

# DRAFT PANGASIOUS AQUACULTURE DIALOGUE STANDARDS FOR THE SECOND PUBLIC COMMENT PERIOD

## Table of Contents

1. Introduction.....	1
2. Understanding standard setting, accreditation and certification .....	2
3. Purpose, justification and scope of the standards .....	4
3.1 Purpose of the standards .....	4
3.2 Justification for the standards .....	4
3.3 Scope of the standards .....	4
4. Process for creating the standards.....	6
5. Content of the standards.....	7
Issue 1: Legal compliance.....	8
Issue 2: Land and water use .....	8
Issue 3: Water pollution and waste management.....	11
Issue 4: Genetics .....	13
Issue 5: Feed management .....	15
Issue 6: Health management, veterinary medicines and chemicals.....	17
Issue 7: Social responsibility and user conflict.....	19
6. Definitions and formulas.....	23
7. Strategy for responding to public comments on the standards .....	29
8. List of Process Facilitation Group members.....	31
9. List of Technical Working Group members .....	31

## 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 industry, 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 practices that contribute to resolving these issues, while reducing, and if possible eliminating, 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 throughout the value chain and 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 through 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 second draft of the standards, presented in this document, is based on sound science and was created by consensus among the 400-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 this 60-day comment period (which is the second and final 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 standards will then be presented to the full group of PAD participants for final approval.

The standards document details the targets the PAD has accepted. Auditor checklists and guidance documents detail the methodologies used to determine if the standard is being met. These documents, obviously, are developed following the completion of the standards development process. Additionally and following completion of the standards, BMP manuals must be created to show that there are specific steps that can be taken to achieve the standards. BMP manuals will be particularly useful to those producers that do not have the capability to test new and innovative techniques that could be used to meet or exceed the PAD standards.

## **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 acceptable tolerance levels or limits of impacts, it is essential that the process is not dominated by one, or a few, stakeholder groups. It is critical that aquaculture standard-setting processes and certification schemes adequately incorporate the experiences and expertise of a broad and diverse group of people who are interested in aquaculture (e.g., producers who use different management practices, conservationists from local and international organizations, and scientists who specialize in different fields related to aquaculture) 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,”](http://www.isealalliance.org/index.cfm?fuseaction=Page.ViewPage&PageID=1046) created by the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance, provides the guidelines under which standard setting should take place. WWF has been accepted as an associate member of ISEAL because of the fact that the ISEAL guidelines are the foundation for the process used by the PAD and seven other aquaculture Dialogues coordinated by WWF. For more information about the ISEAL guidelines, 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, and 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, the entity that manages the standard, and the entity that accredits the certifiers. For this reason, such certification, defined as third-party, 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 first 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 need for a multi-stakeholder, consensus-based and transparent process to create metrics-based 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, chemicals and medicines)

- 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*<sup>1</sup> and *Pangasius bocourti*<sup>2</sup>.

The PAD standards apply globally to all locations and scales of pangasius aquaculture production systems.

### **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,

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<sup>1</sup> Common name in Vietnam: tra

<sup>2</sup> Common name in Vietnam: basa

especially in the case of small-scale farms producing the same species and using 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 environmental 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, multi-lateral organizations, development groups and allied businesses).

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

- WWF notified ISEAL of the intent to apply the “Code of Good Practices 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, all 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 directly 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 (high level goals) 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 Process Facilitation Group (PFG) that is charged with managing the PAD process. (See list of PFG members in Section 8.)
  - Technical Working Groups (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) have been merged and, therefore, are addressed by one TWG instead of two.
- 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 the first public comment period.
- The TWGs reviewed and drafted answers to the comments received.
- The full set of comments and some key questions were presented to the PAD participants, who reached consensus (although sometimes not unanimity) on all matters at hand
- The TWGs held meetings to revise the standards based on the decisions made by the PAD participants. TWG outcomes were then submitted to the PFG for review.
- The PFG and TWG coordinators compiled the draft principles, criteria, indicators and standards and posted them for this second public comment period.

## **5. Content of the standards**

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

### 1. Legal compliance

2. Land and water use
3. Water pollution and waste management
4. Genetics
5. Feed management
6. Health management, veterinary medicines and chemicals
7. Social responsibility and user conflict

### ***Issue 1: Legal compliance***

Pangasius aquaculture operations must, at a minimum, respect and adhere to national and local laws.

In cases of conflict between national and local regulations, national laws take precedence. Due consideration should also be given to customary laws. This will be considered under Issue 7. The PAD is expected to develop sustainability standards beyond those required by law but the basis for certification must be compliance with the legal requirements of the producing country.

#### Principle

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

#### Criteria, Indicators and Standards

Criteria 1: Compliance with local and national regulations

Indicator 1.1 Compliance with permits and registration requirements set by local and national authorities

Standard 1.1 100% compliance with permits and registration requirements set by local and national authorities

Indicator 1.2 Compliance with all taxes.

