Methodologies and Guidelines for Training/ Orientation on Standards to Non-Standards Experts and Cross-Border Trade Compliance

Fisheries and Aquaculture Managers Training Module
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### Abbreviations and Acronyms

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABC</td>
<td>Allowable Biological Catch</td>
</tr>
<tr>
<td>AEM</td>
<td>African Eco-Labelling Mechanism</td>
</tr>
<tr>
<td>AES</td>
<td>African Eco-Labelling Standard</td>
</tr>
<tr>
<td>ARS</td>
<td>African (Regional) Standard</td>
</tr>
<tr>
<td>ARSO</td>
<td>African Organization for Standardization</td>
</tr>
<tr>
<td>AU</td>
<td>African Union</td>
</tr>
<tr>
<td>AUC</td>
<td>African Union Commission</td>
</tr>
<tr>
<td>CAADP</td>
<td>Comprehensive Africa Agriculture Development Programme</td>
</tr>
<tr>
<td>CABI</td>
<td>Centre for Agriculture and Biosciences International</td>
</tr>
<tr>
<td>COFI</td>
<td>FAO Committee on Fisheries</td>
</tr>
<tr>
<td>COMESA</td>
<td>Common Market for Eastern and Southern Africa</td>
</tr>
<tr>
<td>CPUE</td>
<td>Catch per unit Effort</td>
</tr>
<tr>
<td>EAC</td>
<td>East African Community</td>
</tr>
<tr>
<td>EAF</td>
<td>Ecosystem Approach to Fisheries</td>
</tr>
<tr>
<td>ECOWAS</td>
<td>Economic Community of West African States</td>
</tr>
<tr>
<td>IOTC</td>
<td>Indian Ocean Tuna Commission</td>
</tr>
<tr>
<td>IPOA</td>
<td>International Plans of Action</td>
</tr>
<tr>
<td>IPOA-CAPACITY</td>
<td>International Plan of Action for the Management of Fishing Capacity</td>
</tr>
<tr>
<td>IPOA-IUU</td>
<td>International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing</td>
</tr>
<tr>
<td>IQF</td>
<td>Individually Quick Frozen</td>
</tr>
<tr>
<td>IUU</td>
<td>Illegal, Unreported and Unregulated Fishing</td>
</tr>
<tr>
<td>LVFO</td>
<td>Lake Victoria Fisheries Organization</td>
</tr>
<tr>
<td>PFRS</td>
<td>Policy Framework and Reform Strategy for Fisheries and Aquaculture</td>
</tr>
<tr>
<td>PFRS</td>
<td>Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
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Methodologies and Guidelines for Training/ Orientation on Standards to Non-Standards Experts and Cross-Border Trade Compliance

Fisheries and Aquaculture Managers Training Module

1. Significance of Fisheries in Africa’s Development

1.1 Global Contribution of African Fisheries and Aquaculture

It is acknowledged that Africa’s participation in global fish trade is fairly limited at approximately 4.9% and slid to being a net importer from 2011 (FAO, 2014). While UNCTAD (2013) puts official intra-African trade at an average of 11% from 2007 to 2011, intra-African trade in fish was reported to be 24% between 2010 and 2012 (FAO, 2014). WTO (2014) cites cotton, coffee and fish as being agricultural commodities with export potential for Africa. In addition, fisheries have the great potential to generate more food and nutrition security benefits and help to achieve other societal objectives such as reducing poverty and protecting the environment or promoting sustainable fisheries management. Since more trade tends to be associated with faster economic growths, expanding fish trade opportunities for small-scale fishers and fish farmers may help raise incomes and achieve sustainability of the African fisheries resources, which would in return sustain the natural wealth of the continent.

Underlining the importance of Agriculture and Food Security, the theme of the Twenty Third Ordinary Session of the AU Assembly in Malabo, Equatorial Guinea, from 26-27 June 2014, was phrased: “Transforming Africa’s Agriculture for Shared Prosperity and Improved Livelihoods through Harnessing Opportunities for Inclusive Growth and Sustainable Development, also marking the tenth Anniversary of the Adoption of the Comprehensive Africa Agriculture Development Programme (CAADP)” (AUC, 2014). It was during this 23rd Session that the Heads of State and Government made the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods (Assembly/AU/ Decl.1(XXIII). Among the commitments made in the declaration, African Member States committed to end hunger in Africa by 2025 through accelerating agricultural growth by at least doubling productivity levels by 2015 by among other things facilitating sustainable and reliable production and access to quality and affordable inputs (for crops, livestock, fisheries, amongst others) through, among other things, provision of “smart” protection to smallholder agriculture.

The Summit also endorsed the landmark Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (AUC-NEPAD, 2014) which was formulated with the main purpose of facilitating coherent policy development for the sustainable management of fisheries and aquaculture resources in the member states of the African union. Abbreviated as PFRS, the document provides for the guidelines on how countries should better capture the wealth of fisheries, reduce poverty, increase food and nutritional security and ensure equitable distribution of the benefits particularly for the poorest, marginalized and most vulnerable in society, such as women. It provides a framework for guiding the development and benchmarking of sustainability standards and certification for fisheries in Africa in order for the standards to convey a true message of sustainability which is reflected in the improved
productivity of fisheries and aquaculture as well as enhanced contribution of fish to sustainable food and nutritional security, economic wellbeing of fishing communities and aquaculture stakeholders, environmental and biodiversity conservation, efficient, effective and transparent governance and improved national incomes.

1.2 Fisheries Contribution in African Economies and Livelihoods

Many African countries are endowed with fish resources from oceans, seas, lakes, rivers, floodplains and fish farms, which generate a range of benefits including food and nutrition security, livelihood, exports and biodiversity. Africa produced a total of 9.9 million tonnes of fish in 2010, of which 2.7 million (1/3) came from inland fisheries, 1.49 million tonnes from aquaculture and the rest from marine capture fisheries (FAO, 2014). The value provided by the fisheries sector as a whole in 2011 was estimated at more than US$24 billion, representing 1.26% of the Gross Domestic Product (GDP) of all African countries, with aquaculture producing an estimated value of almost US$3 billion per year (de Graaf et al., 2014).

Furthermore, fisheries sector as a whole employs 12.3 million people as full-time fishers or full-time and part-time processors, accounting for 2.1% of Africa's population of between 15 and 64 years old. Of these employed, almost half were fishers; 42.4% were processors and 7.5% were engaged in aquaculture. Women are heavily involved in the fish sector, accounting for about 27.3% of the total workforce in fisheries and aquaculture, and they are directly involved in fishing (3.6 %), processing (58%), and aquaculture (4%). With regard to food and nutrition security, fish is a very important source of animal protein, accounting for an average of around 5% of total protein FAO (2014). Per capita consumption of fish in Africa was reported to be 9.7 kg per year; lower than the world average (18.9 kg/year); with some countries (Congo, Gabon, Liberia, Malawi and South Africa) experiencing stagnant or declining per capita FAO (2014).

1.3 ARSO’s Contribution to the Objectives of the Fish Trade Program

In order to contribute to the Fish Trade Program, ARSO and WorldFish signed an MOU on 13th August 2015 which forms the basis for the current contract. While the first activity focused on the Study on Regional Analysis/Mapping of Certification Procedures and Standards in Africa, this second study is purposed to achieve the following objectives:

(i) Based on the outcomes of the first MOA, to develop methodologies and guidelines for training/orientation of non-standards experts, including policymakers, fisheries managers (from Ministries/Departments of Fisheries), processors and traders in order to help them understand the implications of standards on fish trade and management of fisheries and aquaculture policy. This could include the potential a High Level Awareness of Fish Standards at the EAC Parliament in 2016;

(ii) To develop methodologies and conduct training/orientation of the students who are working on standards and well as support them with design and implementation of their research work, including access to the African Standards databank;

(iii) To develop the Compliance Assessment for fish trade and support countries to use it on a pilot cross-border trade facilitation, using the COMESA-CABI Breaking Barriers Project, in partnership with East African Community (EAC) and Lake Victoria Fisheries Organizations (LVFO) (on Uganda-Kenya Border);
(iv) To develop a Road Map for rolling out of the African Eco-labelling Mechanism (AEM) standards, as a model for testing “Trade-For-Sustainability” using Kenya aquaculture as a pilot, in collaboration with the Department of Fisheries.

2. Study Methodology: Content Outlines

2.1 Stakeholder Modular Approach

The Fish Trade Program fits into the current standards harmonization process while providing a much needed impetus due to its stakeholder-oriented approach. ARSO is cognizant of the fact that the technical nature of many standards has been identified as a major contributing factor to the low uptake and utilization of standards among African enterprises and communities. The situation is exacerbated by the fact that many African countries do not offer specialized expert interpretation of standards for implementers. In the food and agriculture sector, the stakeholders mostly constitute smallholder farmers with limited exposure to technical language.

From the foregoing, it emerges that the harmonization of standards alone cannot sufficiently address the needs of the African people in terms of realizing the benefits of implanting the standards. Thus, there exists a gap in the simplification of the technical language of the standards to the level where the target population understands the principle requirements and underlying rationale of the standards and hence empowering them to deploy the standards in their operations.

Furthermore, there is need to sensitize Members of Parliament especially the EAC on the role of the political leadership in supporting capacity development and facilitating fish trade in Africa. Food trade is heavily influenced by politics (Nestle, 2010; Leal, 2010; Herring, 2015) and this fact has to be taken into account if Africa has to coherently address fish trade within the continent as well as in the global market arena.

ARSO recognizes the need to diffuse knowledge on standards development to upcoming standardizers and sector players especially those undertaking fisheries-related studies in universities and other tertiary institutions. ARSO has undertaken to develop methodologies and guidelines for orientation and training on standards and the implications on policy and market access, including sample sites and rationale for conducting test sessions for high and middle level officials as well as students. This is aimed at filling the existing gap which tends to create an impression of standards being elitist instruments rather than tools common for use by all stakeholders to facilitate trade and development especially in the fisheries and aquaculture sector.

2.2 Stratification of Stakeholders

The stakeholders are stratified into the following groups in order to help them understand the implications of standards on fish trade and management of fisheries and aquaculture policy and their respective roles:

(i) policy-makers including political leaders and parliamentarians
(ii) fisheries managers (from Ministries/Departments of Fisheries)
(iii) processors and traders
(iv) university students who are working on standards and research work
2.3 Fisheries Managers (from Ministries / Departments of Fisheries)

This stratum consists of personnel with managerial responsibilities for fisheries and aquaculture in ministries or departments of fisheries. This group is expected to be responsible for the initiation of policy positions, implementing and/or enforcing government policies, regulations and standards at the operational level. This cadre of personnel will be responsible for operational matters in projects and programmes for value addition and product development, animal health, food safety, preparation of positions for trade negotiations, market access issues, market research and development among other functions. Being a capacity building session, the duration allocated is three days as a minimum and will cover the following broad areas:

(i) Fisheries and aquaculture resource endowments of Africa: A review

(ii) The role of the quality infrastructure in facilitating industrialization, trade and development

(iii) Standards for fisheries and aquaculture: Identification of standardization needs, stakeholders and networks

(iv) Standards and conformity-oriented value addition in fisheries and aquaculture

(v) Sustainability practices in fisheries resource management

(vi) Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa

(vii) Introduction to ARS/AES 02:2014, Fisheries — Sustainability and eco-labelling — Requirements

(viii) Public and private standardization systems for fisheries and effective articulation of national position and interests

(ix) The rules-based nature of fish trade: Implications of the WTO TBT and SPS Agreements — The national obligations under the OIE and WTO fish trade facilitation regimes

(x) Standards and food safety regulations: Exploring the intersections

(xi) Utilization of standards for regulation

(xii) Regulation for development in the fisheries and aquaculture sector

(xiii) The politics of food safety and food security indicators: The politics of international food standards

(xiv) The case for an enhanced regional fish trade framework

(xv) The political economy of undernutrition: Bringing fisheries and aquaculture to bear

(xvi) Best practices in securing and enforcing of fisheries resource instruments

(xvii) Securing Africa’s fisheries resources: Marine and shared water resources
3. **Fisheries Managers (from Ministries / Departments of Fisheries)**

3.1 **Methodology of Delivery**

The methodology is proposed to be a three-five days seminar designed to create a high level of understanding of the fisheries and aquaculture standards, conformity assessment, SPS measures and technical regulations which affect fish trade. The fisheries managers should be equipped to identify standardization needs as they are responsible for product development and diversification.

The mode of delivery is expected to be PowerPoint presentations with substantive papers prepared and bound for ease of reference. Additional materials will be provided in electronic format.

3.2 **Institutional Coordination**

ARSO will be primarily responsible for ensuring effective delivery of the workshop. Coordination with the departments of fisheries, national WTO TBT and SPS coordinators, national standards coordinators, PAQI and individual consultants will be considered.

3.3 **Content Outlines: Fisheries Managers**

The following provides the framework of the content to be delivered for fisheries managers in the fisheries and aquaculture sector. The orientation should emphasize the operational and management responsibilities for this cadre of officials. This level of officials form not only the technocratic core of the fisheries and aquaculture functions, but they are also the group that experiences various challenges originating from inadequate policies, static legal frameworks, inadequate or unavailable standards, inadequate conformity assessment facilitation and human and capital resource issues, among a long list of deficiencies. Formulation of policies and negotiation positions originate from this group and hence an exposure to the political states of play is considered necessary. The outlines below are expected to guide the content development and presentations in the direction which ARSO considers to be relevant in creating a good understanding of the crucial role of standards and conformity assessment in fish trade.

3.3.1 **Fisheries and Aquaculture Resource Endowments of Africa: A Review**

A. **Introduction**

The fisheries resources in Member States include the following depending on the geographical positioning:

(a) Marine capture fisheries

(b) Inland capture fisheries and

(c) Aquaculture

B. **Marine Capture Fisheries**

This is practiced both at artisanal and industrial scales. Key fish species include:

(1) Hake
(2) Horse mackerel
(3) Anchovy
(4) Pilchards
(6) Lobsters
(7) Tunas: Bluefin tuna; Southern albacore; Yellowfin; Bigeye; Skipjack
(8) Shrimps and prawns
(9) Demersal fish: breams; Groupers, and Snappers
(10) Octopuses
(11) Scallops and clams

C. Inland Capture Fisheries

This is practiced both at artisanal and industrial scales. Key fish species include:

(1) Nile perch: *Lates niloticus* and *L. macropthalmus*
(2) Tilapias:
(3) Small pelagic fishes: *Rastrineobola argentea* (Dagaa/Omena/Mukene), *Stolothrissa tanganica* and *Limnothrissa moidon* (Kapenta), *Poechilorhissa nuerensis* and *Bangueluenensis (Engraulicypris moeruenasis)* (Chisense) *Neobola bredoi* (Muziri) and *Brycinus nurse* (Ragoogi)

(4) African Lungfish
(5) African catfish: *Clarias gariepinus*
(6) Common Shrimp: *Caridina nilotica*
(7) *Stolothrissa tanganicae*: Lake Tanganyika sprat — Chilwe, Kapenta, Nsembe (Zambia); Ndaga (Burundi); Dagaa, Ndagala, Ndakala (Tanzania); Ndaga (DR Congo).

Table 1: Some Common Fish Species in African Water Bodies

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Coverage (km²)/Countries</th>
<th>Production</th>
<th>Main species</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanganyika</td>
<td>32.900 km² Burundi, DRC (45%) Tanzania (41%) Zambia</td>
<td>200,000 tons in (2011)</td>
<td><em>Stolothrissa tanganicae</em> and <em>Limnothrissa moidon</em> (Kapenta) <em>Lates stappersii</em> (Bukabuka Mukeke) <em>Lates angustifrons</em> (Capitaine) <em>lates Marie</em> (Ngonzi, Sanga) <em>Lates microlepis</em> (Nonzi/Nyunvi) Tilapiine</td>
<td>About 94,800 active fishers (2011). Kapenta contributes 60% to total catch and lates stappersii 30%</td>
</tr>
<tr>
<td>Malawi/Nyasa</td>
<td>29600 km² Malawi, Tanzania and Mozambique</td>
<td>50.600 (2007)</td>
<td><em>Haplochronis</em> spp. (Mbuna). <em>Copadichromis</em> spp. (Utaka), <em>Poeochromis</em> spp. (Chambo), <em>Rhamphochromis</em> spp. (Ncheni). <em>Engraulicypris</em> sandella (Usipa), <em>Barbus paludinosus</em> (Matemba), <em>Bagrus meridionalis</em> (Kapango) and <em>Clarias</em>, gariepinus (Mlamba)</td>
<td>About 50,000 fishers and over 35000 fish processors, traders etc in Malawi</td>
</tr>
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### Lakes Coverage (km²) Countries

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Coverage (km²)/ Countries</th>
<th>Production</th>
<th>Main species</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert</td>
<td>5270 km² DRC 46% and Uganda 54%</td>
<td>More than 150,000 (in 2010)</td>
<td><em>Atelostes baremose (Ngaar)</em>, <em>Hydrocynus forskahli (Ngasia)</em>, <em>Lates niloticus</em>, <em>L. macrophthalmus</em>, <em>Brycinus nurse</em> (53%), <em>Neobola</em> (22%) <em>Bagrus bayad</em></td>
<td>The small pelagic (<em>Ragoogi</em>) and <em>Muziri</em> catch is over 60% of the Lake in Uganda. Production data is for Uganda only.</td>
</tr>
<tr>
<td>Mweru-Luapula</td>
<td>4580 km² Zambia 58% And DRC 42%</td>
<td>More than 22,000 (in 2010)</td>
<td><em>Poecilothrissa mweruensis</em> and <em>Bangeluensis (Chisesnse)</em>, <em>Oreochromis macrochir (Tilapia)</em>, <em>Hydrocynus vitattus (Tiger fish)</em></td>
<td>About 25000 fishers in Zambian waters.</td>
</tr>
<tr>
<td>Edward</td>
<td>2325 km² Uganda 29% DRC 71%</td>
<td>10,000 (2010)</td>
<td><em>Tilapia, bagrus, barbus, Protopterus, Clarias, Haplochromis</em></td>
<td>516 fishers (No. of fishers, boats and fishing gears are controlled/set in Uganda).</td>
</tr>
<tr>
<td>Kivu</td>
<td>2370 km² Rwanda 42% DRC 58%</td>
<td>7000 (1991)</td>
<td><em>Oreochromis niloticus, (Ingerge), Stolothrissa tanganicae and Limnothrissa miodon (Kapenta)</em>, <em>Barbus spp., Clarias spp. Haplochromis spp.</em></td>
<td>About 6500 fishers Kapenta (Limnothrissa contribute over 80% of the total catch.</td>
</tr>
</tbody>
</table>

### D. Aquaculture Fisheries

African aquaculture can broadly be divided into two: *community based aquaculture* which is promoted by international organizations, aid agencies and governments as part of their efforts to alleviate poverty, create livelihoods and improve the food supply situation; and *commercial aquaculture*, which is mainly privately financed and export oriented. Key fish species include:

1. African catfish (*Clarias gariepinus*)
2. Trouts
3. Tilapias (*Oreochromis niloticus, O. andersonii, O. macrochir, and Tilapia rendalli* especially)
4. Common carp (*Cyprinus carpio*)
5. Freshwater prawns (*Machrobraccium rosenbergii*)
6. Marine species include the Black Tiger prawn (*Penaeus monodon*)
7. Oysters (primarily the Pacific Oyster *Crassostria gigas*)
8. Abalone

### E. Non-Fish Aquatic Resources

There is a markedly significant farming of the Nile crocodile (*Crocodylus niloticus*) in some African countries for skin and meat.

### F. Economic Contribution of African Fisheries and Aquaculture

A recent study by de Graaf et al.(2014) estimates the value added by the fisheries sector as a whole in 2011 to be more than US$24 billion, 1.26 percent of the GDP of all African countries. Detailed figures by subsector highlight the relevance of marine artisanal fisheries and related processing, and also of inland fisheries, which contribute one-third of the total catches in African countries. Aquaculture is still developing in Africa and is mostly concentrated in a few countries but it already produces an estimated value of almost US$3 billion per year. As data on licence fees paid by foreign fleets were not easily available to the national experts...
participating in this study, an attempt was also made to estimate the value of fisheries agreements with Distant Water Fishing Nations (DWFNs) fishing in the exclusive economic zones of African States. Considering that 25 percent of all marine catches around Africa are still by non-African countries, if also these catches were caught by African States in theory they could generate an additional value of US$3.3 billion, which is eight times higher than the current US$0.4 billion African countries earn from fisheries agreements.

According to the new estimates produced by the study, the fisheries sector as a whole employs 12.3 million people as full-time fishers or full-time and part-time processors, representing 2.1 percent of Africa’s population of between 15 and 64 years old. Fishers represent half of all people engaged in the sector, 42.4 percent are processors and 7.5 percent work in aquaculture. About 27.3 percent of the people engaged in fisheries and aquaculture are women, with marked differences in their share among fishers (3.6 percent), processors (58 percent), and aquaculture workers (4 percent).

Table 2: Fisheries and Aquaculture Contribution to GDP in the Whole Africa by Subsector

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Gross Value Added (US$ millions)</th>
<th>Contribution to GDP %</th>
</tr>
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<tbody>
<tr>
<td>Total GDPs African countries</td>
<td>1,909,514</td>
<td></td>
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<tr>
<td>Total Fisheries and Aquaculture</td>
<td>24,030</td>
<td>1.26</td>
</tr>
<tr>
<td>Total Inland Fisheries</td>
<td>6,275</td>
<td>0.33</td>
</tr>
<tr>
<td>Inland fishing</td>
<td>4,676</td>
<td>0.24</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>1,590</td>
<td>0.08</td>
</tr>
<tr>
<td>Local licences</td>
<td>8</td>
<td>0.00</td>
</tr>
<tr>
<td>Total Marine Artisanal Fisheries</td>
<td>8,130</td>
<td>0.43</td>
</tr>
<tr>
<td>Marine artisanal fishing</td>
<td>5,246</td>
<td>0.27</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>2,870</td>
<td>0.15</td>
</tr>
<tr>
<td>Local licences</td>
<td>13</td>
<td>0.00</td>
</tr>
<tr>
<td>Total Marine Industrial Fisheries</td>
<td>6,849</td>
<td>0.36</td>
</tr>
<tr>
<td>Marine industrial fishing</td>
<td>4,670</td>
<td>0.24</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>1,878</td>
<td>0.10</td>
</tr>
<tr>
<td>Local licences</td>
<td>302</td>
<td>0.02</td>
</tr>
<tr>
<td>Total Aquaculture</td>
<td>2,776</td>
<td>0.15</td>
</tr>
</tbody>
</table>

(de Graaf et al., 2014)

In West Africa fishing activities, mostly in the marine artisanal subsector, are a major contributor to GDP with high overall contributions in Ghana, Mauritania and Sierra Leone. In Central Africa, inland fisheries is the major contributor to GDP with high overall contributions by the Democratic Republic of the Congo and Uganda. In Southern Africa, marine industrial fisheries is the major contributor to GDP.

The total GDPA is compiled by the national statistical offices according to the International Standard Industrial Classification (ISIC). It includes “Agriculture, livestock, hunting, forestry, and fishing” but excludes processing, which is covered under “Manufacture of Food Products”. Therefore, the contribution of fisheries to GDPA can be only calculated as the share of fishing.
and aquaculture economic activities in the agriculture production but excluding the value generated by post-harvest.

Total value added of fishing and aquaculture in Africa is US$17.4 billion. With a total GDPA of US$288.4 billion, the fisheries sector contributes 6 percent of the GDPA for the whole of Africa. The highest contribution is from marine artisanal fishing contributing 1.82 percent of total GDPA, whereas inland fishing and marine industrial fishing have the same contribution of 1.62 percent, and aquaculture contributes almost 1 percent.

References
The Value of African Fisheries (de Graaf et al., 2014)
A Fishery Manager's Guidebook (Cochrane et al., 2009)
Harnessing Fishery Resources: Swimming the Tide to Africa’s Development (UNECA, 2012)
Mariculture in the WIO Region: Challenges and Prospects (Troell et al., 2011)
A Complete Guide to the Freshwater Fishes of Southern Africa (Skelton, 2001)
A Guide to the Common Sea Fishes of Southern Africa (Van der Elst, 1993)
Field Identification Guide to the Living Marine Resources of Kenya (Anam et al., 2012)
Maximizing Utilization of Pelagic Fish Resources (Hariono et al., 2006)

3.3.2 The Role of the Quality Infrastructure in Facilitating Industrialization, Trade and Development

A. Regional integration essentially refers to the process in which countries enter into a regional agreement in order to enhance regional cooperation through regional institutions and rules in various sectors. Many of the regional integration initiatives are driven by political, economic and security considerations leading to a wide range of forms of integration involving many African countries. The following are the common forms and characteristics of regional integration:

(a) Preferential Trade Area (PTA): Agreement of preferential conditions, such as lower customs duties or higher import quotas for certain goods.

(b) Free Trade Area (FTA): Extensive reduction of trade restrictions between the member states, usually covering the overall trade in goods.

(c) Customs Union (CU): Elimination of internal trade restrictions and introduction of common external tariffs, often in connection with the reduction of additional impediments, such as administrative barriers.
(d) **Common Market (CM):** Expansion of the freedom of movement of goods to the elimination of obstacles in other areas, such as free movement of capital, services and labour.

(e) **Economic Union:** Establishment of a uniform internal market, including the harmonization of national policies and of the economic framework.

**B.** Miesner (2009) reports that FTAs dominate regional integration schemes with 139 of the 152 WTO notified Regional Trade Agreements (RTAs) being defined as Free Trade Agreements (FTAs) whereas Customs Unions only account for 13 cases. Moreover, the establishment of regional economic communities is influenced by a range of economic, political and security-related considerations which may be summarized as follows (Crawford *et al.*, 2005):

(i) Exploiting economies of scale and benefits from specialization by expanding the domestic market and developing new markets

(ii) Attracting foreign direct investments, particularly for countries with low labour costs and a preferential access to larger markets

(iii) Enhancing integration processes in areas that are currently only insufficiently covered by multilateral agreements, such as investments, competition, environment or labour standards

(iv) Supporting the negotiating power in multilateral agreements by forming regional blocks and strengthening geopolitical alliances

(v) Consolidating peace processes and promoting violent-free solutions to conflicts by a regional cooperation on security issues

**C.** The elimination of technical barriers to trade (TBTs) constitutes one of the fundamental requirements of any regional integration. These TBTs arise due to the discrepancy of national standards of trading partners from international standards and they have the following consequences for international trade:

(i) products, processes and systems are subject to different mandatory requirements and may therefore violate legal regulations of the trading partner,

(ii) testing procedures that assess the conformity of products, processes and systems against defined requirements may not be recognized,

(iii) conformity assessment bodies of the trading partner which cannot prove their competence against agreed standards may not be trusted.

**D.** WTO (2005) highlights the importance of standards in trade by stating that it is through sharing a common standard that anonymous partners in a market can communicate, can have common expectations on the performance of each other’s product, and can trust the compatibility of their joint production. Thus, standards are necessary for the smooth functioning of anonymous exchanges – and therefore, for the efficient functioning of the market. It is for this reason that the issue of a quality infrastructure has always been a key part of regional trade agreements. Recent reports indicate that over 80% of the global trade is already affected by standards and technical regulations (Gonçalves *et al.*, 2011). This means that for a regional integration agreement to function smoothly, there must be a robust quality infrastructure to underpin it. Miesner (2009) explains that the contributions of the quality infrastructure to regional economic integration depends on the selected form of integration and include:
(1) **Removal of technical barriers to trade:** Regional economic integration aims at reducing trade barriers between the member states. A quality infrastructure is fundamental to the harmonization and mutual recognition of standards, technical regulations and conformity assessments, thus providing the basis to overcome non-tariff trade barriers.

(2) **Improvement of competitiveness of enterprises:** Regional economic integration creates larger domestic markets and promotes the establishment of transnational value chains. A quality infrastructure increases the compatibility between suppliers and customers, reduces transaction costs, provides developing countries with an easier access to international good practices and improves the competitiveness of small and medium-sized enterprises in particular.

(3) **Strengthening of socio-economic coherence:** Regional economic integration is often characterized by cooperation in the field of individual sector policies, such as environmental and health policies. A quality infrastructure provides the technical framework for establishing common limiting values and other regulatory requirements and provides capacities for the effective implementation of those requirements.

(4) **Safeguarding of interests from other regional economic blocks:** Regional economic integration leads to the creation of economic blocks that significantly shape the global economic framework. A quality infrastructure combines the available technical know-how of its member states and channels the input into multilateral negotiation processes in order to safeguard regional interests.

(5) **Strengthening the negotiating position in trade disputes:** Regional economic integration requires a common position in trade disputes with other economic blocks that will often involve the interpretation of TBT-related facts and findings (such as bans on the import of contaminated food products). A quality infrastructure supports trade policy dialogues with the aid of scientific-technical insights based on recognized test results.

(6) **Consolidating the regional technological autonomy:** Regional economic integration facilitates the bundling of regional resources in order to establish competitive institutions for research and development. A quality infrastructure helps to utilize existing national know-how, to develop specialized networks, and to enhance the technological emancipation of the region.

**E.** The degree of contributions of the quality infrastructure to regional integration must be coupled with the other fundamental structures such as the condition of regional transport and communications networks and the development stage of local production facilities as well as the quality of technical, administrative and political institutions in general.

**References**

*The Answer to the Global Challenge: A National Quality Infrastructure* (Sanetra et al., 2007)

*Contributions of Quality Infrastructure to Regional Economic Integration: Insights and Experiences Gained from Technical Cooperation of PTB* (Miesner, 2009)

*Non-Tariff Measures and Regional Integration in the Southern African Development Community* (UNCTAD, 2015)
3.3.3 Standards for Fisheries and Aquaculture: Identification of Standardization Needs, Stakeholders and Networks

A. Sample Types of Standards and Standards-Type Deliverables

(i) **Terminology /Glossary:** standard listing definitions of terms used in a particular sector, field or discipline serving to make communication uniformly understood

(ii) **Codes of Practice:** standard comprising recommendations for accepted good practice as followed by competent and conscientious practitioners, and which brings together the results of practical experience and acquired knowledge for ease of access and use of the information

(iii) **Specifications:** standard that sets out detailed requirements, to be satisfied by a product, material, process, service or system, and the procedures for checking conformity to these requirements. Quality, safety and health characteristics of fish products, equipment and systems, e.g., tuna loins, smoked fish, fishing nets and gears, etc.

(iv) **Methods of conformity assessment:** standard that gives a complete account of the way in which an activity is performed (and, where appropriate, of the equipment or tools required to perform it) and conclusions are reached, to a degree of precision appropriate to the stated purpose. Test methods for parameters such as heavy metals, pesticide residues, organoleptic properties, freshness, phycotoxins, presence of diseases through microbiological, virological indicators; and inspection methods.

(v) **Metrological characteristics:** Confirming the actual weights of the products to avoid fraud

(vi) **Water and environmental quality, health and safety** parameters for aquaculture and capture fisheries

(vii) **Guide:** standard that gives broad and general information about a subject, with background information where appropriate

(viii) **Classification:** standard comprising designations and descriptions of different grades of a product and that identifies and arranges data in hierarchical order

(ix) **Publicly Available Specification (PAS):** provisional document, developed under broadly the same processes as a formal standard and published when standardization of a particular subject is urgently required, but further research or development is required before it can be published as a formal standard.
Technical Specifications: these are normative documents prepared and published when the subject in question is still under development or where for any other reason there is the future but not immediate possibility of an agreement to publish an ordinary standard. A Technical Specification may be established with a view to serving for instance the purpose of:

(a) publishing aspects of a subject which may support the development and progress of the market but where an ordinary Standard is not feasible or not yet feasible;

(b) giving guidance to the market on or by specifications and related test methods;

(c) providing specifications in experimental circumstances and/or evolving technologies.

The decision to publish a technical specification may be the necessary where:

(d) there had been insufficient support at the enquiry stage for the work item to progress to an ordinary standard;

(e) no consensus can be reached on the submission of the work item within the given target date.

The maximum lifetime of a Technical Specification is 6 years (i.e. one three-year period and one confirmation).

Technical Reports: When a technical committee has collected data of a different kind from that which is normally published as a Standard (this may include, for example, data obtained from a survey carried out among the national bodies, data on work in international organizations or data on the "state of the art" in relation to standards of national bodies on a particular subject), the technical committee may decide, by consensus, to publish such data in the form of a Technical Report. The document shall be entirely informative in nature and shall not contain matter implying that it is normative. It shall clearly explain its relationship to normative aspects of the subject which are, or will be, dealt with in standards related to the subject.

Crucially, the development of a TR cannot conflict with, or contradict, existing or draft work within the formal standards arena and must complement, not conflict with, any legislation in the subject area.

No time limit is specified for the lifetime of Technical Reports, but it is recommended that Technical Reports be regularly reviewed by the responsible technical body to ensure that they remain valid.

B. Rationale for Preparing a Standard

B.1 Problem Statement
Many products fail to achieve their expected performance commercially and/or technically with disastrous results for the producer and dissatisfaction or worse for the customer. Key problems encountered by producers include:

(i) insufficient knowledge of the market/target customer;
(ii) inadequate understanding between customer and producer;

(iii) inadequate profit margins;

(iv) the product being too expensive;

(v) failure to meet regulatory requirements;

(vi) failure to meet performance targets;

(vii) the time to market being too long;

(viii) development expenditure being too high;

(ix) insufficient in-house skills and knowledge to cover the process;

(x) excessive warranty, delivery or other commitments creating serious financial obligations.

The main benefit in dealing properly with these problems is a better product for which the commercial and technical risks have been assessed and eliminated or reduced to an acceptable level. The benefit to the producer can be significant both in reducing the cost of the product and/or in improving the quality, reliability and commercial viability of the product.

It is easy to become obsessed with an innovative idea, or a new technology, without looking dispassionately at its overall viability or other justification to pursue it. By gathering sufficient information to understand the potential product its viability can be properly assessed. Gathering this information in a disciplined way facilitates decision making, and also exposes conflicts or trade-offs, allowing them to be resolved at an early stage and so avoiding problems later.

The three main areas that need to be understood when making decisions about the development of a new product include:

(a) commercial considerations;

(b) attributes of product performance necessary to satisfy the customer; and

(c) regulatory requirements.

Only when all the requirements for a new product have been understood is it possible to ensure that the product is safe or to review or test it adequately. Thus the development of a specification is the precursor to assuring safety, quality and reliability.

**B.2 Principles**

A standard shall:

(a) be complete within the limits given in its scope clause;

(b) be consistent, accurate and unambiguous;

(c) take full account of the current state of technical development;

(d) provide a framework in which innovation can be accommodated and supported; and
(e) be readily comprehensible to those who might reasonably be expected to use it (i.e. its target audience).

(f) not make any requirement in respect of compliance with the law or discharge of legal obligations.

The type of standard used shall be selected as being the most appropriate for its purpose. Irrespective of its target audience, the provisions of a standard shall be drafted with due regard to the legitimate needs of the whole community, and, in particular, to those of the end users of its subject matter.

NOTE 1 With a very few exceptions, standards do not have force of law: the application of a standard is almost always voluntary, although standards are very often used in support of legislation, and compliance with a standard is sometimes quoted in legislation as offering a route to discharging legal obligations.

NOTE 2 It is a fundamental principle that standards never make requirements or recommendations for compliance with particular legislation. To do so would imply that such compliance is optional; standards users are expected to obey the law regardless of whether they comply with standards.

NOTE 3 Legislation is constantly changing and evolving, and no standard can be expected to keep pace with these changes. In order to prevent a particular standard being regarded as an authoritative statement of current legislation, it is rare for legislation to be quoted or listed extensively. However, it is good practice to draw readers’ attention to particular important pieces of legislation that might have an impact on the way in which a standard is applied.

NOTE 4 Standards are very often used as the basis for contracts and it is therefore particularly important that they are drafted sufficiently clearly and robustly as to be able to withstand legal scrutiny.

