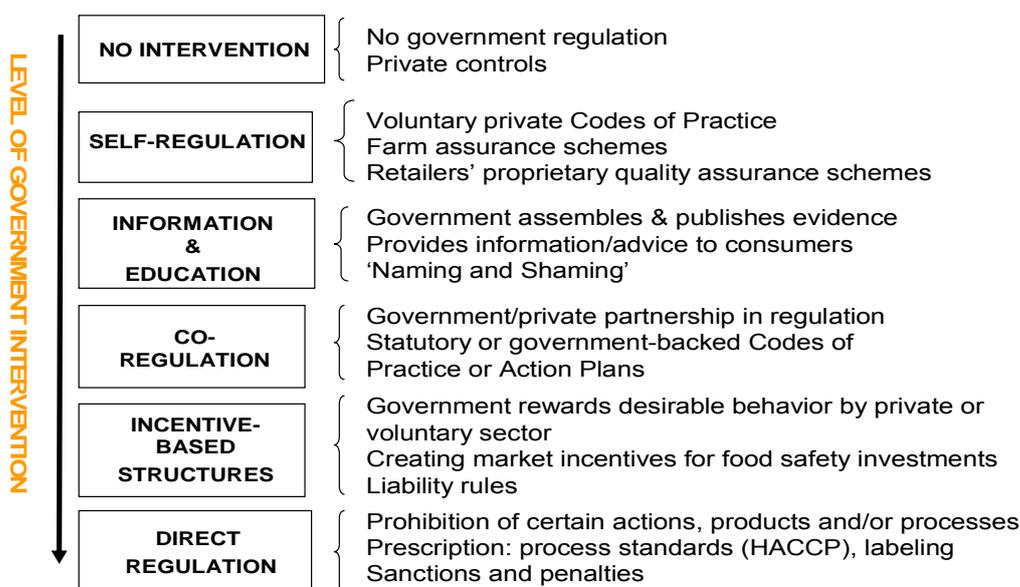
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The development of certification and quality signaling systems is occurring in the context of a broader shift in regulatory approaches to assuring food quality, particularly food safety (Henson 2008, Garcia et al. 2007). These shifts are in response to the larger volume of food products being sold and the internationalization of supply chains. Governments face increasing challenges in assuring the quality of

domestically produced foods and find that traditional border inspection approaches are not equal to the task of regulating imports.

Certification and quality signaling systems can have differing relationships to regulatory systems. Figure 2 shows options for mixes of public and private actions to assure food quality ranging from systems with no government intervention through direct (“command and control”) regulation. The regulatory context is important because it sets the parameters in which certification and quality signaling programs operate. It also affects the benefits and costs of those systems and their distribution within supply chains. Many certification and quality signaling schemes in the fisheries industries are characterized by self-regulation—they are privately organized, privately operated, and voluntary. True co-regulatory schemes, where aspects of the system are controlled by a mix of governmental and private parties, are less common. International agreements, national codes of conduct, and technical regulations exist in fisheries and are often the basis for voluntary self-regulatory certification schemes. However, their impact on fishery management and catch practices remains weak. Moreover, government programs in B2B and/or fishery supply chain certification using incentive based mechanisms are largely unexplored at this time.

**Figure 1. Options for public/private actions to assure food quality**



Source : Adapted from Garcia *et al.* (2007)

A key consideration for those developing private systems is whether government approaches to quality and quality assurance will shift in the future in ways that support the expansion or constriction of certification and quality signaling systems. In retrospect, will the current period be seen as a period when government oversight was at its least stringent—in other words, a relative free-for-all? Will governments find that privately developed systems have problems and drawbacks that require more active oversight? In this case, the movement would be toward more co-regulation, incentive based mechanisms, or direct intervention, all of which would constrain the development of certification and quality signaling schemes. On the other hand, governments may decide that private systems are yielding desirable market

performance and rather than constraining these systems they may give them further leeway in the future. It is important to note that companies and other market players may prefer, and even lobby for, a more activist government approach if the private system becomes unruly or disadvantages them. From an economic perspective, participants in certification and quality signaling schemes must recognize that property rights in these systems are not fixed—nor are their private benefits and costs. Detailed understanding of the structures and competitive forces in individual fisheries is crucial knowledge for regulators to determine whether oversight is adequate and for industry stakeholders to understand directions in which this oversight might go.

Standards, certification, and quality signaling are means for assuring quality and creating markets for quality assurance. Governments play an active role in information provision through mandatory and voluntary programs, and through systems to prevent and punish fraud and deception. Whether a country chooses to use mandatory or voluntary programs is strongly influenced by whether it believes there is a market failure in providing information and how it views its responsibility to address that failure. Governments may take four main approaches (Caswell 2006):

- Need to know. Governments may judge that the public needs to know some information (e.g., nutritional quality, environmental sustainability) in making a purchase decision or safely using a product. In this case, labelling will usually be mandatory.
- Right to know. Governments may judge that the public has a right to know other information before buying a product. This information is frequently about attributes that are not safety related but are other attributes that consumers care about. In this case, labelling will also usually be mandatory. Governments will ensure that minimum information requirements are met. Firms can then choose to differentiate themselves by providing more or additional information.
- Want to know. Governments may judge that the public wants to know other information about products or production processes. The regulator may actively oversee the provision of this information when it believes doing so will increase market efficiency (e.g. certified organic). A frequent means of doing so is by setting standards or defining minimum requirements that can form the basis for voluntary labelling.
- Fraud protection. At base, governments always are responsible for protecting consumers against market deception and fraud in claims made for products.

The evolution of standards, certification, and quality signaling in the fisheries industries depends upon the perceived and real benefits and costs of those systems from the point of view of governments, private parties, non-governmental organizations, and consumers. For example, governments now largely treat the information on sustainability associated with eco-labelling as a “want to know” situation. A certification program such as that of the Marine Stewardship Council emphasizes eco-labelling on the basis of consumer demand and willingness to pay price premiums based on information provided to them. To date governments have not taken an active oversight role in this area, for example by implementing control mechanisms, stricter standards for accreditation, or defining minimum requirements as an operational basis for private voluntary labelling systems. Instead, they have developed documents to guide the development of eco-labelling schemes largely to prevent illegal and unregulated (IUU) fishing and fraud. The degree of government oversight and control is evolving at the same time that private systems are evolving. Government oversight has a direct impact on private benefits and costs. The government’s responsibility of defining and enforcing the regulatory foundation for certification and labelling is crucial in preventing fraud and potential market failure. Potential trade-offs between governmental objectives, societal welfare (e.g. marine preservation), and private benefit cost considerations (e.g. market differentiation) will play an important role in the future design and impact of certification and quality signaling in fisheries.

### 3.2 *Market Drivers for Certification and Quality Signaling Systems*

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A significant amount of literature has been published over the last decade focusing on the conceptual understanding of and empirical measurement of the market forces that are driving the development of certification and quality signaling systems (e.g., Henson 2008, Roe and Sheldon 2007, Carriquiry *et al.* 2003). Wessells *et al.* (2001) provide an excellent discussion of these forces for the case of eco-labelling for fisheries sustainability, while Caswell (2006) provides an overview of these forces for the full suite of fishery product attributes. Clearly, the emergence of more prominent and powerful private and third-party certification systems is a hallmark of today's marketplace.

