DRAFT PANGASIUS AQUACULTURE DIALOGUE STANDARDS FOR THE FIRST PERIOD OF PUBLIC COMMENT

Table of contents

1. Introduction

Aquaculture is the fastest growing food production system in the world. Global production from aquaculture is growing substantially and this trend is projected to continue. Aquaculture provides increasingly significant quantities of fish and other aquatic food sources for human consumption and is a key source of protein. The industry also creates millions of jobs on and off the farm. With appropriate management, aquaculture can be environmentally and socially sustainable, meet the growing need for aquatic foods and contribute to food security, poverty reduction and sustainable economic development.

As with any rapidly growing activity, the growth in aquaculture production has raised concerns about negative social and environmental impacts related to farming, such as water pollution, the spread of diseases and unfair labor practices at farms. And as in any industry, there are some businesses addressing these issues well and some who are not doing so at all or are doing so poorly. It is important that we face the challenge of promoting and spreading practices that contribute to resolving these issues, while eliminating or reducing those that have a negative impact.

One solution to this challenge is creating standards for responsible aquaculture production, as well as a process for certifying producers who adopt the standards. Standards, when adopted, can help reassure seafood

buyers, either throughout the value chain or at the consumer level, that aquaculture products do not have adverse impacts on environmental or social sustainability. One way buyers can support sustainability is by purchasing certified products that have been produced in compliance with these standards.

Standards and certification systems also are valuable because they can provide added confidence to consumers that compliance with government and inter-governmental requirements has been achieved by providing additional verification and documentation of such compliance.

Through a multi-stakeholder process called the Pangasius Aquaculture Dialogue (PAD), measurable, performance-based standards for the pangasius aquaculture industry are being created. The standards, when adopted, will help minimize the key negative environmental and social issues associated with pangasius farming. The first draft of the standards, presented in this document, is based on sound science and was created by consensus among the 250-plus stakeholders who have been involved in the PAD since it began in September 2007.The PAD is coordinated by World Wildlife Fund (WWF).

Feedback received during the 60-day comment period will be used by the PAD's technical working groups (TWGs), as well as the Process Facilitation Group (PFG) that manages the PAD, to revise the standards. The revised standards will then be posted for a second 60-day public comment period. Again, input received during that period will be used by the PFG and TWGs to revise the standards, which will be presented to the full group of PAD participants for final approval.

2. Understanding standard setting, accreditation and certification

Certification is the verification of compliance with a set of performance-based standards. Certification schemes encompass the processes, systems, procedures and activities related to three functions: 1) standard setting, 2) accreditation and 3) certification (i.e., verification of compliance, also known as "conformity assessment"). Certification may also include the labeling of companies, practices, operations or products that conform to the standards.

For aquaculture certification to be credible, it must be consistent with rigorous procedures for standards setting, accreditation and certification. The certification scheme must establish and maintain the confidence of the producers and industry operators involved in aquaculture activities, as well as the confidence of other stakeholders, including consumers, governments and civil society groups.

For standard setting, which is the process of creating the required standards, it is essential that the process is not dominated by one, or a few, stakeholder groups. It is critical that aquaculture certification schemes adequately incorporate multi-stakeholder involvement in an inclusive, transparent process. Attention to the needs and conditions of small-scale producers and

their communities is particularly important. If the standards are to be global, then they must include stakeholders from around the world.

The "Code of Good Practice for Setting Social and Environmental Standards," created by the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance, provides the criteria by which standard setting must take place. WWF has been accepted as an associate member of ISEAL because of the fact that the ISEAL criteria are the foundation for the process used by the PAD and seven other aquaculture Dialogues coordinated by WWF. For more information about the ISEAL criteria, go to http://www.isealalliance.org/index.cfm?fuseaction=Page.ViewPage&PageID=1046

For accreditation, which is the process of authorizing entities to verify compliance with the standards, it is important that there is no conflict of interest between the entity coordinating the standard setting process, the entity that manages the standards, the entity that accredits third-party certification bodies, or the entity that undertakes the third-party certification. Sufficient separation is required between these components to maintain independence and credibility.

For certification, which is the process of verifying compliance with the standards, it is critical that there is no conflict of interest between the entity that conducts this function (i.e., the certification body) and the farm seeking certification, the entities that undertook standard setting, and the entity that manages the standard or the entity that accredits the certifiers. For this reason, third-party certification is the most robust, credible and trustworthy process. Through this process, an accredited, independent certification body analyzes the process or product, and reports on compliance.

3. Purpose, justification and scope of the standards

3.1 Purpose of the standards

The purpose of the PAD standards is to provide a means to measurably improve the environmental and social performance of pangasius aquaculture development and operations.

3.2 Justification for the standards

The justification for the standards as agreed by consensus at the 1st PAD meeting is based on the following points:

- Pangasius is increasingly popular among consumers. While it used to only be eaten in Vietnam, it is now exported to more than 100 international markets.
- Pangasius farming is experiencing an extremely fast growth, with production growing more than 60-fold in the last decade.

- There is a desire by the stakeholders participating in the PAD to safeguard the sustainability of pangasius farming and consumers' safety, therefore maintaining quality and productivity.
- There is a need to be proactive rather than reactive to problems.
- There is a desire for a multi-stakeholder, consensus-based, metrics-based and transparent set of standards.