C. Nature of Standards — Specifications

Product specifications are particularly important in outlining the fit-for-use characteristics of products. They are prepared to specify requirements for performance and technical attributes of a product and to give guidance on the process of making and using a product. The preparation of standard should be preceded by gathering of the requisite information as outlined hereafter.

C.1 Overview: The information to be collected must be prioritized noting that arriving at the correct values is an iterative process throughout the initial stages of the specification.

In the case of trade-offs, conflicting requirements, or where there is a need to prioritize issues, the use of quality function deployment (QFD) can be a useful tool to aid decision making.

It is important to consider the whole life-cycle of the product and not just to concentrate on operation by the user. This means thinking about the market, product development, production, packaging, distribution, use, training, maintenance, repair, reuse, recycling, disposal and how each of these phases might affect the design (see Figure 1).

In evaluating which criteria relate to an individual product, it is recommended not only to use the checklists given in this standard, but also to think laterally about any other issues crucial to the success of the product and the satisfaction of customers. However the information is acquired it should be recorded.

C.2 Researching and Understanding Customer Needs: In the preliminary phase information about customer requirements should be acquired. The criteria that are, or need to be, established should include those that will make the product a success. These are likely to be expressed in general terms but any limits on parameters such as size, weight, noise, power, colour or appearance should be included wherever practicable. The concept of universal/accessible design should be embraced, considering the widest possible range of
users, including children, older and disabled people. A key issue is to ensure that the "voice of the customer" is heard throughout the organization in particular by those contributing to the new product design.

Conducting market research helps to identify customer needs, new market niches and customer acceptability. Initiating prototype testing, user trials, focus groups and user groups, involving consumers where appropriate, assists in achieving final model acceptance. It is important to identify the customer.

![Diagram showing the steps in identifying the criteria](image)

**Figure 1: Steps in identifying the criteria**

**C.3 Researching and Understanding the Market:** In order to assess the commercial viability of the product the size of the market, the competition, budgetary requirements, financial resources, return on investment, the window of opportunity and time to market should be understood. This information leads to conclusions about how and where to sell the product, the time-scales required, reliability and quality. All of these conclusions are criteria to be included eventually, as applicable, in the specification.

**C.4 Understanding the Potential Product:** In this phase the preferred product design begins to emerge and it becomes clear how the concept is to be implemented. Decisions are made about the final look and feel of the product and its performance. Trade-offs quite often need to be made between the customer’s perceived needs and what is feasible within technical, financial and time constraints. Trade-offs might also be necessary in order to reach the best overall solution. Any relaxation of requirements should be checked for impact on the commercial or technical viability of the product.

**C.5 Understanding which Legislation and Standards are Applicable:** For many products national legislations are applicable and it is necessary to establish which legislation and thus
which regulations and standards may have an impact on the design.

C.6 Understanding How to Manufacture the Product: Once the detailed design has emerged (realization phase) product parameters can be finalized in the specification. The product’s architecture and detailed design can now be recorded fully in the design documentation. Criteria for manufacturing should be established in as much detail as practicable including methods of manufacture and test. Manufacturing staff (including those from any major sub-contractors) should be involved in this. Any special criteria for bought-in parts or sub-assemblies should be recorded.

C.7 Understanding How to Verify, Test and Validate the Product: When establishing the process of product conformity it is important to distinguish between verification, production testing and validation.

(i) **Verification** establishes that the design meets its specification. This may be achieved, to a degree, during the design process through the use of design reviews, etc. This is then supported by a final record showing that the overall design meets all the requirements.

(ii) **Production testing** ensures that individual examples of the product function satisfactorily.

(iii) **Validation** in its simplest form establishes that the product meets customer needs while at the other extreme it ensures that the product is fully fit for its intended purpose.

In the verification and validation process all the attributes of the product should be considered. Production testing covers critical and/or safety-related aspects and is only a subset of the overall product performance. It is usually necessary to test examples of the product fully to acquire the data to satisfy the initial design verification. Validation will include physical testing of the complete product under operating conditions to ensure that it meets the needs of the customer. Validation will also include recording the data as evidence of the validation process. With some products, validation may only be achievable with on-site testing.

In addition to proving the design it is usually necessary to prepare a production test specification. The application of production testing ensures that in the unfortunate event that a non-conforming product is produced it is not released. A balance may have to be drawn between the cost and delay of testing and the risk of a faulty product being allowed through. It is common to concentrate on safety testing and basic functionality. For simpler products sampling inspection can be appropriate in which case an acceptable quality level (AQL) should be chosen. If sampling inspection is used there is a finite and predictable risk of a defective product reaching the customer. For this reason sampling inspection is not appropriate for some criteria or products. If it is used this should be made clear on any declaration of conformity.

C.8 Understanding How to Support the Product: Criteria for supporting the product should be established as early as practicable. The nature of the design itself and the thoroughness of any instructions for use can have a bearing on the amount of support customers need. Arrangements for dealing with warranty claims, criteria for associated costs, response times and helpdesk performance should all be established, as applicable.

D Recording the Criteria

D.1 Overview: All relevant criteria should be recorded formally to build up the product specification document. Where criteria are known to be relevant, but their values are not yet
established, they should be recorded as, for example, “TBD” (to be determined). This will reduce the likelihood of issues being overlooked later.

Figure 2 illustrates how, as criteria are acquired, they can be documented. For clarity, the process is summarized as a sequence, but it is more likely to be iterative within each step, or even between steps. The approach can be tailored to suit an individual product. Criteria should be covered to an extent that all interested parties will be satisfied.

It is useful to distinguish between the criteria to be recorded in the specification document and the associated commercial intelligence. It is vital to collect, assimilate and communicate the latter but for confidentiality reasons it may be prudent to keep it segregated from the product specification, particularly if this will be released outside the organization. Commercial intelligence can form an annex to the product specification.

All staff involved in the design process should be given ready access to all technical information and as much commercial intelligence as practicable. The specification may be in the form of handwritten text, a word-processed document, a computer database, or any other appropriate medium. Whichever method is chosen, some form of revision control should be in place (e.g. at least a date), to ensure users are working to up-to-date information as the document grows.

It is useful to adopt a formal structure for the document including numbered sections and subsections, or even numbered individual lines of the specification, so that references or changes to it can be made unambiguously at a later date.

D.2 Some Practical Tips for Writing a Specification: The following are some practical tips for writing a specification.

(a) Start preparing the specification document very early on.

(b) Prepare it in a form that can easily be read and used by others.

(c) For complex products with multidisciplinary design, areas of the specification may be compiled by different people or sub-groups. Each should be aware of what the other is doing and the information brought together for review.

(d) Start by writing all the obviously applicable headings even if it is not yet possible to fill in any details (see Annex F for some suggestions).

(e) Put down all salient and useable information but be concise.

(f) Where possible be quantitative rather than qualitative: put down numbers, with tolerances where practicable.

(g) Avoid being unnecessarily restrictive: this can increase eventual product cost or limit design options.

(h) Always involve all the relevant people: research has shown that people tend to put too great an emphasis on areas of their own expertise and not enough on others. Multiple inputs help to counteract this effect.
Figure 2: How Acquiring Criteria Builds up the Documentation

(i) Writing a specification is an iterative process but try not to change the specification too often.

(j) Allow changes in the specification early on in order to refine it. However, changes will eventually become disruptive, so later unnecessary changes should be discouraged.

(k) Eventually changing the specification has to stop so that design work can proceed in a controlled way. It may be extremely wasteful to try to undertake detailed design while the specification is still changing.
Good management is necessary to know when to change the specification and when not to: it will give stability to the subsequent design process. It is important to try to minimize disruption but nevertheless to be willing to accommodate important changes if they are necessary to keep the specification on target to produce a successful product.

A good way of deciding if a change should be allowed late on is to consider the cost of the change compared with the loss in profit from leaving the design unaltered. Whilst impossible to assess accurately, prompting the person who wants the change to think about the degree of benefit compared with the cost of the disruption, helps to filter out unnecessary cosmetic or minor changes, while allowing those that affect the product’s function or reliability.

E. Types of Specifications

E.1 General: Specifications are generally written for two purposes:

(a) to state unequivocally requirements concerning the performance and technical attributes of a product;

(b) to give guidance on the process of making and using a product.

The requirements and guidance needed to define and implement a product may be incorporated into one document, or exist in a whole series of inter-related documents. The approach taken is usually dictated by the size and complexity of the product and the precepts of the organization concerned. Figure 3 illustrates the relationship between the various kinds of specification used during a typical product life cycle.

E.2 Triggers: An outline of the proposed product to be specified may be given in an initial brief that states the customer's key requirements. This initial brief may be further developed into a business proposal, project brief, design brief and, if necessary, a full performance specification. These preliminary steps should be taken during the project's conception and feasibility phases, before any work on its implementation is authorized or started.

E.3 Requirements: A performance specification should state the required attributes of the product, together with any constraints, without giving a detailed technical description. This information should then be used during the implementation phase as the basis for preparing a product specification that contains a full technical description of the product.

A product specification may describe in detail a new product designed to meet a particular customer's requirement or general market requirement, or an existing product. Such specifications may be used for contractual purposes.

The product specification needs to give all the information required to realize the product and provide objective evidence that the product conforms to its performance specification (or, in the absence of a performance specification, to the client's initial brief).

Product specifications may also describe an existing product to a prospective customer and may be supplied in the form of a brochure, catalogue entry, handbook or user manual. Such descriptive specifications, when accepted by the customer, place an onus on the supplier to provide a product that conforms to the description; thus descriptions can become firm requirements.
Figure 3: Order of Use of Specification Types
Primary purpose of the product that also gives essential instructions concerning such matters as style, grade, performance, appearance, characteristics, conditions of use, health and safety, packaging, conformity assessment, reliability and maintainability.

Requirements that are to be incorporated in the product design, such as compliance with standards, processes and management systems.

Process and precautions to be observed in withdrawing from service and discarding or otherwise dispensing with a product and any associated waste or redundant materials.

Requirements to ensure that the product can be moved and stored with adequate protection from damage to itself, the environment, property and people.

Process for examining the product to determine its conformity with requirements given in the product specification.

Process and detailed procedures for installing the product, including, if necessary, unpacking, preparation, assembly, commissioning, testing and hand-over to the customer.

Process and detailed procedures for the routine, preventive and corrective maintenance needed to keep the product operating in accordance with its performance specification.

Constituents of the product, including raw materials, finished components and all other items required for its construction.

Process and detailed procedures for bringing the product into use and then operating and maintaining it so that the requirements of the performance specification are fulfilled throughout its life cycle.

Methods and logistics of creating the product, including the materials, equipment, physical conditions, facilities, personnel, procedures and sequence of activities that contribute to the delivery of an end product that conforms to its specification.

Criteria that need to be met before the product is handed over to the customer.

Process and detailed procedures for testing the product, including, if necessary, the criteria for assessing the test results for compliance with the acceptance and/or performance specifications.

Figure 4: Some Types of Specifications
E.4 Processes: Process specifications (see Figure 4) should be developed where necessary to give detailed guidance on the technical and procedural aspects of product implementation. They should be concerned with the required output, invariably the delivery of a product that conforms to the performance specification.

The specification of processes should be broad and of a general nature, relying on internal and external standards without necessarily making reference to them. These specifications are often referred to simply as procedures and should describe the way in which a set of inter-related resources and activities transforms inputs into outputs.

E.5 Other Types of Specification: A small selection of commonly used kinds of specification and their purposes are described in Figure 4. These may specify products and/or processes; they may be prescriptive and/or descriptive.

F. Management of Specifications during Preparation

F.1 Related Documents, References and Duplication: Before starting to prepare a specification, it is advisable to search for existing documents that might serve the same purpose, either in part or in whole. The following types of publication may be relevant to the proposed specification:

(a) the organization’s internal specifications;
(b) general rule documents;
(c) national, RECs, African and international standards;
(d) standards issued by professional, industrial, commercial and public sector bodies;
(e) technical books, journals and product catalogues;
(f) statutory instruments, conditions of contract and other legal conditions;
(g) specifications issued by prospective purchasers or specifications of other organizations.

Even if a suitable document is not found, some of the information obtained may be relevant to the proposed specification and should be referenced or incorporated as necessary.

F.2 Drafting Procedures: The sequence of the work in drafting a specification may not correspond to the order in which the specification is presented. A six-stage procedure for drafting a typical specification is given in Figure 5. This procedure is iterative, but for clarity the feedback lines are omitted in the figure.

F.2.1 First draft: The subject for consideration should be nominated then the objectives agreed with those directly responsible before collecting the appropriate data, such as relevant regulations, standard procedures, suppliers and prices. National and trade standards need to be sought, suppliers’ catalogues collected and examined and existing applications noted.

If an initial investigation shows that an existing standard does not exist and the subject is worth pursuing, discuss the objectives between interested parties and decide on the form of standard required. Is it design, process or quality control for example?

Prepare a first draft of the standard for discussion. Some of the many points to be agreed at this stage are outlined below.
(a) **Proposed scope.** Does it conform to established standards or regulations (international, national, company)? Is it adequate for possible future development? Are there too many sizes? Do the sizes follow a logical progression?

(b) **Application.** For what applications is the scope suitable or unsuitable? Is the new standard to be applied retrospectively or for future use only?

(c) **Quality.** Is the item/procedure specified in sufficient detail to ensure consistent application?

(d) **Availability.** Can the articles be obtained at the right price, right quantities and at the right time?

(e) **Health and safety.** Are all regulations observed?

Compliance with national and/or international standards will ensure that most of the above points have been considered. The final form of the standard will then emerge to be published for comment, and when approved will be distributed to all who may have occasion to use it.

**F.2.2 Editing:** Most of the early drafts need to be edited to conform to the corporate style, particularly with regard to layout. Illustrations should be used to reduce text. Information from another standard should be cross-referred to rather than repeated from another standard. Repeated information is difficult to keep updated.

**Be brief:** Do not over-elaborate, the aim is to convey information without ambiguity.

**Avoid jargon:** Documents may have to be understood by non-specialists.

**Use illustrations:** Illustrations can be used to minimize text.

**Cross-refer:** Do not repeat information already quoted in another standard.

**Include instructions for use:** These may be quoted once rather than in every document.

**Be precise:** Avoid words such as "etcetera", "whenever possible" or "wherever practicable" "unless specified elsewhere".

**F.2.3 Circulating for Comment:** All interested parties should be consulted about a specification and a consensus obtained before the draft is issued. This may take longer in a large business or if more than one section or department is involved. In a smaller organization it is possible to dispense with a formal structure of committees and working parties. Consensus does not mean everyone unequivocally agrees but that all reasonable arguments are withdrawn.

Draft specifications should be circulated to all interested parties and the comments considered before issuing a second draft.

An accompanying note should be circulated with the draft to explain briefly its aim and to give the reasons why it is being produced. The responders should be asked to quote the relevant clause number, indicate whether the comment is editorial or technical and each comment should be accompanied with a proposal for the changed wording plus a justification for the change. The process of circulating for comment should be repeated until consensus has been reached, then the specification should be submitted for signature to the approved signatories. The signatures make the document "legal" and it is then printed and distributed via the document control system.
F.3 Authorization for Issue: The completed specification should be checked for accuracy and suitability for issue by a person who was not involved in its preparation, but who is conversant with the subject.

The quality management system needs to specify the persons in the organization who are authorized to sign a document as approved prior to release. The authority of specifications should be clear. A document applicable to more than two departments is considered as a business standard and is signed by the managing director.

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![Figure 5: Stages in the preparation of a specification](image)

**Figure 5: Stages in the preparation of a specification**

F.4 Management of Issued Specifications

F.4.1 Primary Identification: Each specification should be given an identifying code, title and issue number. The code should identify the class of subject matter or the objectives of the document, to facilitate classification in a library. It should also permit quick reference and traceability.

F.4.2 Availability and Storage: Copies of the specification should be recorded, stored and controlled so that they are directly available to all authorized users.

Most organizations use and store other organizations' specifications. One approach to the storage of a variety of external specifications is to classify them on receipt, giving them internal codes, so that they can be traced.

F.4.3 Review: All specifications should be reviewed at regular intervals and amended as necessary. The interval between each review should not exceed 5 years.
Figure 6: Interrelationship of Product Documentation
**F.4.4 Change Management and Disposal:** A regularized procedure should be used to issue new documents and amendments. Holders of handbooks and individual documents need to be identified and addressed each time an amendment is made. The instruction has to state clearly whether the document being issued is new, revised or withdrawn, and the name of the holder and the location should be identified. Holders of standards documents should be asked to acknowledge receipt of amendment instructions and should be pursued if they do not. The holder of a standards handbook should similarly record who made an amendment on an amendment record sheet in the front of each volume.

A copy of each issue of the specification should be permanently archived, together with any information concerning modifications. Reference to archived specifications may be necessary at any time in the future, for example, as evidence in disputes and litigation. All obsolete specifications in circulation should be retrieved to prevent their continued use. It may also be necessary to destroy these copies for security reasons. Advance information on changes should be made using the official change channels.

**G Research File and Documentation Supporting Specifications**

The research process supporting the development of a product specification shall be documented in detail and clearly indicate references which support decisions to set limits for parameters and characteristics which define the quality, health, safety and environmental provisions in the standard. Standardization experts should demonstrate updated understanding of the research and technological developments in their field of standardization rather than appearing to arbitrarily fixing parameters in standards. A well-organized and referenced research file creates a crucial baseline from which reviews and product diversification can proceed as well as serving to address any legal claims and product liability issues.

Where this standard is applied to simpler products, or smaller organizations, a suggested method is to consolidate all the technical information into one product specification (as shown in the top left-hand circle in Figure 6) and confidential information into a commercial appendix or file. The consequence is that the specification becomes one or two evolutionary documents rather than the traditional series where the earliest becomes obsolete.

The design verification results and design validation results illustrated in Figure 6 are necessary in order to be able to demonstrate that the final product meets the requirements of the product specification.

**H Typical Standards for Fisheries and Aquaculture**

We are focusing on standards applicable through the value chains, such as:

(a) Responsible fisheries (capture fisheries
(b) Good agricultural practices
(c) Good manufacturing practices
(d) Sustainable fisheries
(e) Certification and conformity assessments
(f) Product specifications
(g) Product market presentations
(g) Traceability standards for fish products

References


_Kwon et al., 2007_


_Future Society and Standards_ (Kwon et al., 2007)

_Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries_ (FAO, 2009)

_Guidelines for the Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries_ (FAO, 2011b)

_Standards and Global Trade: A Voice for Africa_ (Wilson et al., 2003)

3.3.4 Standards and Conformity-Oriented Value Addition in Fisheries and Aquaculture

A Fresh, Frozen and Cured Fish and Aquaculture Products

- Fresh and frozen whole finfish
- Fresh and frozen whole bivalves

B Value Added Fishery Products

B.1 Breaded and battered products (including fried)

1. Shrimp breaded and battered
2. Squid breaded and battered
3. Cuttlefish breaded and battered
4. Octopus breaded
5. Clams breaded
6. Breaded fish fingers
7. Breaded crab cakes

B.2 Pickle, curry, meal kit. etc.,

1. Shrimp prepared products
2. Shrimp pickle
3. Shrimp curry
4. Squid prepared products
5. Cuttlefish prepared products
6. Fish pickle
7. Fish curry
(8) Mussel / clam meat pickle

B.3 Surimi based products
(1) Surimi products (Analogues)

B.4 Freeze dried products
(1) AFD shrimp, AFD shrimp powder
(2) AFD squid
(3) AFD Cuttlefish
(4) AFD Octopus

B.5 Shrimp IQF products and Tray/pouch packs
(1) Shrimp IQF raw
(2) Shrimp IQF blanched / cooked
(3) Shrimp in tray / pouch packs
(4) Shrimp IQF headon
(5) Shrimp nobashi

B.6 Squid IQF and its products and Tray/pouch packs
(1) Squid IQF raw
(2) Squid IQF blanched cooked
(3) Squid tube / rings

B.7 Cuttlefish IQF / IF and its products and Tray/pouch packs
(1) Cuttlefish IQF/IF raw
(2) Cuttlefish IQF blanched / cooked
(3) Cuttlefish and its products in tray/pouch packs

B.8 Octopus IQF / IF and its products
(1) Octopus IQF raw / whole cleaned
(2) IQF / IF Octopus blanched / cooked

B.9 Frozen Fish fillets / loins / steaks, chunks, portions etc. in tray / vacuum pack or in tray / pouches (except tuna)

B.10 Lobster whole cooked / half cut IQF / packed in tray/pouches

B.11 Stuffed crab, Raw crabmeat / soft shell crab

B.12 Tuna products and precooked loins and other such prepared products.
(1) Frozen yellow fin tuna (sashimi grade)
(2) Frozen big eye tuna (sashimi grade)
(3) Frozen tuna fillet and other tuna meat (whether or not minced)
(4) Precooked loins and other such prepared products

B.13 Canned seafood and canned / retort pouch products.
(1) Canned seafood
(2) Retort pouch seafood products

C Standards for Grades of Fishery Products

(1) Grades of Whole or Dressed Fish
   Whole or Dressed Fish
   Frozen Headless Dressed Whiting
(2) Grades of Fish Steaks

Frozen Halibut Steaks
Frozen Salmon Steaks

(3) Grades of Fish Fillets

Fish Fillets
Cod Fillets
Flounder & Sole Fillets
Haddock Fillets
Ocean and Pacific Perch Fillets

(4) Grades of Frozen Fish Blocks and Products Made Therefrom

Frozen Fish Fillet Blocks
Frozen Minced Fish Blocks
Frozen Raw Fish Portions
Frozen Raw Breaded Fish Sticks
Frozen Raw Breaded Fish Portions
Frozen Fried Fish Sticks
Frozen Fried Fish Portions

(5) Grades of Crustacean Shellfish

Fresh and Frozen Shrimp
Frozen Raw Breaded Shrimp

(6) Grades of Molluscan Shellfish

Frozen Raw Scallops
Frozen Raw Breaded Scallops and Frozen Fried Scallops

(7) Freshwater Catfish and Products made Therefrom

Catfish

References

Barriers to Compliance with International HACCP Regulations: A Whole Chain Approach to the National Fisheries Food Safety Management System in Sierra Leone (Sheriff, 2013)

Fish and Fishery Products Hazards and Controls Guidance (FDA, 2011b)

Handbook of Seafood and Seafood Products Analysis (Nollet et al., 2010)

3.3.5 Sustainability Practices in Fisheries Resource Management

A. In the standardization field, policy objectives are placed at the highest hierarchy and should inform the targets set by standards and conformity assessment. Owing to the dynamisms and imperatives of trade, it is recognized that in many situations policies are formulated as a response to the exigent state of play. Indubitably, the exigent state of play that informed the eco-labelling standards and certification regimes operating in Africa derived their
mandate exogenously and are predominantly oriented towards satisfying the requirements formulated by marketing and retail chains in Europe and North America. In their original formulation, these standards and schemes were intended to satisfy European and North American consumers that the products, predominantly food were:

(a) Safe and healthy

(b) Produced in an environmentally sustainable manner which secured future supplies

B. In response to food safety scares of the 1990s, many governments in North America and Europe established mandatory requirements for firms to introduce Hazard Analysis and Critical Control Point (HACCP) food safety management systems (Washington et al., 2011). Private standards schemes in fisheries and aquaculture have emerged in areas where there is a perception that public regulatory frameworks are failing to achieve desired outcomes, such as sustainability and responsible fisheries management, or to ensure food safety, quality and environmental sustainability in the growing aquaculture industry. The two main types of private standards which affect fish trade relate to:

(a) “Ecolabels” which focus on sustainability of fish stocks and are designed to incentivize responsible fisheries practices and to influence the procurement policies of large retailers and brand owners, as well as the purchasing decisions of consumers.

(b) Food safety and quality fish and seafood private standards which seek to offer guarantees related to quality, safety, environmental impacts, social responsibility, traceability, and transparency of production processes.

C. UNEP-TDIE (2009) recognizes that much of the interest in certification as a market-based initiative stems from the fact that certified products can be traded globally, and the value of international seafood trade has been growing rapidly in recent years. Resulting improvements in fisheries management from certification could result not just in the environmental benefits which are the main motivation for those establishing environmental certification schemes, but also potentially in significant contributions to both poverty alleviation and food security in developing countries through guaranteeing the long-term availability of fish stocks, increased long-term value-added and improved trade. Certification and ecolabelling thus have the potential to generate environmental, social, and economic benefits (UNEP-TDIE, 2009).

D. The concept of an African Ecolabelling Mechanism (AEM) was supported by UNEP under the African 10 Year Framework Programme (10YFP) on Sustainable Consumption and Production. The relevance of the AEM to African countries were highlighted in the background assessment report (Janisch, 2007) as follows:

1. **Environmental requirements**: Increasingly being used to define commercial relationships between producers and buyers by way of eco-labels.

2. **Market competitiveness**: Make African products competitive in destination markets and improve environmental and social aspects of production.

3. **Rationalize and unify eco-labels**: Reduce the need for individual green claims and avoid ‘label fatigue’ and ‘label clutter’.

4. **Locally relevant certification process with internationally-recognised standards**: Facilitate exports market for high-value sectors.

5. **Raise awareness on mitigating environmental impact in Africa**.
Communicate the message of African sustainability: Communicate the accurate message of sustainability that accounts for the African circumstances.

Emphasise that an African Eco-label assures genuine benefits: In particular that the label is part of providing institutional, environmental, social and economic wellbeing (poverty reduction) in Africa on a sustainable basis as opposed to existing eco-labels which offer partial solutions.

Expanding Africa’s market access: Evidence is strong that eco-labels have a role to play in expanding Africa’s market access and assuring customers that current issues of concern such as environmental degradation and greenhouse gas emissions are mitigated by compliance with the African eco-label.

E. These objectives helped to shape the African Ecolabelling Standards (ARS/AES). The African Eco-Labelling Mechanism (AEM) was formally established in 2010 to coordinate the development of sustainability standards and conformity assessment of the same with a view to issuing Eco-Labelling Certification for goods and services complying with these standards. A quick-win strategy was to develop a benchmarking scheme with a view to creating a mutual recognition arrangement for the various eco-labelling and sustainability schemes operating in Africa. While in the course of developing these standards there were strong voices arguing for the direct adoption of existing eco-labelling standards which already had international visibility and presence, or completely abandoning the African initiative in favour of giving recognition to existing schemes.

References

Ecolabelling and Certification in Capture Fisheries and Aquaculture (NAAS, 2012)

Ecolabelling and Fisheries Management (Gardiner et al., 2004)

Eco-Labelling and Sustainable Fisheries (Deere, 1999)

Eco-Label Conveys Reliable Information on Fish Stock Health to Seafood Consumers (Gutiérrez et al., 2012)

Fisheries and Aquaculture Certification: Implications for Southeast Asia (Wilkings, 2012)

Guidelines for the Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries (FAO, 2011b)

Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries (FAO, 2009)

Product Certification and Ecolabelling for Fisheries Sustainability (Wessells et al., 2001)

Private Standards and Certification in Fisheries and Aquaculture: Current Practice and Emerging Issues (Washington et al., 2011)

Is Certification a Viable Option for Small Producer Fish Farmers in the Global South? Insights from Vietnam (Marschke et al., 2014)
3.3.6 Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa

The overall purpose of the Policy Framework and Reform Strategy for Fisheries and Aquaculture is to facilitate transformation of Africa’s fisheries and aquaculture for food, livelihoods and wealth. Accordingly, the Policy Framework and Reform Strategy is intended to:

1. Elaborate and make explicit essential guiding principles for good governance of Africa’s fisheries for increased coherence and coordination of the sector.
2. Assist AU Member States, RECs and RFBs to develop realistic fisheries and aquaculture policies by suggesting standards and best practices to the sector’s benefits to AU member states, in terms of food security, employment and income.
3. Help facilitate regional collaboration and integration in shared fisheries and aquaculture resources management.
4. Provide appropriate guidance on how to implement reforms for fisheries and aquaculture development.
5. Facilitate ratification and/or adoption of appropriate provisions in international fisheries management instruments.
6. Facilitate advocacy for increased investment in the fisheries and aquaculture sector.

The key references to sustainability are those which address (i) Legal institutional framework; (ii) Social wellbeing; (iii) Economic and livelihood sustainability; and (iv) Environmental sustainability.

Institutional Reforms

The PFRS recognizes that the regulatory and governance framework is characterized as ineffective and of need for reform in many countries. The PFRS seeks to establish national and sub-national governance and institutional arrangements that ensure that the societal contribution generated by Africa’s sectors have the greatest impacts at the most appropriate level.

Social Aspect

The PFRS envisions Member States moving from open access fisheries to user rights-based fisheries as a key element in increasing societal benefits from the sector while ensuring ecological sustainability of the resource. Member States are invited to define and design various suites of user rights-based fisheries management that take into account the geographical scope, socio-cultural context and nature of the fisheries, and minimize negative impacts to vulnerable groups and ecosystems.

Economic and Livelihood Sustainability

The PFRS recognizes the abundance in Africa of rich and diverse fisheries resources, both marine and inland which together generate significant economic benefits to the continent in terms of revenues, food and livelihoods. Part of the policy objectives of the PFRS includes the following economic and livelihood sustainability aspects:

(i) Development of sustainable small-scale fisheries by improving and strengthening the contribution of small-scale fisheries to poverty alleviation, food and nutrition security and socio-economic benefits of fishing communities and beyond.
Realizing the full potential of the aquaculture sector to generate wealth, social benefits and contribute to the development of the African economy by jumpstarting market-led sustainable development strategies

Promoting responsible and equitable fish trade and marketing by significantly harnessing the benefits of Africa’s fisheries and aquaculture endowments through accelerated trade and marketing

Environmental Sustainability
The PFRS expresses concern on the current unsustainable exploitation of fisheries resources, noting that many resources are in a critical state for a number of reasons, including overcapacity and effort, uncontrolled use of illegal practices, over-exploitation and environmental degradation including mechanized trawling in inshore and protected areas and pollution. The PFRS also notes that fisheries policies are expansionary with emphasis on tonnage landed rather than extracting higher values by processing and value addition. Coastal resources are under growing fishing pressure by both mechanized trawling and small-scale fisheries operators. Thus the PFRS advocates the adoption of policies and measures which promote conservation and sustainable resource use.

Reference
Electronic or printed copies of the following documents to be distributed:

Regional Assessment of Fisheries Issues, Challenges and Opportunities for Eastern Africa Region: Toward the Formulation of the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (Mwima, 2012)

The Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa: Creating a Conducive and Enabling Environment for the Fish Sector to Create Equitable, Social and Economic Development in Africa (AUC-NEPAD, 2014)


3.3.7 Introduction to ARS/AES 02:2014, Fisheries — Sustainability and Eco-Labelling — Requirements

This African standard originated from the realization that existing eco-labelling schemes and standards operating in Africa and across the world had specific biases with respect to the sustainability pillars. The current standard, ARS/AES 2:2014 takes into account Africa’s circumstances with the aim of ensuring that fisheries and aquaculture operations translate to genuine benefits for African operators and host communities rather than only satisfying the perceptions of foreign customers. It is important to recognize that ARS/AES 2 was developed in parallel with the PFRS and therefore some aspects of the PFRS may not be aligned. Below are the highlights of ARS/AES 2:2014.

ARS/AES 2 employs eight key principles which together with criteria and indicators address the sustainability perspectives:

(a) Principle 1: Legal compliance
(b) Principle 2: Respect human rights
(c) Principle 3: Respect labour rights
(d) Principle 4: Maintain fisheries resources and rebuild depleted fish stocks
(e) Principle 5: Maintain ecosystems integrity
(f) Principle 6: Contribute to the mitigation and adaptation to the detrimental effects of climate change.
(g) Principle 7: Responsible waste management
(h) Principle 8: Efficient use of resources

These eight (8) principles are detailed within the following outline:

(a) Governance and policy
   (i) Legal compliance
   (ii) Management systems
   (iii) Incentives for sustainable fishing
   (iv) Fishing methods and gear
   (v) Information for research
   (vi) Customary rights

(b) Social aspect
   (i) Universal Declaration of Human Rights
   (ii) Labour rights

(c) Fisheries resources
   (i) Fish stocks status
   (ii) Reference point
   (iii) Stock rebuilding
   (iv) Harvest strategy
   (v) Harvest control rules and tools

(d) Ecosystem approach
   (i) Fishing operations
   (ii) Retained species
   (iii) Bycatch species
   (iv) Endangered, threatened and protected (ETP) species
   (v) Habitats
   (vi) Ecosystem

(e) Climate change aspect
   (i) Climate change mitigation and adaptation
   (ii) Reduction of ozone layer depleting compounds

(f) Environmental Management

(g) Waste Management

(h) Resource Management
   (i) Energy Management

The standard is structured to support large scale as well as small-scale fisheries. The standard was optimized for inland and marine capture fisheries operations.

Reference
A printed or electronic copy of ARS/AES 02:2014, Fisheries — Sustainability and eco-labelling — Requirements to be provided.
3.3.8 Public and Private Standardization Systems for Fisheries and Effective Articulation of National Position and Interests

A. Introduction to Public and Private Standards

Public standards are understood as those established by government authority and embedded in laws and regulations (Bain et al., 2013). Private standards are often referred to as voluntary because compliance is enacted through the market and not via public authority. In addition, where market signals or drivers do not exist, or are weak, companies may choose to use private standards to protect their reputation or show to the public that they are a socially and/or environmentally responsible business. There may also be overlap between the two where public regulations incorporate private standards and where private standards incorporate public standards (e.g. public food safety standards are often incorporated into private food safety certification systems, such as ISO 22000).

Formal standards are tied increasingly to a hierarchical monitoring and compliance infrastructure that includes standard setting, certification (often through third-party certifiers), and accreditation, the so-called tripartite standards regime (TSR) (Bain et al., 2013). With the expansion in standards and standard-makers, third-party certifiers (TPC) emerged to assess, evaluate and certify safety and quality claims against a particular set of standards and compliance procedures. Similarly, as the number of certifiers and certifications expanded, accreditation organizations were developed to standardize TPC and regulate their practices. This rise in the ‘control of control’ is intended to promote self-regulation in the management of risk as well as to help stabilize networks through the creation of trust and legitimacy.

B. The Rise of Private Standards

Within the agri-food sector, standards are part of the institutional infrastructure that coordinates the production and distribution of agricultural products. Until the 1990s, bulk commodities, such as grain, cotton and cocoa, dominated world trade. To facilitate the creation of such commodity markets, reduce transaction costs and increase market efficiency public standards were developed. Here the focus of attention was on product standards (e.g. pesticide residues, colour, moisture content), which could easily be measured and would ensure uniformity and consistency (Ransom, 2007).

In the recent past, a confluence of forces have challenged this paradigm, creating new opportunities for non-state actors, including food retailers, business associations, non-governmental organizations, and multi-stakeholder groups, to develop standards and use them, together with labels and certification systems, to accomplish a range of objectives. Some of the key drivers of these developments include

(i) greater attention consumers put on food safety and quality,
(ii) the expansion of global value chains in the wake of the establishment of the World Trade Organization (WTO)
(iii) the rise of neo-liberal economic and social policies
(iv) activist concerns about corporate social responsibility within the context of globalization
(v) a shift from public to more private market governance; partly due to lack of technical expertise and lack in financial resources to deal with ever more complex standards issues on public level.
Proponents of private standards argue that within this changing economic and political climate the nation state alone was no longer capable – or willing – to regulate the behaviour of businesses.

As the importance and promulgation of standards has increased so has scholarly interest in who develops and controls standards and for what purpose. Influenced by frameworks such as global value chain analysis (GVCA), scholars argue that power within the market has shifted from producers and manufacturers to retailers. Mammoth food retailers have benefited from the changes described above and are using their oligarchic position in the marketplace, together with their ability to source products from around the globe, to establish themselves as the primary gatekeeper to consumer markets.