A paradigm shift has occurred in the agri-food system caused by the growing influence of consumer perceptions, concerns, and demand: changing regulatory environments; and increased retail concentration. The initial adoption of private retail food standards was primarily driven by competition among retailers to differentiate themselves and establish a reputation with their customer base. At the same time, the rapid globalization and integration of many food supply chains exposed processors and distributors to threats from uncertain quality, particularly safety, in supply chains. Standards and certification requirements for suppliers provide means of quality assurance. They allow companies to mitigate liabilities and protect retailer reputation and the value of own retail brands. Additional attributes of interest have been added to retailer competition over time including labour and social standards, environmental footprints, and animal welfare.

As systems have evolved, flexibility, efficiency, and technical and management know-how are essential skills for stakeholders along modern food supply chains. Governmental agencies assigned with regulatory oversight of food markets are increasingly overstrained as the levels of sophistication in food quality, safety, and other attributes rises with market and consumer demands. The interaction and balance between public and private standards is changing. It is estimated that voluntarily standards cover 70% of total retail sales (Fulponi 2006).

The importance of private food standards is a key aspect of the paradigm shift in food supply chains. Voluntary standards increasingly exceed regulatory standard requirements putting private standards and retail chains in an even stronger role in shaping food production and management systems. As suppliers and producers require voluntary firm accreditation and product certification to enter more lucrative retail markets, voluntary certification systems start to show elements of mandatory standards.

While originally being at their heart a form of retail competition, the trend more recently has been toward greater convergence of private food standards. For example, Fulponi (2006) analyzes retailer's efforts to align their voluntary standards. Greater convergence and less conflict between standards and requirements may not only further the integration of supply chains but may also allow concentrated and powerful retailers to further implement their own private global food management system. Voluntary certification can essentially become mandatory for participation in supply chains raising concerns about the possible "pay to play nature" of certification in some markets. In other words, certification requirements may extract surplus (profits) from market participants through fee structures. Essentially, in the terms of economists, fees can be used as a form of price discrimination that exploits producers' willingness to pay to participate in particular supply chains. Oversight of certification structures may be necessary in some cases to assure that less powerful players in supply chains retain some of the benefits of the systems.

Certification and quality signaling systems are dependent on their credibility and the trust that buyers in the supply chain or consumers place in them (Hatanaka and Busch 2008, Busch and Baine 2004). As such, these systems can be fragile as they are vulnerable to two types of exploitation by members of the supply chain. First, members of the scheme may not fully comply with standards thus allowing substandard but certified product onto the market. Second, producers outside the scheme may seek to free ride on it. If

the scheme is unable to effectively differentiate itself from other similar products, it is vulnerable to quality problems that occur in the closely related products. The costs of loss of credibility in terms of market reputation and share create strong incentives for certification systems to police themselves. For instance, new generation voluntary quality assurance systems (e.g., GLOBALGAP aquaculture) stand out by sophisticated standard enforcement and traceability systems. When operated by specialized, independent third-party auditors, many certification schemes play crucial roles in the sourcing strategies of retailers and sit in judgment over market access for firms and entire supply chains in the food trade.

Markets for certification and quality signaling are just that—markets. As such, they are and need to be more intensively evaluated from an industrial organization and trade perspective. For example, an antitrust perspective may be fruitfully applied to certification systems that dominate particular seafood markets to insure that the systems are fairly operated and are not functioning as a platform for implicit or explicit collusion (e.g., quantity restrictions, quality restrictions, price setting, exclusionary practices). Similarly, countries will take a strong interest in the operation of these systems because of their effects on international terms of trade and compliance with agreements under the World Trade Organization. The situation for fisheries products has added complexity because of the interaction of public authorities from developed and developing countries in managing marine resources worldwide.

### ***3.3 Key Questions for Evaluating the Economic Benefits and Costs of Systems***

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Key questions for evaluating the economic benefits and costs of standards, certification, and quality signaling in the fisheries industries arise at all levels of the supply chain, including at the consumer level. They also focus on the distribution of benefits and costs across market participants, including the governments that oversee the operation of markets. An evaluation of the benefits and costs needs to take into consideration the mix of public and private responsibility being used (e.g., private standards/private certification/private supply chain information, public standards/private certification/public labelling requirements). Moreover, the trade-offs between the different objectives that stakeholders (public and private) have for adopting and implementing standards need to be revealed to assure economic efficiency. As markets for certification evolve, a central question is who controls the process? What are the roles of international organizations, governments, companies, non-governmental organizations, third-party certifiers, and consumers in the process? How should we judge whether the system is working and for whom? While the parties interested in certification systems have taken numerous steps to regularize and standardize their development, this development still may feel chaotic. A key question is whether this feel is just the nature of a healthily evolving, dynamic market or something that needs to be brought under tighter control.

#### **4. Current Approaches to Certifying and Signaling the Quality of Fishery Products**

Fisheries management and economics have traditionally focused on supply-side measures using a multitude of policy instruments to promote more responsible and sustainable fisheries management practices (Sutinen 2008). In recent years, however, there has been a growing recognition that more traditional fisheries management measures aimed at the supply side of the market through controlling fishery inputs, gear, or total allowable catch are insufficient to guarantee the societal goal of resource conservation through sustainable fisheries production. Moreover, these measures are not oriented toward markets and do not adequately address the dynamic of developments in consumer preferences and demand for fishery products (Economist 2008).

Aquaculture production systems have rapidly emerged under the pressing evidence of over-exploitation of fisheries and hence declining stocks. They now account for a significant share of the total supply of fishery products. The growth of near coastal fish farming, especially in the developing world, has been promoted by changing preferences for alternative sources of protein in many western countries based on growing concerns about nutrition and health. Main drivers of the growth in aquaculture are its ability to control production parameters (e.g., through feed, chemicals, and drugs), its independence from weather conditions, and its ability to meet market demands (e.g. consistency in product size, quality). Aquaculture was among the first to shift its strategic focus to quality differentiation along custom supply chains to meet consumer demand (Jin *et al.* 2007). Subsequently, policy makers and supply-chain partners have designed mandatory and voluntary standards and labelling rules for fisheries and aquaculture designed to assure the credibility of incentive-based systems and reward sustainable capture fisheries and aquaculture production systems at large (FAO 2002, 2005).

A firm's decision to invest in product and/or process differentiation through use of alternative certification and quality signaling schemes along a specific supply chain is determined by the expected return on investment (Teisl *et al.* 2002). Both demand and supply factors determine the overall success and longevity of certification and quality signaling schemes in fisheries markets. Ultimately, firms will adopt the most effective and economically viable of the alternative certification systems available for fisheries based on their benefit-cost ratios (Gudmundsson and Wessells 2000). The existing economic evidence suggests that a strongly preferred firm or supply chain strategy for attribute certification and signaling in fisheries markets has not emerged at this point. The systems that have emerged are largely focused on eco-labelling. As discussed in the following sections, the economic evidence suggests that consumer labelling that combines multiple attributes at the country or regional market level may be more successful in meeting consumer expectations and demand for differentiated and sustainable seafood products. A first step in this direction will be to improve consumers' overall understanding of sustainable fishery practices and related communication measures through information and labelling campaigns.