3.3 Scope of the standards

3.3.1 Issue areas of pangasius aquaculture to which the standards apply

The PAD is creating criteria, indicators and standards for addressing the negative social and environmental issues related to pangasius aquaculture.

Criteria are the areas to focus on to address the issues. Indicators are what to measure in order to determine the extent of the issue. Standards are the numbers and/or performance levels that must be reached to determine if the impact is being minimized.

3.3.2 Operational components of pangasius aquaculture to which the standards apply

Pangasius aquaculture and its value chains generally consist of the following operational components:

- Supply chain inputs (e.g., water, seed, feed and chemicals)
- Production systems (e.g., ponds, pens and cages and the other equipment and operations associated with production)
- Processing
- Chain of custody (e.g., from production, through processing, export, import, distribution and retail)

These standards are designed to address the most significant impacts of pangasius aquaculture, which are mostly from the production systems and the immediate inputs to production (e.g., feed, seed and water).

These standards apply to production systems currently used for pangasius production, such as ponds, pens and cages.

3.3.3 Range of activities within aquaculture to which the standards apply

The PAD standards apply to the planning, development and operation of pangasius aquaculture production systems, which in turn affect the inputs,

production, processing and chain of custody components. Planning includes farm siting; water use planning; assessment of environmental, social and cumulative impacts; etc. Development includes construction, habitat removal, user access, etc. Operation includes stocking densities, effluent discharge, working conditions, use of chemicals and veterinary medicines, feed composition and use, etc.

3.3.4 Species and geographic scope to which the standards apply

The PAD standards apply to the production of two pangasius species: *Pangasianodon hypophthalmus*[1] and *Pangasius bocourti*[2].

The PAD standards apply globally to all locations and scales of pangasius aquaculture production systems. Although the majority of pangasius production currently takes place in Vietnam, there are significant pangasius farming operations in other countries, such as Bangladesh, India, China and Thailand.

3.3.5 Unit of certification to which the standards apply

The unit of certification refers to the extent of the specific aquaculture operation to be assessed and monitored for compliance with the standards. The size of the production operation can vary considerably and needs careful consideration when determining the entity that will seek assessment for compliance. As the focus of these standards is on production and the immediate inputs to production, the unit of certification will typically consist of a single farm or other production unit.

The unit of certification may also encompass a group of operations that should be considered collectively as the aquaculture operation under consideration, especially in the case of small-scale farms involving the same species and similar management regime. For example, they may be in close proximity to each other, share resources or infrastructure (e.g., water sources or effluent discharge systems), share a landscape unit (e.g., a watershed), and/or have the same production system. Farms will also have cumulative effects, which will often be the main environment issue. Determining the unit of certification requires that an appropriate spatial scale and level of potential cumulative effects be considered. The certification body will determine the ultimate unit of certification and procedures for auditing.

4. Process for creating the standards

The draft standards for pangasius aquaculture are being developed through transparent, consensus-oriented discussions with a broad and diverse group of stakeholders (e.g., producers, buyers, NGOs, researchers, governments,

[1] Common name in Vietnam: tra
[2] Common name in Vietnam: basa

multi-lateral organizations, development groups and allied businesses). The PAD is coordinated by WWF.

The steps in the process, to date, are described below:

- WWF notified ISEAL of the intent to apply the "Code of Good Practice for Setting Social and Environmental Standards" to the PAD. ISEAL approved this step and accepted WWF as an associate member on behalf of all of the Aquaculture Dialogues.

- Participation in the PAD is a voluntary process and anyone with an interest can be involved. To maximize involvement, the inaugural meeting of the PAD – as well as later PAD meetings – were publicized on the Aquaculture Dialogues website, in seafood trade publications, and in several other publications read by key stakeholders. Key stakeholders were also asked by WWF and others to participate in the PAD in order to ensure its credibility.

- PAD participants agreed on eight key environmental and social issues associated with pangasius aquaculture and on the principles to address each issue.

- PAD participants agreed on the objectives of and justification for the PAD, as well as the PAD process.

- PAD participants agreed on a governance structure for the development of the standards. This includes the following:

    - The PFG that is charged with managing the PAD process. (See list of PFG members in Section 8.)

    - TWGs that are in charge of drafting the principles, criteria, indicators and standards.

    - PAD meetings, where final decisions concerning the PAD standards are made by consensus by the participants at the meeting.

- Seven TWGs were formed to address the eight key issues. (See list of TWG members in Section 9.) Two of those issues (health and veterinary medicines/chemicals) are addressed by one TWG and have now been merged into one issue.

- Each TWG appointed a TWG coordinator responsible for moderating the TWG discussions and compiling the TWG outcomes. (See list of TWG coordinators in Section 9.)

- TWG members held discussions by e-mail and through in-person meetings until they reached consensus (although sometimes not unanimity) on the PAD draft principles, criteria, indicators and standards.

- The draft principles, criteria, indicators and standards were presented to the PAD participants at a PAD meeting. Their input was used by the TWGs to revise the suite.

- The PFG and TWG coordinators compiled the draft principles, criteria, indicators and standards and posted them for public comment.

5. Content of the standards

this document reports the outcome of the seven PAD TWGs and presents pangasius standards for the following issues:

Legal compliance
Land and water use
Water pollution and waste management
Genetics
feed management
Health management, veterinary medicines and chemicals
Social responsibility and user conflict

Issue 1: Legal compliance

Pangasius aquaculture operations must, at a minimum, respect and adhere to national and local laws. The PAD may develop sustainability standards beyond those required by law but the basis for aquaculture must be compliance with the legal requirements of the producing country.