Researchers utilizing a GVCA framework have been particularly concerned with understanding the distributional effects of retailer-led standards and their implications for power and inequality, especially for small-scale producers in developing countries and to a lesser degree farm workers and women. Here, a focus on governance is viewed as valuable for revealing the social relations inherent in the production of commodities. The concept of governance focuses our attention on understanding the tools, techniques and activities, such as standards and audits, that food retailers utilize to influence and coordinate production and consumption within the value chain. For example, retailers use standards to shape the division of labour within the agri-food system, which has important implications for how financial, material, and human resources, as well as costs, risks and rewards, are distributed.

NGOs have also emerged as important actors in setting standards and shaping the governance of global value chains. Media and activist exposés have drawn public attention to examples of negligent behaviour, such as the use of child labour, by suppliers to the major retailers. Recognizing that the brand name and corporate reputation of retailers is vulnerable to such negative campaigns, NGOs have pressured – or worked with – retailers to establish standards and certification systems designed to minimize the threat of liability and scandal for retailers while enhancing the social and environmental performance of actors throughout the value chain. In addition, NGOs, have sought to challenge what they perceive as the destructive environmental and social production and consumption practices inherent within the conventional agri-food market by developing alternative systems of standards and certification. Perhaps best known is the example of fair trade, which through its social and environmental standards seeks to transform inequitable North–South relations, empower producers, and encourage ethical consumption.

Agri-food scholars have also been influenced by conventions theory and the economy of qualities approach. One of the central ideas here is that competition within the food sector has shifted from a focus on price and quantity to one that emphasizes notions of quality. Retailers or NGOs are concerned with creating standards that can communicate information to the consumer about particular attributes, such as safety or production process, embedded in a product. For example, standards can be used to communicate if a banana is organic, something that a consumer cannot determine objectively for themselves. A conventions approach is focused on understanding the role of norms and values in determining how particular assessments of quality are made as well as the rules, procedures and organizational forms that coordinate exchange relations. Through an analysis of conventions, researchers can appreciate ‘the constellations of ideas, practices, and institutions’ that comprise and guide ‘relations of production, exchange, and consumption’.

In sum, private standards are no longer simply about reducing transaction costs and increasing market efficiency. Instead, private standards have emerged as tools used strategically by both businesses and NGOs to achieve a range of objectives. These objectives include access to new markets, coordination of operations, quality and safety assurances to consumers, and the establishment of new brands, niche products and markets.
One recent area of enquiry has been to analyse the discursive and organizational mechanisms through which private standards and standard-makers achieve and maintain legitimacy. Public standards derive their authority and legitimacy from the state and the democratic decision-making process. The issue for these scholars is to understand how standard-makers convince potential standard-users to view their standards as credible and trustworthy. The legitimacy of governance mechanisms is especially relevant within the context of global trade where rules and regulations are largely voluntary and authorities policing non-compliance are largely absent. It is argued that the use of public, private or public–private hybrid TPC organizations has become de rigueur for enhancing the trust and legitimacy of claim-making related to standards, largely due to its perception as a compliance tool that is transparent, independent and objective.

Proponents assert that standards are grounded in techno-scientific practices, such as value neutrality, consistency, and transparency, as well as the objectivity of independent third-party certifiers. Influenced by science studies, especially actor-network theory, agri-food scholars of standards have sought to challenge this view. Drawing on understandings of how techno-scientific development works in practice, these scholars argue that standards are not simply an objective means to address technical compatibility issues. Rather, standards and TPC are socially mediated and are ‘examples of disciplinary power’. Standards are not absolute, universalist tools imposed on local actors and sites, instead the ongoing work of standardizing – making people and things commensurable and calculable – is a process of negotiation, revision and strategic design. From this perspective, standards inevitably embody the interests, values, and asymmetrical power relations of different actors involved in the process.

One of the useful insights that have emerged is that science, politics and ethics are not mutually exclusive. Standards are normative because the very process of creating classifications and categories involves choices over what or who to include and exclude. Standards are normative because they not only define ‘what (who) is good and what is bad’, but also discipline ‘those people and things that do not conform to the accepted definitions of good and bad’. Similarly, standards are norms through ‘which people, objects or actions (including government regulation itself) can be judged and compared’. Standards have political and moral significance because they order relationships among people by defining their rights and their exposure to the rights of others. Thus, we can understand techno-scientific practices, such as standards, as ‘politics by other means’, which play a role in (re)producing social structures and informing issues related to ethics, social justice and democracy.

C. Typology of Standards

Four distinctions of standards can be made as follows (ITC, 2011):

(i) Public nonmarket-based standards collaboration of intergovernmental organizations or cooperation among domestic regulators (e.g., ILO core labour standards)

(ii) Public market-based standards result from market-like competition between public regulatory agencies of individual states or regional and multilateral standard setting bodies (e.g., Codex standards, ARSO).

(iii) Non-market-based private regulation by private bodies dominating one or several sectors (e.g., ISO and IEC standards).

(iv) Market based private regulation by firms or any other body, such as NGOs, research institutes, multi-stakeholder coalitions/roundtables and industry associations (e.g., Fairtrade, FSC, MSC).
D. The Basics in Public Standards Setting

While tariffs and quotas have been reduced significantly since the creation of the WTO the rise in public and private standards is one element contributing to the growing amount of non-tariff measures. So as to counter a trade impeding impact of non-tariff measures, a number of agreements were developed. Key agreements include (ITC, 2011):

- **The Sanitary and Phytosanitary (SPS) Agreement**: this agreement lays out the basic rules for food safety and animal and plant health standards. Countries are allowed to develop their own standards given that these standards are based on science, and are only applied to the extent necessary to protect human, animal or plant life or health. Also, they should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail. Importantly, member countries are encouraged to use international standards, guidelines and recommendations where they exist. This gives international standards setting bodies such as the Codex Alimentarius de facto mandatory status.

- **The Technical Barriers to Trade (TBT) Agreement**: this agreement aims to ensure that regulations, standards, labelling, customs forms, testing, certification procedures and other technical aspects do not create unnecessary obstacles to trade. Members still have the right to implement measures to achieve legitimate policy objectives, such as the protection of human health and safety, or the environment.

- **The Trade Related Intellectual Property Rights (TRIPS) Agreement**: this agreement introduced global minimum standards for protecting and enforcing intellectual property rights in international trade. It requires similar intellectual property regimes from all signatory nations. WTO members are obliged to adapt their laws to the minimum standards of protection and to comply with detailed obligations for the enforcement of intellectual property rights.

A key area regulated by public standards is food safety and quality and environmental protection. Food safety constitutes a public good aiming to reduce risks to human health related to food consumption. It is generally seen as a responsibility of the state as markets alone will not always provide the socially desirable level of food safety, although companies have several legal and market incentives to provide effective food safety control. Public authorities need to correct this market failure resulting in information asymmetries and consumption externalities.

This is particularly relevant for a good’s *experience* attributes, where consumers can evaluate characteristics such as quality and utility only upon consumption and *credence* attributes, which are impossible for a consumer to ascertain even after consumption or utilization of a good. In these cases, standards and certifications facilitate the functioning of the market. They define the specifications of the product and provide consumers with a guarantee concerning the product’s characteristics, such as the process of production, ingredients used or its utility impact. Certifications and labels reduce the information asymmetry between the seller and the buyer. For *search* attributes, market incentives mostly are strong enough to provide the desirable amount of food quality, because a consumer can evaluate the product before buying and consuming it.

A number of governments started requesting preventive systems of food safety control, notably the HACCP standard system. HACCP is a preventive system that allows identifying potential food safety hazards during the food production and preparation process. In combination with product traceability systems, this allows for the enforcement through inspection of production
records rather than finished product inspection. This shift from regulating the product to regulating the production processes makes regular product inspection and firm plant visits redundant, which in turn reduces costs. Public authorities’ controls changed from product inspection to control whether appropriate systems are in place and function correctly. Authorities can rely on reports and work more efficiently, which results in more controls being carried out. This delegation of quality control to the sellers constitutes a major shift in the role of public authorities.

Public authorities not only set minimum requirements for food safety but also define minimum quality standards. While the majority of standards developed by governments are mandatory and also include grades, weights and measures mainly for agricultural commodities, governments are also involved in the development of voluntary standards. For example, a number of governments participate in the development of the International Organization for Standardization (ISO) standards.

In the case of the organic standards, governments took a key role in developing national or regional standards. This also provided for a harmonized definition of the term ‘organic’ and provided a legal framework for accrediting certification bodies. A national authority implements this legal framework on national level. Goods to be imported into the EU as organic must meet organic production and procedural standards as defined in EC regulation. Production, processing, documentation, inspection and certification need to be of equivalent standards to EU Regulation, meaning that regulation in the exporting country does not need to be identical, but procedure and actions need to be in place demonstrating that the legislator targets of the Regulation have been met. This allows exporting countries to develop their own organic production and certification systems. Most policy recommendations to governments are provided by voluntary accreditation schemes, with the International Federation of Organic Agriculture Movements (IFOAM) being the most influential.

In developing an EU recognized national certification system Chile improved market access for its organic producers to the EU and reduced transaction costs. Exporters no longer need to request a special import permit to import their organic products into the EU. National standards seem to lead to ‘superior export performance’. From an economic point of view, incentive based voluntary standards can be more efficient than mandatory regulation, generating lower compliance and transaction costs. This emphasizes the importance of the development of national voluntary standards and the potential impact on trade that harmonized standards could have. However, research generated mixed results as to the efficiency of voluntary standards in achieving socially and environmentally desirable outcomes (ITC, 2011).

E. Developing Private Standards

Private standards are as standards developed by private entities such as companies, non-governmental organizations or multi-stakeholder coalitions (ITC, 2011). These standards may vary in scope, ownership and objectives. Objectives range from environmental conservation, ensuring food safety, protection of social and human rights, to promoting good agricultural and manufacturing practices. Private standards can be numerical standards defining required characteristics of products such as contaminant limits or maximum residue limits, or process standards prescribing the production processes (including performance objectives) or pertaining to management system and documentation requirements.

Private standards certification schemes comprise the private standard itself and also covers the standard setting procedures, adoption and implementation practices, and conformity assessment and enforcement. Drivers for the development of private standards are numerous. They include:
(i) Increased consumer awareness of the impact of food on health,

(ii) Food quality and due diligence requirements assigned to food chain operators,

(iii) Growing societal and consumer demand for more responsibly produced goods and information about the production and processing conditions of products. The latter resulted in an increasing number of consumers and companies basing purchasing decisions on ethical criteria and a notion of corporate responsibility.

Particularly in the food sector, firms use private standards to differentiate from competitors, to build brand recognition and consumer loyalty, and to define and occupy market niches. This leads to companies establishing standards beyond public requirements for food safety. Given the high transaction costs for individual firms of establishing their own standard in supply chains, firms started to pressure industry organizations and established coalitions and consortia (national and international) for the development of collective standards. Examples include the Global Food Safety Initiative (GFSI), Global GAP, or the British Retail Consortium (BRC).

In some cases companies exceed public standards aiming (i) to build influence on private standard setting in case public authorities decide to further develop public standards and (ii) to be able to select a private standard of their choice that minimizes their costs in complying with public standards. In a survey of the Committee on Sanitary and Phytosanitary Measures of the WTO, over two thirds of respondents replied that ‘at least some of the requirements of private standards exceed those of the relevant international standards and official import requirements’. These include more detailed operational procedures, lower MRLs, among others. But pre-emptive strategies also have other reasons such as being a measure to pre-empt additional public regulation.

In addition, standards are a tool to more efficiently manage geographically wide spread supply chains by standardizing product requirements and reducing transaction costs. Companies also use standards to ensure a quantitatively and qualitatively consistent supply and build their own brand specific product attributes. Especially credence attributes of products relating to production and handling of products are guaranteed through the use of standards and certification. In addition to these standards an ‘intense dynamic has emerged around initiatives dealing with social, environmental, and sustainability concerns - pushed by international agreements and civil society pressures - giving rise to a complex and evolving landscape of voluntary standard initiatives in agricultural and agrifood markets. While standards relating to ethical concerns, sustainability issues or product quality, in most cases can be considered business-to-consumers (B2C) standards (with some using a label), food safety, traceability and GAP standards, usually are business-to-business (B2B) standards.

By implementing private standards some companies claim that their product safety is above that required by public authorities. This entails the danger of eroding public confidence in public food safety authorities. Additionally, public confidence in national food safety authorities is in the interest of all stakeholders in the food industry. According to the FAO/WHO Codex Alimentarius Commission reducing minimum residue levels below the official amount, as done by some corporations through additional private standards, does not provide additional protection of public health (ITC, 2011). The same applies to restricting the number of residues where it has not been scientifically proven that multiple residues might have a synergistic toxicological effect. Therefore, the level of detail of private food standards needs to be scientifically proven, for example when it comes to exceeding minimum residue levels. Private standards thus risk undermining the authority of the texts adopted by the FAO/WHO Codex Alimentarius Commission (CAC). Standards going beyond CAC mainly address traceability, documentation and testing requirements.
This development also has challenging implications for producers and exporters. Private standards exceeding public requirements are more difficult to comply with. Private food standards tend to impose the same requirements to suppliers all over the world where these face very different preconditions in meeting them. Aiming to alleviate this problem, CAC standards, for example, focus on the relevant factors to be taken into account and the results to be achieved. So, they prescribe the ‘what’ and ‘why’, but do not detail the ‘how’. The reason for this is the recognition of the very different circumstances and realities in member countries. The ‘why’, the actions, procedures and provisions to be put in place are translated by national governments, producers or food business associations and individual food businesses.

Preventive food safety management resulted in the development of process standards and codes of conduct instead of end-product checks. It is argued that private food quality systems are often more flexible and agile in responding to consumer needs than national or international public standards. Nevertheless, there remains a trade-off between an efficient food quality control system operated by a business and the most efficient food quality outcome for society given the risks and transaction costs associated with expensive supply chains (e.g. traceability, or separation for composite products).

Finally, the question whether the SPS Agreement is applicable to private standards has not been settled conclusively. In a nutshell, some countries argue that Article 13 of the SPS Agreement obliges governments to ensure that product certification and labelling standards developed by private entities are consistent with WTO rules. Article 13 requires governments to ‘take such reasonable measures as may be available to them to ensure that nongovernmental entities within their territories [...] comply with the relevant provisions of this Agreement’. Conversely, others argue that Article 13 is not legally binding for private certification schemes as they do not qualify as non-governmental entities. The question whether private standards could be considered as ‘non-governmental entities’ as defined in the WTO SPS Agreement remains contested. The SPS Agreement has not been effective in addressing private standards, mainly regarding two issues: (i) legal issues that relate to the multilateral agreement structure of the General Agreement on Tariffs and Trade (GATT), SPS, and TBT Agreements and (ii) practical issues over the implications of private standards.

As competition in international food markets is shifting from price based to quality based, private food standards are expected to become more important and widespread. Although firm incentives to carry out control of credence attributes are theoretically small, the contrary development is evident and retailers and food firms are found to compete on the basis of food safety and quality, increasing the number of private standards. This inevitably leads to the discussion about the legitimacy of private standards and the question what makes a legitimate standard. Legitimacy becomes particularly relevant when discussing overlaps in private and public standard setting and in cases where private standards substitute public standards and assume regulatory functions.

F. The Legitimacy of Private Standards

Private standards are governance mechanisms beyond the state that claim legitimacy, although these may not be elected mandate holders and do not have democratic internal structures. But without a certain extent of legitimacy, standards are not accepted as regulatory instruments. An independent set of indicators to measure the relative legitimacy of specific standards: the influence of value chain stakeholders on the standards-setting process, the extent to which the standard-setting process is transparent, the inclusion of developing country interests, and the scientific foundation on which they are based. On this basis, the authors cite the lack of representation of smaller firms and marginalized groups as a challenge to the legitimacy of some standards. A key concern surrounding the legitimacy of the standards is whether they are ‘science-based’, questioning if private food safety standards do in fact provide appreciably higher levels of protection against food safety hazards than those under the purview of the SPS.
Agreement. Finally, the credibility of the standard setters is a precondition for private standards to obtain legitimacy. But credibility alone does not guarantee legitimacy.

The different notions of legitimacy revolve around the three concepts of transparency, inclusiveness and accountability and the different stages of (i) standards setting, (ii) standard implementation and the certification process, (iii) standard monitoring, and (iv) the impacts of standards. The key elements according to which these stages are scrutinized include: the assurance of a transparent process, the inclusion of diverse interests (inclusiveness), the scientific foundation of requirements, and the accountability of standard organizations. The concepts of legitimacy tend to focus on one or two stages that are analyzed according to one or several elements of legitimacy. It is important to note that concepts such as accountability, transparency and inclusiveness are overlapping as for one of them to function it requires that the other two be equally respected. For example, to achieve full accountability organizations need to be transparent; and inclusiveness is not very useful if you are not at the same time accountable to the stakeholders you are including. Figure 18 provides an overview of the key elements of legitimacy.

In summary, it is evident that a number of approaches co-exist aiming to define what makes a legitimate standard. It is important that the discussion of the legitimacy of private standards and the different elements constituting standards’ legitimacy be kept in mind, while looking at the complementarities, overlaps and conflicts of private and public standards. Legitimacy of private standards is particularly critical when private standards substitute public standards and assume regulatory functions. The same applies to cases where private standards are referenced in public norms.

The ways in which public authorities engage with private standards can decisively influence the legitimacy of private standards, e.g. through their simple use of a standard. Governments’ behavior can go from facilitating national stakeholder dialogue on private standards, through public authorities incentivizing organizations to adhere to private standards, to public authorities incorporating private standards in statutes, regulations, permits or international agreements. These governmental actions can potentially work towards public and private standards’ harmonization, complementarity or substitution.

**Figure 7: Elements of legitimacy (ITC, 2011)**

**G. Effective Articulation of National Position and Interests in Standardization**

Effective articulation of national position and interests in standardization should be informed not only on the scientific facts which should be indisputable, but also the reality of the existing trade-political environment and as well as emerging issues. The implementation of private food
standards is likely to become even more widespread in terms of the types of markets to which they apply, the number of countries where use of 3rd party certification systems is important and the product groups affected. This underlines the need for private standard setters and governmental authorities to better understand the impact of private standards and to take measures to optimise the benefits of private standard certification and reduce difficulties that they pose, particularly to developing countries. Transparency, on the part of industry and industry coalitions, in the setting and implementation of private food standards becomes increasingly important. Other considerations that could guide discussions on approaches for moving forward to a better understanding of the issues and a shared vision of the role of private food standards in the overall architecture of food safety regulation include the following (FAO, 2010):

(1) Concerned national institutions should ensure that they are well informed of the situation in their countries concerning the use and impact of private standards and can report on these to relevant international organizations.

(2) Engagement between private standard setting bodies and concerned international organizations could contribute to resolving some of the concerns of developing countries. However, it must be understood that constructive dialogue depends on all parties having access to relevant information.

(3) The ability of countries to **implement** Codex standards and guidelines would greatly enhance their ability to comply with private food standard requirements. Countries should consider making better use of Regional Codex Coordinating Committees for regular reporting on actions taken to implement Codex standards in their national context.

(4) Stakeholder input into the development and review of private standards contributes to promoting their feasibility in each national context. Member countries and private standard setters should consider whether national technical working groups might be an effective means of providing developing country input into the processes of reviewing and revising private standard schemes.

(5) Member organizations of the Standards and Trade Development Facility (STDF) and the STDF secretariat might consider increased emphasis on identifying and promoting best practices in designing and delivering technical assistance aimed at enabling food chain operators in developing countries to implement effective programmes of food safety management.

(6) The ability of developing countries to demonstrate equivalence of alternative food safety management measures could contribute to overcoming the challenges posed by overly prescriptive private standards. Donor agencies and development partners should consider increasing their support for building the scientific and technical capacities in developing countries that would facilitate such approaches.

(7) The use of microbiological criteria may become increasingly important in both official and private food safety standards. Member countries should be aware of the potential relevance of new work proposed by the Codex Committee on Food Hygiene concerning the revision of the Codex “Principles for the development and application of microbiological criteria” to their expressed concerns about the stringency of private food standards.
A. Introduction

Trade within national jurisdictions and across borders is increasingly affected by the proliferation of standards and technical regulations with increased regulatory intensity being particularly noticeable in the food and agricultural sectors covering cereals; fish, crustaceans and other aquatic vertebrates; edible preparations of meat, fish and crustaceans; edible vegetables, roots and tubers; prepared vegetables, fruit, nuts and other plant parts; and prepared cereals and flours (Sheldon, 2013). The proliferation of standards and technical regulations in both the food and agricultural sectors is typically regarded as the response of policymakers to consumer demands for improved product safety, increased environmental protection, and greater product information. Standards and technical regulations “have as their prima facie objective the correction of market inefficiencies stemming from regional, national, transnational, or global externalities associated with the production, distribution, and consumption of these products.

Standards in the food and agricultural sector can be classified under two broad categories: (i) provision of public goods such as control of pesticide use in agricultural production; and (ii) reduction of transactions costs associated with information asymmetries between producers and consumers concerning food product characteristics, e.g., the extent of pesticide residues in a product which consumers are unable to ascertain either before or after its consumption. While the theory of optimal intervention prescribes that market distortions should be targeted at source, there is also acknowledgement that they may also provide protection for domestic producers and are, therefore, subject to “regulatory capture” (Sheldon, 2013). Given the potential for standards and technical regulations to distort international trade, a key outcome of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994 was the securing of multilateral disciplines on their use through the World Trade Organization’s (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), and the Agreement on Technical Barriers to Trade (TBT). The objective of these agreements is to ensure that standards and technical regulations, while potentially meeting legitimate economic objectives, are not disguised restrictions on international trade.

Sheldon (2013) reports that there has been considerable discussion of the problems of regulatory compliance faced by developing countries in accessing developed country markets, given the latter typically have higher levels of regulatory intensity than the former. Testing the hypothesis of “standards as barriers” has been a dominant feature of the limited amount of
empirical research on the impact of food safety regulations on trade flows of specific food and agricultural commodities. A common finding of these empirical studies is that more stringent standards imposed by developed countries act as barriers to trade.

B. Basic Definitions under WTO SPS and TBT Agreements

Certification system: the set of rules for executing of works on certification, its participants and rules for operation of the certification system as a whole.

Standard: a document establishing, for the purposes of voluntary multiple use, the product performances, the rules for realization and the characteristics of processes of production, operation, storage, transportation, marketing and utilization, executing of works or rendering of services. The standard may also contain the requirements for terminology, symbology, packing, marking or labelling, and the rules for their affixing.

Standardization: the activity of establishing of rules and performances for the purpose of their voluntary multiple use, aimed at achievement of orderliness in the spheres of production and circulation of products, and at heightening of competitiveness of products, works or services.

Technical regulating: the legal regulating of relations in the field of establishing, application and executing of obligatory requirements for products, processes of production, operation, storage, transportation, marketing and utilization, and also in the field of establishing and application, on a voluntary basis, of the requirements for products, processes of production, operation, storage, transportation, marketing and utilization, executing of works or rendering of services, and legal regulating of relations in the field of conformity assessment.

Technical regulation: a directive, compliance with which is mandatory, whereby the competent authority, through an administrative action, establishes the characteristics of a product or the production processes or methods relating to the product, including applicable administrative provisions. It may also include, or exclusively address, requirements in the areas of terminology, symbols, packaging, branding or labelling applicable to products, including buildings, structures and constructions, for processes of production, operation, storage, transportation, marketing and utilization. Preparation, adoption and application shall be the responsibility of the respective Ministries or agencies duly authorized for this purpose.

C. Pivotal Provisions of the WTO SPS Agreement

SPS measures include all relevant laws, decrees, regulations, requirements and procedures including, inter alia, end product criteria; processes and product methods; testing, inspection, certification and approval procedures; quarantine treatments including relevant requirements associated with the transportation of animals and plants, or with the materials necessary for their survival during transport; provisions on relevant statistical methods, sampling procedures and methods of risk assessment; and packaging and labelling requirements directly related to food safety.

D. Key Expectations

(i) Except under very special circumstances, countries generally benefit from removal or reduction trade barriers arising from SPS measures and technical regulations.

(ii) In principle, SPS standards are introduced by government in the interest of the society, to protect public, animal and plant health, and the environment.

(iii) In theory, establishment of SPS standards (or other technical standards) could facilitate trade through reducing transaction cost, by assuring consumers that the food they
consume is of an acceptable standard and reducing the cost of uncertainty that they face in assessing product quality.

(iv) Standards can serve to signal quality in foreign markets and thus contribute to increasing elasticity of substitution between similar goods produced in different countries, thereby permitting relatively more efficient producers to thrive through export expansion.

(v) Efficiency of production would be increased through standardization as it reduces information asymmetries between buyers and sellers, and promotes product commutability, thereby allowing for increased economies of scale and scope.

E. **Key Impacts**

Importing countries may deliberately craft SPS measures that impose a cost or other disadvantage on foreign competitors to provide protection for domestic producers.

Even when comparable SPS measures are applied in developed countries to both domestic and imported products, they can act to impede imports from developing countries because of asymmetry in compliance cost.

Food safety has the potential of mutating to a 'luxury' good whose demand rises as income levels rise, and greater prosperity tends to be accompanied by increased demand for more stringent SPS standards in developed countries. Many in developed countries see the much laxer SPS standards that often prevail in developing countries as a threat precipitating 'a race to bottom'.

As traditional trade barriers such as tariff and quantitative restrictions continue to decline, protectionist interests are likely to make increasing use of food safety regulations and other technical barriers to block trade.

Among African countries, TBTs and SPS measures have been deployed on the instigation of foreign interests to hinder intra-African trade.

Institutional capacity constraints to conduct conformity assessment on fish products coupled with rapid changes in the food safety perceptions of export destination countries. Significant investments are usually required to procure equipment, materials and competent human resources which represent a major barrier to developing countries.

Discriminative technical and financial assistance and transitional periods for the application of environmental and biodiversity safeguards such as turtle excluder devices (TEDs) in shrimp trawlers to reduce sea turtle mortality (Asche *et al.*, 2009).

The globalization of the fish trade has led to substantial product that is exported to one country, processed, and then re-exported, sometimes back to the original country. If product is processed in a country besides the one harvesting or producing it, traceability may be more difficult. Traceability requirements could then become technical barriers to trade not just for raw product but also for processed product that ostensibly originates in the importing country.

Export-oriented fisheries are subjected to legislative and regulatory pressures in the export destinations which may demand significant costs in legislative and regulatory reforms and upgrades of processing facilities, and in some cases loss of markets and closing down of facilities unable to upgrade (Henson *et al.*, 2004).
The WTO SPS Agreement anticipates SPS measures differ in the first instance due to significant differences in tastes, diets, income levels and perceptions that influence the tolerance of populations toward these risks. Differences in climate and in the available technology (from refrigeration through to irradiation) affect the incidence of different food safety and agricultural health hazards. Standards reflect the feasibility of implementation, which itself is influenced by legal and industry structures as well as available technical, scientific, administrative and financial resources. Some food safety risks, for example, tend to be greater in developing countries due to weaknesses in physical infrastructure (for example standards of sanitation and access to potable water) and the higher incidence of certain infectious diseases. Further, tropical or sub-tropical climatic conditions may be more conducive to the spread of certain pests and diseases that pose risks to human, animal and/or plant health (Jaffee et al., 2004).

**F. Key Obligations of Member States under WTO SPS and TBT Regimes**

Member States are under the following obligations whenever they anticipate developing and adopting SPS measures and technical regulations:

**F.1 SPS Measures**

1. Relevant technical regulatory authorities shall prepare, adopt and enforce technical regulations establishing essential minimum SPS measures in relation to products originating from the separate countries and/or places, including the restriction of import, use, storage, transportation, marketing and utilization, providing biological safety (irrespective of the ways of safety assurance used by the manufacturer).

2. The SPS measures may provide for the requirements for products, for methods of product processing and production, for procedures of product testing, inspection, conformity assurance, the quarantine rules, including the requirements connected with transportation of animals and plants, for materials necessary to ensure life or health of animals and plants during their transportation, and also for methods and procedure of sampling, for methods of test and evaluating of risk and other requirements contained in technical regulations.

3. Regulatory authorities shall ensure that any SPS measure that it prepares, adopted, maintained or enforced is:

   a. based on scientific principles, taking into account relevant factors including, where appropriate, different geographic conditions;

   b. not maintained where there is no longer a scientific basis for it; and

   c. based on a risk assessment, as appropriate to the circumstances.

4. Each regulatory authority shall ensure that an SPS measure that it adopts, maintains or applies does not arbitrarily or unjustifiably discriminate between domestic goods and like goods of another country, or between goods of another country and like goods of any other country, where identical or similar conditions prevail.

5. SPS Measures shall be proportionate to the appropriate level of protection, taking into account technical and economic feasibility.
(6) Regulatory authorities shall not adopt, maintain or apply any SPS measure with a view to, or with the effect of, creating a disguised restriction on trade.

(7) Technical regulatory authorities shall use, as a basis for preparing sanitary and phytosanitary measures, relevant international standards, guidelines or recommendations which will not be trade disruptive.

(8) Governments shall continuously register and analyse all cases causing harm, as a result of violation of requirements of SPS measures, to life or health of people, property of natural or legal persons, state or municipal property, environment, life or health of animals and plants, taking into account the weight of this harm, and also shall organize the informing of purchasers, manufacturers and sellers on the situation in the field of observance of technical regulation requirements.

F.2 Technical Regulations

(1) The following objectives shall constitute the legitimate purposes for the preparation, adoption and application of technical regulations in consistency with the provisions of the WTO TBT Agreement:

(a) protection of life or health of people, property of natural or legal persons, state or municipal property;
(b) protection the environment, life or health of animals and plants;
(c) prevention of actions misleading the purchasers / deceptive practices.

(2) In pursuing the legitimate objectives, regulatory authorities may establish the levels of protection that it considers appropriate.

(3) Regulatory authorities shall not prepare, adopt, maintain or apply any technical regulations with a view to or with the effect of creating an unnecessary obstacle to trade. An unnecessary obstacle to trade shall not be deemed to be created where:

(a) the demonstrable purpose of the measure is to achieve a legitimate objective; and
(b) the measure does not operate to exclude products of other Member States that meet that legitimate objective.

(4) Regulatory authorities shall ensure that a technical regulation shall:

(a) serve clearly identified policy goals, and be effective in achieving those goals;
(b) have a sound legal and empirical basis;
(c) produce benefits that justify costs, considering the distribution of effects across society and taking economic, environmental and social effects into account;
(d) minimize costs and market distortions;
(e) promote innovation through market incentives and goal-based approaches;

(f) be clear, simple, and practical for users;

(g) be consistent with other regulations and policies; and

(h) be compatible as far as possible with competition, trade and investment-facilitating principles at domestic and international levels.

G. WTO Dispute Resolution Mechanism

For any state or customs territory, WTO membership implies accepting limitations on regulatory autonomy in five areas: (1) trade in goods; (2) trade in services; (3) the protection of intellectual property rights; (4) the settlement of disputes; and (5) periodic review of national trade policies (Hoekman et al., 2007).

SPS and TBT Agreements address trade in goods and services and under the WTO legal obligations, all disputes arising from the implementation of these agreements shall exclusively be addressed through the Dispute Settlement Body (DSB).

Settling disputes is the responsibility of the Dispute Settlement Body (the General Council), which consists of all WTO members. The Dispute Settlement Body has the sole authority to establish “panels” of experts to consider the case, and to accept or reject the panels’ findings or the results of an appeal. It monitors the implementation of the rulings and recommendations, and has the power to authorize retaliation when a country does not comply with a ruling.

- **First stage: consultation** (up to 60 days). Before taking any other actions the countries in dispute have to talk to each other to see if they can settle their differences by themselves. If that fails, they can also ask the WTO director-general to mediate or try to help in any other way.

- **Second stage: the panel** (up to 45 days for a panel to be appointed, plus 6 months for the panel to conclude). If consultations fail, the complaining country can ask for a panel to be appointed. The country “in the dock” can block the creation of a panel once, but when the Dispute Settlement Body meets for a second time, the appointment can no longer be blocked (unless there is a consensus against appointing the panel).

Officially, the panel is helping the Dispute Settlement Body make rulings or recommendations. But because the panel's report can only be rejected by consensus in the Dispute Settlement Body, its conclusions are difficult to overturn. The panel's findings have to be based on the agreements cited.

The panel's final report should normally be given to the parties to the dispute within six months. In cases of urgency, including those concerning perishable goods, the deadline is shortened to three months.
The agreement describes in some detail how the panels are to work. The main stages are:

1. **Before the first hearing**: each side in the dispute presents its case in writing to the panel.

2. **First hearing: the case for the complaining country and defence**: the complaining country (or countries), the responding country, and those that have
announced they have an interest in the dispute, make their case at the panel’s first hearing.

(3) **Rebuttals:** the countries involved submit written rebuttals and present oral arguments at the panel’s second meeting.

(4) **Experts:** if one side raises scientific or other technical matters, the panel may consult experts or appoint an expert review group to prepare an advisory report.

(5) **First draft:** the panel submits the descriptive (factual and argument) sections of its report to the two sides, giving them two weeks to comment. This report does not include findings and conclusions.

(6) **Interim report:** The panel then submits an interim report, including its findings and conclusions, to the two sides, giving them one week to ask for a review.

(7) **Review:** The period of review must not exceed two weeks. During that time, the panel may hold additional meetings with the two sides.

(8) **Final report:** A final report is submitted to the two sides and three weeks later, it is circulated to all WTO members. If the panel decides that the disputed trade measure does break a WTO agreement or an obligation, it recommends that the measure be made to conform with WTO rules. The panel may suggest how this could be done.

(9) **The report becomes a ruling:** The report becomes the Dispute Settlement Body’s ruling or recommendation within 60 days unless a consensus rejects it. Both sides can appeal the report (and in some cases both sides do).

**Appeals**

Either side can appeal a panel’s ruling. Sometimes both sides do so. Appeals have to be based on points of law such as legal interpretation — they cannot re-examine existing evidence or examine new issues.

Each appeal is heard by three members of a permanent seven-member Appellate Body set up by the Dispute Settlement Body and broadly representing the range of WTO membership. Members of the Appellate Body have four-year terms. They have to be individuals with recognized standing in the field of law and international trade, not affiliated with any government.

The appeal can uphold, modify or reverse the panel’s legal findings and conclusions. Normally appeals should not last more than 60 days, with an absolute maximum of 90 days.

The Dispute Settlement Body has to accept or reject the appeals report within 30 days — and rejection is only possible by consensus.

**H. Scientific Evidence as Basis for WTO Engagements**

The proliferation and enhanced stringency of food safety and agricultural health standards is a source of concern among many developing countries and those promoting the increased integration of these countries into the world trading system. Reflecting wider changes in the trade regime for various agricultural and food products, there is a presumption that food safety and agricultural health measures can (and will) be used as a protectionist tool, providing 'scientific' justifications for prohibiting imports of certain products altogether, or discriminating
against imports by applying higher standards and/or more rigorous regulatory oversight than on domestic suppliers.

The SPS Agreement permitted measures that were ‘necessary to protect human, animal or plant life and health’, yet required regulators to: (1) base measures on a scientific risk assessment; (2) recognize that different measures can achieve equivalent safety outcomes; and (3) allow imports from distinct regions in an exporting country when presented with evidence of the absence or low incidence of pests or diseases.

Scientific justification is called for wherever standards are deemed to not be based on established international standards. Yet, complications are inevitable given the wide range of areas for which no agreed international standards exist and given broad (and emerging) areas for which the state of scientific knowledge is incomplete. Hence, many of the controversies which have occurred surround the legitimacy and appropriateness of measures in the context of scientific uncertainty.

I. Capacity of African Member States to Engage in WTO

Most African countries have not developed the capacity to demonstrate compliance of their fish products to international or regional standards. The imposition of scientifically unproven limits or disproportionate requirements on products originating from African countries has not been scientifically challenged due to low capacity of Member States in carrying out comparative research.

To establish and enforce appropriate standards requires building expertise and devoting additional resources to applied science and public management. To a great extent this effort can be left to private firms wishing to expand domestic and international sales, but there remains a role for government in light of the public-good nature of effective standards. In defining and implementing more effective standards, however, many poor countries will need technical assistance from international organizations and specialists with expertise (Hoekman et al., 2002).