Standard 1.2 100% compliance with all taxes.

Indicator 1.3 Compliance with local and national legal regulations on water discharge

Standard 1.3 100% compliance with local and national legal regulations on water discharge

Indicator 1.4 Compliance with local and national legal regulations on planning

Standard 1.4 100% compliance with local and national legal regulations on planning

### ***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 resource users and the environment. To address this, a growing number of countries have established land and water use plans. Some also have created aquaculture development plans and zoning regulations for certain 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 through 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 as defined in these standards.

### Principle

Farms<sup>3</sup> must be located, designed, constructed and managed to minimize and, when possible, avoid negative impacts on other users and the environment.

### Criteria, Indicators and Standards

Criteria 1: Compliance with official development plans<sup>4</sup>

Indicator 1.1 Location of the farm in relation to official development plans<sup>5</sup>

Standard 1.1 Farms must be constructed in an area that complies with any approved aquaculture development plans effective in the area

Criteria 2: Conversion of high value ecosystem

Indicator 2.1 Conversion of ecosystems, other than agriculture or aquaculture land to establish the farm<sup>6</sup>.

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<sup>3</sup> Pond, cage and pen-based

<sup>4</sup> Including development guidelines and projects

<sup>5</sup> Including aquaculture development plans

<sup>6</sup> Relevant only to farms established after the PAD standards have been finalized

Standard 2.1 Farms can only be established by converting agricultural or aquaculture land (at the time when the final PAD standards are published)<sup>7</sup>

Criteria 3: Connectivity

Indicator 3.1 Impediment to navigation, the hydrological regime or aquatic/amphibious organisms movement

Standard 3.1 Farms must:

- Not impede navigation, aquatic animals or water movement
- Allow that water bodies are connected through a path, across the whole water column, that covers the width of at least 50% of the water body
- Not occupy more than 20 percent of the width of the water body calculated when the water body level/width is at its minimum.
- In the case of pens, not have more than 2 contiguous pens at the time and only if a stretch of river bank of the length of the 2 pens is left free from farms on both sides of the pens

Criteria 4: Water use

Indicator 4.1 Compliance to water allocation limits, as set by local authorities or a reputable independent institution

Standard 4.1 Farms shall comply with water allocation limits (if available), as set by local authorities or a reputable independent institution

Indicator 4.2 % reduction in the level of the water source

Standard 4.2 Water intake shall not lead to a reduction of 10% in the water level (note: use stick located 1m into the river)<sup>8</sup>.

Indicator 4.3 Groundwater abstraction

Standard 4.3 Groundwater can only be abstracted from surficial aquifers that are regularly recharged and for which there is no evidence of depletion

Indicator 4.4 Amount of water abstracted per ton of fish produced

Standard 4.4 The ratio of total water abstracted (Note: not water consumed) must not exceed 5,000 m<sup>3</sup> per ton of fish produced for a given culture period.

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<sup>7</sup> The restoration of natural ecosystems must be considered in further revisions of these standards paying attention to the location of restoration efforts in order to maximise ecological benefits. A potential approach towards restoration could involve the establishment of a “fund” to which certified farmer farming in locations that used to be high value ecosystem should contribute to.

<sup>8</sup> These are arbitrary figures but are designed to address the impact of water abstraction in a measurable manner

### ***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. The PAD recognizes 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 properly (as defined in these standards) 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 the environment.

#### Principle:

Minimize the negative impact of pangasius farming on water and land resources

#### Criteria, indicators and standards

Criteria 1: Nutrient efficiency

Indicator 1.1 Amount of total phosphorus (TP) added as feed per metric ton of fish produced (in cages)

Standard 1.1 Maximum 16.5kg of TP per ton of fish produced

Indicator 1.2 Amount of total nitrogen (TN) added as feed per metric ton of fish produced (in cages)

Standard 1.2 Maximum 58.1kg of TN per ton of fish produced

Criteria 2: Water quality in effluents

Indicator 2.1 TP/TN in the receiving water, in relation to the phosphorous/nitrogen (P/N) being discharged

Standard 2.1 If the TP/TN in the receiving water is higher than [value to be proposed during this public commentary period] only water with a lower TP/TN, TP and TN concentration can be discharged

Criteria 3: Nutrients in pond sediments

Indicator 3.1 Average % change of TP between inlet and outlet

Standard 3.1 Average % change of TP between outlet and inlet: maximum 100%

Indicator 3.2 Average % change of TN between inlet and outlet

Standard 3.2 Average % change in TN between outlet and inlet: maximum 70%

Indicator 3.3 Dissolved oxygen (DO) concentration in water discharged

Standard 3.3 At all times, DO in water discharged is 3 mg/l or above

Criteria 4: Sludge discharge

Indicator 4.1 Direct discharge of sludge and evidence of a sludge repository and sludge use