Principle

Locate and operate farms within established local and national legal frameworks.

Criteria

Compliance with local and national legal frameworks.

Indicators

Documented compliance with local and national legal frameworks.

Standards

The following standards are proposed:

1. Compliance with local and national authorities (e.g., evidence of

legal access[3]), and concessions to land and/or water use.

2. Compliance with all land taxes.
3. Compliance with local and national legal frameworks.

Issue 2: Land and water use

The responsible use of land and water resources is fundamental to sustainable pangasius aquaculture. The siting, design and construction of pangasius farms often have a negative impact on other users and the environment. To address this, a growing number of countries have established land and water use plans. Some also have approved aquaculture development plans and specific zoning of aquaculture activities. Respecting these planning decisions forms the basis for appropriate pangasius farm development.

More specifically, regarding land use, responsible pangasius aquaculture should not result in the loss of wetland habitat through conversion to aquaculture use or though impacts from siting facilities in wetlands.

It is also important that pangasius aquaculture does not adversely affect the hydrological regime in the area of farm operations. For example, water movement should not be restricted or altered in such a way that aquatic animal movements are affected by the aquaculture operation. In addition, use of the water system by other users should not be adversely affected. For example, navigability of rivers should not be blocked or made more hazardous by pangasius aquaculture facilities.

The level of water use also is a major concern. Therefore, the amount of water taken out of the river system and not returned must be managed to remain within reasonable limits.

Principle

Farms[4] must be located, designed, constructed and managed to minimize negative impacts on other users and the environment.

Criteria

- Compliance with official aquaculture development plans.
- Wetland conversion.
- Water movement.
- Water use.

[3] In Tilapia Aquaculture Dialogue –'evidence of lease'

[4] Pond, cage and pen-based

Indicators

1. Location of farm in relation to official aquaculture development plans.
2. Conversion of wetland(s) to establish the farm[5].
3. Impediment to navigation, the natural hydrological regime or aquatic animal movement.
4. Amount of water abstracted per ton of fish produced.

Standards

1. Farms must be constructed in an area that complies with any approved aquaculture development plans effective in the area.
2. Farms must not be constructed in wetlands[6] or protected areas, such as national parks or areas listed in the World Database on Protected Areas (http://www.wdpa.org/). In countries which are flood prone (e.g., Bangladesh), up to 30 percent of the flooded area can be converted.
3. Farms must not impede navigation, the natural hydrological regime or aquatic animal movement. Farms must not present hazards to the transportation of local people. Farms must not occupy more than 25 percent of a water canal.
4. The ratio of water abstracted per unit of fish production must not exceed 5,000 m^3/ton of fish produced for a given culture period.

Issue 3: Water pollution and waste management

Pangasius aquaculture can have a negative effect on water quality, particularly when the farming leads to excess effluents and nutrients in pond sediments. We recognize it is difficult to operate commercial pangasius culture systems without some impact on the water used, whether diluted or concentrated, immediately detectable, or contained in the sediments. However, it is important to control ammonia, nitrogen, phosphorous and Biological Oxygen Demand and to develop specific water quality standards for them. Monitoring of effluent water quality and pond sediments is critical to ensuring the aquaculture operations are not generating unacceptable levels of pollution. Related to this is the issue of water exchange between ponds and other water bodies, which should be controlled by managing the percentage of water that is transferred.

Waste management is closely related to water pollution issues. Sludge from ponds should be disposed of properly and not discharged into public water bodies, where it can be a significant pollution source. Another major waste stream is dead and moribund fish removed from ponds. Proper disposal (e.g., burial or incineration) is necessary to ensure that this waste does not impact

[5] Relevant only to farms established after the PAD standards have been finalized

[6] Wetlands as designated by the RAMSAR convention were of particular concern. Also mentioned for consideration were (1) national parks (2) conservation of internal habitats or buffer zones in and around existing farmed areas (possibly measurable by species/unit area) and terrestrial as well as wetland habitat

the environment.

Principle

Minimize the negative impact of pangasius farming on water resources.

Criteria

- Water quality of effluents.
- Nutrients in pond sediments.
- Sludge discharge.
- Water exchange.
- Waste management.

Indicators

1. Percentage change of Total Ammonia Nitrogen (TAN) between pond and inlet[7].
2. Dissolved Oxygen (DO) concentration in water discharged.
3. Percentage change of 5-day Biological Oxygen Demand (BOD_5) between pond and inlet.
4. Percentage change of total phosphorus between pond and inlet.
5. Percentage change of total nitrogen between pond and inlet.
6. Direct discharge of sludge.
7. Evidence of a sludge repository and sludge use.
8. Percentage change of turbidity between pond and inlet.
9. Percentage of Total Nitrogen (TN) in pond sediments.
10. Percentage of Total Phosphorus (TP) in pond sediments.
11. Maximum daily percentage of water exchange.
12. Disposal of dead/moribund fish removed from the pond.