The SPS and TBT agreements have set a bar that must be met by exporting firms in developing countries. These agreements strongly encourage importing nations to adopt product standards that are at least as rigorous as those developed by international standards-setting bodies. Over time, all WTO members can be expected to adopt such regulations, with the richer members choosing even stronger rules. Thus, developing economies have no choice but to meet recognized international standards, at least for exports. It is likely, however, that such standards would have to be applied to all production within each country simply to inspire confidence in importing markets that goods are produced safely by all potential supply sources.

In this context, problems relating to the implementation of obligations under the TBT and SPS agreements rank high among developing country concerns. Lack of modern technical infrastructure and capacity to engage in international standards development activities and to provide internationally recognized testing and certification procedures for products is a common constraint. Without the resources necessary for building and maintaining modern standards and conformity assessment systems, it is difficult either to ensure rights or to exercise responsibilities under existing WTO rules. If developing countries lack resources to access information on international standards or to participate in their development, a key link between the rule of law as specified in the WTO system and developing countries’ ability to fulfill their obligations and defend their rights is called into question.

Many countries are also concerned to clarify provisions regarding special and differential treatment in the TBT and SPS agreements. India, for example, has recommended extending the timeframe for compliance by developing country members with the existing provisions of WTO
agreements referencing standards. In a related vein, a number of developing countries have cited problems with their ability to react to notifications of new TBT and SPS measures. A notification of intent to promulgate a new regulation, with a 60-day open comment rule, is of questionable value to developing countries that have no capacity to respond.

Concern over the use of environmental standards to restrict imports is also prevalent among developing countries. The use of trade measures to enforce environmental standards is viewed with serious alarm by many countries with regard to both manufactures and agricultural products. Among other issues, the lack of clear rules on the appropriate use of labels to indicate environmental impact and the rise in the use of standards for process and production measures in industrial countries have been noted in developing country submissions to the WTO.

Questions of how and under what circumstances mutual recognition agreements (MRAs) are best implemented to facilitate trade have also been raised. Such agreements are used to reduce the trade-impeding effect of technical barriers through mutual recognition of national product testing and certification procedures. To date, they have only been negotiated between industrial countries, although both the TBT and SPS agreements encourage all WTO members to enter into MRAs.

Developing countries may use the WTO dispute resolution mechanism to raise concerns about whether particular standards in import partners meet SPS and WTO rules. This situation likely means that WTO panels must give greater voice to scientific evidence and representations by members of civil society. Developing countries need to monitor the development of dispute settlement in this regard and assert their own interests. It must be recognized, however, that the WTO itself is not a standards-setting body; it has neither the expertise nor the resources for this purpose. Ultimately, the real concern of developing countries must be to influence the development of global standards in ways that at least pay attention to their concerns.

**J. WTO and the North-South Politics**

There are arguments that since SPS standards have the latitude of protecting the health and safety of human, plant and animal life, their adoption and enforcement tend to be less transparent, allowing ample room for tweaking them to make them stronger than necessary for achieving optimal levels of social protection and to twist the related testing and certification (conformity assessment) procedures to make competing imports less competitive (Athukorala et al., 2003).

An example is given of the 1998 EC regulation that reduced the maximum permissible level of aflatoxin in foodstuffs and animal feed to a lower level than international standards specified by the Codex Alimentarius (EEC, 1998). The results suggest that the EU standards, which would reduce health risk by approximately 1.4 death per billion a year would reduce exports by more than 60% or US$ 670 billion from 9 countries (Cameroon, the Dominican Republic, Ghana, Nicaragua, Nigeria, Sudan, Senegal, Tanzania and Zambia) (Athukorala et al., 2003), as compared with regulation based on the international (Codex) standard.

There is evidence of some instances where standards prohibit trade altogether (Athukorala et al., 2003:432). For example, a EU regulation requires that dairy products be manufactured from milk produced by cows kept on farms and milked mechanically. This regulation virtually precludes imports from many DCs where milk production is by and large a smallholder activity. The EU recently invoked this regulation to ban import of camel cheese from Mauritania, bringing hardship to a small enterprise, which developed the product at a considerable cost (Athukorala et al., 2003). The EU also raised the issue that Mauritania is not free of foot-and-mouth disease, although there is little scientific evidence to suggest that camels (or, in particular, camel milk) can transmit the associated virus. An Australian
quarantine regulation requires that chicken meat imported from Thailand must be heated at 70 Celsius for 143 minutes to avoid the possibility of carrying a certain disease. This has effectively closed the Australian market for Thai chicken exporter (It is said that the required heat treatment transforms chicken into paper!). In June 2002, Thai authorities provided the Australian government with a risk assessment report showing that the risk of introducing IBDV to backyard flocks through cooked chicken meat was negligible.

**References**


*Food Standards and International Trade* (Sheldon, 2013)

*The Oxford Handbook of the Economics of Food Consumption and Policy* (Lusk *et al.*, 2013)

*African Perspectives on the Need for Global Harmonisation of Food Safety Regulations* (Anelich, 2014)

*The Impact of Food Safety and Quality Standards on Developing Countries Agricultural Producers and Exports* (Chemnitz, 2011)


*Trade and Fisheries: Key Issues for the World Trade Organization* (Asche *et al.*, 2009)

*Kenyan Exports of Nile Perch: Impact of Food Safety Standards on an Export-Oriented Supply Chain* (Henson *et al.*, 2004)

*Bridging the Standards Divide: Recommendations for Reform from a Development Perspective* (Wilson, 2001)


*The Role of Science in the Uruguay Round and NAFTA Trade Discipline* (Wirth, 1994)

### 3.3.10 Standards and Food Safety Regulations: Exploring the Intersections

#### A. Food Safety Laws and Regulations

**A.1** Food laws and regulations cover all stages of the production, processing and distribution of food and animal feed. The general objectives of food laws and regulations are:

(a) guarantee a high level of protection of human life and health and the protection of consumers’ interests;

(b) guarantee fair practices in food trade, taking into account animal health and welfare, plant health and the environment;

(c) ensure free movement of food and feed manufactured and marketed in national or regional jurisdictions;

(d) facilitate global trade of safe feed and safe, wholesome food by taking into account international standards and agreements.
A.2 Food safety regulations require food facilities to have a food safety plan that includes:

(i) hazard analysis, preventive controls;

(ii) oversight and management of preventive controls;

(iii) monitoring; corrections and corrective actions (documented); and

(iv) verification that preventive controls are implemented and effective.

B. Food Safety Standards

Food safety standards help companies establish good manufacturing processes so they can produce safe products that comply with food safety legislation and meet quality levels expected by consumers.

While in developed countries compliance with public and private food safety standards focuses on public health, in underdeveloped countries, the emphasis is on economic development and how standards shape access to markets and what is their economic impact on producers.

C. Public and private regulation

Food safety touches upon issues of public regulation, private supply chain coordination, and international trade. More stringent food safety standards have emerged in the recent past as the result of several factors, including advances in hazard detection and epidemiology, high profile health scares, scientific and regulatory consensus on best approaches to risk management, and the recognition of global standards and approaches under the WTO. As a result there is a consensus “among nations about the basic components of an effective food safety system... the vision is of a farm-to-fork, risk-based, scientifically supported safety control system”.

Public standards constitute legal requirements for market entry, and can be used by governments to deny market access for exporting countries or firms that fail to comply. These standards may include requirements that must be met by public agencies in exporting countries as well as by private firms engaged in export. Public standards must meet World Trade Organization requirements for transparency, equal application to domestic and imported products, and must be based on scientific risk assessment. Typically such standards change only infrequently. Private standards are set by buyers (or a by a consortium of firms) and include both safety and quality specifications for particular market channels. While they may be de facto requirements for particular buyers, failure to comply with private standards will not, by itself, preclude entry into an importing country. Private standards change over time as buyers manage risks and reputation, and thus compliance must also evolve.

New regulations or standards can add to production costs. In high-income countries, such costs are weighed against the public health benefits from reduced foodborne illness. But in developing countries, studies have focused on how standards shape market participation, exports, and farm incomes. Higher public standards in importing countries reduce traded quantities, especially from low-income exporters. Higher standards can serve as catalysts for improved management, higher value added, and greater efficiency in production and marketing. The costs imposed by more stringent standards have elevated concern that food safety standards pose a barrier to market participation by small farms or firms. The high non-recurring costs of setting up a food safety quality control system might give an advantage to larger firms and farms that can employ economies of scale and exclude smaller competitors. In addition, buyers incur higher transaction costs when they have to monitor compliance from many small suppliers.
Failure to meet public standards imposed by high-income countries led to the exclusion from markets of some developing countries and firms as new standards came into force in the 1990s. Examples include European Union (EU) bans on imports of fishery products from Bangladesh in 1997; from Kenya in 1997-2000; and from Malaysia in 1998); and a U.S. ban on raspberries from Guatemala in 1997-98. Case studies document how bans led to substantial export revenue losses and how many banned firms, struggling to comply, went out of business or, if they survived, incurred high compliance costs. Public sector support in exporting countries was sometimes required to underwrite investments beyond the reach of individual firms. Such support enabled a resumption of exports as firms came into compliance, but at a lower and less profitable level than before. Even where countries maintained export market access and avoided product bans, compliance costs were substantial. Thus, exporter compliance with public standards imposed by importing countries increased costs and may have reduced trade. Compliance with public standards to achieve access to high-income markets may be a strategic priority for some governments, which suggests a public sector role in compliance.

References
Measuring the Impacts of Food Safety Regulations: A Methodological Review (Ragona et al., 2008)

Harmonization of Legislation and Regulations to Achieve Food Safety: US and Canada Perspective (Keener et al., 2014)

Hygiene Requirements, Controls and Inspections in the Fish Market Chain (Çakılı et al., 2013)

3.3.11 Utilization of Standards for Regulation

A. Role of Standards in Regulation Setting

A.1 National standards bodies should promote efficient and effective voluntary standardization in order to advance the national economy, support sustainable development, benefit the health, safety and welfare of workers and the public, assist and protect consumers, facilitate domestic and international trade and further international cooperation in relation to standardization. For regulated areas, additional considerations and guidance are needed to meet the expectations of policy and regulatory decision makers.

A.2 Increasing regulatory confidence in standards is critical to the overall social utility of the standards world. Standards only have value if they are used. When a standard is incorporated into a regulation, it is being utilized at the highest possible level and becomes part of the overall technical and social infrastructure of the jurisdiction(s) concerned.

A.3 Some advantages for a regulatory authority referencing standards developed within the National Standards System include:

(a) the standards have been developed by balanced committees of all relevant interests, employing the principles of consensus;

(b) the standards have undergone a public review process as well as a “second level review” by the standards body prior to publication;

(c) the standards are maintained and reviewed at appropriate intervals to ensure current technological developments are incorporated;
(d) the commercial needs of producers, users, and other interests are addressed at the development stage, thus ensuing regulations referencing these standards are more amenable to commercial acceptance; and,

(e) the standards address the national public interest by considering to the extent possible as appropriate to the subject of the standard, how it advances the national economy, supports sustainable development, benefits the health, safety and welfare of workers and the public, assists and protects consumers and facilitates trade.

B. Considerations on the Development of Regulatory-Oriented Standards

B.1 The effective development of a standard suitable for incorporation by reference in a legislative instrument requires that a cooperative effort between the regulatory authority and the standards development committee be established from the outset.

B.2 The standards development committee should be aware of the views of the regulatory authority with respect to the scope of the standard and its expected date of completion.

B.3 Representatives of interested regulatory authorities should be active participants on the standards development committee. If for reasons of balance, time, or distance this is not possible, they should be associate or corresponding members who can make comments and provide input.

B.4 Depending on the nature and complexity of the work of the standards development committee and the number of regulatory authorities involved, it may be advisable to establish an appropriate mechanism for coordination with all interested parties. For example, coordination with a range of regulatory authorities could be achieved by correspondence and through report sharing which is made simple and effective with current technology.

B.5 Should a standards development committee become aware of a requirement which is beyond the scope but related to, or considered essential to, a broader aspect of the subject under consideration, the standards development committee should refer the issue to the appropriate body, such as other standards or code committees or a regulatory authority so that the matter can be resolved.

C. The Content of the Standard

C.1 The body of a standard for reference in legislative instruments should contain only those requirements considered essential for regulatory reference.

C.2 A standard intended for regulatory reference as well as for marketplace needs should be drafted to facilitate this separation whenever possible.

C.3 Requirements should be divided into distinct, consistent and easily identifiable sections to facilitate their incorporation by reference in codes and regulations. This permits selected sections to be separately identified in a code or regulation when only part of the standard is referenced.

C.4 References to certification or administrative requirements relating to conformity assessment, marks of conformity and other non-technical issues, including promotional material, should not be included in the normative content of a standard. These requirements typically use terms such as "approved," "approval," "accepted," "acceptable," "certified," "listed" and "registered" and imply acceptance, endorsement, certification or listing by a regulatory authority or its appointee. Such requirements may be included in the preface, notes to the preface, foreword, or informative annexes.
C.5 A standard should not specify any date for enforcement of a standard to be referenced in a legislative instrument. The enforcement date is an administrative requirement determined by the regulatory authority.

C.6 The language for a standard to be used in regulation should be clear, direct and precise. A standard written in language which "recommends" is not likely to be suitable in a regulation if failure to comply could result in prosecution.

C.7 Each specific requirement of the standard should be stated unambiguously using wording that is logical, valid and specific. In particular,

(a) terms such as “adequate”, “adversely affected”, “sufficiently strong”, and “extreme conditions”, should be avoided;

(b) qualitative adjectives and nouns that could be taken as absolute should not be used unless defined. Examples include “waterproof”, “unbreakable”, “flat”, and “safe”;

(c) qualitative adjectives and nouns that describe a measurable property should not be used unless defined. Examples include “high”, “strong”, “transparent”, and “accurate”; and,

(d) the term "unless otherwise specified" should not be used, except when the "other specification" is clearly identified in the standard.

C.8 If a standard is to repeat requirements stated in another standard, the repetition should be by specific reference and clearly indicate the referenced version. The use of the term "latest issue" should be avoided unless it has been carefully thought out and decided by the standards development committee that there are valid reasons to do so.

D. Advantages of Referencing Standards in Regulations

When a standard is available and it allows the achievement of a regulatory objective by reference, it can provide some of the following advantages:

(a) **Fulfil the Need**: the process of developing a standard in a consensual manner, which takes into account various interests, supports a solution that is likely to meet the expectations of the majority of the stakeholders addressed by the regulation.

(b) **Verification**: a standard which lends itself to 3rd party certification enhances confidence in a product or a system and provides the necessary positive support for a regulatory requirement.

(c) **Effectiveness of Requirements and Access to Expertise**: a standard may represent the sum of the knowledge of a broader expert pool than the one which the regulatory authority has access to.

(d) **Uniformity of Requirements**: a standard produced in collaboration with representatives of several jurisdictions of regulatory authorities results in more uniform requirements, eliminating unnecessary trans-border barriers and favouring the exchange of good and services.
Marketplace Compliance: by referencing standards which bring together marketplace and regulatory input, the likelihood of market compliance increases, thereby reducing the oversight burden.

Efficiency: If manufacturers are using the same tool to meet market needs and regulatory needs it will be more effective and efficient where both are concerned.

Resource Savings: referencing a standard which contributes to the objective of the regulation is likely to save significant resources. This saving can be examined in light of costs associated with participation by the regulatory authorities in the standard development process.

E. Methods of Referencing Standards

E.1 The method of referencing standards in regulations usually employs one of the following preferred variations:

(a) Dated Identification (Referencing a Specific Issue of a Standard): This is the most restrictive reference, used when a specific issue of a standard is intended, and future amendments and editions are excluded. Such references should include a date of issue or edition number of the standard.

(b) Dated Identification (Referencing a Specific Issue of a Standard Including Future Amendments): This type of reference incorporates a specific issue of a standard and includes all future amendments to that specific issue, but excludes new editions. Such references should include the date of the specific issue of the standard with the addition of the preferred phrase "as amended from time to time".

(c) Undated Identification (Referencing to Incorporate New Editions of the Referenced Standard without Requiring a Change to the Regulation): This type of reference incorporates a standard with no mention of a date of issue or a specific edition. In such instances, regulatory authorities should add the phrase, "latest edition of". This is the most liberal reference and permits regulatory authorities to respond easily and quickly to technical changes.

E.2 Each regulatory authority is responsible for determining which type of reference it is empowered to employ and must consult the provisions of the appropriate legislative instrument. For example, some Acts may not allow the use of undated references as this could be interpreted as a delegation of legislative authority to the standards development committee.

F. Referencing Options

F.1 The following are potential options for referencing standards or parts of standards:

(a) Complete Reference: In this application, all of the contents of the standard are included by reference in the regulation.

(b) Qualified Reference: In this application, selected portions of the referenced standard are deleted as being inappropriate for the intended purpose, however, the retained balance of the standard is included in the regulation.

(c) Partial Reference: In this application, only selected portions of the referenced standard are included in the regulation.
(d) Reference as Good Practice: In this application, a standard is referenced as a guide to permit conformance to "good engineering practice". The method of compliance to ensure good engineering practice is generally determined by regulatory authorities. This is a flexible approach that does not require compliance with the referenced standard, but informs the user of its existence and acceptability.

(e) Reference as an Alternate: In this application, standards are referenced as examples whereby compliance will ensure that certain performance requirements will be satisfied or where compliance will allow the user to obviate certain provisions.

(f) Inclusive Reference to Standards: In this application, the standard selected as a reference contains one or more references to other standards. For example, standard X (the primary reference) may include a reference to standard Y, (the secondary reference) and Y in turn may reference standard Z (the tertiary reference). Regulatory authorities should ensure that such secondary or tertiary references are germane to the regulation being formulated. If not, this should be so indicated by specifying they are to be excluded, or by the application of the "Qualified" or "Partial" reference options described above.

G. Recommendations for Maintenance and Maintenance Procedures for Standards for Use in Legislative Instruments

G.1 National Standards bodies have procedures which require them to regularly review standards to ensure that they remain current and abreast of technology. When undertaking this review, standards development committees should determine the requirements of the interested regulatory authorities. When a standard is being considered for maintenance action, the standards development organization should provide sufficient notice to the interested regulatory authorities such that they may have ample opportunity to make their views known or to take such action as they consider appropriate.

G.2 Regulatory authorities should develop procedures to assist them in monitoring the status of standards referenced in their regulations. This monitoring should include updates, amendments and withdrawals so that the regulatory authority can take appropriate action to affected regulations. As part of its maintenance procedure, the regulatory authorities should maintain active participation in the appropriate standards committees.

References
Safe Food Australia: A Guide to the Food Safety Standards (ANZFA, 2001)
Private Food Safety Standards: Their Role in Food Safety Regulation and their Impact (FAO, 2010)
Analysis of Economic Impacts: Standards for the Growing, Harvesting, Packing and Holding of Produce for Human Consumption (FDA, 2011a)
Methods of Referencing Standards in Legislation with an Emphasis on European Legislation (Leibrock, 2002)
Key Considerations in the Development and Use of Standards in Legislative Instruments: Understanding the Partnership of the Regulatory and Voluntary Standards Systems (SCC, 2006a)
3.3.12 Regulation for Development in the Fisheries and Aquaculture Sector

A. Need for Fisheries and Aquaculture Management

A.1 Fisheries make essential contributions to human well-being, providing basic food supplies, employment, livelihoods, recreational opportunities, sources of foreign currency or recreational opportunities for hundreds of millions of people (Cochrane et al., 2009). They are an integral component of communities and societies almost wherever humans have access to water bodies: oceans, seas, lakes and rivers. So far, so good, but a problem arises because, in addition to providing benefits for society, fisheries also have negative impacts which, if not sufficiently controlled, can not only destroy or diminish the benefits they provide but also lead to damage to the ecosystem with resulting negative impacts on other important goods and services for humans, including the conservation value of the ecosystems.

A.2 Fisheries management is the process that has evolved to ensure that fisheries operate in a manner that not only provides the immediate benefits but also does not result in excessive or irreversible damage to the exploited fish stocks or the diversity, integrity and structure of the ecosystem, so that the stocks and ecosystem will continue to provide the full range of benefits in the future. Fisheries management has been successful in some cases but it has become widely recognised in recent decades that there have also been many, many cases of failure. As a result, there is global concern about the state of most aquatic ecosystems and their ability to continue to provide benefits, not least the production of fish for human use.

A.3 There are many reasons for this widespread problem, including amongst others: scientific uncertainty; an inherent conflict between short-term social and economic needs and goals and the longer-term need for sustainability; poor management practices in the past, particularly the absence of long-term rights and failing to ensure that stakeholders participate in management; insufficient capacity within the management agencies and others.

A.4 Cochrane et al. (2009) outline the following key principles to serve to focus attention on the starting points for effective fisheries management:

1. The fishing sector consists of a number of dynamic components, also commonly interacting with other sectors through the ecosystem and biological resources, the stakeholders and the market. The overall evolution of the sector and its components is therefore hard to predict in the long term.

2. Fish stocks and communities are finite and biological production constrains the potential yield from a fishery.

3. Biological production of a stock is a function of the size and structure of the stock and of the ecological environment with which it interacts and is influenced by natural and human-induced changes in this environment.

4. Human consumptive demands on fish resources are fundamentally in conflict with the constraint of maintaining a suitably low risk to the resource. Further, modern technology provides humans with the means, and demand for its benefits provides the motivation to extract fish biomass at rates much higher than it can be produced.

5. In a multi-species fishery, which description encompasses almost all fisheries, it is impossible to maximise or optimise the yield from all species or stocks simultaneously.

6. Uncertainty pervades fisheries management and hinders informed decision-making. The greater the uncertainty, the more conservative should be the
approach (i.e. as uncertainty increases, realised yield as a proportion of estimated maximum average yield should be decreased).

(7) The short-term dependency of society on a fishery will determine the relative priority of the immediate social and/or economic goals in relation to the long-term goal of sustainable utilisation.

(8) A sense of security of tenure and a long-term stake in the resource for those (individuals, communities or groups) with access ought to be most conducive to maintaining responsible fisheries.

(9) Genuine participation in the management process by fully informed stakeholders is consistent with the democratic principle, facilitates identification of acceptable management systems and encourages compliance with laws and regulations.

A.5 In keeping with the integrated nature of fisheries ecosystems, these principles cannot be seen in isolation in considering how best to manage fisheries: their implications and consequences overlap, complement and confound each other, which is what makes fisheries management so demanding and challenging.

Figure 9: The hierarchical relationships between the different intentions (policy, goals and objectives), standards (reference points and indicators) and actions (management measures). Collectively these make up the management strategy and would be described in the management plan (Cochrane et al., 2009)
Figure 10: Historical and present-day perspectives on biological and ecological parameters and information of relevance for the sustainable management of aquatic natural resources (Cochrane et al., 2009).

NOTE The time axis moves from the past (left) to the present. In the early years of fishery science, the information used was catch and effort with no biological or ecological components. As dynamic pool models developed, a few biological parameters shown lower left were applied. Awareness and understanding of the need for more detailed information has resulted in a much wider range of data being necessary for management (boxes on the right).

A.6 Figure 22 illustrates a hypothetical coastal area in which several property-rights regimes are found together. On the coast is a private aquaculture area, next to a fishing territory controlled by a village. The coastal fishery within the territorial sea (up to 12 miles) and the offshore fishery in the Exclusive Economic Zone (EEZ usually up to 200 miles) are under state property. Beyond the EEZ there may be an international regime in force on the high seas, but the area may have many of the characteristics of an open-access situation with fishing fleets opportunistically targeting resources that acquire high market value. Resources may be effectively open-access within the territorial sea and the EEZ as well, if the state is unable to enforce its regulations, a common situation in many developing countries. The private and the communal areas may both be mixed regimes, as it is the state that normally leases aquaculture areas and enables a community to control its fishing area, as in co-management.

Although the example is hypothetical, many coastal areas in fact have co-existing and overlapping property-rights regimes. Resource managers cannot function effectively unless they know the property-rights regimes they are dealing with, and the implications of each with respect to dealing with the ‘tragedy of the commons’
The term *management*, which carries implications of domination of nature, can be updated to highlight governance, social relationships, adaptation and the maintenance of the productive potential of the ecosystem. Most of the objectives commonly stated for fisheries management fall into three categories. One set relates to resource sustainability, ensuring that the biological productive capacity of the resource is maintained. The other two sets are social and economic, and relate either to the optimization of returns from the fishery (efficiency) or to the fair distribution of those returns among stakeholders (equity). Some 22 fishery objectives are recognized (Table 13) relating to sustainability (six of them), efficiency (twelve) and equity (eight) (Cochrane et al., 2009). Any of these objectives may be a valid goal for a fishery, but it is not possible to achieve them all for a single fishery. Some of the objectives are incompatible with one another. For example, management can aim to maximize the biological yield or the economic yield but not both.
### B. Legal and Institutional Considerations

B.1 The fisheries law facilitates and supports fisheries management by implementing the general fisheries policy, defines the scope of its application and establishes institutional mechanisms for fisheries management. It also defines management responsibilities, recognises and regulates the interests of fishers and other stakeholders and the relationship between them to facilitate the attainment of fisheries management objectives. The ultimate purpose of fisheries law is to guarantee that the terms and conditions under which fisheries are managed and the mechanisms that regulate conflict are enforced. The latter is guaranteed through established processes for compliance and enforcement of assigned rights and duties in a judicial or other forum, for example, courts or administrative enforcement mechanisms or processes.

### B.2 Matters Typically Addressed by Principal Fisheries Legislation

(a) **Objectives** – States general development policies and management objectives of policies and the law.

(b) **Definitions** – Defines terms and phrases used to assist in interpretation and application of the law.

(c) **Scope** – Defines the extent of application of law (including extraterritorial applications, e.g., to nationals or persons within the territory, fisheries waters or types of fisheries.)

<table>
<thead>
<tr>
<th>Objective</th>
<th>Main purpose</th>
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<tbody>
<tr>
<td>1. Maximize catches</td>
<td>Sustainability</td>
</tr>
<tr>
<td>2. Maximize profit</td>
<td>Efficiency</td>
</tr>
<tr>
<td>3. Conserve fish stocks</td>
<td>Sustainability</td>
</tr>
<tr>
<td>4. Stabilize stock levels</td>
<td>Efficiency</td>
</tr>
<tr>
<td>5. Stabilize catch rates</td>
<td>Efficiency</td>
</tr>
<tr>
<td>6. Maintain healthy ecosystem</td>
<td>Efficiency</td>
</tr>
<tr>
<td>7. Provide employment</td>
<td>Equity</td>
</tr>
<tr>
<td>8. Increase fisher's incomes</td>
<td>Equity</td>
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<tr>
<td>9. Reduce conflicts among fisher groups or with non-fishery stakeholders</td>
<td>Equity</td>
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<tr>
<td>10. Protect sports fisheries</td>
<td>Equity</td>
</tr>
<tr>
<td>11. Improve quality of fish</td>
<td>Equity</td>
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<tr>
<td>12. Prevent waste of fish</td>
<td>Equity</td>
</tr>
<tr>
<td>13. Maintain low consumer prices</td>
<td>Efficiency</td>
</tr>
<tr>
<td>14. Increase cost-effectiveness</td>
<td>Efficiency</td>
</tr>
<tr>
<td>15. Increase women's participation</td>
<td>Equity</td>
</tr>
<tr>
<td>16. Reserve resource for local fishers</td>
<td>Equity</td>
</tr>
<tr>
<td>17. Reduce overcapacity</td>
<td>Efficiency</td>
</tr>
<tr>
<td>18. Exploit under-utilized stocks</td>
<td>Equity</td>
</tr>
<tr>
<td>19. Increase fish exports</td>
<td>Equity</td>
</tr>
<tr>
<td>20. Improve foreign relations</td>
<td>Efficiency</td>
</tr>
<tr>
<td>21. Increase foreign exchange</td>
<td>Equity</td>
</tr>
<tr>
<td>22. Provide government revenue</td>
<td>Equity</td>
</tr>
</tbody>
</table>
Administrative and management institutional framework – Establishes or designates the public management authority, executive head and staff, boards, committees, etc. and their powers and functions.

Management approaches, principles and planning – Stipulates specific management aspirations or management approaches, guidelines, management plans including formulation, content and endorsement. A different or specific fishery that is to be managed and the approach to be used may also be described.

Statement of general fishing access and entitlements – Sets out the prerequisites for fishing and the persons or groups of persons who can participate in fisheries, e.g., nationals, locally based foreign operators/vessels or foreign vessels.

Management tools and related processes – Establishes and describes the management tools to be utilised for regulating input and output, such as concessions, licences and other authorisations, fishing rights, quotas including individual transferable quotas and spatial and temporal limits.

Monitoring, Control and Surveillance (MCS)† (Bio-economic and enforcement information requirements) – Establishes and defines the MCS schemes and tools including scientific observer programmes and inspection schemes, procedures, powers and rights, for example, rights of observers or inspectors to access all parts of the vessel and stop, board and inspect vessels.

Prohibitions, violations and sanctions and enforcement processes – Creates or describes prohibitions and violations, the administrative or criminal enforcement process to deal with violations including evidentiary provisions. This part of the law also establishes and describes sanctions for violations.

Alternative approaches to management – Establishes the ability for the State or management authority to delegate, devolve or enter partnership or cooperative arrangements for management or to engage in other management approaches as appropriate.

Regulations – Sets out requirements including standards, restrictions, procedures etc. that are too elaborate to be stated in principal legislation but are required for implementation of the principal law.

B.3 National Fisheries and Related Legislation
Fisheries law, primarily as a body of national or domestic laws, is unique to the country or territorial subdivision within which the law applies. The manner in which the law is elaborated, interpreted and applied is subject to the country’s legal and judicial system (e.g. civil or common law) as shaped by the governance framework and the country’s legal history, philosophy, case law and customs.

Managers should be familiar with the principal sources of law they administer and where their management powers and functions come from. As a minimum, managers should know the fundamental elements of the principal fisheries legislation and appreciate that other laws that govern other sectors, to the extent that they operationally impact on any aspect of fisheries, are also considered part of the fisheries legal framework. Managers must then work within the ambit of that framework. Fisheries managers should be aware of a ‘non-fisheries-specific’ category of laws that govern other sectors but indirectly impact on fisheries such as fundamental laws (e.g. the Constitution) and laws on local government or decentralisation, shipping, veterinary, customs and excise, environment and conservation, health (food safety
and quality), trade and commerce. A basic awareness of these laws will facilitate the identification of the person or office within the other sector's regulatory authority that should be consulted on operational matters. In some instances, the manager is clearly instructed by the primary fisheries law to ensure that certain management interventions are consistent with other laws.

**B.4 International Instruments**

**B.4.1** A plethora of international instruments in capture fisheries addressing various fisheries management issues have emerged in the last two decades. Binding instruments include:


(b) Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessel on the High Seas


**B.4.2** The LOS Convention, often referred to as the constitution for the oceans, codifies customary international law of the sea and lays the foundation for all subsequent international arrangements and agreements relating to the use of the oceans and seas. Arising directly from the LOS Convention and designed to strengthen its provisions on high seas fisheries and transboundary stocks is the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement) and the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Compliance Agreement).

**B.4.3** The influence exerted by binding fisheries instruments on national policies and legislation is remarkably visible. For example, in anticipation of entry into force of the LOS Convention, many coastal states enacted national legislation claiming 200 nautical miles exclusive economic zones (EEZs). As a consequence of Article 73 of the LOS Convention, there is a growing trend to limit sanctions against the crew of foreign fishing vessels found in contravention of the coastal state's fisheries-specific laws in the EEZ to monetary and non-custodial sanctions in the absence of an agreement to the contrary between the states concerned. Coastal states now require vessels flying their flags, including those operating on the high seas, to be licensed and subjected to conditions set out in the Compliance Agreement and the UN Fish Stocks Agreement.

**B.4.4** A non-binding fisheries instrument of global significance is the FAO Code of Conduct. Although a voluntary instrument, the FAO Code of Conduct is of high value. It is implemented in numerous policy documents and national legislation. The FAO Code of Conduct, in issuing guidelines on areas where legislation is required for promoting responsible fisheries, is useful in policy and legislative development. The international plans of action (IPOA) developed under the auspices of the Food and Agriculture Organization of the United Nations (FAO) to implement certain aspects of the FAO Code of Conduct are similarly useful. The International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) warrants special mention. The IPOA-IUU contains valuable guidelines for legislative implementation particularly in MCS. An increasing number of states have adopted National Plans of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated fishing (NPOA-IUU) modelled on the IPOA-IUU.
B.5  Relationship between International and National Fisheries Legal Frameworks

International law and international fisheries instruments are vital to fisheries management as they reflect state commitments to recognised conservation and management doctrines, standards, rights and best practices (Figure 23). The manager is required to develop sufficient familiarity with international binding and voluntary instruments concerning fisheries to ensure their effective translation and application at the domestic level. This is necessitated by the often overlooked fact that international law and commitments by states as stipulated in conventions and agreements may bind states, but in many instances they will not be applied or enforced domestically against natural or juridical persons unless they are reflected in ‘enabling legislation’. For example, the requirement of a state party to the Compliance Agreement to record and license vessels flying its flag cannot be imposed on the owners or operators of such vessels unless there is in place national legislation that has the same requirement. Domestic enabling legislation is vital for non-binding instruments, such as the FAO Code of Conduct and IPOAs, as national legislation can translate the calls for voluntary action into legal requirements by enforcing rights and responsibilities and sanctioning non-compliance.

![Diagram of the National Fisheries Legal Framework](image)

Figure 12: Representation of a typical national fisheries legal framework showing the relationship between international, non-fisheries-specific and fisheries-specific law.

B.6  Regional Fisheries Entities and Arrangements

Regional fisheries bodies (RFBs) and regional fisheries management organizations (RFMOs) and arrangements, to the extent allowed by their constitutions, have important institutional, advisory, regulatory and coordinating functions in fisheries management. These entities are the principal medium for multilateral cooperation for the management of shared resources as mandated by the LOS Convention and reinforced in the UN Fish Stocks Agreement, the Compliance Agreement, the FAO Code of Conduct, the IPOA-IUU and other binding and non-binding fisheries instruments. The management, regulatory or coordination regimes of these entities are often pragmatic and are of immediate relevance to state parties in terms of how management advice, measures and regulations are tailored to the region concerned. This in
turn often translates into efficient domestic implementation or enforcement of management measures, regulations or advice. The documented growing role of RFBs in preventing, deterring and eliminating IUU fishing clearly underlines the significance of their contribution to global fisheries management.

As a result of the duty for states to cooperate through RFBs, RFMOs and arrangements and the increasing role and involvement of RFBs in combating IUU fishing, more countries than in the past will become members of one or more regional bodies, including RFMOs, such as the various tuna bodies (e.g. the Indian Ocean Tuna Commission (IOTC)). Managers must be aware of the RFMOs or RFBs in which their country is involved, and the implications and obligations of membership or in becoming a ‘cooperating non-party’ particularly where the RFMO or RFB has the competence to adopt binding decisions.