Standard 4.1 No direct discharge of sludge in public water bodies or natural ecosystems<sup>9</sup>. Also, there must be evidence of a sludge repository (of appropriate size<sup>10</sup>) and of sludge being used

Criteria 5: Waste management

Indicator 5.1 Disposal of dead/moribund fish removed from the pond

Standard 5.1 Proper disposal of dead/moribund fish removed from the pond (e.g. burial, incineration and recycling, such as by using fermentation and fertilizer)

Criteria 6: Energy consumption

Indicator 6.1 Recording variables related to energy consumption and the production of Green House Gases:

- Fuel use for the farm operations (from time of stocking to harvest)
- Quantity of electricity consumed for the farm
- Amount of dead fish and method of disposal

Standard 6.1 Collect information on the following variables (per crop):

- Fuel use for the farm operations
- Quantity of electricity consumed for the farm
- Amount of dead fish and method of disposal (must collect anyway)

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<sup>9</sup> Provide definition and reference

<sup>10</sup> Appropriate size will be calculated by the auditor comparing the approximate volume of sludge with volume of the sludge repository

## ***Issue 4: Genetics***

Pangasius aquaculture raises a number of important issues in relation to genetics, such as impacts on indigenous species when introduced as an exotic species, the importance of preventing escapes, the need to maintain genetic diversity, and the potential 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, and, therefore, the risks associated with it must be acknowledged. Some genetic changes are likely in any stock of fish that is bred in captivity over several generations. Pangasius, in its natural habitat, has a complex population structure, and 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 the genetic perturbation of wild populations.

Pangasius escapees may also have an effect on local non-catfish biodiversity, but the PAD TWG working on this issue has not been able to obtain data on the impacts and to develop reliable metrics to measure this phenomenon. As this standard evolves, it is critical to assess these impacts and, where necessary, incorporate indicators and standards that measure and prevent any adverse impacts.

While a range of techniques and practices are available to prevent escapes, no foolproof system has been developed. Therefore, it is important to approach escapee management from the perspective of minimization rather than hypothetical elimination. 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, Indicators and Standards:

Criteria 1 Non-indigenous species.

Indicator 1.1 Farming of pangasius in locations where that species is indigenous or has a self-recruiting stock established

Standard 1.1 Pangasius farming shall take place only in locations where that species of pangasius is indigenous or has a self-recruiting stock established

Criteria 2 Genetic diversity

Indicator 2.1 Genetic stock from which seed is sourced

Standard 2.1 Seed shall be sourced from pangasius populations already established in the river system<sup>11</sup> used by the farm.

Criteria 3 Source of seed

Indicator 3.1 Use of wild-caught seed

Standard 3.1 No wild-caught seed shall be used for on-growing

Criteria 4 GMOs and hybridization

Indicator 4.1 Use of GMO or hybrid seed

Standard 4.1 No GMO or hybrid seed shall be used

Criteria 5 Escapees.

Indicator 5.1 Measures in place to minimize escapes

Standard 5.1 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. The following BMPs are mandated upon the farming operation:

- Inlets and outlets to culture systems and all confinements are to be equipped with net mesh or grills appropriately sized to retain the stocks in culture
- Regular, timely inspections and repairs are performed, and recorded in a permanent register (available for inspection)
- Bund height above high water/flood levels
- Traps on water outlets to catch/kill escapes (e.g., juvenile fish, chemical treatment of effluent ponds) and data are recorded

Criteria 6 Performance of BMPs

Indicator 6.1 Evidence suggesting that the BMP to minimize escapees have been compromised

Standard 6.1 There shall be no evidence suggesting that these BMPs have been compromised (e.g. collapse of the bund and intentional release)

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<sup>11</sup> A thorough map of pangasius establishment that indicated the range of the species as well as distinct stocks will be necessary in order to enforce this standard.

## ***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 PAD 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.

### **Responsible sourcing of feed ingredients**

The PAD standards have been developed for pangasius farms. The PAD understands that farmers using manufactured feeds from a third party supplier have a limited ability to control the sources of ingredients used in the feeds they buy. However, where required, documentation from feed suppliers must be supplied to support the calculation of their values for the standards.

In future versions of these standards, it is intended that farms will be required to show that they use feed that complies with separate feed standards. These may be developed through a separate feed dialogue or a similar ISEAL compliant process.

Where the farm produces feed for its own use and has control over the sourcing of ingredients used in that feed, the farm will be required to demonstrate its compliance with the same ingredient-sourcing requirements and standards for feed.

