



AQUACULTURE IN ASIAN COUNTRIES

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Image: Fish farm pond in Thailand

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Summary

In the past few decades, several Asian countries have risen to become the largest aquaculture and, more specifically, finfish producers worldwide. In 2018, almost 90% of all commodified fish¹ came from Asian countries, with China, India, Indonesia, Vietnam, and Bangladesh dominating the global market. Recently, Asian countries have intensified their operations with national and foreign investment, pushing for the sector's growth and boosting the export market. This report will give an overview of aquaculture in Asian countries, which is an essential step towards understanding the value of experimental work towards mitigating inherent fish welfare constraints in these regions. We found that national legislation and certification schemes already established in Asian countries either lack or have insufficient fish welfare requirements. At the same time, traditional farming practices limit farmers' ability to safeguard fish welfare. As production continues to grow and intensify, the environmental, social, and ethical costs of this lack of attention to fish welfare will continue to deepen. There is, however, a growing animal protection movement in Asia that understands the necessity of establishing welfare as the norm while aquaculture is still a young sector. The issues raised here require urgent action and shared responsibility. They also require the consideration of complex interactions between cultural beliefs, the international fish trade, fish consumption, institutional politics, and farmers' awareness of fish welfare.

Preamble

Fish Welfare Initiative sees promising opportunities to improve fish welfare in many Asian countries, especially in East, South, and Southeast Asia. This belief is informed by our preliminary research, in-country visits, and conversations with experts. These regions house particularly high-volume producers and their aquaculture sectors are still expected to grow substantially, after which local fish consumption will increase. Though poor rearing conditions with minimal regulatory frameworks persist and certification schemes are rarely present, the awareness of animal welfare issues is growing.

¹ Here the term fish includes finfish, molluscs, and crustaceans. This interpretation is frequently used by the FAO. This number was taken from [FAO, 2020](#).

We believe that it is impactful to focus some attention on this continent, especially the high-production countries, to ensure that they establish welfare as a core part of their increased and intensified production. Nevertheless, Asia is a massive region and we do not want to generalize. Every country has very specific laws and practices. This report aims to give a comprehensive account of Asian aquaculture with a focus on the top-producing Asian countries. We hope to encourage other organizations and experts to explore the possibility of working on fish welfare in these countries.

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1. About Asia

Asia is the largest and most populous continent in the world with 4.6 billion people, making up 60% of the global population.² The 49 states recognized by the United Nations (UN) are commonly divided into six distinct regions: South, Southeast, East, North, West, and Central Asia (Fig. 1).



Figure 1: Regions of Asia according to the [United Nations Statistics Division](#).

Asia's systems of government are as diverse as its languages and cultures. These political systems encompass democratic, theocratic, and federal republics, as well as single party governments, constitutional monarchies, and absolute monarchies. The prospect of effective animal advocacy work strongly depends on how supportive local governments and their legislation are. Thus, fish welfare advocates and researchers must assess the respective government system of each country when deciding where to focus their attention.

² As of May 2020. This number is taken from [Worldodometer](#).

2. Aquaculture Production in Asian Countries

Before 1960, aquaculture production was evenly distributed across the globe. However, in the past five decades, Asian countries clearly outpaced any other region (Fig. 2). The sector has been growing by an average of 7.5-8% per year for the past 20 years, with the highest growth rates early after the turn of the century.³ **By 2018, Asian farmers produced almost 89% of fish worldwide.**⁴

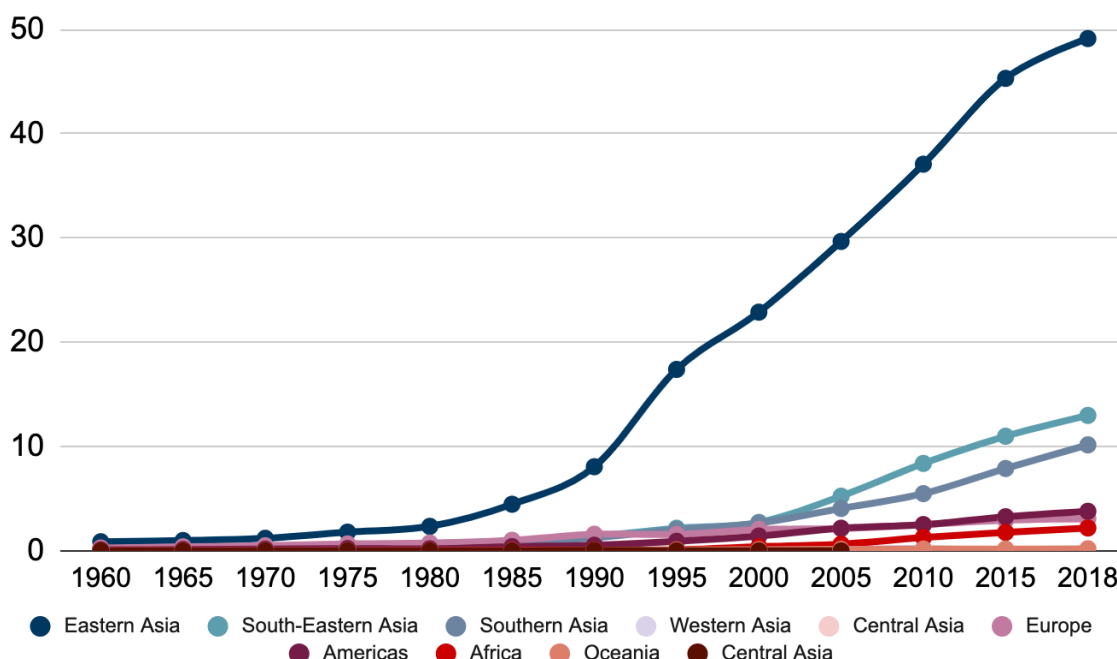


Figure 2: Aquaculture production by region from 1960 to 2018 (in million tons). Here, aquaculture encompasses all aquatic organisms for consumption. Source: Illustrated by FWI, numbers from [FAO FishstatJ, 2020](#)