However, strategies aimed at differentiating the quality of fisheries products can malfunction in an environment where members of a supply chain—fishermen, traders, processors, retailers, food service operators, and consumers—may have differential yet incomplete information about attribute quality. If market based certification and quality signaling schemes are to support more sustainable and eco-friendly fisheries, stakeholders along the supply chain and ultimately consumers must be aware of, understand, and have preferences for the products and attributes promoted to them. Moreover, even if consumers show a positive willingness to pay for product characteristics and information conveyed to them, the question remains of how the accrued benefits and costs (i.e., the economic welfare effects) of greater product differentiation will be distributed along the fishery supply chain. For instance, in supply chains where economic power is concentrated in the hands of a few firms at one or more stages along the marketing channel the distribution of economic profits has been shown to be biased towards the stages that exert

market power (Sexton 2000). For the case of fisheries, a number of studies have addressed market power in fishery supply chains with and without individual transferable quota (ITQ) management systems in place (Love 1995, Anderson 2008, McEvoy et al. 2007).

#### **4.1 *The Attribute Space for Fisheries Standards, Certification, and Quality Signaling***

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As noted above, it is useful to think of fishery products as bundles of attributes, any of which may be certified and signaled. Figure 1 provides a categorization of these attributes into food safety, nutrition, sensory/organoleptic, value/function, and process characteristics. The utility and benefits that each product provides to the buyer can be characterized by a unique set of one or more attributes.

A growing number of empirical economic studies based on the attribute demand approach have sought to quantify consumer preferences for and valuation of the fishery product attributes shown in Figure 1 (Anderson and Bettencourt 1993, Wessells and Holland 1998, Wessells *et al.* 1999, Wessells 2000, Carroll *et al.* 2001, Teisl *et al.* 2002, Jaffry *et al.* 2004). Most studies agree that labelling of quality attributes has the potential to influence consumer preferences and hence demand for differentiated seafood products. However, empirical findings suggest that preferences and demands are not necessarily consistent across countries, markets and consumer segments (Jaffry *et al.* 2004). The same holds true for the profile and functioning of different fishery supply chains that determine how products and related information flow from producers to consumers (Guillotreau 2004). How the benefits of greater product differentiation are distributed along the value chain also varies (Guillotreau 2004). Certain consumers and market segments may have preferences for specific fishery attributes such as sustainable catch practices or specific product origins and are willing to pay a price premium for them. Other consumers, however, may be less concerned about environmental attributes of fisheries. Their purchase or non purchase decision may be primarily based on value for price or price alone. Whether providing additional and credible information on attributes through certification and labelling can alter consumer behaviour and yield additional value for fisheries and their producers must be assessed on a case-by-case basis.

Nevertheless, the economic literature agrees that objective and verifiable information about fisheries and their product attributes (e.g., wild or farmed) plays a crucial role in helping consumers and supply chain stakeholders to better identify, demand, and market seafood products from sustainable and well-managed fisheries (Dewally and Ederington 2006). Driven by mounting evidence of the importance of intrinsic product attributes in food marketing (Caswell and Mojduszka 1996, Caswell, Noelke and Mojduszka 2002, Grolleau and Caswell 2006) product labelling and certification are recognized as effective means of generating market-based incentives and direct benefits in support of various supply chain and management objectives. This includes successful differentiation strategies such as organic products from aquaculture that have parallels to the growth of organics in other food markets. For instance, the National Organic Standards Board in the United States developed a set of criteria in an effort to provide a framework for organic aquaculture (Washington Post 2008). Indeed, there is a growing proliferation of consumer labelling, including attributes of geographical origin, production system, nutrition, convenience, and sustainability. For fishery labelling a subset of these attributes is often summarized under the term eco-labelling (Roheim 2003). The following sections present an overview of key attribute labelling schemes in fisheries and discuss their relevance for advancing certification and labelling schemes in fishery supply chains.

#### **4.2 *Economic Evidence and Analysis of Consumer Demand for Particular Attributes***

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An increasing number of studies explore the economic benefits of seafood product labelling marketing in an effort to better understand the demand for different seafood attributes and its relationship to fisheries systems and management (Wessells *et al.* 1999, Wessells 2000, Carroll *et al.* 2001, Teisl *et al.* 2002). An important factor shaping consumer demand for seafood and acceptance of certification and

labels is the level of trust and credibility assigned to different sources of information (Caswell and Mojduszka 1996, Caswell 2006). The overall cost of quality assurance programs and their distribution largely depend on the program acceptance and participation by producers and firms along the value chain. Strong consumer demand for a labelling scheme will attract producers to join a program. Larger labelling schemes may realize economies of scale through lower program cost per unit of certified product. This in turn will have a positive effect on program profitability for individual members. Minimum industry support and stakeholder participation is therefore essential to mitigate the burden of additional program cost and influence the benefit-cost ratio of certification and labelling, a major determinant of long-term program profitability and success.

Within the seafood attribute space, several credence attributes are of particular relevance to fisheries and warrant discussion when product differentiation, certification, and labelling systems are concerned. Recall that credence attributes are those that the buyer cannot evaluate even after purchase and use. For example, a consumer cannot verify that a fishery product was caught from a sustainably managed fishery but standards, certification, and labelling can, if reliable, assure the consumer that this is the case. An emerging economic literature on fishery attributes highlights the various unique combinations of quality attributes related to the product and the process by which it was produced that differentiate fishery products from other foods (Wessells *et al.* 1999). Beyond the presence of combinations of credence attributes, fisheries are characterized by their unique nature as natural common pool resources. This implies an additional layer on complexity and potential trade-offs between the private and public good elements that co-exist in fisheries.

**Box 3. Fisheries pose unique combinations and trade-offs between private and public goods**

While all foods can be characterized by their own unique presence of search, experience, and credence attributes, fisheries products stand out in having credence environmental attributes that often have public goods attributes. What economists mean by public goods is that many environmental attributes associated with ocean capture fisheries (e.g., species or origin from a specific marine biotope) are non-rival and non-exclusive in usage or consumption. In other words, in addition to being credence attributes in terms of consumer product claims, the environmental harmlessness of specific management practices (or alternatively their sustainability) is also of great interest to public authorities responsible for marine environmental protection.

Fisheries products are among the world's most widely traded food commodities. This trade is dominated by developing country exports and imports by the high-value markets of Europe and North America. Although differentiation of products by their geographical origin has a long history in agro-food trade, comparable labelling of seafood attributes linked to origin is still rare. However, mandatory regulation of catch documentation in the European Union and the United States to combat illegal and unregulated (IUU) fishing provide credible information sources on catch origins (and traceability) that could facilitate geographical labelling to better inform consumers. Historical and partially philosophical differences have shaped origin based certification and labelling systems in Europe and North America. The European regulations in this area focus on Protected Designations of Origin (PDO) and Protected Geographical Indications (PGI), while the North American counterpart of certified geographical origins is part of the trademark protection system. Common to the three systems is a positive consumer willingness to pay (WTP) for a proven and trustable link between geographical origin and the inherent quality characteristics of a particular food product (Loureiro and Umberger 2005).

To date different scientific methods exist to verify and communicate the geographic origin of wines (e.g., EC regulation No 2065/2001). Methods to actively label and communicate the geographic origin of seafood lag behind. The different catch documentation systems in the EU and the U.S. National Oceanic and Atmospheric Administration (NOAA) system have not yet developed commercially viable analytical methods for traceability to prevent fraud in fishery supply chains. Based on its relatively low cost, the FAO

(2005) and research by Yamashita *et al.* (2008) promote the use of DNA-marker techniques for species and geographic origin identification in fisheries. Labelling of commercially valuable seafood based on quality and origin can be a viable component in future marketing of seafood to consumers. According to the economics literature, we can distinguish two broad consumer segments interested in product origin information. First is a growing segment of well informed, educated 'eco-driven' consumers that actively seeks information on product origin as a proxy for their eco footprint. They use this information as part of their considerations when making purchase decisions between alternative seafood products (Imkamp 2000). Second is a consumer segment that Lusk *et al.* (2006) describe as the 'ethnocentric consumer'. These consumers are characterized by lower information and higher risk aversion. The ethnocentric consumer discriminates against imported foods and in favour of domestically sourced products either for food safety reasons or for reasons of patriotism.