Standards

1. TAN: maximum 700 percent change.
2. DO in water discharged is 3mg/l or above.
3. BOD_5: maximum 40 percent change.
4. Total phosphorus: maximum 150 percent change.
5. Total nitrogen: maximum 120 percent change.
6. No direct discharge of sludge in public water bodies.
7. There must be evidence of a sludge repository and of sludge being used.
8. Turbidity: maximum 20 percent change.
9. TN in pond sediments: maximum of 4.3 percent at harvest.
10. TP in pond sediments: maximum of 1.2 percent at harvest.
11. Maximum daily percentage of water exchange should not exceed 25 percent, except during harvest.
12. Proper disposal of dead/moribund fish removed from the pond (e.g.. burial or incineration).

Issue 4: Genetics

Pangasius aquaculture raises a number of important issues in relation to genetics, such as impacts to indigenous species when introduced as exotic species, the importance of preventing escapes, the need to maintain genetic diversity, and the problems of Genetically Modified Organisms (GMOs) and hybridization.

Pangasius aquaculture can impact habitats and/or the genetic integrity of local pangasius populations if the farming occurs in locations where the farmed species is not indigenous or if a self-recruiting stock is not established. This type of aquaculture also can impact the environment if measures are not in place to minimize escapes from production systems, especially via drainage systems and during flood events.

Genetic changes in hatchery populations also are an important aspect of pangasius aquaculture to be addressed. Some genetic changes are likely in any stock of fish that are bred in captivity over several generations. Pangasius, in its natural habitat, has a complex population structure. Therefore, captive breeding may result in the mixing of genetically distinct stocks. Because it is not sustainable to base pangasius aquaculture on wild-caught fry or broodstock, minimizing escapes of captive-bred fish is essential to preventing genetic impacts on wild populations. A range of techniques and practices are available to prevent escapes. Escape reduction also is a good business practice, as there are economic incentives to prevent escapes.

The use of GMOs and hybrid seed creates additional issues regarding genetic pollution and impacts on farm stocks and wild populations. These impacts can be prevented by avoiding the use of GMOs and hybrid seed.

Principle

Minimize impacts of pangasius aquaculture on the genetic integrity of local pangasius populations.

Criteria

- Non-indigenous species.
- Genetic diversity.
- Escapees.
- GMOs and hybridization.

Indicators

1. Farming of pangasius in locations where that species is indigenous or has a self-recruiting stock established.
2. Genetic stock from which seed is sourced.

3. Measures in place to minimize escapes.
4. Use of GMO or hybrid seed.

Standards

1. Pangasius farming shall take place only in locations where that species of pangasius is indigenous or has a self-recruiting stock established .
2. Seed shall be sourced from pangasius populations already established in the river system[8] used by the farm.
3. Farms shall apply Better Management Practices (BMPs) to minimize escapes from production systems (including drainage systems), and to reduce the number of escapes during floods. BMPs include:
    - Bund height above high water/flood levels.
    - Traps on water outlets to catch/kill escapes (e.g., juvenile fish, chemical treatment of effluent ponds).
    - Bund construction / quality / engineering standards[9]
4. No GMO or hybrid seed shall be used.

Issue 5: Feed management

"Feed" refers to all feeds or feed items, regardless of where or how they are produced, and applies to all farms applying for certification. Farms that meet the standards should be able to demonstrate compliance regardless of whether their feed is made by a commercial feed mill or on site.

The use of fish meal and fish oil in pangasius aquaculture, as in other forms of aquaculture, is a key issue of concern. Concerns center around the sustainability of fishmeal and fish oil sources as well as ensuring that the amount of fish oil and fishmeal used to produce pangasius does not use more fish than are produced by farming. In addition, the practice of using locally sourced fish to feed directly to pangasius can have impacts on the environment and biodiversity.

The direct use of fish and fish products to feed pangasius is an unacceptable practice. If fish products are to be used in the manufacturing of feed, they should be from a sustainable source, should not be from a fishery where unacceptable levels of by-catch are caught and should not pose a threat to endangered species that may be inadvertently included in the by-catch. Feed suppliers can ensure that the amount and sources of fish products used in feed, or used as feed, are from sustainable sources.

On-farm feeding management and feeding efficiency are important to achieving the efficient use of available feed resources. Good feed management on the farm is essential to achieving efficient use of available

[8] The term "river system" must be defined to require seed sourcing from appropriately local areas. Otherwise, one could argue that the Mekong River, for example, is one large "river system," and source seed from Laos for a farm in Vietnam.
[9] Metrics have not yet been defined for this BMP

feed resources and minimizing waste. Feeding rates and conversion of feed to fish should be within good standards of efficiency and consistency. Fish Feed Equivalence Ratio (FFER), and the Coefficient of Variation (CV) of the economic Feed Conversion Ratio (eFCR) provide useful means to measure whether fish product use is being managed and wastes are being minimized.

Principle

Use feed and feeding practices that make efficient use of available feed resources and minimize waste.

Criteria

- Efficient use of fish products.
- Efficient management of fish feed on the farm.

Indicators

1. Fish product source.
2. eFCR.
3. CV of eFCR for given size of fish.
4. FFER.

Standards

1. No direct use of fish and/or fish products as feed is permitted. Fish product source must have documented evidence provided that all fish products used as feed, or used in the manufacture of feed:
   - Comes from an approved list (See definitions and formulas in Section 6.)
   - Are not in the "threatened categories" on the International Union for Conservation of Nature and Natural Resources red list (www.iucnredlist.org/), which are Vulnerable, Endangered and Critically Endangered. Also, are not from fisheries that pose a threat to species in these categories.
   - Are from fish stocks that have an average score greater than 7.5 with no individual indicator below 6.0, according to Fish Source (http://www.fishsource.org/site/fisheries)
2. eFCR must be less than 1.75 for the complete production cycle.
3. CV of the eFCR must be less than or equal to 15 percent.
4. The fish feed equivalence ratio (FFER) must be less than 0.5.