The use of fishmeal and fish oil in pangasius aquaculture, as in other forms of aquaculture, is a key issue.. Concerns center around the sustainability of fishmeal and fish oil sources as well as ensuring that the amount of fish used to produce fishmeal and oil for farmed pangasius does not exceed the amount of pangasius that are produced on the farm.

Also, the practice of feeding locally sourced fish directly to pangasius can impact the environment and biodiversity.

The direct use of fish and fish products (including what is commonly referred to as “trash fish”<sup>12</sup>) to feed pangasius is an unacceptable practice. If these ingredients are to be used to manufacture feed, they should be from legal, reported and regulated fisheries that respect the United Nations Food and Agriculture Organization’s “Code of Conduct for Responsible Fisheries;” be from a certified sustainable source; not be from a fishery where unacceptable levels of by-catch are caught; and 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.

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<sup>12</sup> See Definitions and formulas

The use of fish processing by-products (e.g., fish frames, skins and fish solubles) to replace other fish product ingredients used in, or as, feed is encouraged under these standards. However, for fish health reasons, the use of processing by-products from pangasius processing is not permitted.

Feeds use a number of ingredients from terrestrial sources, including animal and plant products, some which may be genetically modified. These are not covered under the current standards. It is intended that these will be covered in a separate feed and feed ingredients dialogue or in a future revision of these standards. However, in principle, certified farms should take steps to ensure that ingredients used in their feeds are from sustainable sources.

On-farm feed management and feed 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 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 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 ensure that feed inputs are sustainable and minimized

### Criteria, Indicators and Standards

Criteria 1 Sustainability of feed ingredients

Indicator 1.1 Direct use of fish and/or fish products (including trash fish) as feed

Standard 1.1 Direct use of fish and/or fish products (including trash fish) as feed is not permitted.

Indicator 1.2 Sustainable sourcing of fish products used in, or as, feed (e.g., meals, oils, processing plant by-products, fish solubles and trash fish)

Standard 1.2 Fish products used in feed shall be considered sustainably sourced if they either:

- a. Have been sourced from fisheries certified as compliant to standards by an ISEAL member;
- b. Are from a fishery with a fisheries score of 6 or above on all FishSource Scores ([www.fishsource.org](http://www.fishsource.org)), or
- c. Have been sourced from fisheries certified as compliant to International Fishmeal and Fish Oil Organization (IFFO) standards

Criteria 2 Efficient management of feed use on the farm.

Indicator 2.1 Weighted average of eFCR

Standard 2.1 The weighted average of the eFCR must be less than 1.75 for the complete production cycle

Indicator 2.2 Maximum eFCR of individual ponds

Standard 2.2 The maximum eFCR for each individual pond during the period under consideration for certification must not exceed 2, and must be within 15% of the weighted average.

Indicator 2.3 FFER

Standard 2.3 The 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. This can be addressed through 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 can 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. Also, the use of antibiotics considered critical for human medicine by World Health Organization shall not be allowed.

Fish stocking density is 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, at any time during production, is an important tool for maintaining fish health.

## Principle

Minimize ecosystem and human health impacts, while maximizing fish health and ensuring food safety

## Criteria, Indicators and Standards

Criteria 1 Mortality rate

Indicator 1.1 Percentage of mortality during the grow-out period

Standard 1.1 The real percentage mortality, from stocking to harvest, shall not exceed 20 percent, on average<sup>13</sup>

Criteria 2 Veterinary medicines and chemicals

Indicator 2.1 Follow legislation or regulations on the use of veterinary medicines and chemicals

Standard 2.1 Use only veterinary medicines and chemicals approved for aquaculture by relevant national authorities and not banned for food fish use in the importing country

Indicator 2.2 Veterinary medicines and chemical use

Standard 2.2 The use of veterinary medicines and chemicals shall:

- Only be prescribed by aquatic animal health specialist (see definitions and formulas), based on a verified condition and follow all label specifications. The specialist shall also indicate how to apply, handle and store veterinary medicines and chemicals;
- Respect the withdrawal period or apply a period of 750 degree-days for those without documented withdrawal period times;
- Exclude antibiotics critical for human medicine, as defined by the World Health Organization; and
- In the case of veterinary medicines, never be done as growth promoters or for preventive (prophylactic) treatment

Criteria 3 Record-keeping

Indicator 3.1 Treatment recording

Standard 3.1 Farmers must keep a record of the name, reasons for use, dates, amounts and withdrawal times of all veterinary medicines and chemicals used in hatchery and grow-out facilities

Indicator 3.2 Daily records of the health of the fish stock

Standard 3.2 Daily records showing regular monitoring of fish for signs of stress or disease shall be kept. (Note: additional performance

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<sup>13</sup> calculated as an average in all the ponds in the farm over one year period

standards on fish health could be identified during PAD standard revisions).

Criteria 4 Fish welfare.