Closely linked to the geographical source of seafood is a set of fishery credence attributes of increasing importance to consumers: environmental, ethical, nutrition, and health properties of capture fisheries and aquaculture products. Health conscious and better informed consumers increasingly turn to seafood as a healthy alternative protein source (FAO 2004). At the same time, consumers demand more detailed information on questions such as "how was it produced?", "is it safe?" or "can I feel good about eating this?" Common to these questions is the demand for credible and objective information and assurance about the quality, and particularly the safety, of different fishery production practices. These consumers want to be assured that the products coming from these fisheries meet actual and perceived quality and safety standards (Mariojous and Paquette 2000).

In fact, evidence of weaker regulatory systems and production standards especially in developing country fisheries may receive negative responses from consumer segments concerned about their safety and health (Wilson *et al.* 2006, Trienekens and Zuurbier 2008). Recent cases of tainted foods originating from developing countries (e.g., China) as well as disagreement over labour and ethical standards have resulted in negative consumer reactions in recipient country markets (Henson and Jaffee 2008, Dey *et al.* 2005). With regard to seafood, reoccurring incidents of Salmonella, antibiotic residues, and pesticide residues in seafood products (e.g., shrimp) have raised concerns among governmental agencies assigned with import inspections (Dyckman 2004). Hence, cases of food safety and other incidents linked to certain geographic origins can have severe outcomes and spill-over effects for international fishery trade and supply chains. The danger is that recipient consumers will blanket reject all products originating from a specific region or country. Seafood imports from developing countries have become an issue of concern to food regulators and a focus for the tightening of border inspection procedures (Alberini *et al.* 2008). Research shows that mandated stricter product and food labelling rules for seafood in the U.S. can have widespread effects on catch and aquaculture systems particularly for some developing countries (Anders and Caswell 2009, Mbithi Mwikya 2006).

Arguing that consumers have the right to know where their food comes from, the United States mandated country-of-origin labelling (MCOOL) of fresh meats, seafood products, and several other products in the U.S. market. MCOOL was introduced in 2005 and implemented in the fall of 2006 for retail fish and shellfish products. While the literature largely agrees over the value of additional consumer information on product origins, some researchers dispute the economic benefits versus the costs of sole origin labelling. Much of this concern is related to the costs of program implementation and the effects of mandatory labelling on the seafood trade and imports from developing countries. Another point of concern is the exemption of the food service market from MCOOL, which could potentially lead to quality deterioration in the non-labeled seafood market (Caswell and Joseph 2008).

As far as food safety, environmental, and ecological externalities are concerned, much of the attention of the public and regulatory agencies has traditionally focused on the design of fishery management practices (Jin *et al.* 2007). However, beyond general ecological concerns associated with the usage of the

common pool resource ‘ocean’, consumer decisions for or against the consumption of seafood—wild or farmed—can be motivated by numerous factors. These include search attributes such as product price and convenience, experience attributes related to nutritional value and taste, or combinations of these attributes. Farmed shrimp or salmon may be very competitive alternatives to their pricey wild caught cousins for consumers seeking additional servings of seafood and/or healthy protein.

Consumer questions on “how was it produced?” and “is it safe?” have attracted media attention. Issues such as methyl mercury in wild capture fish initiated a debate over the possible trade-offs consumers face between nutritional benefits and health concerns when purchasing seafood (Verbeke *et al.* 2007, Nesheim and Yaktine 2007). In some cases aquaculture may have a comparative advantage through its greater control of production and environmental factors to produce a preset mix of quality and quantity that better meets consumer preferences. Pesticide and antibiotic residues in farmed shrimp and salmon, together with unwanted environmental externalities associated with fish farming, have attracted media attention and made consumers well aware of the trade-offs and threats of farmed seafood (Hites *et al.* 2004). Negative media information is likely to alter product preferences and purchasing behaviour given the still widespread lack of sufficient knowledge among consumers about seafood (Mariojous and Wessells 2002). Comparing the inherent attributes of wild and farmed seafood consumers are confronted with a trade-off between two production systems that both deliver sets of positive and negative attributes. In other words, they offer different mixes of benefits and costs in consumption. Both systems suffer from perceived widespread negative yet different sets of environmental externalities that are only partially offset by other attributes. Existing labelling and certification systems in fishery markets are insufficient in satisfying consumers’ demand for information and assurance to mitigate the many trade-offs consumers face when trying to make an informed decision between these two alternatives production systems available to satisfy their growing appetite for fish.

An important aspect in looking at the impact of certification and labelling on consumer demand is the inherent trade-off that consumers may have to make between product attributes such as taste, convenience, and nutritional quality and process attributes that are linked to environmental attributes and externalities produced by fishery markets. The interested consumer faces a seemingly endless array of choices when shopping for foods. An increasing number of governmental, industry, or independent third-party certification bodies communicate to consumers through multiple channels signaling credibility with, for example, stamps of approval (Lohr 1998). Hence, the consumer’s purchase decision takes place in an environment of competing offers, claims, and benefit-cost trade-offs. This dilemma caused by label proliferation has received increasing attention from economists and policy makers because it threatens to diminish the expected welfare benefits from information revelation. It may increase search costs for both consumer and supply chain stakeholders.

A solid understanding of the market forces that influence the supply and demand of fishery product differentiation is essential for the economic evaluation of the welfare effects of certification and labelling schemes and of fishery policy. Past research indicates that many consumer seafood product choices are determined by preferences for certain species. These preferences are in turn driven by food budget constraints as well as differences in socio-demographic profiles that influence food behaviour across countries and markets.

Nevertheless, existing evidence strongly suggests that preferences for seafood products labeled as environmentally friendly—carrying certified eco-labels—dominate over alternative non-labeled products in most fishery markets. As a result, holding other factors constant, a willingness to pay price premium exists in many market for environmental fishery attributes (Blend and van Ravenswaay 1999, Jaffry *et al.* 2004). Numerous case studies have established a willingness to pay range of 10% to 20% over the price of a comparable non-labeled product. This general willingness to pay and consumer acceptance of labels, however, differs significantly when other variables enter the seafood choice equation. Other individual

consumption habits influence choices and willingness to pay in addition to general preferences (e.g., for species) and demographic profiles (e.g., income, gender, country/region, and education) (Nimon and Beghin 1999, Johnston and Roheim 2006). As a result of these interactions, consumer behaviour may differ across product markets and time, as will predicted benefit cost ratios and welfare effects for eco-labelling programs. For instance, significant differences in consumer response to seafood labels and willingness to pay may be found in comparing restaurant consumption of seafood to retail purchases for at-home consumption (Nesheim and Yaktine 2007). Although factors such as eating experience and taste usually dominate consumer's out-of-home consumption choices, the foodservice sector and particularly higher priced restaurants are adopting informational seafood labels to inform customers. The food sector is showing a growing interest in various seafood labelling schemes and eco-labelling programs (Jacquet and Pauly 2007). Among the several organizations and initiatives that promote the preservation of marine resources and global ocean habitats that are discussed in the following section, the Marine Stewardship Council's eco-labelling standard can be considered the leading and most reputed standard in the industry.