Issue 6: Health management, veterinary medicines and chemicals

Managing the health of farmed pangasius stocks depends on the overall management of the farm, including the reasonable, responsible use of

veterinary medicines and chemicals. This must be undertaken in a manner that focuses on ensuring fish health and maintaining food safety and quality, while also minimizing the impacts to human health and the environment.

A key measure of fish health is survival during the grow-out period. Pangasius farming can be best served by each farm having a comprehensive health management plan. Such plans should promote preventative, proactive treatments over chemical and veterinary medicine use. Regular monitoring of fish for stress or disease and the proper removal and disposal of mortalities are important components of implementing a plan to ensure optimal fish health and reducing the impact of diseases on other farms and the environment.

Veterinary medicines and chemicals may play an important role in maintaining fish health and survival. Veterinary medicine and chemical use should be restricted to those approved for aquaculture applications by the country of production and those which are not banned for use in food fish by the importing country.

Fish stocking density may be an important element of maintaining fish health and welfare. There is always a need to find the right balance between space efficiency, farming performance, disease control and fish welfare. Guidance on maximum fish densities for ponds and cages, especially at harvest, is an important tool for maintaining fish health.

Principle

Maximize fish health; ensure food safety and quality while minimizing ecosystem and human health impacts.

Criteria

- Survival.
- Veterinary medicines and chemicals.
- Record-keeping.
- Fish welfare.

Indicators

1. Survival during the grow-out period.
2. Follow legislation or regulations on the use of veterinary medicines and chemicals.
3. Veterinary medicines and chemicals use.
4. Treatment recording.
5. Maximum fish density.
6. Documented health management plan and farm-book.

Standards

1. The annual survival rate must be at least 80 percent, on average.
2. Use only veterinary medicines and chemicals approved for aquaculture by relevant local authorities and which are not banned for food fish use in the importing country.
3. The use of veterinary medicines and chemicals shall:
   - Only be prescribed and administered by people trained to do so;
   - Only be based on a diagnosed condition and follow all label specifications and
   - Respect the withdrawal period or apply a period of 750 degree-days for those without documented withdrawal period times.

   In addition, antibiotics shall never be used as growth promoters or for preventive (prophylactic) treatment;

4. Farmers must keep a record of the name, dates, amounts and withdrawal times of all veterinary medicines and chemicals used in hatchery and grow-out facilities.
5. Fish density shall not exceed 15 and 80 kilograms, respectively, per cubic meter for ponds and cages (generally at harvest).
6. Farms must create and implement, under the signed approval of a certified health specialist, a comprehensive health management plan that promotes proactive treatments (e.g., vaccines and probiotics) over chemical and veterinary medicine use. The plan should also include regular monitoring of fish for signs of stress or disease; proper removal and disposal of mortalities; and appropriate storage and handling of chemicals.

Issue 7: Social responsibility and user conflict

Pangasius aquaculture can be undertaken in a socially responsible manner that ensures the operations benefit farm workers and local communities. The labor rights of pangasius workers are important and farm work conditions should ensure that employees are treated and paid fairly. Appropriate farm conditions include no child labor, no forced labor and no discrimination. Complaint procedures and protection for whistle blowers are critical to achieving and maintaining fair and equitable working conditions. A responsible pangasius farm situation ensures worker health and welfare through safe and hygienic working conditions and relevant training for workers and managers.

The people who live in communities around pangasius farms are critical stakeholders. Regular communication and consultation can build trusting relationships with local communities and prevent or minimize conflicts. The farms should contribute to poverty alleviation and food security so that there are net benefits to the local community.

Principle

Develop and operate farms in a socially responsible manner that contributes effectively to community development and poverty alleviation.

Criteria

- Conflicts with users and local communities.
- Benefits to local communities.
- Labor rights.

Indicators

1. Freedom of association.
2. Collective bargaining.
3. Transparency in wage setting.
4. Child labor[10] without jeopardizing schooling.
5. Forced labor.
6. Bonded labor.
7. Discrimination.
8. Safety awareness.
9. Corrective actions in response to accidents.
10. Insurance.
11. Minimum wage.
12. Labor contracts.
13. Complaints by employees.
14. Complaints by people in the local communities.
15. Preferential employment within local communities.

Standards

1. Employees[11] shall have free access to worker associations or permission to create a worker association if one does not exist.
2. Employees shall have the right to collective bargaining.
3. Employees shall have the right to know the mechanism for setting the wages and benefits.
4. Minimum age of permanent workers shall be 15 years old. Children over 12 years old working outside the hours set aside for school attendance could be employed for light work as long as that work does not exceed two hours per day on school days or holidays. Employing temporary workers[12] below 18 years old should not jeopardize schooling.
5. Employees shall have the freedom to leave the farm premises by the end of their designated work day and not be forced to work overtime.