Indicator 4.1 Growth rate (see definitions and formulas)

Standard 4.1 Growth rate shall be higher than 3.85 g/day

Indicator 4.2 Maximum fish density at any time

Standard 4.2 Fish density shall not exceed 38 kg/m<sup>2</sup> for ponds and pens and 80 kg/m<sup>3</sup> for cages, at any time

### ***Issue 7: Social responsibility and user conflict***

Pangasius aquaculture should be done 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 workers should be treated fairly, paid fairly and have the ability to have a reasonable work/life balance, in spite of the need for work hours to be flexible. 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 ensures worker health and welfare through safe and hygienic working conditions and relevant training for workers and managers. Although the standards do not specifically refer to compliance with labor laws, it is implicit that labor laws in the country producing pangasius should always be obeyed.

The people who live near and around pangasius farms are an integral part of the larger pangasius aquaculture “community.” Regular communication and consultation can build trusting relationships between the farm operators and local communities, and prevent or minimize conflicts between them. The farms should contribute to poverty alleviation and food security so that there are net benefits to the local community.

Pangasius aquaculture also brings a number of benefits that are currently not recorded and could potentially be included in the standards.

#### Principle

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

#### Labor rights

Criteria 1. Child labor<sup>14</sup>

Indicator 1.1 Minimum age of permanent workers

Standard 1.1 Minimum age of permanent workers shall be 15 years old.

Indicator 1.2 Working conditions for workers below 18 years old.

Standard 1.2. Employing workers below 18 years old shall:

- Not jeopardize schooling, with a maximum of seven working hours/day on school days
- Be restricted to light work

Criteria 2. Forced and compulsory labor

Indicator 2.1. Workers' right to terminate the contract.

Standard 2.1: Workers shall be free to terminate their employment and receive full payment until the last day of their employment, based on reasonable notice given to their employer

Criteria 3. Health and safety

Indicator 3.1 Health and safety of the working and living environment

Standard 3.1. The employer shall provide a safe and healthy working and living environment

Indicator 3.2: Workers' awareness of the health and safety hazards at the work place and how to deal with them

Standard 3,2 Workers shall be made aware of the health and safety hazards at the work place and how to deal with them

Indicator 3.3 Recording of accidents by the employer

Standard 3.3. The employer shall record all accidents, even if minor<sup>15</sup>, and take preventive and corrective action<sup>16</sup>

Indicator 3.4 Health insurance

Standard 3.4. The employer shall ensure that all permanent workers have health insurance. Accident insurance is important for poverty alleviation. Accident insurance during working hours should be considered for inclusion during PAD standard revisions. At the same time, organisations should promote industry wide health and accident insurance for workers.

Criteria 4. Freedom of association and collective bargaining

Indicator 4.1 Right to form or join organizations to defend their workers' rights

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<sup>14</sup> Child labor does not include children helping their parents on their own farm, provided that working does not jeopardize their schooling or health.

<sup>15</sup> Accidents that could not be handled in-house and, therefore, the person was taken to the closest clinic.

<sup>16</sup> During revisions to the PAD standards, PAD stakeholders should consider also addressing the risk of long term accidents (eg resulting from toxicity of chemicals)

Standard 4.1 Workers<sup>17</sup> shall have the right to form or join organizations to defend their rights (including their right to collective bargaining), without interference from the employer and without suffering negative consequences as a result of exercising this right

Criteria 5 Discrimination

Indicator 5.1 Discrimination from employer or other workers

Standard 5.1. Workers shall not suffer any discrimination<sup>18</sup> from the employer or other workers.

Criteria 6. Fair and progressive practices toward workers (including disciplinary practices)

Indicator 6.1 Treatment of workers

Standard 6.1. Employers shall treat all workers with dignity and respect

Criteria 7. Working hours

Indicator 7.1 Maximum working hours

Standard 7.1. Regular working hours will not exceed 8h/day or 48h/week (although these do not have to be consecutive hours). Workers shall have the right to leave the workplace premises after completing the standard workday.

Indicator 7.2 Minimum time off

Standard 7.2. Workers will be given at least two nights/week off if they reside on the farm and four days/month off.

Indicator 7.3 Overtime conditions

Standard 7.3. Overtime hours are voluntary and shall not exceed a maximum of 12 hours per week. They shall occur on an exceptional (not regular) basis and shall be paid at a premium rate.

Criteria 8. Fair and decent wages

Indicator 8.1 Minimum wage

Standard 8.1. The employer shall pay at least minimum wages,<sup>19</sup> as defined by law, and seek to ensure that wages cover basic needs, plus some discretionary income<sup>20</sup>

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<sup>17</sup> Immediate family members of the farm owner (i.e., children, spouse, parents and siblings) and exchange labour may not be considered as employees.