The five **countries with the highest aquaculture fish production worldwide are China, India, Indonesia, Vietnam, and Bangladesh** (Fig. 3).⁵ Together these made up 79% of global finfish production in 2018; China produced 50%, India 12%, and Indonesia 8%. Because of these countries' market dominance, this report will largely focus on South, Southeast, and East Asia.

³ FAO. (2020). [The State of World Fisheries and Aquaculture](#). and De Silva, S. S. & Davie, F. B. (2010). [Success Stories in Asian Aquaculture](#).

⁴ For the purpose of this report, the term fish encompasses finfish, crustaceans and molluscs. To distinguish the commonly consumed fish, finfish excludes molluscs and crustaceans. When talking about fish produced for and consumed by humans, we will use the term food fish.

⁵ FAO. (2020). [The State of World Fisheries and Aquaculture](#).

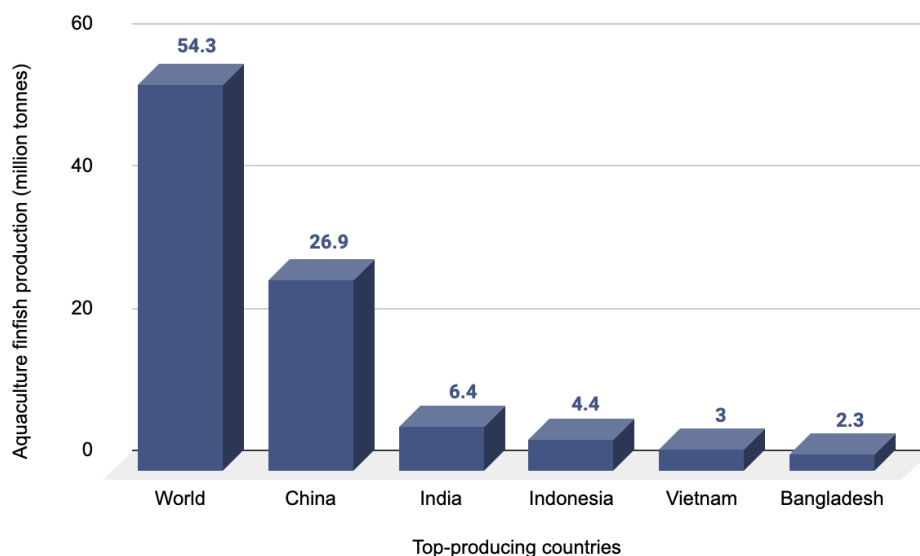


Figure 3: Aquaculture finfish production of the world's top producers in 2018 (in million tonnes).

Source: Illustrated by FWI, numbers from [FAO, 2020](#)

2.1. Production Systems

Aquaculture fish production has been long-present in Asian countries. Thus, existing production systems represent different levels of technology, farmers' involvement, and ecosystems (Fig. 4).

Rice fields can be found in seasonally flooded deltas like the Mekong River Delta in Vietnam.⁶

Aquaculture ponds are natural or artificial impoundments forming closed water bodies that hold freshwater (rain-fed, irrigated, flow-through) or brackish water.⁷

Raceways or tanks are artificially constructed units (straight-sided or round), often surrounded with concrete on the bottom and sides, that receive water from one side and discharge it on the other end of the unit.⁸

Cages or net pens are floating or suspended enclosures located in natural aquatic systems such as lakes, rivers, oceans, and artificial water bodies.⁹

⁶ Agbayani, R. F. et al. (1997). Aquaculture Economics in Asia and the Pacific.

⁷ Troell, M. (2014). Does aquaculture add resilience to the global food system?

⁸ Soto, D. et al. (2007). Building an ecosystem approach to aquaculture.

⁹ Ibid.

Recirculating Aquaculture Systems (RASs) are fully controlled, closed systems. They are used on land-based tanks or raceways. RASs are frequently used at particular life stages and for higher-value species.¹⁰