A limited number of studies have elicited whether consumers in different markets would be willing to purchase eco-labeled or otherwise differentiated seafood. Typically studies ask consumers whether they prefer and would be willing to purchase labeled seafood product versus a non-labeled alternative product. These studies are called stated preference by economists because the consumer tells the researcher what he/she would purchase rather than facing and making an actual purchase decision in a store. A first and central finding of these studies was that the attribute 'fish species' had a significant influence on consumers' overall willingness to purchase seafood (Anderson and Bettencourt 1993, Wessells *et al.* 1999, Johnston *et al.* 2001). Jaffry *et al.* (2004) studied the market potential for environmental labelling of seafood in the UK and found that consumers had a preference for sustainability criteria conveyed by the seafood eco-label.

In 2003, the Seafood Choices Alliance, an international program supporting sustainable developments in seafood supply chains, polled 1000 seafood consumers in the United States. The survey found that 71% of consumers preferred "environmentally responsible" product labelling on seafood and would be willing to purchase labeled seafood. These same respondents also stated they would be willing to substitute away from some of their most preferred seafood items (species) such as tuna and shrimp if new information confirmed their production systems are unsustainable (Seafood Choices Alliance 2003). Johnston and Roheim (2006) found that consumers were not willing to give up their preferred species or seafood dish based on the presence of a seafood eco-label alone.

Overall the above findings confirm the common conclusions of previous stated preference studies in other food markets that reveal a considerable gap in stated preferences and actual revealed consumer behaviour in food choices (Loureiro *et al.* 2003). Divergences between stated and actual behaviour (consumers are in practice less willing to pay for certified products than they said they would be) suggest the perceived additional benefit from labeled seafood choices must be sufficiently large to meet the diverse tastes and preferences of consumers in different markets. Willingness to pay studies in seafood markets indicate consumers are willing to pay more for fish sourced from sustainable fisheries or aquaculture. However, the majority of studies are based on hypothetical labelling scenarios. Consumer response and trust in fishery eco-labelling has not yet been proven through systematic, empirical market data.

Quantitative analysis of the market performance of consumer labels and associated certification programs is needed to establish evidence of market share development (market penetration) of labeled product beyond label recognition and acceptance. Such data is needed to calculate reliable benefit-cost ratios for individual products and value chains. Knowledge about the behaviour of retail demand and substitutive relationships between different labeled products and/or non-labeled seafood can provide valuable knowledge for continuous market and label development. Moreover, benefit-cost analysis will

allow the owners (governments, companies, and organizations) of standards involved in certification and consumer labelling to determine best practices for communication and marketing strategies.

### 4.3 *Classifying Current Certification and Quality Signaling Programs*

While the history of food labelling goes back for centuries, collective labelling, where large numbers of firms collectively commit to follow a set of rules, dates for our purposes to the beginning of the 19<sup>th</sup> century. Mandatory food labelling began in North America under regulatory agencies such as the Department of Agriculture and the Bureau of Chemistry in the United States leading to the Food and Drug Act in 1906. Collective labelling of environmental claims relevant to food marketing was only initiated in the late 1970s in Europe with the introduction of the Blue Angel label in Germany. Advances in international agreements related to fisheries management and marine conservation occurred through the 1982 UN Convention on the Law of the Sea, the 1995 UN Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and the 1993 publication of the FAO Compliance Agreement and 1995 Code of Conduct for Responsible Fisheries. These agreements have cleared the way for the development of environmental or eco-labelling schemes in world fisheries in line with raising concerns over the sustainability of current practices for management of common pool fishery resources. However, a breakthrough in the establishment of globally acceptable guidelines for eco-labelling and market based incentives for sustainable fishery practices was reached at the 1992 ‘Rio Conference’—the United Nations Conference on Environment and Development (UNCED).

Since Rio mandatory and voluntary environmental product labelling in the food and resource sectors has attracted much attention, mostly in European and American high-value markets (U.S. EPA 1998). Fishery eco-labelling as a subset of environmental labelling is typically characterized by an independent verification of voluntary compliance with environmental standards set by expert institutions often external to fisheries (e.g., German Blue Angel). The quintessence of eco-labelling is to create demand for labeled products resulting in a higher price and/or market share. These market based changes will in turn create incentives to expand the supply of certified and labeled seafood thereby crowding out unsustainable fishery market segments (FAO 1995). Since then a three tier system of voluntary eco-labelling has emerged.

Eco-labelling generally depends on the presence of a third party to guarantee an independent assessment of products and production methods. The Sub-Committee on Environmental Labelling of the International Organization for Standardization (ISO) is the world’s largest voluntary governance and regulatory body for standardization. ISO 14000 is a series of international, voluntary environmental management standards specifically focused on the environment. This series includes standards on Environmental Management Systems (EMS), Environmental Auditing & Related Investigations (EA&RI), Environmental Labels and Declarations (EL), Environmental Performance Evaluation (EPE), Life Cycle Assessment (LCA), and Terms and Definitions (T&D). ISO 14020 outlines guiding principles for the development and use of environmental labels and declarations (ISO 2009). Table 1 shows the three types of eco-labelling schemes as distinguished by ISO that are relevant to fisheries.

**Table 1. ISO Eco-labelling classification system**

Type I	Independent third-party life-cycle assessment of large cross section of products according to multiple environmental criteria. Least damaging product is certified and awarded label.
Type II	Labelling of self-audited environmental product or process claims by industry bodies, importers, or retailers. Initiator of environmental label proliferation in response to a growing demand for consumer good labelling.
Type III	Independent third-party labelling according to quantifiable indicators defined in specialized pre-set product or process standard.

Type I labelling is the most stringent. Here the certification process involves comparisons of the environmental properties of products from several competitors. After the assessment the certifier on behalf of the standard owner issues a labelling certificate to the manufacturers with the most preferable method and/or products. In the literature, certification procedures applied in eco-labelling are often associated with ISO Type I certification systems (OECD 1997), identifying best in class products and practices. They typically rely on third-party verification and certification.

Unlike Type I labelling programs, Type II labels are self-declared firm-level claims about the environmental properties of their products and services. Without independent assessment and certification, Type II labelling is a phenomenon in response to growing consumer awareness and results in a proliferation of competing environmental labels in product markets. As such, Type II labels are a marketing tool used by producers or distributors to differentiate their products and services.

Type III labels are not restricted to best in class products and allow consumers to weight certified environmental properties in relation to other preferred product attributes as part of an informed purchase decision involving tradeoffs. Type III labelling programs are characterized by program specific, pre-set, and quantifiable product and process requirements against which independent certification bodies assess firms and their products.

While most Type I programs were first initiated by governmental programs, a new stream of sector specific ‘hybrid’ programs then emerged, led and administered by independent organizations such as the Forest Stewardship Council and the Marine Stewardship Council. Both bodies were founded following the 1992 Rio conference. A yet more recent class of labels that combines elements of Types I and III labelling are sector or product specific, self-enforced industry standards. Such “green” voluntary standards rest upon independent third-party (a party other than the buyer or seller) assessment of the firm’s product and/or process compliance with a set of voluntary performance and management objectives or minimum standards. The standards themselves and/or oversight by certifiers may be done by governments. Examples of such sector based measures are the U.S. Department of Agriculture’s organic standard and label as well as the U.S. Department of Commerce’s Dolphin Safe tuna label. Both voluntary programs combine setting specific minimum performance requirements for firms in the industry with independent testing of production processes and final products. In general, third-party certification, as opposed to first-party internal assessments or second-party certification by a business partner, provides the highest degree of independence between the certifier and the party seeking certification. Certifier independence and objectiveness have been identified as attributes of crucial importance to the credibility of certification schemes (Anders *et al.* 2007). Analysis of the reliability of third-party certification is just beginning to appear (Albersmeier *et al.* 2009). The text box below provides details on how certification systems operate.