<sup>18</sup> Including but not limited to: race, caste, origin, color, gender, age, disability, religion, sexual orientation, resident or migrant, union and political affiliations.

<sup>19</sup> Wages shall be paid in cash or in a manner most convenient to workers

Indicator 8.2 Workers' awareness of the mechanism for setting the wages and benefits

Standard 8.2. Workers shall have the right to know the mechanism for setting the wages and benefits.

Criteria 9. Labor contracts

Indicator 9.1 Availability of copies of labor contracts with workers

Standard 9.1 Workers shall have copies of their labor contract. The probation period shall not exceed one month

Criteria 10. Management systems

Indicator 10.1 Mechanism to collect and address complaints

Standard 10.1 The employer shall ensure that all workers have appropriate channels to communicate anonymously with employers on matters relating to labor rights and working conditions. All issues raised by workers will be registered, tracked and responded to. At least 90 percent of the complaints shall be resolved within one month after being received.<sup>21</sup>

Indicator 10.2 Maximum time to enrollment of suppliers and subcontractors that ensure suitable health and safety conditions for their workers

Standard 10.2 Within 1 year from achieving certification, farmers shall identify companies that ensure suitable health and safety conditions for their workers<sup>22</sup>

### **Community impact**

Criteria 11. Complaints by people in the local communities

Indicator 11.1 Application of a verifiable conflict resolution policy for local communities

Standard 11.1. Farm owners shall apply a verifiable conflict resolution policy for local communities that states that **all** complaints (to be submitted anonymously, if desired) shall be tracked transparently, publicly accessible and responded to. At least 90 percent of the complaints shall be resolved within six months from the date of being received<sup>23</sup>.

Criteria 12. Preferential employment within local communities

Indicator 12.1 Evidence of advertising positions within local communities

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<sup>20</sup> For guidance and methods for basic needs wage calculation, see SA8000 Guidance Document

<sup>21</sup> Complaints include the ones coming from other resource users, employees and buyers (e.g., middlemen or processors).

<sup>22</sup> Dependent on farmer having access to a reasonable (to be decided by the auditor) amount of companies

<sup>23</sup> Complaints include the ones coming from other resource users, employees and buyers (e.g., middlemen or processors).

Standard 12.1 Farm owners shall document evidence of advertising positions within local communities before hiring migrant workers

Indicator 12.2 Records of communication conducted with local communities and their representatives

Standard 12.2: Farmers shall show records of communication conducted with local communities and their representatives

## **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.

### **Antibiotic critical for human medicine**

[http://www.who.int/foodborne\\_disease/resistance/antimicrobials\\_human.pdf](http://www.who.int/foodborne_disease/resistance/antimicrobials_human.pdf)

Table 1: Listing and categorization of antimicrobials used in human medicine

CRITICALLY IMPORTANT ANTIMICROBIALS			
Drug name	Criterion 1	Criterion 2	Comments
<b>Aminoglycosides</b>	Y	Y	<p>Limited therapy as part of treatment of enterococcal endocarditis and MDR tuberculosis</p> <p>Potential transmission of <i>Enterococcus</i> spp., <i>Enterobacteriaceae</i> (including <i>Escherichia coli</i>), and <i>Mycobacterium</i> spp. from non-human sources</p>
amikacin			
arbekacin			
gentamicin netilmicin tobramycin			
streptomycin			
<b>Ansamycins</b>	Y	Y	<p>Limited therapy as part of therapy of mycobacterial diseases including tuberculosis and single drug therapy may select for resistance</p> <p>Potential transmission of <i>Mycobacterium</i> spp. from non-human sources</p>
rifabutin			
rifampin			
rifaximin			
<b>Carbapenems and other penems</b>	Y	Y	<p>Limited therapy as part of treatment of disease due to MDR Gram-negative bacteria</p> <p>Potential transmission of <i>Enterobacteriaceae</i> including <i>E. coli</i> and <i>Salmonella</i> spp. from non-human sources</p>
ertapenem			
faropenem			
imipenem			
meropenem			
<b>Cephalosporins, (3<sup>rd</sup> and 4<sup>th</sup> generation)</b>	Y	Y	<p>Limited therapy for acute bacterial meningitis and disease due to <i>Salmonella</i> in children</p> <p>Additionally, 4<sup>th</sup> generation cephalosporins provide limited therapy for empirical treatment of neutropenic patients with persistent fever.</p> <p>Potential transmission of <i>Enterobacteriaceae</i> including <i>E. coli</i> and <i>Salmonella</i> spp. from non-human sources</p>
cefixime			
cefoperazone			
cefoperazone/sulbactam			
cefotaxime			
cefpodoxime			
ceftazidime			
ceftizoxime			
ceftriaxone			
cefepime			
cefoselis			
cefprome			
<b>Glycopeptides</b>	Y	Y	<p>Limited therapy for infections due to MDR <i>Staphylococcus aureus</i> and <i>Enterococcus</i> spp.</p> <p>Potential transmission of <i>Enterococcus</i> spp. and MDR <i>S. aureus</i> from non-human sources</p>
teicoplanin			
vancomycin			