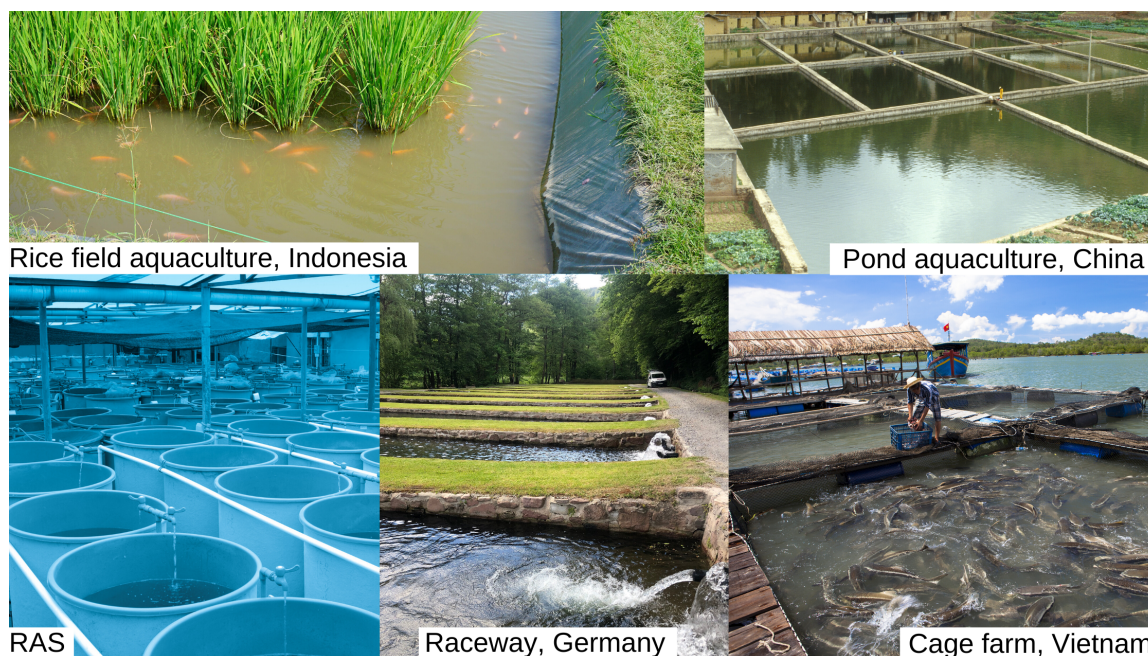


Figure 4: Aquaculture systems. (Their location is exemplary and does not indicate that this is the common system used in the respective country.)

Small-scale, traditional farms are the prevalent operation system in many Asian countries, often addressing family-level subsistence and livelihood needs.¹¹ Pond culture systems dominate aquaculture production in these regions.¹² Small-scale operations are usually extensive, meaning that the water quality and feeding is mostly regulated without human input.¹³ Past work on fish welfare has largely focused on intensive systems as they are more prevalent in European and North-American aquaculture, where most studies on captive fish welfare have been conducted. **We believe that exploring collaboration options with extensive farm operators is necessary considering the vast number of small-scale farms in the top-producing countries.**

Information about the prevalent farming systems in individual countries is scarce. We only found data on some producers in Asia:

¹⁰ Soto, D. et al. (2007). Building an ecosystem approach to aquaculture.

¹¹ Rola, W. R. and Hasan, M. R. (2007). Economics of aquaculture feeding practices: a synthesis of case studies undertaken in six Asian countries.

¹² FAO. (2010). Enhancing the contribution of small-scale aquaculture to food security, poverty alleviation and socio-economic development.

¹³ For an explanation of intensive and extensive aquaculture systems, see [here](#).

In **Indonesia**,¹⁴ half of the aquaculture production in 2009 came from mariculture, 25% from brackish-water, and 12% from freshwater pond systems. Overall, small-scale farms are the most prevalent. In 2019, aquaculture created 4 million jobs along its value chain. 95% of the households that own freshwater ponds operate on less than 0.5 ha of land.

In **Bangladesh**,¹⁵ 86% of aquaculture operations in 2010 were inland. 20% of rural inhabitants operated a homestead pond, which is used for bathing, livestock hydration, and fish farming. Homestead ponds accounted for almost 32% of fish production, and semi-intensive carp cultures for 31%.

In **Thailand**,¹⁶ most freshwater aquaculture is practiced in the form of pond aquaculture, and 90% of freshwater farmers operate farms of less than 5 ha.

In **Vietnam**,¹⁷ 2.4 million households are engaged in aquaculture production. 75% of these households have farm sizes less than 2 ha, and 90% own less than 3 ha. However, it is important to keep in mind that these numbers represent the share of farmers and not production - 90% of farmers having farm sizes of less than 3 ha **is not** equivalent to 90% of Vietnam's fish being reared on farms of less than 3 ha.

2.2. Finfish Species Farmed

Finfish make up 48% of the world's aquaculture and 45% of Asian aquaculture. In Asian countries, these fishes are farmed in all of the aforementioned [production systems](#). **Carnivorous freshwater fishes are the highest value species, while herbivorous and omnivorous freshwater fishes constitute the majority of production by weight.**

In weight (tonnes produced), Asian finfish aquaculture is centered around three major freshwater groups: 1. Cyprinidae: carps, barbels, & other cyprinids; 2. Cichlidae: tilapia and other cichlids, and 3. Catfish (Siluriformes). These groups dominate international aquaculture (Fig. 5). Milkfish (Chanidae) are less frequently produced than the aforementioned fish groups, but play a major role in world finfish aquaculture due to their value. Table 1 illustrates the specific production parameters for each species group. Fig. 6 gives an overview of the countries and territories producing each respective group, as well as the quantity in tonnes.

Note with respect to quantifying fish in terms of "tonnes produced": Ideally, we refrain from quantifying living beings in terms of tonnes, but data about individual fish is often nonexistent. We could calculate estimates for the number of individual fish produced, but it would be time-consuming and only marginally helpful for the purpose of illustrating the production volume.

¹⁴ Philips, M. et al. (2016). [Aquaculture Big Numbers](#).

¹⁵ Belton, B. et al. (2011). [Review of aquaculture and fish consumption in Bangladesh](#).