#### **Box 4. How certification takes place**

Eco-labelling systems supported by independent third-party certification systems can be characterized by multi-level and multi-tiered approaches to firm certification and accreditation. Common to standards in food and seafood markets (e.g., GLOBALGAP, MSC) are modular systems that allow certifiers to apply different sets of sub-standards and requirements adapted to specific products and outcomes. Further standard guidelines define implementation and communication guidelines to assure the transparency and objectives of procedure control. The majority of voluntary standards are themselves benchmarked against fundamental rules of standardization and accredited, for instance, by ISO.

Depending on the targeted level or standard objective, applicants must comply with a basic set of rules often denoted as system rules or standard principles (first level). Based on this level of scrutiny are sets of performance measures adapted to specific standard criteria only relevant to certain products and/or sectors covered by the certification system (second level). Sets of rules can be grouped either according to only product specific differences, or include categories of attributes such as environmental or management related assessment criteria that will vary with overall standards objectives. A third level in the certification process involves the measurement of performance indicators (scoring) for each second-level category of standard requirements. Total

*Source* : Franz (2009)

Increasing interest in fishery differentiation and the signalling of various efforts to protect marine environments have resulted in a proliferation of different voluntary eco-labelling programs over time. Table 2 lists and analyzes the characteristics of leading fisheries certification schemes, allowing a side-by-side comparison. The common objective of the eco-labelling schemes shown is to provide consumers with the opportunity to express their preferences for key seafood attributes with an emphasis on environmental attributes. In turn, a positive awareness of and consumer response to certification and labelling may provide fishermen and seafood processors with concrete incentives to adopt preferable production methods and join labelling schemes. This incentive depends, however, as pointed out above, on the distribution of the benefits and costs of certification schemes along the supply chain. In the presence of market power in these supply chains, a positive consumer willingness to pay price premiums is a necessary but not sufficient criterion for profitable and commercially viable labelling schemes that make returns to participants along the supply chain.

**Table 2. Comparison of voluntary certification and eco-labelling schemes in capture fisheries and aquaculture**

Scheme Characteristics	Schemes			
	Marine Stewardship Council	GLOBALGAP Aquaculture - Salmonids and Shrimp	Nordic Technical Working Group on Eco-labelling	Global Aquaculture Alliance
Type of Scheme	Certification and labelling of fisheries	Independent retailer B2B supply-chain coordination and certification system	Voluntary certification framework for eco-labelling in sustainable capture fisheries	U.S based non-profit scheme promotes international environmentally responsible fish farming
Owner of Scheme	Independent scheme since 1999. Initiated by WWF and Unilever Foods	GLOBALGAP Retail Consortium	Nordic country working group members and EU observers; ownership NA.	Global Aquaculture Alliance
Geographic Scope	Open to global fisheries	Global, aquaculture	Global	Global, U.S. focus
Regulation (regulatory oversight)	Industry-NGO initiative	Industry based scheme	Complimentary to FAO sustainable fishery guidelines development	Independent non-profit organization close to U.S. aquaculture sector
Standard Setting Organization	Marine Stewardship Council International (MSCI), non-profit	GLOBALGAP standard setting committee	Nordic technical working group members	Global Aquaculture Alliance
Standard Classification (I, II, or III)	ISO Type I label	ISO Type II independent certification and labelling scheme	Memorandum of understanding, guidelines, definitions and principles	ISO Type III variant supply chain standard; Type II industry promotional element.
Certifying Body	Accreditation of third-party bodies to audit fisheries in accordance with MSC objectives.	Market or country based accredited independent third-party certification bodies based on ISO 14000 standard rules.	None	Aquaculture Certification Council
Standards	MSC fishery product assessment, standard: 1: must prevent overfishing, depletion; support population recovery; 2: maintain structure, productivity, function, diversity of marine ecosystem; 3: Effective fishery management; incl. stakeholder participation; fishery laws, institutional aspects, sustainability frameworks.	Supply-chain integrated producer-level quality assurance scheme. Definition of product specific performance quality attributes, minimum standards; Registration process incl. social, environmental production method assessment; Limited to farmed Salmonids, Shrimp, Pangasius, Tilapia.	Terminology, code of conduct principles for voluntary eco-labelling; Precautionary principle guidelines for environmental fisheries management.	Codes of practice for responsible shrimp farming and aquaculture; Scope: <a href="#">food</a> safety, <a href="#">mangoves</a> , protection, best practices, <a href="#">feeding standards</a> , species <a href="#">health</a> , environmental management ( <a href="#">effluents and wastes</a> ).

**Table 2. (cont.)**  
**Comparison of voluntary certification and eco-labelling schemes in capture fisheries and aquaculture**

Scheme Characteristics	Schemes			
	Marine Stewardship Council	GLOBALGAP Aquaculture - Salmonids and Shrimp	Nordic Technical Working Group on Eco-labelling	Global Aquaculture Alliance
Attributes Certified	Eco-labelling emphasizes fishery, marine resource sustainability; Promotion of certified product in downstream market.	Holistic approach to certification of product specific quality attributes, production premises and methods.	Emphasis on sustainability and ecology of capture fisheries at international level. Explicit exclusion of product differentiation and food safety aspects.	Certification of industry best practices; consumer focus, quality assurance.
Signaling Mechanism	Chain of custody standard for certified products including custom traceability system; Promotion of MSC mission through PR efforts (public endorsement). Consumer product labelling of certified fisheries.	Integrated supply chain (B2B) quality, safety assurance scheme. B2B integration, coordination; traceability system to mitigate adverse quality, safety outcomes. No consumer communication.	Not defined.	Promotion, labelling, media strategy for Alliance members; focus on consumer labelling of quality attributes, sector best practices.

In addition to the four schemes compared in Table 2, Friends of the Sea is a newer initiative that began in 2006. It is a not-for-profit organization that emerged out of an initiative of the European Earth Island Institute's Dolphin-Safe Project. Friends of the Sea certifies fisheries and their products according to a set of sustainability criteria aimed at marine habitat protection and including social impact assessment of fisheries. In contrast to other programs, Friends of the Sea certification is available to both wild and farmed fisheries. The certification involves independent third-party certification through a network of international, reputable certification bodies (e.g., SGS, Bureau Veritas). Friends of the Sea follows a strict code of transparency of certification making initial inspection fees (Euro 4000) and annual cost of using their label (Euro 2000) publicly available

The Marine Stewardship Council's scheme was the first non-profit eco-labelling initiative building upon principle guidelines outlined by the FAO and Rio Declaration on Environment and Development (FAO 1995, 1998, UNEP 1992). It is the best known "brand" in the market place (Roheim 2003). However, the MSC experience also illustrates obstacles faced by not-for-profit environmental labelling schemes that largely arise from their dependence on buy-in from donor organizations and later by large retail chains in high-value consumer markets. These retailers need to be willing to stock and distribute labeled seafood products. This dependence is emphasized by the initial slow market take-up of MSC labeled products. While it took a total of seven years for the first 500 labeled products to appear, the next 500 labels were registered within only nine-months in 2006. MSC's 2000<sup>th</sup> product label was registered in January 2009 for the French retail giant Carrefour (MSC 2009). Yet, MSC's sales of labeled seafood to consumers of \$1 billion is still relatively small in a fishery commodity market reaching \$100 billion in export sales worldwide (FAO 2008).