C. Fisheries Management Approaches and Tools

Typically, the approaches or tools that can be used to manage fisheries are determined or restricted to those set out in the fisheries legislation as outlined below:

C.1 Fishery Plans: Many countries have embraced the management planning approach in regulating and managing fisheries by requiring the development of fishery plans in fisheries legislation. The manager should determine whether the law requires general (national) plans or specific fishery plans to be developed. The manager should also be familiar with the process for development and promulgation of the fishery plan, any mandatory elements of the plan, the legal status of such plans and their implementation, enforcement and review requirements. Examples of matters that can be regulated include the following:

(a) measures for the conservation, management, development, licensing and regulation of fisheries or any particular fishery, including total allowable catch and quota system as appropriate

(b) licensing any vessel or class or category of vessels to be used for fishing and related activities or any other purpose

(c) licensing or registration of fishing gear and other equipment or devices used for fishing

(d) types and sizes of fishing gears and other fishing devices including the sizes of fishing nets that may be used for fishing, where they may be used and prohibited fishing nets

(e) manufacture, importation and sale of fishing nets

(f) landing requirements for any vessel or class or category of vessel or licence

(g) catching, loading, landing, handling, transhipping, transporting, possession and disposal of fish

(h) tuna fishing or fishing for any specified species of fish

(i) importation, export, distribution and marketing of fish and fish products

(j) licensing, control and use of fish aggregating devices, and, the rights to the aggregated fish and prescribing times and the minimum distance from such devices to for fishing
(k) standards and measures for the safety of fishers
(l) matters relating to satellite monitoring of fishing activities
(m) aquaculture
(n) recreational fishing
(o) canoe fishing including markings and identity of canoes
(p) the provision of statistical and other information related to fisheries
(q) control, inspection or operation of fish processing establishments
(r) returns concerning fishing operations required to be submitted by licensees
(s) licences and logbooks to be carried on board motor fishing vessels
(t) further conditions for fishing licences
(u) conditions for the approval of charter agreements
(v) general matters for the achievement of the purposes of the principal fisheries legislation

C.2 Effort and Catch Management: The regulation of effort would most likely be achieved through the implementation of an authorisation (licensing or permitting) system. Many jurisdictions require in their fisheries laws that no person shall engage in fishing without a concession or an authorisation in a form of licence or permit issued in accordance with the fisheries law with effort control measures such as gear restrictions, fishing day limits and spatial restrictions in order to achieve better results in managing effort.

The typical catch management measure, the total allowable catch (TAC), is often prescribed in the fisheries law. For certain stocks, such as highly migratory tuna stocks, the requirement to specify the TAC is required by the LOS Convention and is restated in the national fisheries law as a matter of course. The only difference between the broad international commitment for setting the TAC stated in the LOS Convention and the requirements relating to TAC in national legislation is that the latter would normally elaborate how the TAC would be determined and allocated as fishing entitlements by the state.

At the multilateral and regional level, the RFMO that has been accorded the appropriate competencies by its members would be the authority that determines and allocates TAC entitlements. Many jurisdictions, particularly those employing quota management systems, would naturally have a requirement in the law for setting the TAC for a fishery.

C.3 Fishing Rights: Legally, a ‘right’ is the ability of the claimants to call upon others without such claims to acknowledge their duty to honour the claim, with any violation of such a duty sanctioned by the state or by an authority. It is ‘a capacity . . . of controlling, with the assent and assistance of the State, the actions of the others.’ The licence or permit to fish is one form of right while a TAC allocation as a quota is another form. An individual transferable quota (ITQ) is at the end of the spectrum which has more rights or valuable characteristics often referred to as ‘property rights’ as it possesses the elements of exclusivity – the ability to hold and manage the right without outside interference; duration, from long term to perpetuity as appropriate; security of tenure – the ability to withstand challenges of others to the title; and transferability, with varying degrees of restriction on transferees.
C.4 Use of Technical Measures: Two categories exist: (a) 'prohibitions' category, e.g., the use of explosives or toxic substances to take fish or the taking of fish using spear guns and electric shocks, or the taking of protected species are prohibited; (b) subsidiary legislation (regulations, decrees, by-laws or administrative orders) to regulate the use of, for example, fishing gear such as nets and vessels and their specifications including the requirements or conditions relating to the taking of certain species and temporal and spatial closures and conditions that apply to these closures.

C.5 Participatory or Partnership Management: Fisheries resources being res communes (of the public domain) are vested in the state and its agents to be regulated for the public good, meaning that law and institutional structures, were not designed historically to support partnerships or co-management. Thus partnerships, co-management arrangements and other forms of participatory management systems must have a legal basis. Co-management must be unhindered, enabled and supported by the fisheries legal framework so that rights and responsibilities, including decision-making for the management of common pool resources, are redistributed, protected and enforced.

Figure 13: Levels of Partnership Arrangements That Can be Legislated

The illustration of the levels of co-management in Figure 24 shows the varying degrees of partnership arrangements that exist. The legal framework is not likely to expressly label that which is essentially a cooperative arrangement as a ‘partnership’, particularly where such arrangements do not involve substantive management interventions. The prevailing practice indicates that the legal frameworks for co-management arrangements are largely 'framework' laws in that they primarily enable the use of co-management by vesting powers in the manager to use co-management where appropriate. These framework laws for co-management set out the basic essentials to provide for

(a) the designation of the co-management unit (e.g. fisher or other stakeholder groups);

(b) choice in demarcation of areas or fisheries for co-management;
allocation of the mandate or such rights and responsibilities as are required for an effective co-management arrangement;

elaborated regulatory framework governing behaviour and relations between various partners in the co-management arrangements and between designated co-management units;

avenues for enforcement of rights and responsibilities and conflict resolution.

It is worth restating here that the manager should appreciate his or her role in the management or support of the prescribed or designated co-management system to ensure that it is well-coordinated and functions in an efficient manner.

D. Fishing Access Agreements

Many developing country coastal states with vast EEZs assign, under bilateral or multilateral access agreements, access rights to fish for foreign fishing vessels. Such agreements should contain the following essential elements:

(a) Provision of fisheries access, related activities and such other matters as are provided for by the fisheries legislation

(b) The granting of preferential access to vessels of certain countries or groups of countries

(c) The requirement that fishery allocations under the agreements do not exceed a level consistent with the conservation and management of fishery resources and the protection of fishing by citizens of the State and must be consistent with all fishery management plans

(d) The requirement to implement minimum terms and conditions of fisheries access as agreed from time to time including:

(1) establishing the responsibility of the foreign party to take all measures necessary to ensure compliance by its vessels with the terms and conditions of the access agreement and with all applicable laws;

(2) requiring the operator or any other person responsible for the operation of a licensed vessel not to tranship fish at sea whether or not such transhipment is done within areas under national jurisdiction or on the high seas, and only tranship through designated ports or as provided by the access agreement;

(3) requiring the operator or any other person responsible for the operation of a licensed vessel to ensure compliance with requirements relating to:

(i) the appointment of a resident local agent;

(ii) the placement of observers;

(iii) reporting requirements as to entry into and exit from the State waters;

(iv) the maintenance of catch figures and log books;
(v) the provision of data and information;
(vi) the imposition of any other control required by law or necessary for the proper management or conservation of any fishery.

(e) The issuing of licences for fishing and related activities, and for any matter provided for under the fisheries legislation
(f) Requiring such other matters as may be necessary for the effective implementation of the access agreement

E. Monitoring, Control and Surveillance

E.1 MCS and the Law: The fisheries law fulfils the following basic functions in relation to MCS:

(a) defines the powers, duties and obligations of the management authority especially in regulating entry and the behaviour of persons engaged in the fishery (e.g. prohibiting certain activities, requiring that other activities be undertaken only under the authority of a licence, and prescribing the manner in which fishing and related activities must be conducted);
(b) establishes or designates the competent entity for MCS including the fisheries monitoring centre;
(c) designates or provides a mechanism for the designation of observers and enforcement officers;
(d) provides the basis for developing MCS plans and implementing various MCS tools, for example, vessel monitoring systems (VMS);
(e) protects the interests of fishers (e.g. confidentiality of information);
(f) grants enforcement powers to officials (e.g. to arrest, detain and seize);
(g) safeguards basic civil rights of alleged wrongdoers in enforcement action; and
(h) establishes the judicial or alternative enforcement system for penalising those who violate fisheries rules, the procedures in that enforcement system and the applicable sanctions.

The manager is essential to the process of identifying weaknesses or gaps in the management and MCS with a view to rectifying them.

E.2 Fisheries Management and MCS in the Fisheries Legal Framework: The need to have information on the behaviour and consequences of the behaviour of fishers and other stakeholders in a fishery, so that appropriate management action or the review thereof can be undertaken, is the core incentive for MCS interventions. The actions to furnish information can be set in motion prior to, during and after fishing operations. The means to procure the kind of information required (e.g. inspections, at-sea monitoring by observers or VMS surveillance) is by and large facilitated by the fisheries law. The manager should be sure to adhere to rules protecting the rights of the person providing information (e.g. ensuring confidentiality). Where enforcement becomes necessary, the fisheries law enables the enforcement authority to utilise available information or gather specific information (e.g. evidence of contraventions) to support enforcement action.
E.3 Participatory Management and MCS: Co-management and other participatory management systems could contemplate an MCS role for the co-management unit or participants. For the reasons elaborated above relating to the nature and implications of MCS interventions, it is vital that any MCS responsibility envisaged for the co-management unit be sanctioned by law. Compliance and enforcement functions for co-management units, particularly those that rely heavily on self-regulation, may not be provided for in the law, as the primary focus of such participatory management systems would be on voluntary compliance, but this is not necessarily true in all cases.

E.4 Vessel Monitoring Systems: VMS like other modern monitoring and near-real-time information systems is a relatively new technology in the MCS toolbox not fully utilized by most developing countries. Among the essential components for the regulatory framework for implementing VMS are:

(a) the enabling power of the FMA to introduce and implement VMS as an MCS tool;

(b) the VMS components and technical standards or specifications for the components;

(c) the rights and responsibilities of the FMA in managing the VMS system and the persons required to implement VMS;

(d) the ownership and the primary and secondary uses of VMS information;

(e) the requirements and specifications for ensuring confidentiality and security of information;

(f) the rules for ensuring efficient operation, maintenance and operational performance of VMS components supported by enforcement and sanctions against violations;

(g) the use of VMS information as evidence in a court of law.

The further use of existing VMS policy or MCS plans which will define how VMS will be used to achieve the objectives set out in such plans, or the formulation of new VMS policies and MCS plans, would greatly assist the development of such a regulatory framework.

E.5 Enforcement: The rules governing enforcement for non-compliance or contraventions of fisheries laws are usually precise. Strict adherence by enforcement officers to these rules, which should be broad enough to enable enforcement officers to carry out their duties but sufficiently strict to protect fishers against the abuse of power, is crucial. Initial enforcement actions such as boarding and inspection on suspicion of contraventions, collecting evidentiary material, directing an alleged offending vessel to port and fixing a bond or security for prompt release of a foreign fishing vessel and its crew are typically located in the principal fisheries legislation. In many developing countries, utilisation of existing enforcement agencies through cross-authorisation to enforce another sector’s law and close collaboration between law enforcement agencies ensures sensible utilisation of scarce resources. Ensuring where possible that there is standard or joint training of fisheries and ordinary law enforcement officers, coordinated exercises and cooperation between the management authority and other law enforcement agencies is essential for effective MCS.

E.6 IUU fishing: IUU fishing as defined in the IPOA-IUU is essentially a description of the problems that MCS and its supporting legal framework are set up to address. The ‘illegal’ and ‘unreported’ problems are typical aspects of the IUU fishing problem – the terms,
fundamentally, refer to situations where regulatory regimes exist and apply to the persons involved in the activities, but the persons who commit the ‘unlawful’ or ‘unreported’ acts deliberately choose to ignore the applicable rules. The compliance and enforcement components of MCS deal with these first two aspects of the IUU fishing problem. The ‘unregulated’ aspect of IUU fishing basically means that there is no regime governing the fisheries (i.e. there are no conservation or management measures in place) or a specific behaviour and therefore compliance and enforcement rules cannot be invoked. The IPOA-IUU and its related technical guidelines are a manager’s essential guidebooks on MCS. They present a wide range of MCS options including legal options to tackle the IUU fishing problem and are indispensable tools to the manager in fulfilling their MCS mandate.

E.7 Port States Measures: The use of Port State Measures (PSM) to complement other means to fight IUU fishing is becoming increasingly crucial. PSM are considered effective weapons against IUU fishing due to the fact that ports lie wholly within a state’s territory and general international law recognises that a state has wide discretion over what happens in its ports. PSM may include denial of access to ports or use of port facilities, refusal of permission to land or tranship catch and inspections to ensure that catches have been taken in accordance with applicable conservation and management measures.

F. Regulation of Fishing Gears and Methods

F.1 The need for fisheries management arises as the surplus production from fish stocks is overtaken by the catching capacity of fishing fleets. Catching capacity is the product of the fishing effort and the combined efficiency of the fishing gear and the fishing vessel (e.g. loading capacity, engine power, range capacity, fish finding and navigational equipment), as well as the skills of the crew.

F.2 Fishing gears

F.2.1 The Ideal Fishing Gear: Some criteria for the ideal fishing gear could be:

(i) highly selective for the target species and sizes, with negligible direct or indirect impact on non-target species, sizes and habitats;

(ii) effective, giving high catches of target species at lowest possible cost;

(iii) quality orientated, producing catches of high quality

F.2.2 Classification of Fishing Gears: Fishing gears are commonly classified in two main categories: passive and active. This classification is based on the relative behaviour of the target species and the fishing gear. With passive gears, the capture of fish is generally based on the movement of the target species towards the gear (e.g. traps), while with active gears capture is generally based on an aimed chase of the target species (e.g. trawls, dredges). A parallel on land would be the difference between the trapping of and hunting for animals.

G. Area and Time Restrictions

G.1 Defining Area and Time Restrictions

Practitioners refer to area closures (whether temporary, seasonal or permanent) by various names, each of which may have a particular formal definition, depending on the legislative or cultural context. Of these various terms, however, ‘Marine Protected Area’ is, perhaps, the most widely used. The International Union for Conservation of Nature (IUCN) defines a Marine Protected Area (MPA) as Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by
law or other effective means to protect part or all of the enclosed environment. Other jurisdictions define an MPA as:

an area of the sea . . . (that) has been designated . . . for special protection for one or more of the following reasons:

(a) the conservation and protection of commercial and non-commercial fishery resources, including marine mammals, and their habitats;

(b) the conservation and protection of endangered or threatened marine species, and their habitats;

(c) the conservation and protection of unique habitats;

(d) the conservation and protection of marine areas of high biodiversity or biological productivity; and

(e) the conservation and protection of any other marine resource or habitat.

The objectives for establishing area or time restrictions may be placed into three broad categories:

(1) Fisheries management issues

(2) Broader conservation considerations

(3) Equity issues.

G.2 As a fishery-management measure

States should prevent overfishing and excess fleet capacity and should implement management measures to ensure that fishing effort is commensurate with the productive capacity of the fishery resources and their sustainable utilization. Area and time restrictions can help in achieving these objectives in the following ways:

(1) Limiting harvest of specific life stages: Often it is desirable to prevent fishing on particular stages of a species life cycle that are especially vulnerable to capture or are critical to overall production. One example is of species that aggregate in particular areas to spawn. There might also be a need to protect areas where juveniles live. Fishing for the adults in an area with a high proportion of juveniles may lead to high juvenile bycatch that fishers cannot land for legal or practical reasons. Closing the area would allow those fish to grow and contribute to the landed catch in later years. Closed seasons, for example, are most often used for fast-growing species with a short recruitment period, such as prawns and shrimps. In fisheries for such species, closing the fishery early in the season allows individuals to grow to larger and more valuable sizes.

(2) Protecting depleted stocks and their habitats during the rebuilding phase of a fishery: If a fishery has collapsed, or is close to collapse, the action one must take to allow the stock to rebuild is likely to be severe, including a total ban on fishing or in some circumstances, allowing fishing in some areas but preventing it in those that are critical to the rebuilding.

(3) Protecting genetic reservoirs: Protected areas to help preserve genetically diverse sub-populations may in some settings provide insurance against such possibilities.
Protecting habitat that is critical for the sustainability of fished populations:
Some types of fishing gear can have large negative effects on benthic (sea, lake or riverbed) habitat that may be important for the sustainability of fished populations. Often such habitats will be inshore, where juvenile fish aggregate in areas with high physical structure such as seagrass beds or mangroves. Article 6.8 of the FAO Code of Conduct makes specific reference to protecting such critical fisheries habitat as a guiding principle for responsible fisheries.

To restrain excess fleet capacity and optimise the value of the catch: When there is excess fishing capacity, a short, properly chosen fishing season can prevent overexploitation of the stocks. With this approach, choosing the right time to open the fishery can have a big effect.

G.3 As a wider conservation measure

Protecting benthic habitats of high conservation value: management measures should provide that ‘biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected’.

Limiting bycatch: In some groundfish fisheries, for example off Alaska, the authorities set closed seasons to minimise bycatch rates or potential effects on marine mammals.

Protecting attributes of the ecosystem that are critical for preserving ecosystem services, in particular the provisioning and regulatory services

G.4 To resolve equity issues

Providing a mechanism to resolve conflict over multiple use of areas or resources, for example artisanal fishers versus industrial fishers, tourism, shipping and recreational fishing, where the only tractable solution is to restrict activities to certain areas by some form of zoning arrangement, either permanently or seasonally.

Reserving valued marine and coastal resources for the preferred use of residents or traditional users: Often indigenous cultures have traditional (and sometimes exclusive) claims on certain lands or resources. Providing exclusive use in an area or season is a way to honour such claims. Similarly, local fishers’ cooperatives or communities might benefit from area-based rights protection.

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Tanzania Fisheries Sector Development Programme (MLFD, 2010)

Review of Fisheries and Aquaculture Development Potentials in Georgia (Khavtasi, 2010)

A Fishery Manager's Guidebook (Cochrane et al., 2009)

A Model Strategic Framework for Prioritization and Development of Inland Water Bodies under Fisheries and Aquaculture (Roy, 2015)
3.3.13 The Politics of Food Safety and Food Security Indicators: The Politics of International Food Standards

A. Introduction
The general public as consumers want food to be safe—or safe enough—and they expect the food industry and government to make sure that it is. The public is also part of the political equation. Food safety is a matter of politics as well as science and stakeholders need to recognize the political forces at work in safety matters. One of the noticeable weaknesses of food safety systems governance in most countries is the fragmented, overlapping, and confusing distribution of authority among the national agencies concerned with food safety. While these disparate authorities are responsible for making sure that unsafe food does not get into the human food supply, most often the system fails to ensure that food companies follow rules designed to protect public health. The mandate overlap complicates government oversight of microbial contaminants in food, genetically engineered foods, and protection of the food supply against potential threats of bioterrorism.

There is a tendency by the food industries to promote economic self-interest at the expense of public health and safety. Whenever things go wrong, culpable companies shift blame to others or variables outside their control, and oppose, resist, and undermine food safety guidelines, following them only when forced to do so by government action or public opinion.

The food industry invokes science as a rationale for self-interested actions. In the case of the ongoing debate about the safety of genetically engineered foods, companies use scientific arguments that the products are not yet known to cause food safety concerns push for registration and approval of their products. Unscrupulous food companies use science as a political tool to oppose requirements to keep harmful microbes out of food, label genetically modified foods, or institute protective measures against bioterrorist threats. Greater attention to food safety has been raised partly by the extensive media coverage in recent years given to food scandals, food-borne human diseases, fears with regard to genetically modified foods, and, recently, consideration of the vulnerability of food and water supplies to terrorist activity.

Food safety is used as a means through which consumer advocacy groups raise issues about the self-interested exercise of corporate power, the imbalance in power between corporate and public interests, and the collusion of government policies with business interests. Advocacy groups can use questions of safety to address much broader social and political concerns.

B. Perceptions of Food Safety Risk
Safety is relative; it is not an inherent biological characteristic of a food. A food may be safe for some people but not others, safe at one level of intake but not another, or safe at one point in time but not later. Instead, we can define a safe food as “one that does not exceed an acceptable level of risk” (Nestle, 2010). Decisions about acceptability involve two overlapping approaches in which people assess risk to decide whether a food is safe: from the perspective of “science” and from the perspective of “values.” A “science-based” approach to food safety, which balances risk against benefits and costs and contributes to the estimation of risk, is distinguished from a “value-based” approach focused on the acceptability of risk, which tends to balance risk against dreaded outcomes or feelings of outrage. Scientific questions do not arise in value-free contexts and value-based approaches often consider scientific arguments. When such decisions have implications for commercial or other self-interested motives, food safety enters the realm of politics.

Nestle (2010) argues that the estimation of risk is a scientific question—and, therefore, a legitimate activity of scientists in government agencies, in universities and in the research institutions while the acceptability of a given level of risk, however, is a political question to be determined in the political arena.
Table 4: Comparison of “science-based” and “value-based” approaches to evaluating the acceptability of food safety risks

<table>
<thead>
<tr>
<th>“Science-Based”</th>
<th>“Value-Based”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counts and calculates:</td>
<td>Assesses whether risk is:</td>
</tr>
<tr>
<td>• Cases</td>
<td>• Voluntary or imposed</td>
</tr>
<tr>
<td>• Severity of illnesses</td>
<td>• Visible or hidden</td>
</tr>
<tr>
<td>• Hospitalizations</td>
<td>• Understood or uncertain</td>
</tr>
<tr>
<td>• Deaths</td>
<td>• Familiar or foreign</td>
</tr>
<tr>
<td>• Costs of the risk</td>
<td>• Natural or technological</td>
</tr>
<tr>
<td>• Benefits of the risk</td>
<td>• Controllable or uncontrollable</td>
</tr>
<tr>
<td>• Costs of reducing the risk</td>
<td>• Mild or severe</td>
</tr>
<tr>
<td>• Balance of risk to benefits</td>
<td>• Fairly or unfairly distributed</td>
</tr>
<tr>
<td>Balances risk against benefit and cost</td>
<td>Balances risk against dread and outrage</td>
</tr>
</tbody>
</table>

Source: (Nestle, 2010)

Thus each dispute has two main components, factual issues and value issues. Factual questions include: What risks are involved? How big are they? Who is at risk? These are scientific questions. The central value question is: Given those facts, what should society do? A more detailed examination of the two approaches to evaluating risks—called, for lack of better terms, science-based and value-based—helps to explain why food safety issues are so political.

B.1 Science-Based Approaches: Counting Cases and Costs

Science begins with an observation, but rather than accepting an observation as a universal truth, scientists question its accuracy, interpretation, and relevance; develop theories to explain its significance; and design and conduct experiments to test those theories (Nestle, 2010). The quality of scientific research depends not only on the question under investigation (some research questions are more interesting and important than others) and the care (“rigour”) with which studies are conducted, but also on the ability of the studies to eliminate (“control for”) all possible causes of the observation other than the one being tested. Scientific methods also extend beyond observations to suggest probable causes, to exclude irrelevant causes (“confounding variables”), and to estimate the probability that a particular cause is the true reason for the observation of interest. However, probability is not the same as proof. Biological experiments in humans are complicated by genetic variation and behavioural differences, and study results nearly always depend on probabilities and statistics. This means that they are subject to interpretation and, therefore, to perception, opinion, and judgment. Scientists tend to minimize the subjective nature of interpretation and to view knowledge gained through the testing of theories as objective, accurate, evidence-based, hypothesis-driven, and rigorous.

In practice, a science-based approach to food safety is one that appears to focus exclusively on the characteristics of the risk itself: annual cases of illness, doctor’s visits, hospitalizations, deaths, costs to individuals and to society, the benefits of doing nothing about the risk, and the benefits and costs of risk reduction. From this perspective, risks are measurable and, therefore, “scientific” and “objective.” Researchers and government officials evaluate potential hazards through a formal process of risk assessment that involves identifying the hazard, characterizing it, determining its degree of exposure in the population, and calculating the
balance of risk to benefit and cost. Using this science-based approach, government agencies identify the primary preventable food safety hazards as microbial infections, antibiotic resistant Salmonella, food allergens, and certain pesticides. Because so much self-interest is at stake in such decisions, these areas have political as well as scientific dimensions—whether recognized or not.

B.2 Value-Based Approaches: Estimating Dread and Outrage

Scientific methods estimate the probability that something in a food might lead to illness, but they do not consider the intangible value or significance of that food to the people eating it. Many people, however, evaluate risks not only for their potential to cause health problems but also from the standpoint of personal beliefs and values that depend on a host of psychological, cultural, and social factors. These personal perspectives about food have also been studied extensively. Anthropologists, for example, tell us that the act of consuming food—taking it into our bodies—is so primal that societies create myths to explain the transformation of food into us. Because, in that sense, we truly are what we eat, food raises questions of intimacy and identity and provokes feelings of anxiety. People do not necessarily want food to be perfectly safe (or we would never eat wild mushrooms or raw oysters). We are just more comfortable knowing what we are eating. At some deep psychological level, “If we are what we eat, and we don’t know what we are eating, then do we still know who we are?”

On the ranking of potential hazards according to the degree of perceived harm, studies indicated that people worry most about risks perceived as highly dangerous, particularly to pregnant women and small children (a science-based concept), but they are also concerned about risks perceived as involuntary, unpreventable, unfamiliar, and inequitably distributed—factors based on values (Nestle, 2010). People are less willing to accept risks induced by technology, those poorly understood by science, and those subject to contradictory statements from experts. The more such value-based factors characterize a particular risk, the more the risk generates feelings of anxiety, alarm, dread, and outrage. In fact, risk communication researchers rank such factors on a predictable scale of dread and outrage.

With respect to food, acceptance of risk depends far more on perception of the number and intensity of dread-and-outrage factors than it does on the number of cases of illness. On a population basis, microbial contaminants unquestionably pose the most prevalent foodborne threat to health. The public, however, also ranks chemical pesticides and additives, irradiation, and genetic engineering high on the list of perceived risks, largely because exposures to them are invisible, involuntary, imposed, and uncontrollable. The health risks of genetically modified foods (however remote they may be) are hidden and undemocratically applied and as a result are far less acceptable. Because questions of who imposes risks and who takes risks are crucial in assessing whether a risk is acceptable, decisions about food safety take on political dimensions.

A comparison of the two approaches to assessing risk explains why whenever someone invokes science in discussions of food safety, we can be reasonably certain that questions of self-interest are at stake but are excluded from debate. Scientists talk about risk as a matter of illness and death. The public wants dread-and-outrage factors to be considered as well. The failure of food companies, scientists, and government agencies to recognize the need to address values as well as science in matters of food safety leads to widespread distrust of the food industry and its regulators. When officials and experts dismiss dread-and-outrage concerns as emotional, irrational, unscientific, and indefensible, they raise questions about their own credibility and competence. They fail to recognize their own biases as well as the predictability of public responses to food safety risks. When a risk manager continues to ignore these factors—and continues to be surprised by the public’s response of outrage—it is worth asking just whose behaviour is irrational (Nestle, 2010).
B.3  The Precautionary Principle: Look Before You Leap

The differences in the two approaches to food safety risk have an additional political dimension. They imply different expectations for the ways in which authorities make decisions about the release of new foods and ingredients. The science-based approach works on the proposition “nothing ventured, nothing gained.” Regulators determine as well as they can whether a food or ingredient is likely to cause harm and permit those that seem reasonably safe to enter the food supply. Food safety authorities use this approach for food additives characterized as “generally recognized as safe” (GRAS). If problems occur, the authorities deal with them after the foods are marketed. This approach requires neither premarket testing nor labelling; it is based on a standard that requires food manufacturers to demonstrate “reasonable certainty of no harm.” This standard, which translates as “safe enough to be acceptable,” leaves plenty of room for subjective opinion and judgment.

An alternative approach is one that has come to be known as the principle of precautionary action, or the “precautionary principle.” Whether or not to invoke the Precautionary Principle is a decision exercised where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection. The appropriate response in a given situation is thus the result of a political decision, a function of the risk level that is “acceptable” to the society on which the risk is imposed. In practice, invocation of the precautionary principle can be used to require companies to demonstrate that foods are safe before they are marketed. Further stressing the principle, the Wingspread statement on the precautionary principle states: “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context, the proponent of the activity, rather than the public, should bear the burden of protection” (Nestle, 2010). Further to this, European and United States experts on food biotechnology issued a joint statement in 2000 saying, “When substantive uncertainties prevent accurate risk assessment, governments should act protectively on the side of safety.” Even so mild a statement suggests that companies will have to do more to demonstrate safety in advance. But because testing can never prove that a food is perfectly safe, public willingness to accept a new food depends on how well it meets the value concerns summarized in Table 3. If a food ranks high in dread and outrage, it will never appear safe enough, no matter how much effort goes into attempts to prove it harmless.

C.  The Political Economy of Foodborne Illness

The strengthening of food laws is a necessary political process intended to control food safety for which the society expects governments and their regulatory agencies to take responsibility. Accurate burden-of-illness estimates for foodborne diseases are useful for policy makers and others that seek to characterize and prioritize resources dedicated to addressing the problem of these diseases (Scharff, 2012).

Government agencies that employ economic cost data in regulatory analyses typically use either a basic cost-of-illness model that includes values for medical care, productivity losses, and mortality or a cost-of-illness model enhanced to include pain and suffering values. By including a value for pain and suffering, the enhanced model has the advantage of more fully accounting for economic costs associated with foodborne illness. This value is derived by monetizing quality-adjusted life years (QALYs) that have been designed to assess utility loss. Monetized QALY losses are the product of loss of well-being from a condition, the number of days with the condition, and the economic value of 1 day (derived from the value of statistical life). Ideally, this measure would represent the ill consumer’s willingness to pay to avoid these pain and suffering losses. In contrast, the basic model avoids the controversy over how QALYs should be used but does not provide a value for the legitimate economic costs associated with pain and suffering.
Table 5: Burden of Foodborne Illness Expressed as Annual Number of Cases in the USA
Adapted from (Scharff, 2012)

<table>
<thead>
<tr>
<th>Disease or agent</th>
<th>No. of illness</th>
<th>No. of hospitalizations</th>
<th>No. of deaths</th>
<th>Total cost (millions of US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bacillus cereus</em></td>
<td>63,400</td>
<td>20</td>
<td>0</td>
<td>2.28 - 46</td>
</tr>
<tr>
<td><em>Brucella spp.</em></td>
<td>839</td>
<td>55</td>
<td>1</td>
<td>8.24 - 7.35</td>
</tr>
<tr>
<td><em>Campylobacter spp.</em></td>
<td>845,024</td>
<td>8,463</td>
<td>76</td>
<td>437 - 4,031, 1,134 - 20,129</td>
</tr>
<tr>
<td><em>Clostridium botulinum</em></td>
<td>55</td>
<td>42</td>
<td>9</td>
<td>4 - 416, 10 - 435</td>
</tr>
<tr>
<td><em>C. perfringens</em></td>
<td>965,958</td>
<td>438</td>
<td>26</td>
<td>45 - 1443, 56 - 1,641</td>
</tr>
<tr>
<td>Shiga toxin-producing <em>Escherichia coli</em> O157:H7</td>
<td>63,153</td>
<td>2,138</td>
<td>20</td>
<td>121 - 1,827, 120 - 1,931</td>
</tr>
<tr>
<td>Shiga toxin-producing <em>E. coli</em> non-O157</td>
<td>112,752</td>
<td>271</td>
<td>0</td>
<td>11 - 273, 16 - 467</td>
</tr>
<tr>
<td><em>Enterotoxigenic E. coli</em></td>
<td>7,894</td>
<td>12</td>
<td>0</td>
<td>0.41 - 0.71, 0 - 71</td>
</tr>
<tr>
<td>Other diarrheagenic <em>E. coli</em></td>
<td>11,982</td>
<td>8</td>
<td>0</td>
<td>0.28 - 0.48</td>
</tr>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>1,591</td>
<td>1,455</td>
<td>255</td>
<td>95 - 661.3, 105 - 6,644</td>
</tr>
<tr>
<td><em>Salmonella, nontyphoidal</em></td>
<td>1,027,561</td>
<td>19,336</td>
<td>378</td>
<td>1479 - 10881, 2,459 - 29,064</td>
</tr>
<tr>
<td><em>S. enterica Typhi</em></td>
<td>1,821</td>
<td>197</td>
<td>0</td>
<td>0.24 - 0.31</td>
</tr>
<tr>
<td><em>Shigella</em></td>
<td>131,254</td>
<td>1,456</td>
<td>10</td>
<td>38 - 768, 105 - 4,526</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>241,148</td>
<td>1,064</td>
<td>6</td>
<td>29 - 434, 35 - 507</td>
</tr>
<tr>
<td><em>Streptococcus group A</em></td>
<td>11,217</td>
<td>1</td>
<td>0</td>
<td>0.112 - 0.170</td>
</tr>
<tr>
<td><em>Vibrio cholerae, toxigenic</em></td>
<td>84</td>
<td>2</td>
<td>0</td>
<td>0.3 - 0.5, 0.1 - 0.5</td>
</tr>
<tr>
<td><em>V. vulnificus</em></td>
<td>96</td>
<td>93</td>
<td>36</td>
<td>54 - 538, 54 - 538</td>
</tr>
<tr>
<td><em>V. parahaemolyticus</em></td>
<td>34,664</td>
<td>100</td>
<td>4</td>
<td>29 - 169, 29 - 213</td>
</tr>
<tr>
<td>Other <em>Vibrio</em></td>
<td>17,564</td>
<td>83</td>
<td>8</td>
<td>28 - 179, 24 - 202</td>
</tr>
<tr>
<td><em>Yersinia enterocolitica</em></td>
<td>97,656</td>
<td>533</td>
<td>29</td>
<td>69 - 1,662, 167 - 3,311</td>
</tr>
<tr>
<td>Parasite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cryptosporidium spp.</em></td>
<td>57,616</td>
<td>210</td>
<td>4</td>
<td>21 - 394, 21 - 569</td>
</tr>
<tr>
<td><em>Cyclospora cayetanensis</em></td>
<td>11,407</td>
<td>11</td>
<td>0</td>
<td>0.39 - 0.63</td>
</tr>
<tr>
<td><em>Giardia intestinalis</em></td>
<td>76,840</td>
<td>225</td>
<td>2</td>
<td>128 - 267, 108 - 597</td>
</tr>
<tr>
<td><em>Toxoplasma gondii</em></td>
<td>86,686</td>
<td>4,428</td>
<td>327</td>
<td>1,112 - 5,726, 1,019 - 6,606</td>
</tr>
<tr>
<td><em>Trichinella spp.</em></td>
<td>156</td>
<td>6</td>
<td>0</td>
<td>0.4 - 1, 1 - 6</td>
</tr>
<tr>
<td>Virus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Astrovirus</em></td>
<td>15,433</td>
<td>87</td>
<td>0</td>
<td>5 - 22, 5 - 44</td>
</tr>
<tr>
<td><em>Hepatitis A</em></td>
<td>1,566</td>
<td>99</td>
<td>7</td>
<td>13 - 125, 12 - 130</td>
</tr>
<tr>
<td><em>Norovirus</em></td>
<td>5,461,731</td>
<td>14,663</td>
<td>149</td>
<td>1,545 - 4,728, 1,424 - 6,912</td>
</tr>
<tr>
<td><em>Rotavirus</em></td>
<td>15,433</td>
<td>348</td>
<td>0</td>
<td>4 - 21, 5 - 37</td>
</tr>
<tr>
<td><em>Sapovirus</em></td>
<td>15,433</td>
<td>87</td>
<td>0</td>
<td>4 - 18, 5 - 34</td>
</tr>
<tr>
<td>Total known</td>
<td>9,388,074</td>
<td>55,962</td>
<td>1,350</td>
<td>8,436 - 29,230, 9,542 - 66,780</td>
</tr>
<tr>
<td>Total unknown</td>
<td>38,392,704</td>
<td>127,839</td>
<td>1,686</td>
<td>21,047 - 51,404, 18,128 - 84,939</td>
</tr>
<tr>
<td>Grand total</td>
<td>47,780,778</td>
<td>183,801</td>
<td>3,036</td>
<td>31,214 - 76,142, 28,595 - 144,599</td>
</tr>
</tbody>
</table>

The estimated cost of foodborne illness was substantial: $51.0 billion in annual health-related costs in the basic model and $77.7 billion in the enhanced model. Whether a potential food safety program improves social welfare is dependent on three factors: the cost per case of foodborne illness, the number of cases expected to be averted by the program, and the cost of
the program to government, consumers, and industry. When examining a particular program, social welfare will only be improved when the product of the cost per case and the number of cases averted exceeds the expected cost of implementing the program for society as a whole.