[10] Child labor does not include children helping their parents on their own farm, provided that working does not jeopardize their schooling or health.
[11] Immediate family members of the farm owner (i.e., children, spouse, parents and siblings) and exchange labour may not be considered as employees.
[12] Three months/year or less.

6. Employees shall not be obligated to stay on the job to repay debt.
7. Employees shall not suffer any discrimination[13] from the employer or other employees.
8. Employees shall be made aware of the health hazards at the work place and how to deal with them.
9. Employers shall record all accidents, even if minor[14], and take corrective action.
10. Employers shall ensure that all permanent workers have health and accident insurance.
11. Employers shall offer 110 percent of minimum wage[15],[16].
12. Employees shall have copies of their labor contract and each labor contract must include a one-month probation period for a permanent job.
13. Farm owners shall draft and apply a verifiable conflict resolution policy for labor that states that conflicts and complaints will be tracked transparently and which responds to all received complaints. At least 90 percent of the complaints should be resolved within one month after being received.[17]
14. Farm owners shall draft and apply a verifiable conflict resolution policy for local communities that states that conflicts and complaints shall be tracked transparently and which responds to all received complaints. At least 90 percent of the complaints shall be resolved within six months from the date of being received.[18]
15. Farm owners shall document evidence of advertising positions within local communities before hiring migrant workers.

[13] Race, caste, origin, color, gender, age, disability, religion, sexual orientation, union or political affiliations. No salary discrimination between men, women and children must be allowed as long as they have the same position and working responsibilities.
[14] Accidents that could not be handled in-house and, therefore, the person was taken to the closest clinic.
[15] Minimum wage is mandatory. Incentives for overtime hours or bonus production are offered. The inflation rate should be mentioned, given that the basic needs are fluctuating because the price for food and basic items is going up.
[16] If the country does not have the minimum wage, the method use by SA8000 to calculate minimum wage should be used.
[17] Complaints include the ones coming from other resource users, employees and buyers (e.g., middlemen or processors).
[18] Complaints include the ones coming from other resource users, employees and buyers (e.g., middlemen or processors).

6. Definitions and formulas

Following are definitions and formulas created by the PAD, unless otherwise noted, and used by the PAD to develop the standards.

Approved, sustainable source

A "sustainable source" is a recognized certified source or one accepted as such by one or more reputable organizations.

Few fisheries used primarily for fishmeal and oil production, or "trash fisheries," are certified. This does not mean that they may not be fished sustainably. Rather, there is limited information on this issue. The PAD, therefore, proposes further investigation of several possible approaches to this issue for the purposes of these standards.

The following schemes do not represent an exclusive or exhaustive list but are examples mentioned during the PAD process as **potential sources of information** to support an approved fish source standard. Other schemes may be available and the PAD welcomes further information on them. Where relevant, comments or concerns related to the individual schemes have been noted. A wider review of available schemes will be undertaken during the first review of public comments.

Certification schemes

- **Marine Stewardship Council (MSC):** http://www.msc.org/. MSC is a certification program with many members in the food fishery sector. They are beginning to investigate some fisheries primarily used for fishmeal and oil production. MSC has had a long relationship with WWF, which helped create the MSC. Some TWG members have expressed reservations about this certification scheme.
- **Friend of the Sea.** http://www.friendofthesea.org/. FoS has a certification program which has already reviewed several fisheries primarily used for fishmeal and oil, as well as some aquaculture production systems. Some TWG members have expressed strong concerns over the credibility of this program.

Databases

The databases described below do not offer certification. Rather, the purpose of the databases is to reviewavailable documentation on management and conditions of individual fisheries or regions.

- **Fish Source:** http://www.fishsource.org/. This is an NGO-developed database investigating individual fisheries. It uses expert panels and literature to develop a scoring system for food fisheries and fisheries primarily used for fish meal and oil. Acceptable fisheries would achieve a certain minimum score in each category published on this database.
- **Rapfish:** http://www.fisheries.ubc.ca/archive/publications/reports/report14_2.php. This database was developed in 1999 by University of British Columbia, Canada to assess countries for the ability to control the fisheries within their jurisdiction. It is likely to be used by IFFO as part of its Code of Responsible Practice CORP screening of fisheries for pre-screening members' fisheries. It can be used in the PAD feed standards to determine if a fishery is likely to be sustainably fished.

Biological Oxygen Demand (BOD)

BOD is the amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water, such as that polluted by sewage. It is used as a measure of the degree of water pollution. It also is referred to as biochemical oxygen demand. (www.answers.com)

5-day Biological Oxygen Demand (BOD5)

BOD5 measures the rate of oxygen uptake by micro-organisms in a sample of water at a temperature of 20°C and over an elapsed period of five days in the dark.

Change in water quality between pond and inlet

The calculation for this is:

(value inside the pond – value in the inlet) / value in the inlet

Coefficient of Variation (CV)

CV is an accepted statistical measure of variability and is calculated as the ratio of the standard deviation to the mean eFCR of the facility. It is calculated using the eFCR value for all ponds harvested in the period between inspections. (See definition of eFCR below.)