¹⁶ Philips, M. et al. (2016). [Aquaculture Big Numbers](#).

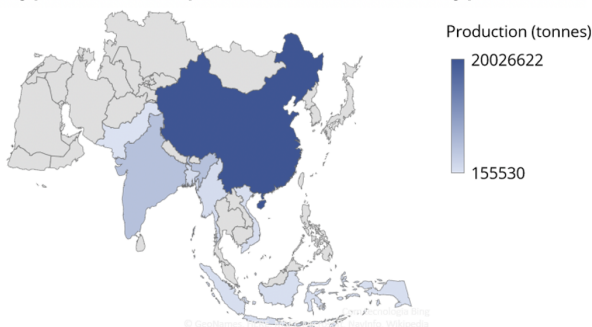
¹⁷ Ibid.

Aquaculture in Asian Countries

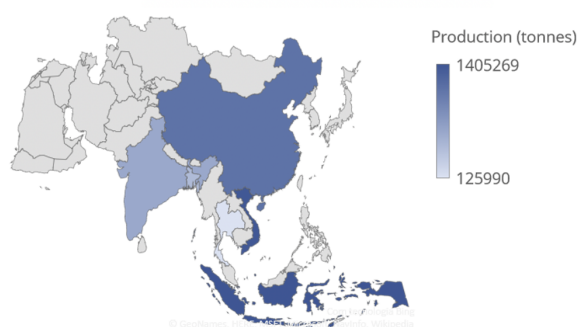
Finfish group	Share of global fish production		Share of Asian producers on global production	Production (in tonnes)	Asian countries (and territories) farming this species	Most common species farmed (by tonnes)
	by tonnes	by value				
Cyprinidae	36.6%	35.6%	98%	28,719,025	36	Common, silver, grass and bighead carp
Cichlidae	7.6%	4.2%	69%	4,151,657	31	Nile, Mozambique, Blue tilapia; blue-nile tilapia hybrid
Siluriformes	7%	4.2%	92%	5,333,194	25	Striped and torpedo-shaped catfish
Chanidae	1.6%	2.6%	99.97%	1,326,746	14	Milkfish

Table 1: Asia's most common finfish groups, the group's share of global production, the percentage produced in Asian countries/territories, overall production, number of countries/territories producing this group, and the most common species farmed. Source: [FAO FishstatJ, 2020](#) and for milkfish: [FAO, 2017](#)

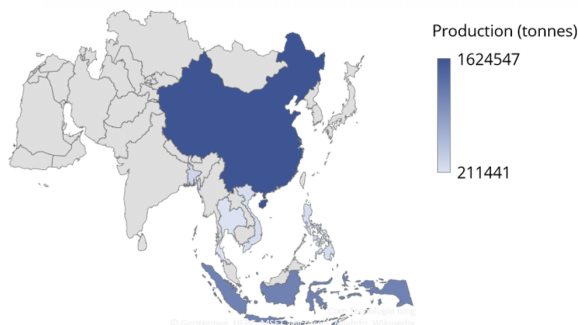
Cyprinidae: carps, barbels, & other cyprinids



Siluriformes: catfishes



Cichlidae: tilapia & other cyprinids



Chanidae: milkfish



Figure 5: Overview of the top producers of cyprinids, cichlids, siluriformes, and milkfish in Asia. Source: Illustrated by Fish Welfare Initiative, data from [FAO FishstatJ, 2020](#)

The aforementioned species are the most produced in terms of tonnes, which is the usual unit of measurement used in aquaculture production. However, looking at the individual numbers of fish produced paints a different picture. **Pond loach, a species of the family Cobitidae (true loaches) is by far the most produced fish worldwide with over 11.5 billion individuals alive on farms at any given point.**¹⁸ In captivity, pond loaches rarely grow bigger than 15 centimeters and usually weigh no more than 20 grams.¹⁹ Hence, their production in tonnes is comparatively low, despite the high number of individuals. In 2016, 99.8% of pond loaches were produced in mainland China. Thus, they represent almost $\frac{1}{4}$ the number of mainland China's farmed fish and roughly $\frac{1}{8}$ of farmed fish worldwide.

2.3. Third-Party Involvement

Farms in Asian countries are frequently associated with **universities and research institutes**.²⁰ These institutions can give leverage to implement higher welfare standards on the farms they work with. They are also key stakeholders because of their vast network and connection to the aquaculture industry. At the same time, the presence of university collaborations could suggest that certain regions already implement basic welfare improvements. Interested parties could then consider working in areas where no action has yet been taken in order to increase their impact on fish welfare. The National Aquaculture Sector Overview ([NASO](#)) of the Food and Agriculture Organization of the United Nations (FAO) has more information on local research institutes and sector stakeholders.

During Fish Welfare Initiative's farm visits in India, we generally found **farmers to be open to working with governmental (as well as non-governmental) organizations** on improving fish welfare, usually with the primary aim of reducing mortality rates.²¹ This attitude is reflected by the results of a study surveying Asian livestock producers, most of whom wished for collaboration between stakeholders, including NGOs, to effectively improve welfare.²² However, we found that farmers have a tendency to be more open to working with foreign organizations that also have an affiliation with a national institution like, for example, a university. Another major constraint to working with farmers is the fact that many Asian countries have numerous small-scale farms. Effecting change on small farms can be far more challenging than large operations, as they are less financially stable and have lower access to equipment. Such constraints hinder the implementation of welfare improvements. These same constraints also mean that producers take on a higher risk when altering production on their farm.