Underlying the discussions of Food Politics are several recurrent themes:

1. The increasing concentration of food producers and distributors into larger and larger units
2. The overproduction and overabundance of food in the United States
3. The competitiveness among food companies to encourage people to eat more food or to substitute their products for those of competing companies
4. The relentless pressures exerted by food companies on government agencies to make favourable regulatory decisions
5. The invocation of science by food companies as a means to achieve commercial goals
6. The clash in values among stakeholders in the food system: industry, government, and consumers
7. The ways in which such themes demonstrate that food is political

D. Food Sources and Virulence

Regardless of the accuracy of cost and case estimates, one trend is clear: an increasingly broad range of foods is contaminated with harmful bacteria. Cases refers to the number of individuals who become ill—whether or not they report the disease. In contrast, outbreaks always are reported; authorities discover them when more than one person gets sick from the same food source and doctors report the illnesses to health officials. It is easier to identify cases—and, therefore, report them—when an illness occurs right after the food is eaten. With these distinctions in mind, the tracking information indicates a change in the food sources of outbreaks: seafood ranks first, followed by eggs, fruits and vegetables (sprouts, lettuce, berries, cantaloupe), beef, poultry, and foods such as salads and sandwiches made with multiple ingredients. In part because so many more meals are consumed outside the home, foods other than those prepared by home cooks now account for 80% of the outbreaks (although not necessarily 80% of the cases of food-borne illness).

E. Government Oversight in Food Safety

Government oversight in food safety is often spread among many institutions. Food safety politics involves diverse stakeholders with highly divergent goals. Food producers must compete for shares of the consumer’s food money. One way to do this is by taking advantage of a divided, inconsistent, and illogical government regulatory system. Food companies owe their primary allegiance to stockholders, and their principal goal must be profit, not public health. Whenever safety measures raise costs or intrude on autonomy, the affected industries mobilize their considerable political power to block actions perceived as unfavourable—even when such measures are strongly supported by science (example: antibiotics). Government regulatory agencies also engage in competition, in this case among themselves for scarce resources and territorial mandates. They often appear to be more concerned about protecting their own turf—or that of the industries they regulate—than about protecting the health of consumers. The public, unaware of such disputes, simply wants food to be safe and assumes that both industry and government share that goal and are doing everything possible to achieve it.
In this environment, the various participants in the food system blame one another (but never themselves) when outbreaks occur. The costs of foodborne illness to individuals, to society, and to food companies should encourage everyone to collaborate in efforts to ensure safe food. That the groups do not collaborate is a curious consequence of food safety politics.

Spriggs et al. (2001) argue that for international competitiveness, a food safety system must be designed consisting of a set of (governmental and non-governmental) institutional arrangements or a ‘governance structure’ providing formal and informal rules to ensure food safety. Institutional arrangements on food safety are important and it is crucial they evolve, as needed, in order to remain consistent with new technological innovations and changing consumer preferences.

Nestle (2010) posits that as citizens, we need to understand that producing safe food is not impossibly difficult. She argues that Sweden, Denmark, and the Netherlands have reduced foodborne illnesses by instituting control systems at every stage of production, starting on the farm. They set testing standards to reduce pathogens, limit antibiotics in animal feed, prevent infections in transported animals, test for microbes at slaughterhouses and supermarkets, and provide incentives to the industry to comply with safety rules.

F. Relevance of Food Safety Systems in Developing Countries to International Food Trade

The importance of developing countries as providers of an increasing percentage of the food being consumed globally is receiving growing recognition. This is because these countries remain an undeniably important source of key food items for developed-country consumers, including increasingly sophisticated food product offerings. Consequently, the status of the food safety and quality systems in these countries is no longer a matter of local interest only; a food safety challenge in Asia or Africa can have repercussions as well in developed countries (Gordon, 2015). As examined in the foregoing sections, governments and their regulatory agencies use standards and technical regulations as a means of assuring consumer demands for improved product safety, increased environmental protection, and greater product information (Sheldon, 2013).

Sheldon (2013) reports that there has been considerable discussion of the problems of regulatory compliance faced by developing countries in accessing developed country markets, given the latter typically have higher levels of regulatory intensity than the former. The growing movement of people, live animals, and food products across borders, rapid urbanization in developing countries, changes in food handling, and the emergence of new pathogens or antibiotic resistance in pathogens all contribute to increasing food safety risks. These issues are recognized in international trade negotiations under the WTO and in the FAO’s Committee on World Food Security. Managing food safety risks is a prerequisite for participation in international trade, and taking advantage of trade opportunities is an important strategy to reduce poverty. There is an increasing realization that exports are a critical component in rural economic growth. Thus, food safety has a dual role in poverty alleviation, as it is important to public health and to market development. At the same time, several global trends lead to increased complexity in food systems, including increased trade in fresh and processed foods, growing urbanization and increased demand for foods of animal origin, and associated changes in the way that food is produced, processed, and distributed.

Current understanding of food safety management and the desire of most industrial countries to be responsive to consumers and efficient in the use of public resources has brought about changes in food safety regulatory systems. The development of modern food safety systems: their structure, practices and functioning, depends on a number of principles and trends including (Unnevehr et al., 2000; Mwamakamba et al., 2012):
(a) Emphasis on development of integrated and holistic food safety systems with a farm-to-table approach using a well-resourced consolidated authority. There is a shift from sectoral approaches to managing food safety risks to more holistic and multi-faceted strategies. The farm-to-table approach to food safety is based on the premise that foodborne disease is commonly caused by multiple factors arising at dispersed points along the farm-to-table continuum. It addresses the notion that quality needs to be managed along the entire food supply chain, from the initial stages of raw material production to the final stages of food preparation to consumption.

(b) The globalization of the food supply chain and obligations under trade agreements as well as advances in the control of foodborne hazards. Greater scientific understanding of food safety risks and means to assess their impact on public health as well as the development of international food standards by the Codex Alimentarius Commission are some of the factors that have influenced proactive approaches to food safety control over the years.

(c) Increased recognition of the roles of stakeholders and cooperation with industry and consumers to provide information and education. There is a general shift in thinking about the roles of stakeholders from the farm-to-table, with responsibilities for food control shifting from the government to producers, processors, food manufacturers, transport operators, retailers and consumers that operate along the food chain. Food producers at all levels have a responsibility for the production of safe food. At the farm level, farmers and workers must control pesticide and other chemical inputs and recognize potential sources of microbial contaminants from water, soil, animals and humans. Fishermen must understand that the safety and quality of their catch is linked to the levels of contaminants in the harvest waters. The food processing and transportation industries must assess where food safety may be jeopardized at critical points in food production and transport and take appropriate measures to control these potential hazards. Retail establishments, restaurants and other food vendors must also understand how to ensure proper sanitary practices and temperature controls. The role of the consumer may be the most important since at that level food safety is assured at the point closest to food consumption. It is the last safety check on the road from the farm to table.

(d) Reorientation of quality assurance protocols. There is a shift from the traditional focus on end-product testing toward quality management of the production process. There has been a renewed emphasis on preventive measures to food safety. A widely recognized preventive system, Hazard Analysis Critical Control Point (HACCP) is geared on sound science and focuses on identifying and preventing hazards from contaminating food.

(d) An open decision making process that allows stakeholder participation.

(e) Evaluation of public health outcomes from regulation.

G. Components of a National Food Control System

(a) Food policy, law and regulations: Containing the necessary statutory powers to ensure jurisdiction over food safety from farm to table and allow competent food authorities to take immediate preventive and enforcement measures using updates food laws, regulations and updated food standards. They must tailor available information, concepts and requirements to the national context, so as to develop a regulatory framework that will both satisfy national needs and meet
international obligations and trading partners' demands.

(b) **Food control management**: Effective food control systems require operational coordination at the national level including an institutional structure which responds to the needs of food safety management. Where food control responsibilities lie among different government agencies, the roles and responsibilities of these agencies should be clearly defined and efforts made to establish a more integrated system, in order to provide increased consistency in assuring the safety of food.

(c) **Inspection services**: An effective food safety management system requires clear inspection policy and procedures that are applied by inspectors who are well trained not only to apply these procedures but also to act as quality assurance advisors and extension officers to the food industry.

(d) **Laboratory services**: Laboratories underpin decisions of food control services. Laboratories are often cited as major constraints to enhancing national laboratories. It has been pointed out, though, that while laboratory capabilities are expensive resources, it is essential, at least at the national level, that good laboratory facilities and competent personnel be adequately supported.

(e) **Information, education, communication and training**: Assuring food safety along the entire food chain requires partnerships and education at all levels. Stakeholder participation and empowerment grounded on sound knowledge of food safety is paramount. All should recognize their individual role to enhancing and minimizing food-related risks. Emphasis of food safety information, education and communication programmes should be in providing the different stakeholders with the information and motivation necessary to make informed decisions on food safety.

H. **Export Challenges Facing Food and Agriculture from Developing Countries**

Food export markets present a somewhat different set of challenges from domestic food safety regulation. Fresh food products are more likely to encounter sanitary and phytosanitary barriers to trade. Delivering safe food to distant markets requires process controls throughout the production process and mechanisms to certify to buyers that such controls are effective. Developing-country exporters need to know how to meet standards in different markets and how to meet the increasing demand for product trace-back and certification of production methods.

The SPS agreement of 1994 provides a framework for resolving disputes about SPS measures under the WTO. There is evidence that this agreement has stimulated activity to reduce SPS barriers to trade, but there remains significant disagreement at the international level over the role of science and consumer choice in regulating risk. Controversies at the global level influence the ability of countries to compete in export markets. They create uncertainties about the potential acceptability of production methods and products in different potential markets.

For Africa, the major challenges faced by countries include (Mwamakamba *et al*., 2012):

(i) **Limited awareness about food safety**. Information, education, health promotion and training programmes for the food industry and consumers are limited in a number of countries. There has been a drastic increase in countries of small-scale food industries, ever-growing number of food vendors and household level
production. This change, however, in the increase of small-scale food industries has not been accompanied by the improvement of food safety patterns in most countries. Personnel engaged in food production and processing have insufficient knowledge to comply with food safety assurance schemes including the Hazard Analysis Critical Control Point (HACCP) system.

(ii) **Inadequate coordination.** The administration of food safety is complicated by the fact that food safety has many facets. National food safety control systems within the Region often have a sectoral or fragmented structure. Typically, under such arrangements the food control responsibilities are shared between several government ministries such as health, agriculture, commerce, environment, trade and tourism. The roles and responsibilities of each of these agencies are specified but remain quite different. While multiple food control agencies may be the norm, they suffer several drawbacks, including lack of coordination, and confusion over jurisdiction. To overcome the problems associated with fragmentation of food control, food control functions could be transferred to a single government department or a national food control body with inter-ministerial and inter-departmental representation.

(iii) **Inadequate enabling policy, outdated legislation and regulations.** In many cases existing legislation is outdated, incomplete and fails to adequately address current and emerging food safety problems. Even with a food act and regulations, enforcement may be undermined by the lack of effective food control infrastructure and institutional capacities to ensure compliance. Failure to clearly clarify in legislative documents the respective responsibilities of the main stakeholders involved in food safety, and the mechanisms through which they should work together results in duplication of regulatory activities and inadequate coordination in policy implementation and surveillance. The existence of several different laws each addressing various aspects of food, animals, plants, public health and trade further compound the problem.

(iv) **Insufficient and inadequate capacities for food safety.** Human resource capacity is inadequate in terms of: development and implementation of policies that affect food safety and trade, including capacity to implement relevant international agreements; capacities for food analysis and microbiological risk assessment procedures.

(v) **Inadequate resources for food safety.** One key factor affecting food control systems is the lack of financial support. This is exacerbated by the low priority accorded to food safety in national and regional planning, and the limited funding food safety receives in relation to other areas. Funds are needed to improve infrastructure, purchase equipment, train personnel and monitor food contamination.

I. **North-South Trade and Food Standards**

Sheldon (2013) reports that it is typically claimed that developing countries are hampered in their ability to meet stringent food standards due to a lack of necessary human capital and poor governance. There is empirical evidence to support the hypothesis that the capacity to satisfy standards is correlated with real GDP per capita, developing countries specializing away from industries with heavier regulatory burdens. Standards in many export destinations for African agricultural and food products are viewed as as instruments of ‘protection in disguise’ (Jaffee et al., 2004; CUTS, 2009; Otieno et al., 2009; Kareem, 2014). For example, the growing concern among policy-makers and private entities in EAC developing countries is about the
proliferation and strengthening of food safety and agricultural standards in the EU market and how this is impacting upon their competitiveness. This concern is multi-faceted, involving:

(i) the suspicion that important standards can and will be used as a trade protection measure and be applied in a discriminatory manner;

(ii) the concern that EAC governments, traders and producers lack the administrative, technical and other capacities to comply with the emerging standards requirements in the EU, or that even in the few cases where they are able to comply, the costs incurred to attain compliance certainly undermines their comparative advantage; and,

(iii) the proposition that such institutional weaknesses and rising compliance costs only serve to marginalise weaker economic players, including small countries, small enterprises, and small-scale farmers.

Jaffee et al. (2004) argue that standards reflect the feasibility of implementation, which itself is influenced by legal and industry structures as well as available technical, scientific, administrative and financial resources. Some food safety risks, for example, tend to be greater in developing countries due to weaknesses in physical infrastructure (for example standards of sanitation and access to potable water) and the higher incidence of certain infectious diseases. Further, tropical or sub-tropical climatic conditions may be more conducive to the spread of certain pests and diseases that pose risks to human, animal and/or plant health.

Over time there has been greatly increased public awareness and concern about food safety within high-income developed countries in the wake of a series of highly publicized food scandals, foodborne illnesses and food-poisoning fatalities. In some countries, these events have shaken the underlying confidence of consumers in national or regional systems of food safety regulation. In response, there have been significant institutional changes in food safety oversight and reform of pertinent laws and regulations. For long-held concerns (for example the potential environmental and health impacts of pesticides), there has been a tightening of many standards in industrialized and other countries. In addition, new standards are being applied to address previously unknown or unregulated hazards.

In parallel with these changes in official standards and public oversight, have been accelerated moves by the private sector to address food safety risks and otherwise address the concerns and preferences of consumers and civil society organizations. Much of the motivation behind this trend has been the mitigation of reputational and/or commercial risks, while in some product lines and industries these moves have also been part of commercial strategies of differentiation. The ensuing result has been a growing plethora of private ‘codes of practice’, standards and other forms of supply chain governance. While these efforts have been especially prominent amongst major food retailers, food manufacturers and restaurant chains in industrialized countries, systems of private food safety governance are also being applied more widely in middle-income and some low-income countries, in part through the investments undertaken by multinational supermarket or restaurant chains and competitive responses by local firms. In addition, new food safety standards in industrialized countries are serving to shape the expectations of developing country consumers, especially those with higher incomes and in urban areas.

The proliferation and enhanced stringency of food safety and agricultural health standards is a source of concern among many developing countries and those promoting the increased integration of these countries into the world trading system. Reflecting wider changes in the trade regime for various agricultural and food products, there is a presumption that food safety and agricultural health measures can (and will) be used as a protectionist tool, providing ‘scientific’ justifications for prohibiting imports of certain products altogether, or discriminating
against imports by applying higher standards and/or more rigorous regulatory oversight than on domestic suppliers. Even if standards are not intentionally used to discriminate against imports, there is concern that their growing complexity and lack of harmonization between countries could still impede the trading efforts of developing countries.

Figure 14: The Standards and Regulatory Environment for Food Trade (Jaffee et al., 2004)

While the process of notification under the SPS Agreement has contributed to increased transparency of official food safety and agricultural health measures, this has been accompanied by the proliferation of private standards that fall outside of the purview of the WTO. Thus, the overall picture for food safety and agricultural health requirements in trade is becoming increasingly complex and fast moving as standards are promulgated in multiple spheres at both the national and international levels. Further, the complexity of this issue stems not only from the variability of standards on paper, it is magnified by differences in the ways, means and intensities by which the standards are monitored and enforced, which themselves are changing over time.

An illustration of this complexity is depicted in Figure 2. For a developing country exporter, the operative ‘rules of the game’ are derived by a combination of factors including the prevailing standards themselves, enforcement capacities and predilections of official agencies, nature of private standards and oversight arrangements such as certification, and the prominence of particular concerns among consumers and civil society organizations at any point in time. Clearly, there are potentially significant gains from the harmonization of standards, internationally, among countries and within the private sector. Yet, complexities will inevitably persist, especially as supply chains are increasingly driven by the exacting and more dynamic demands of consumers. The challenge for developing countries is clearly immense, although (as is discussed below) the pay-off for those that succeed is potentially significant. However one thing is certain, non-compliance is not an option for those that wish to continue to export!

J. Food Security Indicators

According to the World Food Summit of 1996 “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets
their dietary needs and food preferences for an active and healthy life” (FAO, 2001). This widely accepted definition points to the following dimensions of food security:

(i) **Food availability**: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).

(ii) **Food access**: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

(iii) **Utilization**: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.

(iv) **Stability**: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

Food security can be assessed using the following indicators (Death, 2011; FAO, 2015):

<table>
<thead>
<tr>
<th>Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Average dietary energy supply adequacy</td>
</tr>
<tr>
<td>• Average value of food production</td>
</tr>
<tr>
<td>• Share of dietary energy supply derived from cereals, roots and tubers</td>
</tr>
<tr>
<td>• Average protein supply</td>
</tr>
<tr>
<td>• Average supply of protein of animal origin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Percent of paved roads over total roads</td>
</tr>
<tr>
<td>• Road density</td>
</tr>
<tr>
<td>• Rail lines density</td>
</tr>
<tr>
<td>• Gross domestic product per capita (in purchasing power equivalent)</td>
</tr>
<tr>
<td>• Domestic food price index</td>
</tr>
<tr>
<td>• Prevalence of undernourishment</td>
</tr>
<tr>
<td>• Share of food expenditure of the poor</td>
</tr>
<tr>
<td>• Depth of the food deficit</td>
</tr>
<tr>
<td>• Prevalence of food inadequacy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cereal import dependency ratio</td>
</tr>
<tr>
<td>• Percent of arable land equipped for irrigation</td>
</tr>
<tr>
<td>• Value of food imports over total merchandise exports</td>
</tr>
<tr>
<td>• Political stability and absence of violence/terrorism</td>
</tr>
</tbody>
</table>
- Domestic food price volatility
- Per capita food production variability
- Per capita food supply variability

**Utilization**

- Access to improved water sources
- Access to improved sanitation facilities
- Percentage of children under 5 years of age affected by wasting
- Percentage of children under 5 years of age who are stunted
- Percentage of children under 5 years of age who are underweight
- Percentage of adults who are underweight
- Prevalence of anaemia among pregnant women
- Prevalence of anaemia among children under 5 years of age
- Prevalence of vitamin A deficiency in the population
- Prevalence of school-age children (6-12 years) with insufficient iodine intake

**Additional Useful Statistics**

- Total population
- Number of people undernourished
- Minimum Dietary Energy Requirement (MDER)
- Average Dietary Energy Requirement (ADER)
- Minimum Dietary Energy Requirement (MDER) - PAL=1.75
- Coefficient of variation of habitual caloric consumption distribution
- Skewness of habitual caloric consumption distribution
- Incidence of caloric losses at retail distribution level
- Dietary Energy Supply (DES)
- Average fat supply
- Prevalence of food over-acquisition
- Maximum Dietary Energy Requirement (XDER)

**References**

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*Food Security: Issues and Trends in International Politics* (Death, 2011)

3.3.14 The Politics of International Food Standards

A. Food Politics

Food politics are the political aspects of the production, control, regulation, inspection, distribution and consumption of food. The politics can be affected by the ethical, cultural, medical and environmental disputes concerning proper farming, agricultural and retailing methods and regulations. Government policies around food production, distribution, and consumption influence the cost, availability, and safety of the food supply domestically and internationally. On a national scale, food policy work affects farmers, food processors, wholesalers, retailers and consumers. Commodity crops, such as corn, rice, wheat, and soy are most often at the heart of agricultural policy-making. While most food policy is initiated domestically, there are international ramifications. Globally, protectionist trade policies, international trade agreements, famine, political instability, and development aid are among the primary influences on food policy. Increasingly, climate change concerns and predictions are gaining the attention of those most concern with ensuring an adequate worldwide food supply.

Herring (2015) explains that simultaneously, the numbers and causes of people asserting political interests in food and agriculture beyond their own grain pile have likewise shifted out and up. Europeans have used a variety of policy and social-movement tactics to influence what Africans can grow and eat. American diplomats apply pressure to alter European political choices about what not to grow and eat. An international organization of People for the Ethical Treatment of Animals challenges traditional practices confining and slaughtering animals—and thus livestock as livelihood and meat as market. Trade conflicts over whether or not phyto-safety regulations constitute another form of agricultural protectionism or an expression of democratic sovereignty cross powerful currents of science and culture: if Americans and Chinese can eat transgenic virus-resistant papayas, how can Japanese legally regulate them out of their markets? In theory, the Codex Alimentarius represents species-wide knowledge of standards for food safety, which should allow deliberation within the World Trade Organization to set lines between agricultural protectionism and justifiable precaution in regulating novel foods. In practice, there are trade conflicts, ineffectual rulings, and intermittent rejection of WTO rulings. Bans on whale slaughter pit Japan against international political coalitions. Bans on eating companion animals such as horses and dogs, or intelligent animals such as dolphins, raise persistent politics in some places but not others, with consequences for international trade. Shark fin is a valued and traditional food in some cultures, but restaurants are routinely raided for surreptitiously serving it in many jurisdictions. Demands for a ban on cow slaughter have raised intermittently powerful politics in India but not in Pakistan or Texas. Signs on bridges in Europe declare “GMOs Kill.” If true, such a claim would unjustify, perhaps morally compel, political mobilization to ban GMOs, create GMO-free zones, attack biotech research facilities, and restrict international trade in genetically engineered foods.

Food politics thus depends fundamentally—and increasingly—on ideas, not simply the material interests that have dominated political economy as an approach. Conventional food politics was answerable in a context of classical political economy: the dynamic of interests within social systems. Major interests were fairly clear: control of surplus from the land. The landless fought for land that produced food, the landed resisted. Tenants mobilized around securing their interests; landlords mobilized around defending theirs. The hungry demanded food as traditional obligation or political right. Farmers demanded better deals from traders and moneylenders and state intervention to protect their livelihoods. These demands on the state for protection from the market continue today, and have become globalized with international allies with less direct material interests in outcomes. The new world of food politics thus adds distinctly different dimensions. Contention exists not only around the expertise of agricultural and nutritional sciences, but also around what have been called, since the mid-20th century, alternative paths to “development.” Not only are distal populations recognizing a political imperative to alleviate hunger in societies our moms probably knew little about, but
justifications differ, as do contending development theories advocating proper roles for states and markets.

B. Standards and Regulatory Capitalism

Food safety standards are among the most long-standing public health regulations and were also among the first to “go global,” as a way of harmonizing national standards and reducing frictions in trade (Post, 2005). Moreover, the World Trade Organization (WTO) relies on international food standards in resolving trade disputes among countries over potentially protectionist policies. Although there has not been the same innovation in regulatory instruments experienced in other fields, such as the environment, the case of food safety provides a strong argument for both the existence of regulatory capitalism and its diffusion via horizontal agents. At the same time, it highlights the resilience of national differences in the face of common global structural forces.

Food safety presents a complex challenge. On one hand, in the United States alone, an estimated 76 million people become ill from foodborne illnesses each year, and 5,000 die. Clearly, monitoring and regulation are needed to prevent such occurrences. On the other hand, trade in food and agriculture is a huge global business, estimated at over $1,486 billion and US$1,765 billion per year respectively (WTO, 2015). At a minimum, differing national food safety standards hinder food trade, increasing costs to the consumer. More of a concern is that national standards are frequently accused of serving as non-tariff barriers to trade, that is, having protectionist purposes with no actual public health effect. Indeed, conflicts over food safety standards have emerged as one of the most controversial international trade issues in recent years, as indicated by U.S. and European Union (EU) tussles in the WTO over beef hormones and genetically modified foods.

To help address these twin concerns of safety and protectionism, an international governmental organization called the Codex Alimentarius Commission (CAC) sets food standards that in turn are used by the WTO in dispute resolution.

Two contradictory expectations arise with respect to how international standards affect domestic policies:

(i) From international relations and international law, whether soft law such as international norms influence the actions of countries or whether only “hard” or binding law and force matter

(ii) Whether, on one hand, international standards will be the result of a least common denominator and subsequently push domestic standards lower or, on the other hand, international standards will help raise domestic standards because large companies can use the higher standards to squeeze out competition. Do international norms matter at all, and if so, in which direction do they push national standards?

There is also need to consider how international standards influence domestic regulations, in particular: (i) how dominant states—primarily the United States, the EU and other Organisation for Economic Co-Operation and Development (OECD) countries—are shaping the global order of food safety, in particular how they are using the international arena to project their own domestic ideas of what regulation should be; and (ii) regional integration initiatives as both horizontal and top-down forces of diffusion best explain the degree of convergence that has happened thus far.

C. The Codex Alimentarius Commission and Food Safety

The CAC is an international governmental organization created more than forty years ago by the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO). Its purpose is to develop international food standards that ensure consumer safety and fair practices in food trade. As a highly technical organization, its work
went mainly unnoticed by the broader international community up until 1994, when the establishment of the WTO cast Codex standards in a more prominent light. Under the terms of the WTO Sanitary and Phytosanitary (SPS) Agreement, which governs disputes related to food safety standards among others, Codex food standards serve as a benchmark in resolving disputes between nations related to trade in food commodities. This development has prompted a massive increase in attention to and participation in Codex activities. One of the key criticisms of the CAC is that despite its dual mandate to protect public health and promote fair trade practices, in fact public health protection takes a back seat to trade interests (Post, 2005).

The relation between the CAC and the WTO is emblematic of the transformation of governance that is embodied in regulatory capitalism. Although the WTO aims to remove barriers to trade among all member countries, it does not advocate complete deregulation. Rather, it seeks to walk a fine line between liberalizing trade and maintaining national regulations. In signing the SPS Agreement, WTO member states acknowledged that safety standards for human, animal, and plant health remain in the domain of states to decide. Yet these domestic measures must either rely on international standards or be based on a risk assessment. Thus, as states agree to free their markets to trade, at the same time they reassert their rights to determine their own safety standards.

The importance accorded to international standards in the WTO SPS agreement, coupled with the failure so far of any national SPS regulations to pass through the WTO dispute resolution process unscathed, has contributed to a tremendous increase in the perceived importance of developing Codex standards. The number of countries participating in Codex Commission meetings jumped from 77 in 1991 to 188 in 2016, a 244 percent increase. Yet although Codex membership is currently composed of more than 188 member states1, as well as numerous nonvoting international governmental and nongovernmental organizations, in practice the development of standards is done by a fraction of the membership, mostly developed countries.

What this means is that although Codex standards are international, in fact they reflect bargaining and negotiation mostly among a set of well-known countries. Although initial drafts of standards are often issued from the Codex secretariat, in fact the drafts are usually written by individual countries. Most of the actual drafting work is done by working groups. Once a carefully tailored draft reaches the full committee for discussion, it is in theory open for discussion, but in fact the working group members are often extremely reluctant to reopen debate on the draft. They argue that the draft reflects a well-thought-out consensus on the part of working group members. In part, this reflects the difficulty of trying to negotiate international standards by committee. But regardless of whether the intention is to exclude opinions, the result is that a handful of countries, usually those that can afford to devote staff time to drafting Codex standards in between committee meetings, dominate the framing of the standard.

D. Perspectives on Diffusion of Standards

There are three overarching types of explanations for the diffusion of regulatory capitalism: top-down, bottom-up, and horizontal as summarized in Table 5. The main source of top-down diffusion involves producers in the major exporting countries. These producers are interested in having similar legal standards across the markets that they export to. Two kinds of effects can result. A race to the bottom of lax regulatory standards occurs when producers press for the lowest common denominator of standard across the range of countries. A race to the top, on the other hand, occurs when dominant producers press for a ratcheting up of standards because they already have to meet a high standard in one country. Thus, under the international explanation, producers in powerful exporting countries (in this case, the United

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1 188 Codex Members - 187 Member Countries and 1 Member Organization (EU) 234 Codex Observers - 54 IGOs, 164 NGOs, 16 UN.
States and countries in the European Union would work to develop Codex standards that reflect their interests and then work to have countries adopt those standards. Depending upon their interests, standards would vary in stringency.

Table 6: Perspectives on Diffusion of Standards

<table>
<thead>
<tr>
<th>Forces of Diffusion</th>
<th>Direction of Diffusion</th>
<th>Promote Convergence and/or Stringency?</th>
</tr>
</thead>
<tbody>
<tr>
<td>International producers</td>
<td>Top-down</td>
<td>Yes on convergence, probably on stringency. Will lobby for convergence of standards because it is easier to meet one standard across markets. May lobby for more stringent standards, since they are more capable of meeting higher standards than small producers and will therefore derive a competitive advantage from higher standards.</td>
</tr>
<tr>
<td>Domestic trade groups</td>
<td>Bottom-up</td>
<td>Depends. Will lobby for convergence with international standards depending on whether they will benefit from adoption of the standard. Similarly, will lobby for stringency if they can derive competitive advantage from it.</td>
</tr>
<tr>
<td>Government officials</td>
<td>Bottom-up</td>
<td>Depends. Will lobby for convergence if they are persuaded by international organizations that this is important. No expectations regarding stringency.</td>
</tr>
<tr>
<td>Regional associations</td>
<td>Horizontal or top-down</td>
<td>Possibly on convergence, probably not on stringency. Member states are supposed to converge on the standards set by the association, so convergence toward international standards depends on whether the association has adopted the international standards already. Increased stringency is unlikely in most regional associations because the primary goal is trade facilitation, and the negotiators generally have that as their main goal.</td>
</tr>
</tbody>
</table>

The second and third perspectives on diffusion incorporate bottom-up actors. The first is industry, such as particular domestic trade associations within the country of interest. Within a country, who wins and who loses from the adoption of a Codex standard? At the national level, if the domestic interests explanation dominates, one would expect that domestic producers or trade associations would be involved in promoting or opposing specific standards depending on whether they win or lose from those standards. The second category of bottom-up domestic interests are actors in government. From this point of view, international standards are not promoted by particular actors; rather, they help domestic actors in government to identify problems and solutions in food safety. Here, the main causal force lies with government actors in the countries that learn from the international system. Rather than seeing governments as adopting standards purely by assessing costs and benefits of doing so, the international standards shape the perceived interests of government actors and help set government agendas. If this explanation dominates, one would expect that what government actors consider as important is to some degree contingent upon what the CAC is considering. This explanation may be particularly important for areas involving scientific and technical knowledge, where epistemic communities may form to push for particular policy changes.

A fourth perspective on diffusion can be found in regional integration initiatives. These can be either a horizontal or a top-down force for diffusion, depending on whether they can be viewed as an interdependent decision of multiple countries or an unchanging exogenous force. Government actors in regional economic communities (for example, EAC, SADC, ECOWAS or COMESA) discuss their standard-setting activities in the context of what the regional integration initiatives require them to do. Because regional trade bodies have explicitly acknowledged Codex standards as at least one basis for harmonization, this pathway of influence is a very important one. Thus, variation in national adoption of Codex standards in this view would depend on the degree to which countries are integrated with regional integration initiatives. This approach views regional initiatives as conduits for policy transfer.
E. The Political Perspectives of Standards

It is evident that under certain conditions—in particular, when a country participates in and perceives as important a regional integration initiative that upholds Codex standards, and when there is little prior regulatory history—international standards do influence countries' policies. In the case of food additives, the result has been to drive standards to more stringent levels than they otherwise might have been, due to the successful efforts of European states to impose their preferences on the Codex standard.

Regional integration initiatives are key to understanding the pattern of convergence since the participation of policy makers in them, can be viewed as part of a policy transfer process. Alternatively, the process can be considered one of institutional isomorphism, where institutions come to resemble those in their immediate environment. This is complementary to the world society approach. Depending on the degree to which regional integration initiatives take decisions apart from their member states, these can be either horizontal or top-down forces for diffusion.

Regulatory capitalism in the form of Codex standards is not a disinterested, objective form of regulation. Rather, it is shaped by powerful countries and actors. In this case, the European Union shaped the standard for food additives. In other areas, other countries have similarly influenced the Codex outcome. The role of politics and power in forming highly technical standards often goes unnoticed. Yet how and by whom the standards are shaped—and for what purposes—has ethical and distributive consequences. “Once clothed in technical language, such [technical] decisions lose their transparency and acquire a look of impartial credibility that resists criticism by actors lacking the necessary expertise”. Wealthy countries are shaping the international food safety regime and then encouraging poorer countries to adopt elements of it, and there are potential problems with this, similar to conclusions others have drawn regarding the global financial system. Thus, as regulatory capitalism continues to spread, conclusions about whether this is a normatively good or bad phenomenon will be highly case-specific, and power in addition to expertise should continue to be a subject of investigation.

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3.3.15 The Case for an Enhanced Regional Fish Trade Framework

A. Introduction

Cocker (2014) reports that fish and fishery products are important to Africa in dietary terms and also add substantially to national and regional economies through employment (Africa has 4 million fishers) and generate much needed foreign revenue through exports streams. The exports are mainly to developed nations (high value fish exports from Africa generated USD$5 billion in 2009, 5% of the global total). Fish are Africa’s leading agricultural export commodity above those such as coffee and bananas. Currently, the continent is a net importer of fish and fish products in order to supply the demand from rising populations, increasing urbanization and the continued economic growth Africa has seen over the past decade. Recent estimates for the continent put intra-African fish trade at approximately US$615million (a significant underestimate as a major factor is the high level of informal, often illegal fish trade within Africa). Aquaculture in Africa, particularly sub-Saharan Africa (SSA), has been viewed with
renewed interest in recent years as a means of alleviating the supply gap which is currently filled by imports.

Aquaculture in SSA has been viewed with renewed interest in recent years and in some regions is expanding rapidly. Over time, it is therefore expected to develop and supply a substantial proportion of national/regional markets, thus reducing pressures on capture fisheries and SSAs reliance on imports. There is now a real drive to steer efforts away from earlier subsistence and production-led strategies and focus on best strategies for meeting market demand. Issues such as the minimization of post-harvest losses and ensuring the quality of product for consumers are equally important for growing an effective production sector. SSA also has the potential to supply inter-continental markets with high value, quality and safe aquaculture products (as it does now with capture fishery exports), complying with the phytosanitary, traceability and certification demands insisted upon by developed markets such as the EU.

B. Opportunities for Growth of Aquaculture and Fisheries Trade

Future fish production must be able to supply a quality product to the market in a timely manner, whether these are local, regional or international. As markets for fish farmers could be dualistic i.e. to supply local, community markets for instance and/or larger, more demanding foreign, importing customers such as supermarkets (demanding in terms of food hygiene standards, traceability and often certification requests), this could either be achieved through larger ventures or cooperative assemblages of small producers or a combination of both, instigating codes of practice and standards that ensure compliance with phytosanitary and traceability issues.