Critically Important Antimicrobials (cont'd)			
Drug name	Criterion 1	Criterion 2	Comments
Lipopeptides daptomycin	Y	Y	Limited therapy for infections due to MDR <i>S. aureus</i>  Potential transmission of <i>Enterococcus</i> spp. and MDR <i>S. aureus</i> from non-human sources
<b>Macrolides (including 14-, 15-, 16-membered compounds), ketolides</b> azithromycin clarithromycin erythromycin midecamycin roxithromycin spiramycin telithromycin	Y	Y	Limited therapy for <i>Legionella</i> , <i>Campylobacter</i> , and MDR <i>Salmonella</i> infections  Potential transmission of <i>Campylobacter</i> spp. from non-human sources (see Comments section immediately following this table for further explanation)
<b>Oxazolidinones</b> linezolid	Y	Y	Limited therapy for infections due to MDR <i>S. aureus</i> and <i>Enterococcus</i> spp.  Potential transmission of <i>Enterococcus</i> spp. and MDR <i>S. aureus</i> from non-human sources
<b>Penicillins, (natural, aminopenicillins and antipseudomonal)</b> ampicillin ampicillin/sulbactam amoxicillin amoxicillin/clavulanate azlocillin carbenicillin mezlocillin penicillin G penicillin V piperacillin piperacillin/tazobactam ticarcillin ticarcillin/clavulanate	Y	Y	Limited therapy for syphilis (natural penicillins) <i>Listeria</i> , <i>Enterococcus</i> spp. (aminopenicillins) and MDR <i>Pseudomonas</i> spp. (antipseudomonal)  Potential transmission of <i>Enterococcus</i> spp., <i>Enterobacteriaceae</i> including <i>E. coli</i> as well as <i>Pseudomonas aeruginosa</i> from non-human sources  (see Comments section immediately following this table for further explanation)

Critically Important Antimicrobials (cont'd)			
Drug name	Criterion 1	Criterion 2	Comments
<b>Quinolones</b>	Y	Y	Limited therapy for <i>Campylobacter</i> spp., invasive disease due to <i>Salmonella</i> spp., and MDR <i>Shigella</i> spp. infections
cinoxacin nalidixic acid piperimidic acid			
ciprofloxacin enoxacin gatifloxacin gemifloxacin levofloxacin lomefloxacin moxifloxacin norfloxacin ofloxacin sparfloxacin			Potential transmission of <i>Campylobacter</i> spp. and Enterobacteriaceae including <i>E. coli</i> and <i>Salmonella</i> spp. from non-human sources
<b>Streptogramins</b>	Y	Y	Limited therapy for MDR <i>Enterococcus faecium</i> and <i>S. aureus</i> infections
quinupristin/dalfo-pristin, pristinamycin			Potential transmission of <i>Enterococcus</i> spp. and MDR <i>S. aureus</i> from non-human sources  (see Comments section immediately following this table for further explanation)
<b>Tetracyclines (Glycylcyclines)</b>	Y	Y	Limited therapy for infections due to MDR <i>S. aureus</i>
tigecycline			
<b>Drugs used solely to treat tuberculosis or other mycobacterial diseases</b>	Y	Y	Limited therapy for tuberculosis and other <i>Mycobacterium</i> spp. disease and for many of these drugs, single drug therapy may select for resistance
cycloserine ethambutol ethionamide isoniazid para-aminosalicylic acid pyrazinamide			Potential transmission of <i>Mycobacterium</i> spp. from non-human sources

### **Aquatic animal health specialist:**

Aquatic animal health specialist will be defined as follows:

- Following the government's regulations, if such regulations exist in the producing country
- If the government does not regulate on this, the following people can be considered as specialists:
  - Veterinarians with at least three months of training on fish pathology
  - Aquaculturists (with university or vocational degree) who have completed at least three months of training on fish pathology. This training maybe included with the university or vocational degree.

### **Change in water quality between outlet and inlet**

The calculation for this is:

(value in outlet – value in the inlet) / value in the inlet

### **Degree days (°D):**

(Number of days \* average water temperature in this time period)

Example:

750° D= 25 days period at a 30°C average water temperature.

#### **- 750°D:**

This value follows the general value (500°C-day) recommended by the Council Directive (EEC) no. 82/2001 for off-label drug use in aquaculture, but increased by 50% as a safety margins, considering that 500°C-day is a very short period of time at 30°C.

### **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](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. Fishmeal and oil from processing plant by-products are not included in the calculation of FFER.