Not surprisingly, uptake of MSC products has varied substantially across consumer markets. This uptake depends on MSC's bargaining position with retailers and the activities of its competitors. MSC is

largely based on supporting promotion and public education through environmental organizations and “word of mouth” strategies that rest upon the power of consumer demand. To date MSC’s market penetration is limited and concentrated among environmentally concerned consumers in Europe and across North America. This penetration level can partially be explained by MSC’s focus on the lengthy and costly certification of fisheries rather than individual suppliers or vessels within a geographically defined fishery. However, this potential limitation to growth could be somewhat offset by a growing “green” movement of large-scale retailers and their vertically integrated supply chains such as GLOBALGAP. GLOBALGAP is one of the world’s leading international private food standards systems, formerly known as the Euro-Retailer Produce Working Group Good Agricultural Practices (EurepGAP). Initiated by a consortium of European retail chains in 1997, EurepGAP was a means of maintaining consumer confidence in product quality through better control of sourcing and supply management. Today GLOBALGAP members have created an international system of private food standards and process requirements for their suppliers ranging across crop, livestock, floral, and aquaculture products. At the heart of GLOBALGAP’s food standards system are over 100 accredited third-party certifiers in over 80 countries that inspect and verify product quality and safety parameters for more than 80 000 suppliers to the retail network worldwide (GLOBALGAP 2007).

Increasing interest in environmental (and social) responsibility by major retail players (e.g., WalMart) that are eager to promote themselves as responsible distributors of healthy, safe, and sustainable food products may boost the demand for fishery eco-labelling. However, increasing label proliferation not only has the potential to confuse consumers. Retail managers across North America have expressed difficulties understanding and choosing seafood eco-labelling programs that meet their companies’ product portfolio and marketing strategies. In response to the multitude of competing eco-labels, the U.S.-based Whole Foods retail chain has started to implement its own certification program for farmed seafood products using independent third-party certifiers to assess required traceability and environmental attributes of their seafood product line (Canadian Grocer 2008).

Table 2 also emphasizes the breadth in scope and the diversity of objectives among existing voluntary eco-labelling schemes. Most labelling schemes represent a blend of attribute quality standards beyond a common core related to the certified sustainability of a fishery. This may not only contribute to increasing costs of label participation for fishermen and processors, it also accounts for the growing confusion about the objectives and messages of different fishery eco-labelling programs. Besides their common goal of greater sustainability in fisheries and aquaculture and protection of marine life, there is a considerable range in how the eco-labelling message is disseminated, diluted, and/or weighted in terms of the extent to which their outcomes are communicated within the supply chain or to consumers. More diversity exists due to differences in standards and the mechanisms through which minimum requirements are enforced. One of the broad goals of the Rio declaration and FAO guidelines for sustainable fisheries and eco-labelling was the development of rules that would be internationally acceptable and applicable. As illustrated in Table 2, the diversity of standards, independent third-party auditing, and enforcement mechanisms is likely to create anything but a globally acceptable set of rules and behaviour. If improvement toward more sustainable fisheries is a major objective of eco-labelling, proliferation of eco-labelling standards may be an unwanted outcome. A potential solution for greater harmonization of certification in fisheries and aquaculture may come from the adoption of ISO’s 14001 Environmental Management System certification as the common denominator for voluntary fishery certification and labelling schemes (Thompson *et al.* 2008).

The literature on food safety and quality standards in other food markets suggests that negative effects may occur as a result of voluntary product and process standardization. These may be to the detriment of already disadvantaged supply chains in developing countries. Greater harmonization of basic quality and safety requirements demanded by many private food standards can be seen as a first step towards creating a more transparent and accessible trade environment for developing country producers. The first focus of

harmonization of certification schemes for eco-labelling standards should primarily be concerned with ISO Type II standards where private parties are solely responsible for setting standards. However, seafood consumers may benefit from having competing standards in the market that provide variety in certification choices. This benefit can be reduced or eliminated, or the overall effect may even be negative, if the competing certifications are difficult to understand, verify, or trust based on conflicting and inconsistent messages on what is sustainable and worthy of eco-labelling.

#### 4.4 *Summary of the Current Situation*

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The rapid internationalization and integration of food supply chains has raised consumer concerns over the origin, quality, and safety of the foods they buy. Demand for consistent and verifiable high quality in food products has sparked a proliferation of signaling and labelling systems aimed at assuring business partners and consumers alike. The price premiums and opportunities for product differentiation that may be associated with search, experience, and credence product attributes have attracted widespread participation in certification and labelling schemes.

Eco-labelling in fisheries has been following suit with other food industries in assuring consumers of the quality and sustainability of seafood products, yet label proliferation is to date comparatively low. MSC eco-labelling is still the industry standard, and enjoys relatively high levels of consumer recognition and demand. Eco-labelling has also served as a blueprint for more advanced integrated B2B quality assurance and certification systems aimed at closer vertical integration. GLOBALGAP's standard for selected aquaculture supply chains is a prominent example. The new supply chain programs are targeted at increased efficiency and information transfer in an effort to achieve greater management control. MSC's eco-label champions stakeholder participation and consumer consultation. There is possible conflict between the goals of schemes such as MSC and those of participants in the supply chain who have a focus on market feasibility and returns. Also, proliferation and competing labelling schemes are potentially confusing to customers and may be perceived as a too risky strategy. New, more stringent and credible eco-labelling rules may earn the consumer's trust and price premiums.

From a fishery industry perspective, eco-labelling needs to remain flexible and pragmatic in order to be responsive to structural and other differences across fisheries. Grolleau *et al.* (2007) find that a firm's decision to adopt and implement certified environmental management system (EMS) greatly depends on a number of structural variables. The study suggests that firm characteristics such as size and previous experience with voluntary food standards are important. Moreover, the probability of voluntary EMS certification is likely to increase when customers demand EMS labelling and certification allows firms to realize management and human resource efficiencies. Potential cost savings from environmental management improvements and trade related factors had no significant effect on a firm's decision to participate in EMS programs. Grolleau *et al.*'s findings support the conclusion that, ultimately, the future of voluntary eco-labelling systems in fisheries and aquaculture will depend on firms' ability to adapt to new voluntary programs, implement them, and still realize sufficient profits (Jordan *et al.* 2003).

In principle, more sustainable fisheries can be promoted by well-designed environmental standards based on significant industry participation, credible labelling backed by independent third-party auditing of compliance, strong retail market take-up, and consumer demand for labeled products. The future viability (lifespan) and credibility of eco-labelling schemes in food and fisheries will ultimately be determined by the ability of programs to mitigate the externalities or resolve the market failures that motivated their establishment. The first economic studies have shown that eco-labelling does have an impact on fishery practices and management. Increased environmental awareness among producers and improved monitoring and record keeping can limit fraud and illegal catch practices by advancing transparency and supply chain traceability. Fishery certification can also enhance performance and improve a fishery's compliance with international rules and standards thereby improving competitiveness. This can particularly result in better

access to high-value consumer markets for many developing country fisheries (Phillips *et al.* 2003). These findings, however, are contrasted by evidence of trade hindering effects of food standards and the increasing demand for certification for some countries (Anders and Caswell 2009). A lack of basic regulatory frameworks and insufficient governmental and industry resources to establish food quality and safety systems are often cited as the most pressing problems for the advancement of food supply chains in developing countries (World Bank 2005).