**Figure 15: Dualities in Fish Supply Chains in Developing Countries (Cocker, 2014)**

Increased supply and quality would enable the establishment of new fish market chains, with aquaculture products that by their very nature can be differentiated from wild caught counterparts in terms of freshness and availability. Improvements in distribution expand the market for producers and enable production volumes to be increased without immediately impacting on local prices. Conversely, up-scaling production results in economies which can allow prices to fall and the market to expand even further as the product becomes affordable to a larger proportion of the population. The more affordable aquaculture products become, the greater the health benefits for poorer consumers who have to spend proportionately more of their available income on food according to Engels Law. For example lower retail prices due to increased aquaculture production have seen per capita fish consumption double in Egypt since 1995.
Factors to be considered for growth of demand for fisheries and aquaculture products in Africa include the following (Cocker, 2014):

(a) Rising domestic and intra-African demand due to growing economies, rising populations, increasing urbanization and depleting wild fish stocks

(b) Dualities in fish quality between fish for domestic consumption and fish destined for export

(c) Fish species familiarity, availability, taste and price are very important marketing issues and paramount purchasing priorities for domestic consumers

(d) Aquaculture products are competing with domestic capture fisheries and foreign imports. There is little or no differentiation between farmed and wild caught fish

(e) Current traditional market chain traders deal with both wild caught and aquaculture production

(f) Domination of small traditional traders dictating prices and distribution particularly for small aquaculture producers who often have no option but to sell their product low down in the market/value chain

(g) Large presence of women as small-scale traders in the traditional fish marketing chains

(h) Large presence of women as small-scale processors in the traditional fish marketing chain

(i) Predominance of traditional retail/open air markets for domestic fish sales

(j) Supermarkets are establishing themselves

(k) Little/limited information dissemination and communication occurs between stakeholders throughout the current traditional fish marketing chains and producers themselves are often ignorant of current market prices and consumer demand trends

(m) Predominance of small-scale aquaculture producers

(n) Current lack of access to formal credit/finance particularly by small-scale producers

(o) Growing presence of medium/large scale aquaculture producers

(q) Little or no direct marketing is undertaken by producers, particularly small producers

(r) Little processing and/or value addition is undertaken by producers, particularly small-scale producers

(s) Poor infrastructure continues to hamper aquaculture production and marketing, including unreliable electricity supplies, cold-chain issues, poor storage facilities and lack of transportation which can all lead to potentially high post-harvest losses in quantity and quality and undermines distribution channel efficiency

(t) Opportunities to satisfy growing market demands in-country in high fish consumption areas for example via urban and peri-urban fish farms and expansion opportunities into geographic areas with lower fish consumption levels

(u) Opportunities for integrating aquaculture with agricultural systems, particularly in small-scale ventures
(v) Opportunities to expand aqua-product distribution to adjacent countries and/or export intra-Africa and/or inter-continentally

C. Fish Trade and Sustainable Development

For many developing countries, the fisheries sector represents a major source of foreign exchange revenue through trade with developed countries and through foreign fishing licence agreements. Fish exports can strengthen income and employment opportunities for local people in domestic fisheries in coastal and inland regions. However, in many countries, policy related to fish trade cannot keep pace with this rapidly growing and evolving sector. Inappropriate policy frameworks put at risk the benefits of increased trade for national development and local communities. Weak governance in the presence of expanding fish trade could aggravate overexploitation of vulnerable fish stocks and diminish access of local markets through traditional trading links and market chains.

Table 7: Factors that Influence the Contribution of Fish Trade to Development in West and Central Africa (FAO, 2007)

<table>
<thead>
<tr>
<th>Historical Context</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• well-established local, national and international fish producing areas, markets and trade routes</td>
<td>• production sources and markets at all levels are subject to unpredictable changes and shocks (e.g. weather, fish stock productivity, market changes)</td>
</tr>
<tr>
<td>• increasing demand for fish across most markets</td>
<td>• risks can be reduced in more diverse trading conditions – e.g. multiple suppliers, stocks, markets, transport options</td>
</tr>
<tr>
<td>• traditional trade between Africa and Europe</td>
<td></td>
</tr>
<tr>
<td>• Africa now a key supplier; Europe a key market but changing patterns</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actors</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• wide range of stakeholders with evolving linkages and market power; usually highly competitive</td>
<td>• contribution to gross domestic product (GDP) and to wider trading options</td>
</tr>
<tr>
<td>• fish trade requires specific business skills and knowledge to deal with changes and manage risk</td>
<td>• local ‘winners’ and ‘losers’ through effects of competition, power and economic redistribution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply Factors</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• raw material access, post-harvest quality and careful handling of perishable products</td>
<td>• national and international laws; challenges of compliance</td>
</tr>
<tr>
<td>• basic infrastructure: roads, shipping, air transport</td>
<td>• leading role of the World Trade Organization (WTO)</td>
</tr>
<tr>
<td>• adequate and timely flow of information on supply, demand and prices</td>
<td>• erosion of trade preferences for developing countries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trade Mechanisms</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>• selling and buying goods (fish products) and services (fishing services) and adding value to them</td>
<td>• rapidly changing trade patterns: new products, markets,</td>
</tr>
<tr>
<td>• direct and indirect contribution to income, employment, food supply and distribution</td>
<td>• participants and regulations with different impacts on different countries</td>
</tr>
<tr>
<td>• need effective and reliable financial and regulatory mechanisms</td>
<td>• unknown impact of trade expansion on fish resource sustainability in conditions of weak fisheries management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wealth/Profit</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• attracts entrepreneurial activity and diverse investment at all operational levels</td>
<td>• vital for harnessing fish trade for development by encouraging wealth generation and widening opportunities (e.g. enabling trade and market access)</td>
</tr>
<tr>
<td>• reinvestment of generated income and profit can take place in the sector and the wider economy</td>
<td>• opportunities to use wealth generated for positive development investments in and outside sector</td>
</tr>
<tr>
<td>• potential redistribution benefits through taxation and government investment</td>
<td>• limit negative impacts, manage risks and ensure future opportunity and equitable benefit sharing</td>
</tr>
<tr>
<td>• negative aspects include rent-seeking by individuals/groups; asymmetric information and access to capital</td>
<td></td>
</tr>
</tbody>
</table>

Wealth/Profit
D. Establishing an Enhanced Regional Fish Trade Framework

Within this overall context, there are three major areas in which to identify issues and prioritize policy interventions to maximize the contribution of fish trade to development and minimize potentially negative distributional and sustainability impacts. These cover trade mechanisms, economic and livelihood impacts and trade policy and change management.

![Diagram of trade mechanisms and policy processes](image)

**Figure 16: Establishing an Enhanced Regional Fish Trade Framework**

D.1 Trade Mechanisms: Intra-African Trade

Consumer issues which need to be addressed for trade to take place include:

- **Food safety**: primarily based on recognized standards for products, hygiene and processes
The ‘SPS’ and ‘TBT’ Agreements: Forming the basis for nations to establish food and safety regulation for plant and animal products intended for trade.

HACCP: Sanitary control systems are now applied by many importing countries to the whole supply chain, such as the HACCP system.

Traceability: A traceable ‘chain of custody’ is vital in applying SPS and related standards and another major issue to exports.

Certification and Branding: In addition to public regulations of food safety and quality, a range of related standards have been introduced by the private sector. Branding is the independent process through which a company promotes certain quality attributes in order to differentiate a product, process or service from others in the marketplace and generate a preferential purchasing attitude towards that brand/logo, thus create loyalty and premium prices and/or stronger access to specific markets.

BMPs and GAPs: Adoption of Better Management Practices (BMPs) – focusing on environmental and social issues, and Good Aquaculture Practices (GAP) – focusing on food safety aspects.

Numerous barriers exist to intra-African trade including cumbersome import and export procedures, border crossing delays, corruption, limited Information and Communication Technology (ICT) usage, inconsistent electricity supply, lack of storage facilities and infrastructure. Major exporters such as Mauritania and Senegal have overcome some constraints, i.e. domestic supply, by investing in infrastructure and fishing fleets. Other countries still have unrealized fish trade potential (Guinea, Liberia, Sierra Leone).

D.2 Economic and Livelihood Impacts

Fish trade policy in African countries must cope with the dynamic nature of global market opportunities and trade patterns. Declining domestic supplies, rising incomes and changing consumer preferences increase the gap in fish supplies in developed countries. This situation generates new opportunities for developing countries to successfully engage in international fish trade. Studies project an increase in demand in developing countries triggered by increased purchasing power and urbanization. Despite the guidance of international trade theory – indicating that any trade is better than no trade – concerns about increased trade persist, especially in situations where domestic food supplies are potentially threatened. The key question is whether emerging trade in fish with Asia is a threat to local people in Africa or an opportunity for benefits from free-trade and the globalization of fish markets.

The impact of foreign competition on regional and local fish trade in Africa is growing. Small pelagics (sardinellas) — an important fish for human consumption in the region, are traded through three routes: local, national and regional trade based on small-scale fisheries, regional trade from industrial fisheries and international trade based on distant water fleets under fishing agreements. Trade with Asia – particularly China – is increasing. This could affect fish supplies in local markets by reducing the supply of inexpensive fish in local markets. There are concerns that this would have negative impacts on the food security of poor people.

D.3 Trade Policy and Change Management

Fish trade can contribute to development, primarily through the trade mechanism for wealth generation. In turn, wealth contributes to economic growth, for example, through reinvestment in other parts of the economy. In order for this mechanism to function properly, an appropriate policy framework and policy process is required. Policy-making processes for economic development and poverty reduction have often overlooked the fisheries sector and fish trade,
indicating a general weakness in the policy process. Fisheries and trade-related government institutions often lack capacity, finances and support from central government to develop strong policy processes to support the contribution of fish trade to development, evaluate investment options and make appropriate decisions, including investments in new forms of trade.

Trade policy and development-related policies often lack coherence. For instance, while free trade is promoted as a mechanism to generate wealth and economic growth based on empirical evidence from countries such as the ‘Asian Tigers’, there is also concern on the impact of liberalized trade in other countries. Free trade can have a negative impact on the livelihoods of marginalized and poor groups. The key question is whether liberalized trade can be pro-poor under conditions of weak governance and lack of policy coherence. A strategic long-term vision on the role of fish trade, supported by effective fisheries management systems, is needed.

A conflict exists between fish trade policy and fisheries management policy due to trade-offs and limitations of unilateral actions. Often there is a case for limiting fish trade development unless adequate fisheries management systems are in place to offset trade-driven overexploitation. In the short-term, it will be necessary to prioritize certain actions such as limiting trade in overexploited or vulnerable fish stocks.

To fully exploit the potential of fish trade to contribute to development in Africa at all levels, effective implementation of trade and fishery management policies will be decisive. If governance is weak, the ‘losers’ in fish trade are likely to be the poor and marginalized. Fish trade policies and actions which ignore this problem, e.g. by capitalizing on trade liberalization but failing to compensate with other livelihood inputs or opportunities, do not add effectively to pro-poor growth.

Faced with limited information on the fish trade and its economic and social impacts, specific policy prescriptions are inappropriate to the highly varied sectoral and national contexts in West Africa. Given these current information constraints, appropriate policy actions by governments, public and private-sector actors in trade, development and fisheries management can include:

### D.4 Roadmap for Regional Fisheries and Aquaculture

Priorities include the following:

- Developing sector-wide strategies at national level for expansion and intensification of aquaculture
- Harnessing the opportunities for SME development provided by expanding domestic markets for fish, including growing urban demand
- Harnessing the opportunity of expanding export markets for high-value products to increase investment in African aquaculture production and processing
- Encourage formation of national, sub-regional, regional and international networks for information exchange
- Strengthen producers’ understanding of aquaculture socio-economic aspects (business plan, record keeping, etc.) and assist them with business plans for aquaculture
- Provide public sector support to private entrepreneurs in setting up the technological infrastructure required for aquaculture (e.g. cold chains, storage facilities, etc)
The removal of market barriers through policy reviews, support to small and medium scale aquaculture enterprises to meet market demand and standards, and improving market information systems are crucial. There is now a clear trend towards the establishment of various types of standards that can be measured, monitored and certificated by independent bodies to provide producers with clear guidelines and consumers and market chain participants with confidence in the environmental or social provenance of the product. Certification and quality assurance schemes are needed with brand development and marketing favourable to aquaculture products from smaller producers.

**Figure 17: Aquaculture Markets and Marketing: A Roadmap (Cocker, 2014)**

When it comes to actually aiding and encouraging the marketing of aquaculture production governments should:

- Make available information to producers and consumers through newspapers, newsletters, radio or other ICT media

- Protect local producers against unfair foreign competition (via imports) provided that protective measures are permissible within the international trade conventions/agreements

- Provide basic marketing infrastructure, such as roads and communication channels

- Assist producers in promoting aquaculture products in order to stimulate demand through agricultural fairs and other such opportunities

- Encourage commercial producers to develop market channels which can be accessed by smaller producers
• Prepare, publish and regularly monitor guidelines on quality standards of aquatic products to protect public health as well as to improve the acceptability of aqua-products

Aquaculture growth has been (and will continue to be) driven by rising demand from growing and urbanizing populations, stagnating supplies from capture fisheries, investment in education and technology research, a dynamic private sector and high levels of public investment in infrastructure to support agricultural development. By improving production, processing and access to regional and global markets through improved policies and investments infrastructure, quality control, capacity, MISs, and sector management, SSA aquaculture, will see substantial growth and sustainable production.

References
Making Fish Trade Work for Development and Livelihoods in West and Central Africa: Policies Linking Trade to Fisheries Management (FAO, 2007)


3.3.16 The Political Economy of Undernutrition: Bringing Fisheries and Aquaculture to Bear

A. Concepts in Malnutrition (WFP, 2012)
Malnutrition occurs when the nutrient and energy intake does not meet or exceeds an individual’s requirements to maintain growth, immunity and organ function. Malnutrition is a general term and covers both undernutrition and over-nutrition (overweight/obesity).

Undernutrition is the consequence of an insufficient intake of energy, protein and/or micronutrients, poor absorption or rapid loss of nutrients due to illness or increased energy expenditure. Undernutrition encompasses low birth weight, stunting, wasting, underweight and micronutrient deficiencies.

Undernourishment indicates food intake that is insufficient to meet dietary energy requirements continuously. Undernourishment is not assessed at the individual level.

Nutrient gap is the difference between nutrient requirements and nutrient intake. While diets may be adequate in terms of energy (kcal), they may still be inadequate in terms of nutrients, leaving individuals at risk of undernutrition.

Micronutrient deficiency is a lack or shortage of a micronutrient (also called vitamins or minerals). Micronutrients are essential components of enzymes and hormones and are therefore key in bodily processes, immunity, proper growth and metabolism of an individual. Micronutrient deficiencies often occur simultaneously and can arise due to lack of intake, absorption, or utilization of one or more vitamins or minerals. It is referred to as hidden hunger because a large percentage of the population may be deficient without showing any clinical symptoms or signs of deficiency.

Growth failure is the condition where an individual is shorter and/or thinner than their well-nourished counterparts and where the individual does not meet her/his growth potential. Growth may fail due to deficiencies of various micronutrients, energy, protein and/or macro-minerals.

Acute malnutrition, also known as wasting, develops as a result of recent rapid weight loss or a failure to gain weight. In children, it is assessed through the nutritional index of weight-for-
height (WFH) or mid-upper arm circumference (MUAC). Acute malnutrition is also assessed using the clinical signs of visible wasting and nutritional oedema. In adults, wasting is assessed through MUAC or Body Mass Index (BMI). In pregnant and lactating women (PLW), wasting can be assessed through MUAC. The degree of acute malnutrition of an individual is classified as either moderate (MAM) or severe (SAM) according to specific cut-offs and reference standards. At the population level, acute malnutrition is categorized in three ways:

(i) **Global acute malnutrition (GAM)** represents the proportion of children 6-59 months in the population classified with MAM + SAM according to their weight-for-height (WFH) (Z-score), and/or nutritional oedema. GAM is an indicator of acute malnutrition in a population, and is used to assess the severity of the situation.

(ii) **Moderate acute malnutrition (MAM)** represents the proportion of children 6-59 months in the population who are classified with WFH ≥ -3 and < -2 (Z-score).

(iii) **Severe acute malnutrition (SAM)** represents the proportion of children 6-59 months in the population who are classified WFH < -3 (Z-score) and/or presence of nutritional oedema.

**Nutritional oedema** indicates a serious type of acute malnutrition in which nutritional deficiencies lead to swelling of limbs (feet, hands) due to retention of fluids. Children with nutritional oedema are automatically classified with severe acute malnutrition (SAM), and often require therapeutic feeding and medical treatment to recover. Also known as bilateral oedema.

**Chronic malnutrition:** Chronic malnutrition is also referred to as stunting and develops as a result of inadequate nutrition or repeated infections or both; typically, during the critical window of opportunity of the first 1,000 days from conception to two years of age. It is measured by the nutritional index of height-for-age (HAZ) and is manifested by a child being too short for his or her age. Unlike wasting, the development of stunting is a slow cumulative process that may not be evident immediately. Chronic malnutrition cannot generally be reversed, only prevented.

### B. The Problem of Undernutrition/Malnutrition

According to IFPRI (2015) good nutrition signals the realization of people’s rights to food and health. Without good nutrition, human beings cannot achieve their full potential. When people’s nutrition status improves, it helps break the intergenerational cycle of poverty, generates broad-based economic growth, and leads to a host of benefits for individuals, families, communities, and countries. Good nutrition provides both a foundation for human development and the scaffolding needed to ensure it reaches its full potential. Good nutrition, in short, is an essential driver of sustainable development.

Malnutrition, though, is a problem of staggering size—large enough to threaten the world’s sustainable development ambitions. Malnutrition takes many forms: children and adults who are skin and bone, children who do not grow properly, people who suffer because their diets are imbalanced, and people who are obese or suffer from nutrition-related non-communicable diseases. Malnutrition affects all countries and one in three people on the planet. Nearly half of all countries face multiple serious burdens of malnutrition such as poor child growth, micronutrient deficiency, and adult overweight.

### C. Burden and Causes of Malnutrition in Africa

The main factors associated with undernutrition as a public health problem can be grouped into the following: environmental (natural or entropic causes), sociocultural-economic (linked to
poverty and inequality) and political-institutional. Together, these factors increase or decrease biomedical access and productivity abilities, through which they determine the quantity and quality of dietary intake and the absorption capacity, which constitute the elements of undernutrition. Each of these factors increases or decreases the likelihood of a person to suffer from undernutrition (see Figure 29). Further, the importance of each of these factors depends on the level of the country’s demographic and epidemiological transition as well as on the person’s current stage in the life cycle. Together these factors determine the intensity of the resulting level of undernutrition.

Poor environmental conditions may increase insect and protozoan infections and also contribute to environmental deficiencies in micronutrients. These include the risks stemming from the natural environment itself and its cycles (floods, droughts, frosts, earthquakes and other phenomena), as well as those produced by humans themselves (such as water and air pollution, contamination of food, expansion of agriculture, etc.). Overpopulation, more commonly seen in developing countries, can reduce food adequacy, leading to inadequate food intake or intake of foods of poor nutritional quality and quantity. The sociocultural-economic determinants include elements associated with poverty and inequality, education and cultural norms, employment and wages, access to social security and coverage of aid programmes. The political-institutional factors encompass government policies and programmes aimed specifically at solving the population’s food and nutritional problems.

Production factors include those directly associated with the production and access to food by the population at risk. The availability and autonomy of each country’s dietary energy supply depend directly on the characteristics of production processes, the degree to which they utilize natural resources, and the extent to which these processes mitigate or aggravate environmental risks.

Finally, biomedical factors take into account the individual’s susceptibility to undernutrition, insofar as deficiencies in certain elements limit the capacity to make biological use of the food consumed (regardless of quantity and quality).

**D. Consequences of Undernutrition in Africa**

Bain *et al.* (2013) reports that malnutrition is estimated to contribute to more than one third of all child deaths, although it is rarely listed as the direct cause. Contributing to more than half of deaths in children worldwide; child malnutrition was associated with 54% of deaths in children in developing countries in 2001. Protein-energy malnutrition (PEM), first described in

![Figure 18: The Causes of Undernutrition (AUC et al., 2014)](image)
the 1920s, is observed most frequently in developing countries but has been described with increasing frequency in hospitalized and chronically ill children in the United States. Child undernutrition has long-term negative effects on a person’s life, most notably in the aspects of health, education, and productivity (see Figure 30). These elements are quantifiable as costs and expenditures to both the public sector and to individuals. Consequently, these effects exacerbate problems in social integration and increase or intensify poverty. A vicious cycle is perpetuated as vulnerability to undernutrition grows.

Kwashiorkor and marasmus are two forms of Protein Energy Malnutrition (PEM) that have been described. The distinction between the two forms of PEM is based on the presence of edema (kwashiorkor) or absence of edema (marasmus). Marasmus involves inadequate intake of protein and calories, whereas a child with kwashiorkor has fair-to-normal calorie intake with inadequate protein intake. Although significant clinical differences between kwashiorkor and marasmus are noted, some studies suggest that marasmus represents an adaptation to starvation whereas kwashiorkor represents a dys-adaptation to starvation.

In addition to PEM, children may be affected by micronutrient deficiencies, which also have a detrimental effect on growth and development. The most common and clinically significant micronutrient deficiencies in children and childbearing women throughout the world include deficiencies of iron, iodine, zinc, and vitamin A and are estimated to affect as many as two billion people. Although fortification programs have helped diminish deficiencies of iodine and vitamin A in individuals in the United States, these deficiencies remain a significant cause of morbidity in developing countries, whereas deficiencies of vitamin C, B, and D have improved in recent years. Micronutrient deficiencies and protein and calorie deficiencies must be addressed for optimal growth and development to be attained in these individuals.
Undernutrition may have immediate or evolving impacts throughout a person’s lifetime; individuals who suffered from undernutrition during early years of their life cycle (including intrauterine) are more likely to be undernourished later in life. Health studies have shown that undernutrition leads to increased appearance or intensified severity of specific pathologies and increases the chance of death during specific stages of the life cycle. The nature and intensity of the impact of undernutrition on pathologies depends, in part, on the epidemiological profile of a given country.

In education, undernutrition affects student performance through disease-related weaknesses and results in limited learning capacity associated with deficient cognitive development. This translates into a greater probability of starting school at a later age, repeating grades, dropping out of school and ultimately obtaining a lower level of education. Later in life, individuals may experience lower physical capacity as a result of stunting. Stunting, which is caused by food deprivation and nutrient deficiencies, is established by low height-for-age measurements during childhood. In adulthood, it leads to an overall reduced body mass when compared to the full adult potential.

E. The Political Economy of Malnutrition: The Cost of Hunger in Africa

Africa has experienced a recent period of economic growth that has positioned the region as a key area for global investment and trade. The pace of real GDP growth on the continent has doubled in the last decade and six of the world’s fastest growing economies are in Africa. All this has occurred despite some of the highest rates of child undernutrition in the world. Globally, there has been progress in reducing both stunting (low height-for-age) rates and the number of stunted children in the last 20 years. In Africa, the proportion of stunted children reported has decreased from 41.6 percent (1990) to 35.6 percent (2011) (see Table 5). Nevertheless, for that same period, the number of stunted children has increased from 45.7 million to 56.3 million, evidencing that stronger efforts must be put in place to have a decisive impact. The biggest proportion of these children are located in East Africa, where 22.8 million represent more than 40 percent of all stunted children on the continent. Together with West Africa, they account for three out of every four stunted children on the continent.

Child undernutrition is one of the most critical negative effects of hunger. When a child is undernourished before the age of five, his or her body and brain cannot develop at its potential, and they are at risk for cognitive delays. Figure 5 illustrates the rates of stunting in Africa. According to this data, 17 countries on the continent have stunting rates above 40% and 36 countries have rates above 30%. Furthermore, a large proportion of Africa’s population often does not access diets containing the essential vitamins and minerals required for optimum health and productivity.

Table 8: Estimated Prevalence and Number of Stunted Children Under Five Years of Age (Moderate or Severe), by UN Region: 1990, 2010, 2011 (AUC et al., 2014)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>41.6</td>
<td>35.9</td>
<td>35.6</td>
<td>45.7</td>
<td>55.8</td>
<td>56.3</td>
</tr>
<tr>
<td>Eastern</td>
<td>50.6</td>
<td>42.5</td>
<td>42.1</td>
<td>18.0</td>
<td>22.6</td>
<td>22.8</td>
</tr>
<tr>
<td>Middle</td>
<td>47.2</td>
<td>35.6</td>
<td>35.0</td>
<td>6.4</td>
<td>7.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Northern</td>
<td>28.6</td>
<td>21.3</td>
<td>21.0</td>
<td>6.3</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Southern</td>
<td>36.2</td>
<td>31.1</td>
<td>30.8</td>
<td>2.2</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Western</td>
<td>39.1</td>
<td>36.5</td>
<td>36.4</td>
<td>12.8</td>
<td>18.6</td>
<td>18.9</td>
</tr>
</tbody>
</table>
**Table 9: Number of Undernourished People, by Region (FAO et al., 2012)**

<table>
<thead>
<tr>
<th>Region</th>
<th>1990-1992</th>
<th>Proportion</th>
<th>2010-2012</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>175</td>
<td>18%</td>
<td>239</td>
<td>28%</td>
</tr>
<tr>
<td>Asia</td>
<td>739</td>
<td>74%</td>
<td>563</td>
<td>65%</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>65</td>
<td>7%</td>
<td>49</td>
<td>6%</td>
</tr>
<tr>
<td>Oceania</td>
<td>1</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>1000</strong></td>
<td></td>
<td><strong>868</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Table 10: Effects of Child Undernourishment through Life (AUC et al., 2014)**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td>Undernourished children are at higher risk of anaemia, diarrhoea, fever and respiratory infections. These additional cases of illness are costly to the health system and to families. Undernourished children are at a higher risk of dying.</td>
</tr>
<tr>
<td>6-18 years</td>
<td>Stunted children are at a higher risk of repeating grades in school and dropping out of school. Grade repetitions are costly to the education system and to families.</td>
</tr>
<tr>
<td>15-64 years</td>
<td>If a child has dropped out of school early and has entered the workforce, he or she may be less productive, particularly in the non-manual labour market. If engaged in manual labour, he or she is likely to have reduced physical capacity and will tend to be less productive. People who are absent from the workforce as a result of undernutrition-related child mortality represent lost economic productivity.</td>
</tr>
</tbody>
</table>
Table 11: Summary of Costs of Child Undernutrition (AUC et al., 2014)

<table>
<thead>
<tr>
<th>Country</th>
<th>Losses National Currency</th>
<th>Losses US$</th>
<th>Equivalent % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>EGP20.3 billion</td>
<td>3.7 billion</td>
<td>1.9</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>ETB55.5 billion</td>
<td>4.7 billion</td>
<td>16.5</td>
</tr>
<tr>
<td>Malawi</td>
<td>MKW147 billion</td>
<td>597 million</td>
<td>10.3</td>
</tr>
<tr>
<td>Rwanda</td>
<td>RWF503.6 billion</td>
<td>820 million</td>
<td>11.5</td>
</tr>
<tr>
<td>Swaziland</td>
<td>SZL783 million</td>
<td>92 million</td>
<td>3.1</td>
</tr>
<tr>
<td>Uganda</td>
<td>UGX1.8 trillion</td>
<td>899 million</td>
<td>5.6</td>
</tr>
</tbody>
</table>

F. The Contribution of Fish Intake, Aquaculture and Fisheries to Improving Nutrition

F.1 The health benefits of fish and seafood have been well documented and widely promoted in recent years. Fish is low in saturated fat and is a healthy alternative to red meat. It provides the body with essential vitamins and minerals, including iron; zinc (from shellfish); vitamins A, B and D; and, of course, protein. Omega-3 fatty acids found in fish are also beneficial, particularly in terms of cardiovascular health. Preliminary evidence suggests that early exposure to omega-3 fats may enhance brain development as well (ARHP/PSR, 2004).

F.2 Tacon et al. (2013) reports that despite the fact that the African region has the lowest per capita supply of aquatic animal food products of any region (9.50 kg/year, with the bulk of this supply coming from capture fisheries), aquatic food products represent over 18.5% of total animal protein supply within the region, and only second to the Asian region at 22.6% in 2009. Moreover, 18 sub-Saharan countries derive the bulk of their very limited animal protein supply from aquatic animal food products, including: Sierra Leone (64.8% total animal protein supply), Gambia (56.6%), Comoros (55.6%), Ghana (54.5%), Cameroon (49.3%), Congo Republic (48.0%), Sao Tome and Principe (46.4%), Equatorial Guinea (42.8%), Nigeria (41.1%), Congo DPR (39.6%), Senegal (38.6%), Mozambique (37.6%), Benin (35.7%), Guinea (33.3%), Guinea (33.3%), Uganda (33.3%), Cote d'Ivoire (31.8%), and Malawi (27.1%).

F.3 In terms of nutrient composition, aquatic animal food products represent one of the world’s most healthy and nutritious food sources. Thus, compared with terrestrial farmed meat products, aquatic animal foods (whether captured or cultured) generally have the following nutritional and health attributes:

(a) Aquatic animal foods have a higher protein content on an edible fresh weight basis (mean 17.3%) than most terrestrial meats (mean 13.8%), despite having a higher moisture content than most terrestrial meats.

(b) Aquatic animal food proteins are highly digestible and have a high biological value, as evident by their excellent essential amino acid (EAA) profile, the latter closely approximating to the recommended human dietary EAA requirement pattern. In particular, aquatic animal proteins are rich dietary sources of methionine and lysine. Since these EAA are usually limiting within most edible plant proteins consumed by humans, aquatic food products constitute a perfect addition to the typical plant-based diets consumed by the rural poor.

(c) Aquatic animal foods are generally leaner on an edible fresh weight basis (average of fat = 2.7%) compared with terrestrial meats (average of fat = 16.6%), have a lower saturated
fat content (average of 0.16% in crustaceans, 0.32% in molluscs, 1.19% in fish, and 4.97% in terrestrial meats), have a lower calorific density (average of 101.3 kcal/100g) than terrestrial meats (average of 209 kcal/100g).

(d) Aquatic animal food products contain the highest concentration of long-chain omega-3 \([n-3]\) polyunsaturated fatty acids of any foodstuffs, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) of terrestrial meat. Highest levels of EPA/DHA were reported within small pelagic fish species, and farmed and wild salmonid fish respectively. Although not analyzed or presented here, it is important to mention that filter feeding freshwater fish species (such as silver carp Hypophthalmichthys molitrix and bighead carp Hypophthalmichthys nobilis) are also rich sources of EPA/DHA, which they derive from freshwater plankton. As a general rule, the tissue levels of EPA/DHA within farmed fish and crustacean species are usually derived from the level of fish oil used within their formulated feeds, with higher levels usually reported with feeds containing higher dietary fish oil levels. In health terms, fish-derived omega-3 \([n-3]\) fatty acids EPA and DHA have been shown to have a positive role in infant development (including neuronal, retinal, and immune function), cardiovascular diseases (including reduced incidence of heart disease in adults), cancer, and various mental illnesses (including depression, attention-deficit hyperactivity disorder, and dementia.

(e) Aquatic animal food products are a richer source of most essential minerals and trace elements than most terrestrial meats, including: Calcium; Phosphorus; Magnesium; Iron; Potassium; Sodium; Zinc; Copper; Manganese; Selenium.

(f) As with the long-chain omega-3 fatty acids EPA and DHA, higher levels of mineral elements were observed in small pelagic fish species (includes European anchovy, Atlantic and Pacific herring, Atlantic mackerel and Spanish mackerel), compared to other fish species, including calcium, iron, magnesium, potassium, zinc, copper, manganese, and selenium. Aquatic animal food products are also rich dietary sources of other important essential trace elements that are generally lacking in terrestrial meat products, including iodine, fluorine, and trivalent chromium.

(g) Aquatic animal food products are a richer source of several key water soluble and fat soluble vitamins than most terrestrial meats, including: Vitamin A; Vitamin C; Vitamin B12; Folic acid; Vitamin E; Vitamin D; Choline.

(h) As with the omega-3 fatty acids and minerals, higher vitamin levels were observed in small pelagic fish species (includes European anchovy, Atlantic and Pacific herring and Atlantic mackerel), compared to other fish species, including riboflavin, niacin, vitamin B12, and vitamin D.

**F.4** Last, but not least, edible aquatic plants or seaweeds also play an important role as a valuable source of essential nutrients in global food supply, including:

(a) Depending upon the species, season, and or culture conditions, edible seaweeds may contain considerable amounts of protein, with the red seaweeds such as Porphyra spp. (Nori) usually having the highest levels of protein (up to 47% on a dry weight basis), followed by green seaweeds such as Enteromorpha lactuca (former Ulva; sea lettuce) with protein levels ranging between 10 to 25%, and lastly by brown seaweeds such as Laminaria japonica with the lowest protein levels of between 5 and 12%, on a dry weight basis. Aspartic acid and glutamic acids constitute a large part of the amino acid make-up of edible seaweed proteins, with these amino acids being highest within brown seaweed proteins. Moreover, edible seaweeds such Palmarea palmata (Dillisk/Dulse) and Enteromorpha spp. (sea lettuce) are good sources of essential amino acids such as histidine, leucine, isoleucine, methionine and valine, with the levels of isoleucine and
threonine in *Palmaria palmata* being similar to the levels found in legumes, and histidine levels is in *Enteromorpha pertusa* being similar to the levels found in egg proteins.

(b) Although the lipid fraction of marine edible seaweeds is usually low (typically ranging between 1.5 and 3.5%, on a dry weight basis), the lipids present are rich in omega-3 polyunsaturated fatty acids, and in particular EPA and to a lesser extent DHA, which are important to human health.

(c) Edible seaweeds are a good source of dietary fibre, including insoluble fibre and soluble fibre. The main component of the fiber component in marine seaweeds are xylans, alginates, carageenans and/or agar.

(d) Edible seaweeds are a rich dietary source of biologically available minerals and trace elements (compared with most other terrestrial plant food sources), including: iodine; iron; zinc; copper; magnesium; potassium; and calcium.

(e) Edible seaweeds are a rich source of many water-soluble and fat soluble vitamins, including vitamin C, vitamin E, vitamin B12, thiamin, riboflavin, niacin, pyridoxine, inositol, folic acid.

![Figure 21: The Pathways through Which Aquaculture Can Contribute to Improving Nutritional Status (Kawarazuka, 2010)](image-url)
Lastly, edible seaweeds may contain a variety of different species specific bioactive chemicals with potential pharmaceutical and health enhancing properties, including bromophenols, phytosterols, photosynthetic pigments, and immune enhancing polysaccharides.

Kawarazuka (2010) explains that aquaculture interventions can contribute to improving nutritional status of households through people consuming fish produced from their own ponds, selling fish for household income to enhance their purchasing power, and by expanding wider accessibility to fish by lowering market prices. Fish sold for cash income contribute to purchasing sufficient staple foods, and can also be used for consumption or purchase of non-staple foods which directly improve dietary intake beyond energy intake.

Kawarazuka (2010) reports on studies which indicate that fish is a major animal protein source and own catches are kept for household consumption although the proportion of catches consumed at household varies from around 10% to 70% of total catches. In the areas where fish are abundant year-round or seasonally, people consume fish caught by household members, and hardly buy them in the markets. The species consumed at household level are low market-value fish and other aquatic animals. Invertebrate and other aquatic animals are more likely to be kept for household consumption while high market-value finfish are exclusively sold at market.
Furthermore, fish supplied from common-pool resources are widely traded in the local markets and therefore fish sold in the local markets can nutritionally contribute to not only households that engage in fishing for household consumption, but also large populations including those who do not engage in small-scale fisheries but purchase fish from local markets.

F.8 Fish supplied by common-pool resources are also an important source of household income for the poor. The pathway is very similar to that of aquaculture, where cash from fish is primarily used to purchase staple foods in some studies. The proportions of fish catches sold varied from 30% to 90% among different countries. Many case studies showed the important role of small-scale fisheries as a seasonal part-time income source, contributing to diversifying livelihoods, especially during lean seasons when incomes from farming or labour wages are low. Furthermore, unlike fish produced by aquaculture which are mostly traded as fresh fish, fish supplied by small-scale fisheries are often seasonal and therefore many fish are processed during high production season. Hence, processing is also an important income source in seasonal small-scale fisheries, in particular, the areas where marketing network for locally processed fish (smoked and dried) to urban markets are well developed.

Figure 23: Identified Pathways through Which Fish Contribute to Improving Nutritional Status (Kawarazuka, 2010)
Improving dietary intake through diversifying the diet is one way to improve nutritional status. Adding small fish into the starch-based diet, as characteristic of the poor, increases micronutrient intakes effectively, with a high bioavailability, and fish carry other vegetables and some oil through a cooking process, contributing also to enhancing the bioavailability of the micronutrients in these foods. In this direct pathway, small-scale fisheries and aquaculture of nutrient-dense fish played an important role, while the nutritional effect of adding large fish into the diet was not fully analysed although it provided animal protein and PUFAs to some extent. Most nutrient-dense fish come from small-scale fisheries, and therefore conservation of these species and integrating them into already existing aquaculture systems is recommended. Food-based strategies which include the promotion and nutritional education of nutrient-dense fish have potential to strengthen this direct pathway.