Dissolved Oxygen (DO)

DO is the concentration of oxygen dissolved in water, expressed in mg/l or as percent saturation, where saturation is the maximum amount of oxygen that can theoretically be dissolved in water at a given altitude and temperature. (http://www.biology-online.org/dictionary/Dissolved_oxygen)

Economic feed conversion ratio (eFCR)

The eFCR is a measure of feed use efficiency on the farm. The more efficiently the feed is converted to fish, the better the efficiency of feed resource use and reduction of waste (and, consequently, water quality in the ponds and effluent). The eFCR is the actual amount of feed used per unit of biomass (total weight of fish) increase. Unlike the standard FCR calculated by most farmers, this formula takes account of the biomass (weight) of fish stocked, as well as losses due to mortality, escape or managed culls.

The calculation for this is:

Total Feed Used (kg or MT) / Net Fish Production (biomass at harvest – biomass stocked) (kg or MT)

Feed

Feed refers to all feeds or feed items regardless of where or how they are produced and applies to all farms applying for certification. Farms that meet the standards should be able to demonstrate compliance regardless of whether their feed is made by a commercial feedmill or on site.

Fish feed equivalence Ratio (FFER)

FFER is a measure of the efficiency with which fish products used in the feed are converted to live fish. It requires some measure of the effectiveness with which fish is converted to fish meal and fish oil.

The calculation for the Feed Fish Equivalency Ratio for Fishmeal is:

(% Fishmeal in feed *eFCR) / (% yield of fishmeal from wild fish)

The calculation for the Feed Fish Equivalency Ratio for Fish oil is:

(% Fish oil in feed *eFCR) / (% yield of fish oil from wild fish)

Accepted estimates for the yield of fishmeal range from 22 - 27 percent. Estimates for yield of fish oil from wild forage fish range from 3-7 percent. Species and season are among the factors that affect the yield. Global average fishmeal yield of 22.22 percent and fish oil yield of 5 percent are assumed in the examples below.

Where possible, these yields should be adjusted to reflect the actual species used in feeds when calculating forage fish dependency.

Fish products

Fish products are defined as all forms of fish or products derived from fish (e.g., whole fresh, frozen, minced, dried, meals, oils, and processing by-products).

Genetically modified organism (GMO)

A GMO is an organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. (Directive 2001/18/EC)

Processing by-products

Trimmings, viscera, heads and frames from the processing of fish – either wild or farmed – are processing by-products. Generally, these are not counted as part of the "fish product" amount when calculating feed fish equivalencies, as this helps promote the best use of the wild-caught fish. However, it is not acceptable to use pangasius by-products in pangasius diets.

Survival

The calculation for survival, which is made as real mortality, is:

Survival = (number of stocked fingerlings) – (harvest biomass / average weight at harvest).

Total Ammonia Nitrogen (TAN)

TAN consists of two fractions, un-ionized ammonia (NH3) and ionized ammonia (NH4+) and is the by-product of protein metabolism. TAN is excreted from the gills

of fish as they assimilate feed and is produced when bacteria decompose organic waste solids within the culture system. The un-ionized form of ammonia-nitrogen is extremely toxic to fish. The fraction of TAN in the un-ionized form is dependent upon the pH and temperature of the water.
(http://www.fishfarming.com/water%20and%20soil.html)

Total Nitrogen (TN)

In relation to a water sample, TN means the measure of all forms of nitrogen found in the water sample, including nitrate, nitrite, ammonia N and organic forms of nitrogen. (http://www.bom.gov.au/water/regulations/definitions-metterms.shtml)

Total Phosphorus (TP)

In relation to a water sample, TP is the total concentration of all forms of phosphorus found in the water sample. (http://www.bom.gov.au/water/regulations/definitions-metterms.shtml)

Trash fish

This term is not well-defined. Therefore, for the purposes of the PAD, this term will be replaced by the term “fish products.”

Waste

In the context of the Feed Management Technical Working Group, waste refers to inefficient use of feed resources. Waste, as in waste products such as nitrogen and phosphorous,and their impact on effluent quality, are dealt with in the water pollution standards.

7. Strategy for responding to public comments on the standards

Stakeholders who submit comments on the PAD draft standards must know their comments will be dealt with in a transparent and responsive way. This document describes the proposed strategy to manage the public comments. The strategy will be presented to the PAD for consideration.

1) **ENSURING ACCESS**: To ensure full **transparency** during the public comment period, it is essential for the PFG and coordinators of the TWGs to have full access to the comments. Responsibilities:
    - The PAD coordinator will submit to the PFG/TWG coordinators *all* of the comments, as is, after the public comment period ends

2) **ORGANIZING FEEDBACK:** We will proactively seek comments during the 60-day public commentary period. Therefore, we envision receiving a great deal of feedback from a wide range of stakeholders. To facilitate each TWG discussion on how to address the comments, it is necessary to **summarize** the comments by key topic areas. Comments should also be **prioritized** to encourage discussion of issues that have not already been dealt with by each TWG. Responsibilities:
    - TWG coordinators will take the lead in the summarization and prioritization of comments related to the issue(s) their TWG was created to address
    - General comments (i.e., not issue-specific) will be summarized and prioritized by the PAD coordinator

3) **GENERATING OPTIONS**: After comments have been summarized, each TWG will have different **options** on how to deal with each item (e.g., *reject* the comment because…, *modify* the standard to be …. , *replace* this indicator with ….., *remove* this indicator). To make the process efficient, these options will be made available to the TWG members as a useful starting point. Responsibilities:
    - TWG coordinators will take the lead in compiling the available options for comments concerning their issue(s)
    - The PAD coordinator will take the lead in compiling the available options for comments/items concerning general issues (i.e., not issue-specific)