¹⁸ Open Philanthropy Project. (2016). [Finfish numbers worldwide based on FAO data](#).

¹⁹ For size, see [FishBase's entry](#). The weight estimate was given by a local advocate.

²⁰ The FAO's [National Fisheries & Aquaculture Sector Overviews](#) have a section on affiliated institutes for each country.

²¹ King-Nobles, H. et al. (2020). [Fish Welfare Scoping Report: Vietnam](#). The scoping report for India is still being developed.

²² Sinclair, M. & Philips, C. V. C. (2019). [Asian Livestock Industry Leaders' Perceptions of the Importance of, and Solutions for, Animal Welfare Issues](#).

2.4. Value Chain

The aquaculture value chain in most Asian countries includes farmers, suppliers (e.g. processing facilities), retailers, exporters, and end-consumers.²³ Seed suppliers and farmers form the base of the value chain. For many small-scale producers, the value chain is simplified as they directly sell to only one buyer (often a market vendor), whereas large-scale producers do business with several buyers and have a more diverse value chain. In some countries, farmers do not have access to retailers and supermarkets, in which case collectors function as intermediaries, buying fish from farmers and selling them to retailers.²⁴ These intermediaries are especially important in small-scale aquaculture, where trade is usually done with the next actor in the value chain instead of reaching out directly to wholesalers.²⁵ Fig. 6 shows the value chain actors and their relationships.

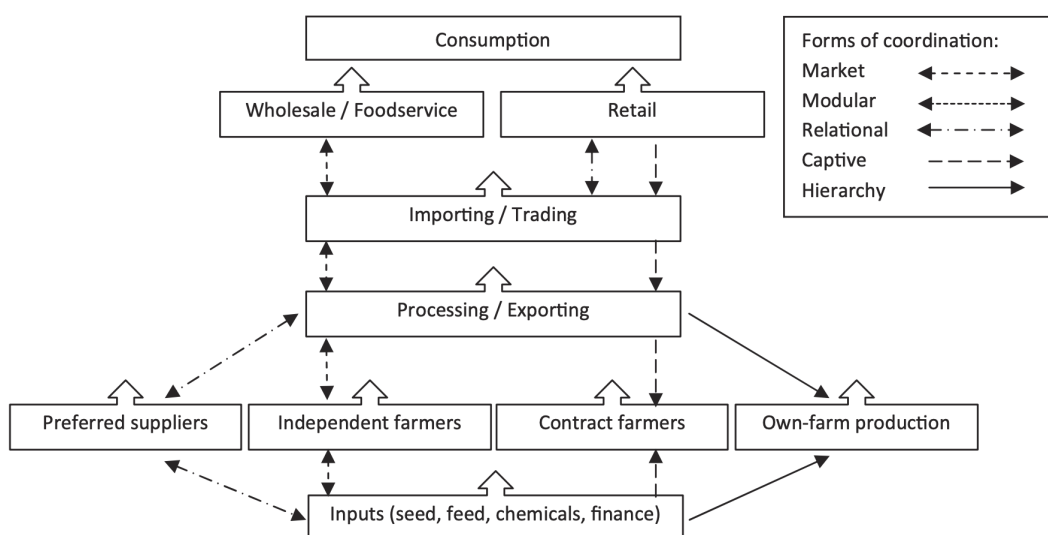


Figure 6: Value chain actors. This is an example of the pangasius value chain in Vietnam and is representative of many East, Southeast, and South Asian countries. Source: [Jespersen et al., 2014](#)

Value chains are strongly influenced by the regulations of international export markets, as well as local and foreign institutions.²⁶ Furthermore, **retailers and other institutions that brand the product are responsible for reaching the end-consumer and see most of the revenue.** They can, therefore, suggest and drive changes in all stages of the value chain, including production on fish farms. Selling to traders and local markets pushes

²³ ILO Report. (2016). [Precarious in the Asian Seafood Global Value Chain](#).

²⁴ FAO. (2006). [National Aquaculture Sector Overview Indonesia](#).

²⁵ Pomeroy, R., et al. (2017). [Linkages and Trust in the Value Chain for Small-scale Aquaculture in Asia](#).

²⁶ Jespersen, K. S. et al. (2014). [What shapes food value chains? Lessons from aquaculture in Asia](#).

farmers to disregard regulations, which are often not economically viable for them.²⁷ For example, in Bangladesh, most produce is sold to wholesale and low-end food services and there are few regulatory barriers to cross when selling seafood.²⁸ In contrast, the European Union (EU) and the United States (US) have progressively stricter regulations in order to safeguard fish welfare. As a result, farmers from China, Bangladesh, Vietnam, and Thailand have started to increasingly export to other Asian nations with lower regulations such as Russia and some Middle Eastern countries.²⁹

2.4.1. Export & Import

In most Asian countries, the majority of fish produced is consumed in the respective countries themselves.³⁰ This is reflected by the average per capita food fish consumption of 24.1 kg/year in Asia, which is 4 kg more than the global average.³¹ Numbers on trade value underline this assumption: **In 2018, almost half of the fish and fish products sourced from Asian countries were traded within the continent.**

In 2018, 28% of Asian food fish products by weight was exported³² That amounts to 20.9 million tonnes. By value, **China is the biggest exporter since 2002**, accounting for 14% of the world's total seafood exports in 2018.³³ China's biggest export markets are Japan, the US, the EU, Hong Kong, and Taiwan.³⁴ The second and third biggest exporters are Norway and Vietnam with 7% and 5% respectively, followed by Chile, India, and Thailand (Fig. 7).