Increasing purchasing power through the sale of fish for cash income which can be used to ensure household food security is an indirect pathway to improve overall dietary intake. Cash income from fish enabled households to add various food items into the diet, besides fish. Some studies reported that household income was used for purchasing animal-source foods or other food items. However there is a challenge that households with insufficient staple foods exchange fish for staple foods, but did not make enough cash from their fish sales to purchase other food items. In this case, households remain with starch-based diets, thereby their quality of diet is not improved.

Another pathway linking small-scale fishery and aquaculture activities with household nutritional outcomes was through women’s involvement in production, processing or sale of fish. Women often engage in fishing activities for household consumption, contributing to strengthening the direct pathway, while trading and processing contribute to empowering women which indirectly improves care for and diet of children.

This review analysed the role of aquaculture and small-scale fisheries separately. The pathways appeared however, to be basically the same. Aquaculture contributed to increasing household income with its high profitability and productivity. However owning a fish pond is an essential condition to initiate aquaculture, except in some cases where common-pool resources and seasonal fish ponds are abundant. On the other hand, fish supplied by small-scale fisheries were not only caught and consumed by household members, but also widely traded in the local markets, providing various livelihood opportunities for the poor, landless and women. Supporting small-scale fisheries through increasing capacity of sustainable resource management is required to keep fish supply from common-pool resources for the poor, as current aquaculture technologies and production systems cannot exactly replace the role played by small-scale fisheries. Nevertheless, aquaculture using common-pool resources such as river channels and floodplains, near shore, marine and lake waters, and seasonal water bodies, has potential for the sustainable supply of fish and household income for the poor, especially the landless and women.

Other linkages, such as health service and health environment of communities, and diseases were not examined as the data were scarce. To fully understand the determinants of nutritional status, integrated research and interventions are required.

References

Combating Micronutrient Deficiencies: Food-Based Approaches (FAO et al., 2011)

3.3.17 Best Practices in Securing and Enforcing of Fisheries Resource Instruments

A. Introduction

Securing and enforcing fisheries resource instruments should attract the same efforts as those put towards securing land-based resources. There are international, regional and subregional fisheries governance instruments which seek to ensure that fisheries resources are sustainably utilized. The effectiveness of these instruments vary across the continent, but for the most part these instruments have issues of improvement.

B. International Fisheries Governance Instruments

B.1 The United Nations Convention on the Law of the Sea in 1982 (UNCLOS, the Convention) and other associated agreements provide an essential framework for establishing a more adequate system of ocean governance. The Convention elaborates a comprehensive regime for governance of the oceans, covering all aspects of ocean space from delimitation to environmental control, scientific research, fishing and other economic and commercial activities, technology and the settlement of disputes relating to ocean matters.

B.2 Exclusive Economic Zone (EEZ): The exclusive economic zone (EEZ), (UNCLOS, Arts. 55-75), was the most significant innovation in relation to the governance of marine fisheries resources in the second half of the twentieth century. By the time the Convention was agreed in 1982, more than 80 coastal States had declared EEZs, mostly of 200 nm. Within this zone, the coastal State enjoys “sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living” (Art. 56). It has the right to set a total allowable catch on the basis of the best scientific evidence available to it (Art. 61). This has established a legal right for coastal States to manage fisheries off their coasts and a framework within which coastal States can effectively limit access to their fisheries.

B.3 Fish Stocks Agreement: In the early 1990s, a consensus among States developed that the general provisions of the Convention requiring cooperation between States in the conservation and management of high seas fisheries resources (Arts. 117-120) needed strengthening. This led to the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN, 1995), also known as the United Nations Fish Stocks Agreement (the Agreement). The Agreement seeks to build upon two provisions of the Convention:
(i) All States have a duty to ensure that their nationals comply with conservation measures adopted for high seas stocks (UN-LOSC 1982, Art.117).

(ii) On the high seas, States have jurisdiction over vessels flying their flag (UN-LOSC 1982, Arts. 90-98).

The Agreement provides for the establishment of regional fisheries management organizations. The Agreement sets out comprehensive areas in which such an organization will have competence covering scientific research, stock assessment, monitoring, surveillance, control and enforcement (Art. 10). The organization can limit participation by new entrants according to a set of criteria listed in Art. 11.

B.4 **FAO Code of Conduct for Responsible Fishing:** A number of other multilateral agreements further elaborate the evolving set of rules for fisheries governance. The Code of Conduct for Responsible Fishing (1995) inter alia spells out flag State responsibilities for the activities of fishing vessels flying its flag and seeks to advance management measures, by agreement among States, that improve the optimal and sustainable use of fisheries resources. The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Resolution 15/93) similarly builds on flag State responsibility for fishing vessels flying its flag (Art. III) and operating on the high seas. A range of other global and regional treaties exist that, in some cases, have a direct bearing on the governance of the fisheries sector.

C. **National Fisheries Instruments**

Fisheries regulations focus on sustainable exploitation of fisheries resources and providing wholesome fish food for human consumption. The rules and regulations are embedded into the Fish (Fisheries) Act of each country. Fish trade may be provided for within the specific fisheries regulation or provided as an annex or through a specific Statutory Instrument.

The License is the major statutory instrument used to regulate fish trade by the countries within the region. Some countries use gear selectivity measures and some add on the slot size measures to regulate fish production and control trade in undersized fish. Some fisheries regulations are not specific on trade aspects but generally imply under fishing areas. A few of the countries have detailed specific trade requirements included in the fish quality and safety rules.

The fisheries regulations of the selected countries are at different levels. Some are outdated and hence, with many subsidiary statutory instruments, others are being updated and some are new.

C.1 **Fish and Fisheries Regulations:** An overview of the lists of principle and subsidiary legislations in countries in Sub-Saharan African countries in which the four corridors of the Fish Trade Programme are focused to highlighted in line with earlier study titled Regional Analysis/Mapping of Certification Procedures and Standards in Africa.

C.2 **Observations on the Fish and Fisheries Regulations:** The following observations can be made from the various laws and regulations of the listed Member States:

(1) All Member States have laws and regulations and national institutional structures to enforce the implementation of the laws and regulations. However, the institutional structures are not identical.
(2) The laws and regulations in some Member States (e.g., Burundi, D. R. Congo, Malawi and Sudan are fairly outdated and cannot seem to have been aligned with current best practices in the governance of fisheries and aquaculture.

(3) Most of the laws and regulations are geared towards regulating the exploitation of the fisheries resources with a view to sustainability. In this respect, the laws provide for:

(i) Maturity of harvest taking into account the growth characteristics of the fish species, the breeding seasons and grow-out characteristics. Some regulations specify timings for closing of the fishing areas to avoid negatively affecting these fish species at these vulnerable seasons.

(ii) The type and nature of equipment to be used for particular target fish species. This includes the types of nets and their mesh sizes and types of fishing vessels.

(iii) Many Member States have regulations detailing the amount of fishing in tonnage which can be extracted from their specific fishing waters. These regulations also specify necessary actions with respect to by-catches and requisite penalties and sanctions for violations.

(4) Most of the laws and regulations do not reflect an ecosystem-based fisheries management approach and thus miss out on important sustainability perspectives.

(5) A number of Member States have progressive laws which define areas to be accessed by artisanal fisher groups by banning foreign access and specifying equipment which can be used in those areas.

(6) Licensing and registration of fishing vessels features in most laws and regulations.

(7) More recent laws and regulations (like those of Zambia) exhibit a coherent consolidation as opposed to outdated laws which are littered with amendments, repeals and subsidiary decrees which are sometimes difficult to comprehend.

(8) Older laws are often at loggerheads with the current trade and integration arrangements of Member States, thus creating barriers to trade and a source of disharmony among Member States.

(9) Some countries, e.g., Angola, Cabo Verde, Mozambique, Namibia and South Africa seem to have laws and regulations which are rather comprehensive and can serve as references for other Member States in Africa.

(10) Many African countries have not domesticated the FAO Code of Conduct for Responsible Fisheries.

(11) Some laws and regulations provide for the full value chain while others are only concerned with the fisheries up to the landing points.

(12) Many Member States have not promulgated aquaculture legislation despite this having a high potential to contribute to their fisheries resources, poverty reduction and rural development strategies.
Most of the laws and regulations do not emphasise on generation and maintenance of fisheries data and statistics.

C.3 Impacts of Fish and Fisheries Laws and Regulations of Trade Facilitation: The disparities evident in the laws and regulations of Member States should raise the first red flag with respect to the potential trade barriers which could arise. The following is a summary of the possible impacts of the regulatory frameworks in this context:

1. The outdated laws such as those in Burundi, DR Congo, Malawi and Sudan predispose these countries to internal and external vulnerabilities. Internal vulnerabilities include the underdevelopment and underperformance of the fisheries sector leading to failure of realizing its potential to contribute to the national food and nutrition security, employment and wealth creation and lack of professional development.

   The external vulnerabilities include dependence on imports contributing to trade deficits; lack of capacity to control safety and quality of imports; inability to quantify national income forfeited and unfavourable foreign exploitation of the countries fisheries resources with low resource rents.

2. Unresponsive national laws and regulations create a barrier to trade since they do not create trust and confidence in trading partners. Trading partners need to be convinced that the national regulatory framework can create conditions to attain food safety and quality before they can engage in trade with any given country.

3. Most laws and regulations are either focused on internal circulation of fish products or are geared towards exports outside of Africa. There is always an underestimated internal market which can be supplied by other African countries but the overwhelming attitude is that imports from other African countries are overlooked by an unsubstantiated national self-reliance. Wherever there are attempts to import fish products from other African countries, fears of unfair competition with local fishers quickly lead to erection of barriers based on the discretionary interpretation of national laws and regulations.

References
Code of Conduct for Responsible Fisheries (FAO, 2011c)
Governability of Fisheries: Theory and Applications (Bavinck et al., 2013)

3.3.18 Securing Africa’s Fisheries Resources: Marine and Shared Water Resources

A. Introduction
Many African States with fisheries resources have demonstrated unmitigated inabilities to manage these resources on a sustainable basis. Major problems experienced in African fisheries arise from: illegal, unreported and unregulated (IUU) fishing; overfishing and degradation of the fisheries resources.

This section is intended to highlight the IUU problem and its effects as a means of creating a strong background to inform the development of good practices and credible sustainability criteria for sustainable fisheries. Experiences from the past standardization initiatives have indicated that many standardization experts underestimate the IUU problem, sometimes considering as constituting a barrier to fisheries trade. Examples of the current problems are intended to reinforce the section and provide avenues for sustainability principles, criteria, indicators and verifiers.
B. **Illegal, Unreported and Unregulated (IUU) Fishing**

The threat posed by illegal, unreported and unregulated (IUU) fishing is widely recognized by the international community (RoNam, 2007; OECD, 2004). The IUU fishing problem affects both domestic waters and the high seas, and all types of fishing vessels, regardless of their size or gear.

But a fundamental question is – why does IUU fishing happen at all? We all know the answer, unless we like to pretend not to! There exists a plethora of excellent and fully available legal and institutional instruments such as the UN Fish Stocks Agreement, the Compliance Agreement, as well as voluntary instruments such as FAO’s Code of Conduct and the various International Plans of Action. Many other States, spent precious time and resources developing these! So then, why does this rape of the sea continue? Why are IUU vessels still able to offload at ports under the noses of certain port states and find lucrative markets for their illicit cargoes? The answer is simple – it is because fishermen, vessel owners, governments and international bodies have to date failed to stop it. In particular, it is because of a lack of political will to tackle the problem. We should control our vessels and nationals. IUU fishing is not an accident – it is carefully planned and, unfortunately, tolerated. Those who finance it make great profits. Some may have high contacts in the right places. As a result, some States continue to offer ports of convenience. Again, there must be real political commitment to stop it.

Many states have signed up to laudable and prudently crafted international conventions, agreements and arrangements. It is however a pity that we are simply failing to meet our obligations to such instruments. But why is this? It seems that we agree on these plans and instruments just as a formality, a diplomatic nicety, but that’s all! It would appear that individual states, be they coastal, flag or port states, are the main culprits for allowing IUU fish to be landed in the first place. Why should the political leaders of this world abdicate from their responsibilities? We can talk and develop prudent and well-intended plans and instruments to our heart’s content, but if real political will is lacking for implementation, then we are all wasting our time, and the rape will continue unabated!

One might reasonable question whether States will not abuse and disrespect voluntary instruments such as the FAO IPOA on IUU fishing, given that so many are after all failing to abide to their legally-binding duties under international instruments.

C. **Defining and Categorizing IUU**

IUU or illegal, unreported and unregulated fishing is fishing that is conducted contradictory to legal conservation and management measures currently in place around the world. The FAO International Plan of Action to prevent, deter and eliminate illegal unreported and unregulated fishing FAO IPOA-IUU (FAO, 2002) contains the accepted definitions:

C.1 **Illegal fishing refers to activities:**

(i) conducted by national or foreign vessels in waters under the jurisdiction of a state, without the permission of that state, or in contravention of its laws and regulations;

(ii) conducted by vessels flying the flag of states that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the states are bound, or relevant provisions of the applicable international law; or
(iii) in violation of national laws or international obligations, including those undertaken by cooperating states to a relevant regional fisheries management organization.

**C.2 Unreported fishing refers to fishing activities:**
(i) which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or

(ii) undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.

**C.3 Unregulated fishing refers to fishing activities:**
(i) in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a state not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or

(ii) in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with state responsibilities for the conservation of living marine resources under international law.

**D. Dimensions of IUU**
(1) unregulated fishing takes place in nations that lack the resources to establish fisheries laws or monitoring, including the monitoring and supervision of foreign ships licensed under unfavourable agreements;

(2) some unreported fishing stems from a lack of scientific data collection; and

(3) while other unreported catches conceal illegal activity.

These three dimensions of illegal fishing are a major threat to the oceans, consumers and seafood businesses around the world.

**E. Contributing Factors to IUU**

**E.1 Too many fishers chasing too few fish:** Overcapacity in fishing — The fishing industry has too much capital invested in vessels that it must operate to realize a return. More and more boats remove more and more fish, not allowing for their reproductive needs. Fish are being caught younger, some being harvested before they can reproduce. Some commercially targeted fish require only a few years to reach a reproductive age while others may take more than 30 years. The result of this is the catch per unit effort (CPUE) has gone up, meaning more effort is being expended to catch fewer available fish. Therefore, in an era of overfished fish stocks and substantial excess fishing capacity, IUU fishing is recognized as a major threat to the long term sustainability of the world’s oceans.

**E.2 High and growing demand for seafood:** As world populations continue to soar, the demand for seafood, an attainable protein resource, increases, and fisheries stocks are harvested beyond their ability to sustainably reproduce. “Fishing down the food chain” is the result. Fish that were previously discarded as “trash fish” are now fisheries targets. While aquaculture is one potential measure to meeting high consumer demand
and reducing soaring wild harvest levels in the future, the gap between supply and
demand continues to widen.

E.3 **Highly profitable:** IUU fishing is highly profitable so a strong economic incentive exists
to participate. It is simply more “expensive” to be a responsible fisher in the global
market. The complexity of the fishing industry and the many levels of organization
involved leave it vulnerable to the influence of organized crime and corruption. Fishing
vessels may also be used in activities such as drug or human trafficking.

E.4 **Weak Enforcement:** Many countries do not dedicate sufficient enforcement resources
to fight illegal fishing and lack capacity to prevent trade of stolen fish. Even vessels that
have been blacklisted for illegal fishing activities by international organizations are
intercepted at port only 25 percent of the time. Lack of government oversight and
resources, poor enforcement and corruption all contribute to the failure of fisheries
enforcement. Reviewers of illegal fishing and compliance reform in South Africa
specifically noted budget cuts, including a two-thirds decline in natural resources
agency staff over the course of a decade, which prevented South African officials from
conducting any visible policing.

E.5 **Few Laws:** Some fisheries are not bound by any law at all. Authorities can only carry
out enforcement when their nation provides regulatory and legal backing, including
adoption of international conventions. Unregulated fishing may also include fishing in
remote locations or by seasonal participants who are not part of a local community.
Remote locations include the majority of the ocean’s waters that are beyond national
boundaries, known as the high seas. There is no designated police force responsible for
the high seas, and the laws binding fishing and other activities in international waters
are minimal. In a notorious chase, an Australian patrol boat pursued a Chilean sea
bass fishing vessel across the high seas for 4,000 miles – yet this kind of enforcement is
the exception rather than the rule. Sections of the ocean are managed with varied
success by “regional fisheries management organizations (RFMOs)” which include
Antarctica’s Commission for the Conservation of Antarctic Marine Living Resources. In
one study, half of ports visited by known illegal vessels were located in nations that
belong to a regional fisheries management organization, though these visits did not
always lead to enforcement action. The effectiveness of RFMOs is limited by the political
will, regulations and capacity of participating nations, suffering the same weaknesses
as the United Nations.

E.6 **The Shell Game:** Illegal fishing is a shell game, with constantly moving vessels that
change names to stay ahead of enforcement authorities. When the ship returns to port,
fraud, bribery, false documentation and money laundering facilitate the sale of stolen
seafood. Finally, some of the most valuable illicit catches tap into organized crime
networks for international distribution. Fraud, crime networks and the lack of
government controls or traceability systems make it easy to distribute stolen seafood
around the globe.

E.6.1 **Fake IDs for Fish:** Flags of convenience are notoriously used to cover up crimes
committed at sea. The United Nations Law of the Sea requires that all vessels fly their
national flag while on the high seas. Every vessel is required to be registered in its home
country and issued an identification number and documents for the purposes of law
enforcement and safety at sea. The state of registry is known as the “flag state” and
linked to the vessel through its owner, manager or nationality. Pirate vessels
deliberately evade policing efforts by hiding their flag, identity and ownership. This
deception can be as simple as not flying a flag, or covering its name and registration
while conducting illegal activity. Panama and other countries began allowing non-
nationals to fly their flags for a fee in the early 1900s in response to U.S. Prohibition
laws against alcohol. Ever since then, countries in need of foreign income compete for ship registration fees and have neither the incentive nor capacity to enforce regulations that ensure safety at sea, environmental, labour and other standards. Illegal fishing vessels use flags of convenience like a fake ID to conceal stolen fish and reduce liability for the owners if the vessel is captured. Illegal vessels also register in international tax havens, through front companies or joint ventures and frequently change their registration to new countries. Vessels registered under flags of convenience do not necessarily have nationals from that country as owners or crew and may never visit the country issuing the flag. During the 1990s and 2000s, long-standing flags of convenience from Panama and Belize were joined by flags from Togo, Equatorial Guinea, Mongolia (landlocked), Russia, China and North Korea among others, as suspected criminals continually sought new places to hide. Fraudulent identities also extend to shipping manifests and catch documents.

E.6.2 **Mixing Fish at Sea**: One of the most common ways that stolen fish enter mainstream seafood trade is by mixing legal and stolen catches together at different steps along the supply chain. Some countries require fishing vessels to report how much fish they catch, where it is caught and other details to monitor compliance with fishing laws. By mixing in stolen fish, they then take on all of the documentation of the legal fish and are effectively laundered. Transfer of fish at sea, known as trans-shipment, is one of the ways that legal and stolen fish are combined. Refrigerated cargo vessels collect catches from many different fishing vessels. Because they do not catch fish, cargo vessels are exempt from catch documentation and monitoring and provide a gap in the chain of custody.

E.6.3 **Mixing Fish in Aquaculture Pens**: Transfer through aquaculture facilities provides another way to mix stolen fish in with legal fish. Bluefin tuna ranches in particular have been identified as a place where undersized fish are accepted from fishing vessels and exact numbers of fish are not reviewed by inspectors, facilitating misreporting of catches. Tuna ranches are aquaculture facilities where wild-caught tuna, often juveniles, are kept in pens until they reach a marketable size.

E.6.4 **Corruption and Bribery**: Corruption and bribery of authorities can happen anywhere seafood is being inspected. When government observers are on-board fishing vessels, they are vulnerable to attacks, harassment and bribery. Individual relationships between fishing businesses and local officials can develop over time, leading to tolerance of illegal activity, bribery and collusion. Stolen fish can move with the assistance of fees paid to local officials or through gangster-controlled transportation networks. Institutionalized corruption can trickle through an agency or corporation. Pirate fishing operations forge or alter paper catch documents, bribing inspectors to accept entry of stolen fish as legal product. Customs and border patrols are also vulnerable and have in some cases have accepted bribes, signed off on blatantly false catch documents or allowed stolen seafood to enter without proper documentation.

F. **Effects of IUU**

IUU fishing can have far reaching consequences. Some effects include the following:

(i) **Unsustainable harvest of fish stocks and other marine wildlife**: IUU products often come from fisheries lacking the strong and effective official conservation and management measures. IUU fishing most often violates conservation and management measures, such as quotas or bycatch limits, established under international agreements. By adversely impacting fisheries, marine ecosystems, food security and coastal communities around the world, IUU fishing
undermines domestic and international conservation and management efforts. Furthermore, IUU fishing risks the sustainability of the official industry.

(ii) **Destruction of marine habitats and loss of fish for future harvest:** IUU fishing often raids officially designated marine parks hosting vulnerable species. Stiles *et al.* (2013) states that pirate fishermen often target the richest and most vulnerable ecosystems in spite of efforts to protect them and cites cases from Australia, Thailand and Guinea Bissau.

(iii) **Loss of nutrition and food safety:** The conditions on ships engaged in IUU fishing often do not meet safety standards and pose food safety and health hazards. IUU fishing also deprives coastal communities of access to fish proteins from their diets.

(iv) **Loss of income and employment for legitimate fishers:** IUU fishing activities reduce the available stocks to local communities and negatively impact incomes and employment opportunities.

(v) **Deplete local, and potentially global, fish stocks** to the point where they become commercially unviable or even push them to the brink of extinction.

(vi) **Undermine labour and safety standards:** Use of unsafe vessels prone to sinking in the seas; unsafe working environments compared to onshore regulations and practices with some akin to medieval era (Stiles *et al.*, 2013);

(vii) **Distort markets of legally harvested fish:** IUU products are routinely low priced since the illegal operators do not meet the same environmental or sanitary standards. This undercuts bottom-lines for legitimate operators by as much as 10 to 15%. The targeting of overfished species reduces the chances of recovery and can lead to fisheries industry collapse. Cracking down on illegal fishing can boost the economy, restoring profitability to the fishery. By eliminating illegal small-mesh nets in Guinea-Bissau, profits for other fishermen could increase between 50 and 100 percent.

(viii) **Contribute to the loss of economic stability in developing coastal nations:** Foreign vessels often perpetrate illegal fishing in the waters of developing countries. Plundering this critical food supply can bankrupt local fishing businesses and stall long-term economic growth. In Somalia alone, illegal, unreported and unregulated fishing removes $300 million from the national economy each year. West Africa is especially vulnerable to illegal fishing by foreign fleets, in addition to heavy fishing pressure from officially sanctioned foreign vessels. Fishermen in Cameroon report wanton destruction to artisanal fishing gear by illegal trawlers from China and the EU (Belhabib *et al.*, 2015; GreenPeace, 2015), who also overexploit coastal fisheries. The combined losses for artisanal fishermen in West Africa due to poachers represent nearly 35 percent of their total catch.

**G. Stopping the Looting of African Fisheries**

**G.1** How can the problem of illegal fishing be stopped? Effective at-sea enforcement will require much greater investment by individual nations in their detection and patrolling capacity, prosecution and penalties against poachers. In China’s fisheries, the number of violations dropped from the 1990s to the 2000s after modest increases in both penalties and enforcement for illegal fishing. Another enforcement study predicted that an increase in the chance of being caught is even more likely to prevent fishing crime
than a similar increase in fines. In addition to at-sea enforcement, more systemic concerns must also be addressed to stop illegal fishing. Pirate fishing happens quickly, sometimes in a few hours, making detection by law enforcement even more difficult. The actual fishing is then followed by days to months of elaborate transactions designed to disguise the origins of stolen fish. Each fish is shuffled and relabelled many times in the black market to break any obvious links to the scene of the crime. By the time stolen fish arrives on consumers’ plates, its true identity is a mystery. The global problem of pirate fishing involves the “entire range of economic transactions associated with catching fish and bringing them to market” and will require a suite of reforms in fisheries management. Harmful government subsidies currently distort the fishing fleet, propping up corrupt businesses involved in illegal fishing and inflating the total number of vessels beyond what can be sustained by the world’s fish populations. These subsidies must be redirected to transition the fleet toward a sustainable future.

There is a wide range of possible measures that can be undertaken to address the problem of IUU fishing. These will need to cover legal, institutional, economic and social dimensions and will require the involvement of multiple players in the national, regional and international fisheries sectors. Determining the cost-effectiveness of alternate approaches to addressing IUU fishing problems should be undertaken to help identify priorities amongst the possible options so that the best results can be obtained from the limited resources that are available to national governments and international organisations.

G.2 Seafood Traceability Deters Illegal Fishing: Industry and government initiatives to stop illegal fishing are increasingly focused on traceability — tracking seafood from boat to plate. Despite increased at-sea enforcement, it will always remain a challenge to catch poachers in the act of illegal fishing. However, traceability provides an opportunity to catch poachers each time stolen seafood is sold or transported. It may be intercepted at the dock, in the warehouse for processing and freezing, at the airport customs desk and all along the distribution channels for seafood. The European Union is currently implementing regulations to ensure that seafood imports are fully documented and legally caught. Similar catch documentation is already in place elsewhere and being refined for the fisheries with the most illicit activity, including bluefin tuna and Chilean sea bass. Experience from the Chilean sea bass traceability system emphasizes how important it is for traceability to include the entire supply chain across all fishing gears, products and jurisdictions. This includes the need to ban any imports that do not participate in traceability. Additional lessons learned include the need for centralized data and surveillance systems, online documents and advance notification of landings to allow inspectors to verify the catch. The U.S. has no traceability requirements for domestic or imported seafood and few regulations for imports or catch documentation. Additionally, the majority of U.S. seafood imports are neither inspected nor labelled with basic information as to when, where and how the fish was caught.

(1) **Full chain traceability of seafood:** Tracking seafood from boat to plate is essential to keep illegally caught fish from entering the U.S. market. Traceability requires documentation to follow the fish through the entire supply chain. In order to stop flow of illegal seafood products, a traceability system must be transparent and verifiable. Frequent inspections confirming the identify of seafood products is critical to the success of any documentation scheme.

(2) **Global information systems:** A global fishing vessel database is needed to connect existing vessel registers maintained separately by different governments and regional fishery management organizations. Though global vessel identifier numbers are issued by the International Maritime Organization, these numbers
focus on shipping and are not currently required for fishing vessels. The High Seas Task Force identified information-sharing between agencies as a critical gap in intelligence currently exploited by illegal operators to evade enforcement. A minimum standard must be established for vessel and catch documentation to facilitate information sharing across jurisdictions and through the supply chain.

(3) **Trade flow analysis:** Patterns in trade and financial flows that indicate suspicious activity could be applied to identify pirate fishing, similar to their use in anti-terrorism efforts. Identifying critical points in the supply chain where trade flow analysis will help will assist in directing enforcement interventions.

(4) **Cooperation between authorities:** Pirate fishing sometimes escapes detection due to overlapping jurisdictions within the U.S. government and between member countries of regional fishery management organizations. As recommended by the Government Accountability Office report on seafood fraud, fighting fraudulent fish requires increased sharing of information and inspection resources between the Food and Drug Administration, Customs and Border Patrol and the National Oceanic and Atmospheric Administration. Most cases where pirate vessels are apprehended on the high seas have involved cooperation between authorities from several different countries.

G.3 **Flag State Actions:** Links between flags of convenience and tax havens have been established and a more concerted approach towards both could be undertaken. There is a need to improve transparency on the procedures and conditions for re-flagging and de-flagging. More countries could usefully investigate the possibilities for applying extra-territorial rules for their nationals. The penalties for IUU fishing offences should be significantly increased and harmonised between jurisdictions.

G.4 **Port State Actions:** The development of minimum guidelines for port state controls and actions against IUU fishers, particularly with respect to the use of prior notice and inspection requirements (including health and safety conditions), should be encouraged. The harmonisation of these controls and actions should be a priority. There is a need to ensure a broader use of port state control measures including inspections, preventing access to services and goods of IUU vessels. There needs to be an agreement to make it illegal to tranship, land and trade in IUU fish. There is also a need to improve the monitoring of the provision of at-sea services and transhipment of fish and fish products.

G.5 **Coastal State Actions and International Trade Responses:** It is necessary to augment monitoring, control and surveillance capacities and improve fisheries management across the board, but in particular in developing countries. Improving and extending the use of catch and trade documentation schemes could help provide additional information on IUU fishing activities. Fair, transparent and non-discriminatory countermeasures should be adopted, consistent with international law, against countries that do not comply with the conservation and management measures adopted by RFMOs, or fail to effectively control the vessels flying their flag, in order to ensure they comply with the conservation and management measures adopted by RFMOs. Countries should identify the area of catch, name of fishing vessels and their past history (of name and flag) in order to collect information necessary for better fisheries management and elimination of IUU fishing.

G.6 **RFMO Actions:** Strengthening the mandate and role of RFMOs and RFBs, in particular their possibilities for tracking IUU fishing, is an important requirement. There is a need to improve information sharing and co-operation among RFMOs, particularly in terms of linking and integrating their data on IUU fishing activities. More RFMOs should
consider publishing lists of companies and vessels engaged in high seas IUU fishing activities and lists of vessels that are authorized to fish. The use of positive and negative lists of IUU fishing vessels and companies is strongly encouraged in this regard. The creation of a global record/register of authorised fishing vessels that are technically capable of engaging in high seas fishing should be considered.

G.7 **International Co-ordination:** Resources matter: more technical and financial resources are needed for capacity building, in particular in the developing states, for monitoring, control and surveillance, and in all activities to combat IUU activities. The international community should move to ratify relevant international treaties on labour and working conditions in the maritime sector in order to strengthen international hard and soft laws to protect fishing crews in general. Improved monitoring of foreign direct investments (out-going and in-coming) in the fishing sector will assist in tracking potential IUU fishing operations. Work should be undertaken nationally and multilaterally to lift the veil of corporate secrecy surrounding the companies undertaking IUU fishing activities and related services. Partnerships between public authorities and businesses offer important scope in the fight against IUU fishing. In this regard, the OECD Guidelines for Multinationals offer some possibilities that could be followed-up by national regulatory authorities. A major effort is required, in particular by regional fisheries management organisations and market countries, to collect and disseminate relevant information. The efforts already underway to improve information at all levels and mechanisms to share information need to be supported and strengthened.

G.8 **NGO and Private Sector Actions:** Whenever possible, governments should consider bilateral consultation with businesses engaged in IUU activities to determine if alternative means of getting IUU vessels out of the business can be found. There should be continued efforts to communicate the IUU problem, for example through promotional/educational campaigns with the market, including intermediate buyers, processors, distributors and consumers. Such activities will help raise awareness of the problem and improve the knowledge of the social, economic and environmental consequences of IUU activities. Industry and NGOs should be encouraged to continue to self-organise their response to IUU fishing and information collection.

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3.3.19 Ecosystems for Water and Food Security: Security of Watersheds and Hinterlands

A. Introduction

Fisheries and aquaculture activities take place within the aquatic environment which is a dynamic ecosystem hosting a large number of live forms. Gradual natural weathering of watershed rocks and soils are carried by runoff into the aquatic environment and their accumulation can impact the quality of the water and the aquatic environment in which the fish grows. Anthropogenic activities can accelerate the flow of materials into the aquatic environment, creating conditions for multiplication of toxins and accumulation of heavy metals to unsafe levels. Anthropogenic activities contribute elevated levels of heavy metals such as mercury, copper, cobalt, chrome, iron, manganese, lead, zinc, arsenic and cadmium. Additional water pollution activities result from agricultural and human settlement activities in the form of agro-chemicals and wastewater systems.

Trash, especially plastic and litter cause adverse effect on fish. Plastics do not degrade easily in environment and therefore remain in the same stable / undegraded form in water bodies. Fish mistakenly confuse plastics as food materials and ingest them which causes blockage in the digestive system and kill the fish. There is also probability that fish and other marine life often get stuck in plastic items. Plastic often cause fish to starve to death by getting stuck around their mouth making them unable to eat. Plastic items can also cause slow choking of marine life to death by getting stuck around the neck of marine life. Apart from plastic, metal, rope, nets and ‘styrofoam’ are among other human made trash items which are disposed off in water bodies and harm marine life.

Tannery effluents contain both organic and inorganic solids in high concentration in either suspended or dissolved forms which results to high oxygen demand in water including admixture of harmful elements like toxic metal salts and chromium metal ion in the water. Without proper treatment and discharge of untreated wastes in water bodies causes serious harm to both environment and life threatening for the aquatic flora and fauna. It has deleterious effect on the soil also adjacent to the water bodies are characterized by high contents of dissolved, suspended organic and inorganic solids giving rise to high oxygen demand and potentially toxic metal salts and chromium metal ion. The tannery effluent, if not treated properly, can cause serious damage to soil and water bodies resulting to increase in soil salinity, reduced fertility and soil infertility and reduces potentiality for growth of crops. In many underdeveloped countries, the harmful and climatic unfriendly effluents from the tanneries are discharged directly into large water bodies even without proper treatment which is a grave and serious issue of concern for the environmental, climatic and public health. Oil spills from industrial sources runoff into the water sources which coat the skin of fish and kill them. Oil provides a source of toxins for fish that can cause disease, genetic defects/alterations and death. The oil damages the surface protective activity of skin which keeps the marine mammal warm. Some sewage feed algae that also flow off in the ocean. These algae grow at a rapid rate and have a high nutrient concentration producing red tides. They are called red tides because of the red appearance of the foam of the ocean waves. Red tides kill fishes by releasing toxins.

Excessive noise production from boats and drilling causes stress on fish and other marine life which make them sick and lethargic. This affects their mating behavior adversely. Fluctuations in water temperature from power plants and factories kill off coral and cause marine life to migrate for relocation in an attempt to find waters with a more sustainable thermal condition. Radioactive waste generated from industrial and military wastes enter the water bodies and are absorbed by fish and can cause genetic, mutagenic and teratogenic defects in them.
B. Purpose
The purpose of this section is to highlight how direct and indirect human activity affect the availability, safety and quality of capture and aquaculture fisheries. Standardization focus for fisheries and aquaculture should take into account parameters which are likely to affect the quality and safety of fisheries and aquaculture products arising from environmental degradation in the immediate aquatic environment and the upstream sources of the water.

This section outlines the possible health and safety hazards arising from environmental degradation.

C. Possible Health and Safety Hazards
(1) Quality of Seafood from Aquaculture
(2) Safety Aspects of Seafood
(3) Abiotic Environmental Factors Affecting Seafood Safety and Properties
(4) Biotic Environmental Factors Affecting Seafood Quality
(5) Seafood Quality Assurance for Algal Toxins
(6) Fish and Shellfish Diseases and Seafood Quality

D. Best Environmental Management for Healthy Fisheries and Aquaculture
The link between the health and safety of the environment and the fisheries and aquaculture resources calls for drastic action on the part of the environmental protection and fisheries authorities in order to assure the quality, safety and health of the fisheries and aquaculture products.

The securing of the watersheds and the strict observance of non-discharge of wastewater into water courses should be enforced without reservation since the consequences of not taking this kind of action seriously compromises the safety and health of fisheries and aquaculture products with assured deleterious impacts on human health and safety.

Lax regulations along watersheds, waterways and water bodies should be reviewed if Africa is to safeguard its fisheries and aquaculture resources availability, quality and safety. The reaction to clean up the environment only on account of export requirements should desist as it implies that national populations are of less concern while in effect the political economy of a healthy population demonstrates the converse.

Notorious discharge of industrial waste into water systems on account of industrialization and job creation excuses is not to be accepted under any circumstances since the costs cannot be justified. Infringements into watersheds on account of population increases should be reviewed and mitigated to offset the costly impacts such infringements would manifest on fisheries and aquaculture resources downstream.

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