4) **SUBMITTING OPTIONS:** To ensure full **transparency** towards the TWG members and PFG. Responsibilities:
    - TWG coordinators will submit the original comments, the comments' summary, prioritization and potential options to their TWG
    - The PAD coordinator will submit to the PFG/TWG coordinators the original comments, comments' summary, prioritization and potential options for feedback that was not issue-specific

5) **ADDRESSING TECHNICAL ISSUES**: Since TWGs and the PFG benefit from a high level of expertise, the PAD will **respond** to the comments in a transparent and technically sound manner. Responsibilities:
    - TWG members will review the comments' summary, prioritization and options and respond to each summary item
    - The PFG/TWG coordinators will review the comments' summary, prioritization and options and respond to each summary item

8. List of Process Facilitation Group members

Name	Organization
Antoine Bui	Binca
Corey Peet	David Suzuki Fundation
David Graham	BirdsEye/Iglo
Flavio Corsin	WWF
Jack Morales	Sustainable Fisheries Partnership
Nguyen Hoai Nam	Vietnam Association of Seafood Exporters & Producers (VASEP)
Nguyen Van Trong	Research Institute for Aquaculture N.2 (RIA2)
Pham Quoc Lam	Butler's Choice
Pham Thi Anh	Van Lang University
Thuy Nguyen	Network of Aquaculture Centres in Asia-Pacific (NACA)
Vo Thanh Khon	Binh An SeaFood Joint Stock Company (BIANFISHCO)

9. List of Technical Working Group members

Name	Organization	Coordinator	Issue1	Issue2	Issue3	Issue4	Issue5	Issue6	Issue7
Albert Salamanca	University of Durham			X					X
Antoine Bui	Binca				X	X	X	X	
Benjamin Belton	University of Stirling								X
Casson Trenor	former Fishwise	4				X	X		
Corey Peet	David Suzuki Foundation		X	X	X				
Dan Fegan	Cargill	5			X		X		
Dave Little	University of Stirling	1	X	X		X			
Dave Robb	EWOS						X		
David Graham	BirdsEye/Iglo						X		
David Penman	University of Stirling					X			

Name	Organization	Coordinator	Issue1	Issue2	Issue3	Issue4	Issue5	Issue6	Issue7
Dinh Thi Thuy	RIA2							X	
Dirk Lamberts	MRAG			X	X	X	X	X	X
Dirk Lorenz-Meyer	Behn Meyer Animal Nutrition				X		X		
Do Thanh Muon	Bureau Veritas Vietnam				X		X	X	
Flavio Corsin	WWF		X	X	X	X	X	X	X
Florentina Constanta	Independent	7							X
Francis Murray	University of Stirling	ex 2	X	X		X	X		X
Geert Depestele	Marine Harvest Pieters N.V.				X			X	
Heinzpeter Studer	Fair Fish							X	
Hua Thi Phuong Lien	AnGiang University				X		X	X	
Jack Morales	Sustainable Fisheries Partnership	3		X	X	X		X	X
Jan Koesling	Bayer							X	
Julien Vignier	Viking Fish Farm			X			X		X
Kwei Lin					X				
Le Nguyen Doan Khoi	University of Groningen/CanTho University		X					X	
Ludwig Nägel					X		X		
Mags Crumlish	University of Stirling						X	X	
Mai Thi Thuy Hang	Social Accountability International								X
Malinee Smithrithee	Department of Fisheries		X			X			X
Marie-Louise Scippo	University of Liege							X	
Md. Mofakkarul Islam	Bangladesh Agricultural University		X						
Mohammad Mahfujul Haque	Bangladesh Agricultural University	2		X					X
Nguyen Duong Hieu	TÜV SÜD PSB VIET NAM CO., LTD						X	X	
Nguyen Thanh Phuong	Can Tho University				X		X		

Name	Organization	Coordinator	Issue1	Issue2	Issue3	Issue4	Issue5	Issue6	Issue7
Nguyen Thi Bich	WWF		X	X	X	X	X	X	X
Nguyen Thi Hai Xuan	CEDMA/RIA1				X			X	
Nguyen Van Sang	RIA2					X			
Nguyen Xuan Nhan	Domenal Joint Stock company				X		X	X	
Nicolas Privet	Anova Food	6				X	X	X	
Patrick Kestemont	University of Namur							X	
Pham Quoc Lam	Butler's Choice								X
Phan Thi Hai Yen	Social Accountability International		X						X
Raphaela Legouvello	Aquaculture Health Consulting							X	
Reiko Omoto	University of Waterloo								X
Roel Bosma	Wageningen University				X		X		
Sena de Silva	NACA		X				X		X
So Nam	Inland Fisheries Research and Development Institute (IFReDI), Fisheries Administration, Cambodia					X	X	X	
Stefano Carboni	University of Stirling					X			X
Steven Schut	Wageningen University								X
Thuy Nguyen	NACA					X			
Timothy Fitzgerald	Environmental Defense							X	
Tran Truong Luu	Survey Design & Investment Consulting Joint Stock Company (SDICO)			X	X				
Uthairat Na-Nakorn	Kasetsart University					X			
Vo Thanh Khon	Bianfishco		X	X	X	X	X	X	X
Wongpathom Kamonrat	Inland Fisheries Resources Research and Development Institute					X			
Xavier Bocquillet	IMO				X				