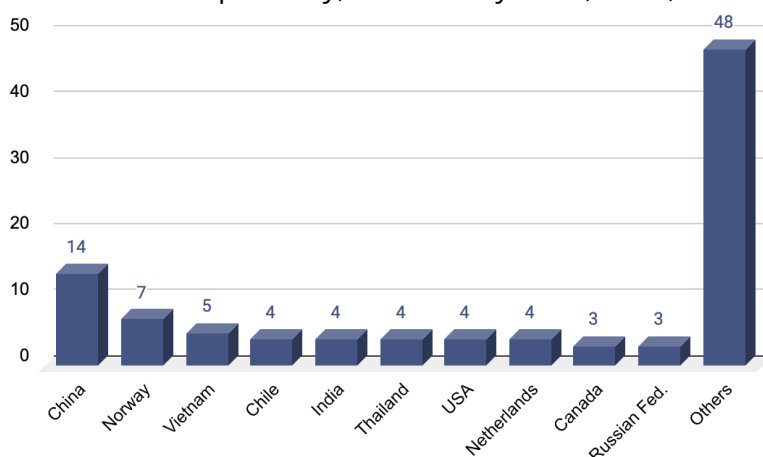


Figure 7: Top aquaculture exporters in terms of product value. Numbers give the percent share of world total export. Source: Illustrated by FWI, numbers from [FAO, 2020](#)

²⁷ Pomeroy, R. et al. (2017). Linkages and Trust in the Value Chain for Small-scale Aquaculture in Asia.

²⁸ Jespersen, K. S. et al. (2014). What shapes food value chains? Lessons from aquaculture in Asia.

²⁹ Ibid.

³⁰ Belton, B. (2016). Not just for the wealthy: Rethinking farmed fish consumption in the global south.

³¹ FAO. (2020). The State of World Fisheries and Aquaculture.

³² Food fish production in Asia in 2018: 72,812.2 thousand tonnes; Food fish exports from Asia in 2018: 20,901 thousand tonnes. Source: [FAO, 2020](#)

³³ FAO. (2020). The State of World Fisheries and Aquaculture.

³⁴ Balod, S. (n.d.). China - Seafood Trade Intelligence Portal.

By product value, the major importers worldwide are the US with 14% of the world total, followed by Japan and China with 9% each (Fig. 8). China is the third biggest importer of fish and fish products since 2011, despite their immense aquaculture production. This is largely because more and more consumers favor foreign, imported species.³⁵ In terms of value, **Oceania imported 67% of fish products from Asian countries, North America imported 48%, Latin America and the Caribbean 32%, Africa 28%, and Europe 14%.** These numbers account for all fish products traded, regardless of whether these were farmed or wild-caught. The actual share of farmed fish is thus lower.

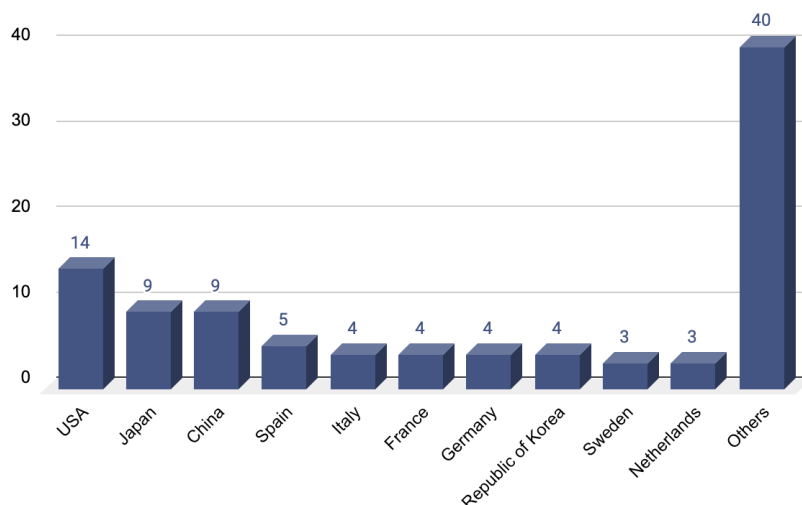


Figure 8: Top aquaculture importers in terms of product value. Numbers give the share of world total export. Source: Illustrated by FWI, numbers from [FAO, 2020](#)

2.5. Husbandry Standards

Farmers in many Asian countries find themselves with limited financial resources in a sector that is growing faster than they can incorporate good welfare practices. Unsurprisingly, this leads to issues for both the producers and the welfare of fish. The sector's growth is frequently restrained by poor water quality and slaughter practices. Furthermore, just like chicken farming,³⁶ aquaculture attracts landowners with limited knowledge about animal farming.³⁷ Both the industry and governments advertise fish farming for its high profit in a growing market.³⁸ **A study surveying 340 farmers in Bangladesh, China, India, the Philippines, Thailand, and Vietnam found profit**

³⁵ FAO. (2020). [The State of World Fisheries and Aquaculture](#).

³⁶ Starting a poultry business is often framed as an easy way of using your land and tapping into the local market. For example by Africa's [Farmer's Weekly](#), meat production giant [Tyson](#), and [Successful Farming magazine](#).