However, to date little is known about the efficacy of food labelling, and particularly fisheries product eco-labelling, as the means of supporting fisheries that are more ecologically sustainable worldwide. Moreover, eco-labelling, as with most food labelling schemes, is characterized by its focus on selected western industrialized economies where consumers and industry have the resources and regulatory frameworks to support new and advanced environmental governance systems. To date there is up-take of eco-labelling schemes in many developing countries that are the origin of an increasing share of the global fishery supply. It bears consideration, however, from a political economy perspective, whether eco-labelling as a means of improving ecological outcomes is after all a largely inefficient tool when compared to directly targeting environmental fisheries management problems with environmental policy and fishers' incomes with better management and marketing systems.

## 5. Looking Forward: Market and Policy Lessons for the Evolution of Certification Systems

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The increasing proliferation and success of different fishery certification and quality signaling schemes indicate that they are serving purposes desired by market participants. The development of eco-labelling schemes, in particular underscores their likely contribution toward viable and profitable fisheries and aquaculture. However, the diversity of schemes and the breadth of market signaling associated with fishery and aquaculture certification and quality signaling also emphasizes the complex nature of the issue at hand. Furthermore, certification and quality signaling schemes focused on a full suite of product attributes (e.g., safety, nutritional quality, fair trade) may continue to give prominence to attributes related to the environmental sustainability of capture fisheries and aquaculture products or this product attribute may be downplayed.

Looking forward, a key consideration is what has motivated the current development of eco-labelling. Eco-labelling is driven by dwindling global fish stocks and media attention to this issue. Eco-labelling serves as a signal to the environmentally conscious consumer. First, eco-labelling allows consumers to make more informed purchase decisions, reduces search costs, and provides extra utility, which translates into price premiums at the retail level. Second, independent certification of claims made by voluntary eco-labels gives these claims the credibility necessary for supply chain partners and end consumers to justify higher costs and market prices. Third, when thought of as an environmental management system for fisheries, eco-labelling sets economic incentives for investment in technologies and practices aimed at more sustainable practices. Ultimately, all three components of eco-labelling (consumer demand for environmental credence attributes, transparency and differentiation in seafood markets, and improved fishery management) are thought to address a widespread collapse of global marine ecosystems, especially wild capture fisheries.

If the preservation of marine ecosystems is the major objective of eco-labelling, then broader economic and regulatory questions warrant discussion:

- Are voluntary eco-labelling systems operated by profit maximizing and competing firms and certification bodies best equipped to achieve this objective?
- If competing eco-labels in seafood markets increase product differentiation based on consumer willingness to pay for combinations of fishery credence attributes, how does this contribute to more sustainable fishery practices and preservation of marine ecosystems?
- A growing literature debates the economic implications of quickly emerging private voluntary standards and certification schemes for international agri-food trade. Fishery products are among the most traded commodities worldwide. What role does quality assurance and eco-labelling in fisheries play for the seafood trade, especially for trade relations between developing and developed country markets?
- The dilemma of marine ecosystems and fisheries is best described by their being natural common pool resources. Typically threatened by overuse, the cost of exclusion of unwanted beneficiaries are prohibitive. Can future eco-labelling schemes fulfill the tasks of social arrangement, regulation, preservation, and maintenance necessary to limit consumption of the common-pool resource of global fish stocks?

Developed as a means of product certification to steer fishery management, eco-labelling also serves to create product differentiation in end consumer markets. At first sight, both objectives contain regulatory

elements through improving market outcomes, preventing or mitigating fraudulent behaviour, and correcting critical market failures that result from information asymmetries. However, evidence presented in Sections 3 and 4, particularly Grolleau *et al.* (2007), suggests that the core economic drivers of firm competition and profit maximization motivate the choice of and adoption of available certification schemes by firms interested in eco-labelling.

Rapid expansion of “new generation” integrated supply-chain certification and control systems, such as GLOBALGAP for selected aquaculture sectors, follows the example of certified marketing systems to be found in many other food markets. Designed by powerful multinational retail chains, their primary focus is on the control of product sourcing from upstream industries and producers. A major objective is protection from food safety incidents and related liabilities that threaten the retailer’s reputation and the market value of brands. In a possible worst case scenario, future certification and quality signaling systems, including eco-labelling, could function as a mere consumer label among many others where the benefits of price premiums are reaped by retailers. Fishers, processors, and traders could be forced to adapt to new standards and requirements without proper compensation. Finally, national governments and NGOs remain solely responsible for the promotion and protection of marine resources based on weakly enforceable international fishery guidelines and multilateral memorandums of understanding.

There are forces that suggest both further proliferation and, alternatively, consolidation of certification and quality signaling for fisheries products. Proliferation can support more effective product differentiation in supply chains and consumer end markets. However, proliferation increases costs of standard setting and auditing and may give rise to confusion among buyers. The outcomes could differ between systems that are intending for B2B use versus those intended for consumer labelling. A possible model for future development in supply chain systems is the consolidation of numerous certification systems for produce in the European market under EurepGAP and then GLOBALGAP.

In compliance with WTO trade regulations, many developed countries have developed and enforce a suite of regulatory standards, technical requirements, and food safety measures. The WTO allows member states to protect domestic consumers from potentially harmful imported products and practices as part of the Sanitary and Phytosanitary (SPS) Agreement and the Technical Barriers to Trade (TBT) Agreement. Empirical evidence on the impact of these measures suggests that border inspections and mandatory compliance with various domestic regulatory standards may increasingly discriminate against food and fishery imports from the developing world (Wilson *et al.* 2005, Alberini *et al.* 2008, Anders and Caswell 2009). The World Bank and others have voiced concerns that SPS and TBT measures increasingly amount to non-tariff barriers in food trade. For seafood imports into the United States under HACCP, Anders and Caswell (2009) find that smaller developing country exporters faced market share losses while larger seafood exporting countries in the developed and developing world had gains. Weakened trade positions may occur to the detriment of developing country fisheries in the adoption of more sustainable and costly fishery management practices. Ponte (2008) finds that smaller developing country fisheries have been additionally marginalized by the growing importance of MSC eco-labelling. To date, many developing country governments and fisheries have been reluctant to actively support eco-labelling schemes. The FAO and others counter this hesitation and promote the benefits of eco-labelling and promise technical assistance. However, it is widely recognized that many developing country governments frequently lack the regulatory frameworks and financial resources to effectively support and participate in international food certification and labelling schemes.

## **6. Conclusion: Oversight of Certification Systems**

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Government regulators and international bodies face considerable challenges in overseeing and guiding the development of certification and quality signaling systems for fisheries products. A major step in making good decisions is for these parties to delineate which policy goals (e.g., improved fisheries management, ecological protection, supply chain functioning, or consumer protection and information) they will pursue using direct intervention through mandatory policy, incentive-based structures, co-regulation, self regulation, and basic fraud protection. While certification and quality schemes can address all of these policy goals, they may not be the best policy instrument for achieving all of them. In addition, government regulators and international bodies must find an approach to the evolution of certification and quality signaling that can move forward with the market rather than trailing it. Given the large and growing market share of developing countries in fisheries (capture and aquaculture), a key component in moving forward will be to develop effective regulatory frameworks and certification schemes that foster standard adoption and implementation in developing country fisheries.

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