The calculation for the Feed Fish Equivalency Ratio for Fishmeal is:  
(% Fishmeal in feed x eFCR) / (% yield of fishmeal from wild fish)

The calculation for the Feed Fish Equivalency Ratio for Fish oil is:  
(% Fish oil in feed x 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)

### **Growth promoters**

Veterinary medicines such as antibiotics to be given to healthy fish for the sole purpose of making them grow faster (i.e. not to treat a specific disease).

### **Growth rate**

(weight at harvest (g)– weight at stocking(g)) / number of days of production  
Unit : grams per day

### **Mortality: real percentage mortality**

Real” refers to the opposition to the recorded mortality. Calculation is defined as below:

A : Number of fingerlings stocked

B : Number of fishes harvested (Harvested biomass / average weight at harvest)

Percentage of real mortality = ((A – B) / A) \*100

### **Processing by-products**

Trimblings, 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.

### **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.

### **Water abstracted**

Water abstracted can be calculated as follows:

<b>Code</b>	<b>Description</b>	<b>Example</b>
PV	Pond Volume	27,000 m <sup>3</sup>
%E	% of pond water exchanged at each time	1/ water exchange
EV	Exchanged volume/time	9,000 m <sup>3</sup> x time
T	N. of Times in which water has been exchanged during one crop	100 times/crop
TEV	Total Exchanged Volume/crop	900,000 m <sup>3</sup> /crop
Q	Quantify of fish harvested	300t
A	Water Abstracted	3000m <sup>3</sup> /t

$$EV = \%E \times PV$$

$$TEV = EV \times T$$

$$A = TEV / Q$$

### **Weighted average of the eFCR**

$$\frac{(eFCR_1 \times \text{amount harvested}_1) + (eFCR_2 \times \text{amount harvested}_2) \text{ etc...}}{(\text{amount harvested}_1) + (\text{amount harvested}_2) \dots}$$

## **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.

- 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 will meet and compile the available options for comments concerning their issue
  - The PFG will meet and compile the available options for comments/items concerning general issues (i.e., not issue-specific)
  
- 4) **REACHING CONSENSUS:** To **respond** to the comments in a transparent and technically sound manner a PAD meeting will be held to reach consensus on the key issues being raised during the public commentary period. Responsibilities:
  - PFG/TWG coordinators present the full set of comments and available options to the PAD participants

## **8. List of Process Facilitation Group members**

<b>Name</b>	<b>Organization</b>
Antoine Bui	Binca
Corey Peet	David Suzuki Foundation
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**

<b>Name</b>	<b>Organization</b>	<b>Coordinator</b>	<b>Issue 1</b>	<b>Issue 2</b>	<b>Issue 3</b>	<b>Issue 4</b>	<b>Issue 5</b>	<b>Issue 6</b>	<b>Issue 7</b>
Albert Salamanca	University of Durham			X					X
Anne Laurance Huillery	independent			X			X		
Antoine Bui	Binca				X	X	X	X	
Benjamin Belton	University of Stirling								X
Casson Trenor	Green Peace	4				X	X		
Corey Peet	David Suzuki Foundation		X	X	X				

Name	Organization	Coordinator	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7
Dan Fegan	Cargill	5			X		X		
Dang Van Vien	Vinh Hoan				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			
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		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
Kelling Ingrid	WorldFish Center								X
Kwei Lin					X				
Le Nguyen Doan Khoi	University of Groningen/CanTho		X					X	

Name	Organization	Coordinator	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7
	University								
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
Marc Campet	Ocialis				X		X		
Marie-Louise Scippo	University of Liege							X	
Md. Mofakkarul Islam	Bangladesh Agricultural University		X						
Mike Phillips	WorldFish Center								X
Mohammad Mahfujul Haque	Bangladesh Agricultural University	2		X					X
Nguyen Duong Hieu	TÜV SÜD PSB VIET NAM CO., LTD						X	X	
Nguyen Huynh Duc	Vung Vuong Sadeq Company								
Nguyen Thanh Phuong	Can Tho University				X		X		
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 Demblans	Distriblus Asia					X			

Name	Organization	Coordinator	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7
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
Phil Nguyen	Asia Innovation			X	X		X	X	
Raphaela Legouvello	Aquaculture Health Consulting							X	
Reiko Omoto	University of Waterloo								X
Roel Bosma	Wageningen University				X		X		
Ruth Mathews	WWF								
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 Hoang Duy	Cuu Long University				X		X		

<b>Name</b>	<b>Organization</b>	<b>Coordinator</b>	<b>Issue 1</b>	<b>Issue 2</b>	<b>Issue 3</b>	<b>Issue 4</b>	<b>Issue 5</b>	<b>Issue 6</b>	<b>Issue 7</b>
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				