³⁷ Vikas, K. (July 11, 2020). [Software engineer becomes successful fish farmer](#). and Mohan, C. (August 24, 2018). [Fish Farming can Earn you Rs.1.75 lacs by Investment of Rs.25K Annually](#).

³⁸ Examples of this framing in China: [Profitable Venture](#), [Chinese pond laoch](#), [Black carp company](#), [Salmon investment](#). Examples for India: [Start Up Business](#), [Times of India](#), [United News of India](#), [Krishi Jargan](#), [Yourstory](#), [Farming India](#)

expectancy to be, by far, the major driver for establishing a fish farm.³⁹ Ultimately, a focus on profit and limited knowledge about farming practices promote welfare issues and create high mortality rates.

Disease Outbreaks

As production intensifies, Asian farms experience more disease and parasite outbreaks.⁴⁰ These outbreaks are devastating for farmers and involve significant suffering of the fish on their farm. Water samples from our unpublished farm visits in Andhra Pradesh, India demonstrated that many fish are reared in pond water from local rivers, which frequently leads to infections and diseases. As a result, farmers use large amounts of antimicrobials, particularly in Southeast Asia.⁴¹ This use of medicine to combat disease is only a band-aid solution that allows the continuation of these practices instead of addressing the root cause of mass infections: poor welfare.⁴²

Feeding and Nutrition

Most fish species produced in Asian countries are omnivorous, '[low trophic](#)' organisms. Appropriate omnivore feed constitutes up to 60% of the total aquaculture farm production costs because formulated fish feed is expensive.⁴³ Many small-scale farmers cannot afford commercial, formulated feed, and instead produce their own.

There are various issues associated with home-made feeds: More of them are needed to get the same weight gain,⁴⁴ and they are frequently inadequate for various life stages, seasons, and production systems.⁴⁵ Furthermore, underfeeding fish can cause severe stress resulting in immunosuppression, aggression, abnormal behavior, and deformities.⁴⁶ On the other hand, overfeeding can result in poor water quality, which decreases immune function.⁴⁷ As a result, feed can cause serious welfare issues if not adequately formulated, produced, and administered.

³⁹ Rola, W. R. & Hasan, M. R. (2007). [Economics of aquaculture feeding practices: a synthesis of case studies undertaken in six Asian countries.](#)

⁴⁰ Bondad-Reantaso, M. G., et al. (2005). [Disease and health management in Asian aquaculture.](#)

⁴¹ Reverter, M. et al. (2020). [Aquaculture at the crossroads of global warming and antimicrobial resistance.](#)

⁴² For further information on this topic refer to the research shared [here](#).

⁴³ Cerqueira, M. et al. (2020). [How tryptophan levels in plant-based aquafeeds affect fish physiology, metabolism and proteome.](#)

⁴⁴ White, P. et al. (2010). [Review of environmental impact, site selection and carrying capacity estimation for small scale aquaculture in Asia.](#)

⁴⁵ Noble, C. et al. (2007). [The impact of environmental variables on the feeding rhythms and daily feed intake of cage-held 1+ Atlantic salmon parr \(Salmo salar L.\).](#)

⁴⁶ Lall, S. P. & McCrea, L. M. (2007). [Role of nutrients in skeletal metabolism and pathology in fish – an overview.](#)

⁴⁷ Oliva-Teles, A. (2012). [Nutrition and health of aquaculture fish.](#)



Figure 9: Pangasius being fed on a farm in Vietnam. Source: personal photograph

Water Quality

In extensive, small-scale operations, water quality issues are unavoidable. Farms rely on minimal resource input and often do not have systems in place to frequently monitor water quality.⁴⁸ The most frequent issues are inadequate temperature, pH, and dissolved oxygen levels. Poor water quality is detrimental to the environment and to fish health, manifesting in slow growth and development.

Transport

Transport can compromise welfare due to induced injuries, inadequate water quality, and overall stress from being moved. The OIE Aquatic Animal Health Code (Chapter 7.2)⁴⁹ describes the general principles for ensuring the welfare of farmed finfish during transport by air, sea, or land. During our scoping visit to Vietnam, we saw fish frequently left out of the water or in small buckets for ten to twenty minutes while being transported to processing facilities.⁵⁰

Slaughter

Overall, legislation for slaughter is vague in many Asian countries (see [Laws and Regulations](#)).⁵¹ A slaughter plant we visited in Vietnam did not stun all fish, but instead slit their gills to let them bleed out. Local wet markets, to which many fish reared in Vietnam are sold, have no welfare standards: fish are frequently left to asphyxiate in small buckets. In India, we observed similar conditions with fish being left to asphyxiate (Fig. 10).

⁴⁸ Health and water quality monitoring protocols are cost-intensive and not practiced regularly in Asia. (Bondad-Reantaso et al., 2005)

⁴⁹ OIE. (2019). [Aquatic Code](#).

⁵⁰ King-Nobles, H. et al. (2020). [Fish Welfare Scoping Report: Vietnam](#).

⁵¹ See the [Laws and Regulations](#) section below.

Small species such as pond loach (*Misgurnus anguillicaudatus*) are slippery and thus impossible to grab, making conventional slaughter methods impractical. These species are frequently killed via [osmotic dehydration](#), or “salting” by being immersed in salt baths. This process drains all water from the animal, ultimately killing it after a long period of suffering. Alternatives to osmotic dehydration for small species do not currently exist, but new options are being investigated as automated slaughter machines enter the market.⁵²

In some countries such as China, Japan, Thailand, Vietnam, and the Republic of Korea, certain dishes involve fish that are eaten alive.⁵³ In the process, fish may be boiled alive. Vendors in wholesale markets frequently practice the live killing of fish, promising a fresher product.⁵⁴ However, scientists found that increased stress before slaughter negatively impacts final product quality, making live slaughter methods unnecessarily cruel.⁵⁵



Figure 10: Left: Pangasius being transported from well boats to a Vietnamese slaughterhouse. During transport, fish were stored in buckets for 10-20 minutes. Right: Silver carp transported in buckets in India. The red blood spots indicate prolonged stress. Source: personal photographs

2.6. Sector Intensification

National and international investment programs have a special interest in increasing countries' export to boost their own investment. **This orientation towards prioritizing export often exists alongside production intensification.** Today, the most produced fish species in Indonesia (Pangasius catfish and Nile tilapia) tend to come from small-scale

⁵² [Video file](#)

⁵³ *Caution: These links show the killing of live animals* - See references for [Vietnam](#), [China](#) (starting at 04:41), [Thailand](#), [Japan](#), [Republic of Korea](#). Fish Welfare Initiative does not support the cultural depiction in these videos but shares these videos with the only intention of illustrating practices.

⁵⁴ Street Fighter. (2019). [Killing live grouper in seafood market](#).

⁵⁵ Poli, B. M. (2005). [Fish welfare and quality as affected by pre-slaughter and slaughter management](#). & Holmyard, N. (2017). [Fish producers benefit from humane slaughter techniques](#).

producers for domestic consumption.⁵⁶ With assistance from the Dutch Centre for the Promotion of Imports from developing countries (CBI), the Indonesian government is in the process of developing policies to boost industrialization and augment the export of tilapia. As a result, the Indonesian aquaculture landscape is slowly changing from many small-scale to fewer large-scale producers.⁵⁷ This trend is not unique to Indonesia. CBI currently works in four of the six top producing countries in Asia: Indonesia, Vietnam, Bangladesh, and the Philippines.⁵⁸

China also actively seeks to invest in fisheries and agriculture with their new “One Belt, One Road” program, with a special focus on Asia and Africa.⁵⁹ As part of this plan, China wants to support any country that lacks the investment required to expand their aquaculture sector, as well as provide required technologies. Several Asian countries have also taken the matter into their own hands, actively recruiting investors⁶⁰ and/or providing national capital.⁶¹ The intensification of aquaculture practices is frequently achieved by introducing recirculatory aquaculture systems (RASs) and other forms of controlled rearing environments.⁶²

The national and international push for aquaculture sector intensification and enhanced commercialization will likely further increase production.⁶³ Alongside these developments, risks related to sustainability and welfare on aquaculture farms will remain an issue that is yet to be properly addressed by farmers and governments. However, without addressing welfare challenges, fish mortality rates will rise and halt the desired aquaculture sector growth, pushing farmers, investors, and governments into stagnation.

3. Future Aquaculture Growth

Asia’s population is expected to increase by 250 million people by 2030, which is equivalent to Indonesia’s entire current population. Alongside this population growth, Asian aquaculture is expected to increase fish⁶⁴ production to 96.4 million tonnes per year by 2030 - a 25.5% increase from 2018.⁶⁵ **Asia will continue to produce 89% of global**

⁵⁶ CBI. (2012). The Indonesian Seafood Sector. & Philips, M. et al. (2016). Aquaculture Big Numbers.

⁵⁷ Ibid.

⁵⁸ Respective value chain analysis reports: Indonesia, Vietnam, Bangladesh, the Philippines

⁵⁹ Godfrey, M. (June 19, 2018). From Indonesia to Norway, China looking to invest in aquaculture overseas.

⁶⁰ BKPM. (2015). Investing in Indonesia’s fisheries sector. & Australian Government. (n.d.). Sustainable fisheries to India.

⁶¹ The Fish Site. (July 8, 2019). India to fund an aquaculture boom.

⁶² NACA. (2020). Aquaculture Asia Magazine, July-September 2020.

⁶³ Bondad-Reantaso, M. G. et al. (2005). Disease and Health Management in Asian Aquaculture.

⁶⁴ Note that the FAO projections use the holistic term “fish” that, besides finfish, includes molluscs and crustaceans.

⁶⁵ FAO. (2020). The State of World Fisheries and Aquaculture.

aquaculture products by 2030 with China, Indonesia, India, and Vietnam as the leading forces.⁶⁶

Aquaculture growth is pushed within the legislative framework of many top-producing countries. For example, China issued a national policy document outlining steps towards increased fisheries and aquaculture production.⁶⁷ Vietnam also strongly pushes to increase production in the coming years.⁶⁸ These developments are often referred to as Blue Growth or Blue Revolution.⁶⁹

Another factor driving this growth is aquaculture's label as the savior of wild fish populations.⁷⁰ While being controversial, this argument still prevails as a generally accepted fact justifying the sector's planned growth.⁷¹ As a result, countries worldwide are promoting aquaculture production as a sustainable alternative to fisheries. Considering the close link between aquaculture and wild-fish capture organizations and businesses need to think carefully about the sustainability of their operations.⁷²

The expected aquaculture growth is also tightly linked to many Asian countries' reliance on seafood and expected population growth (see [Socio-Economic Factors](#)).

4. Laws and Regulations

Safeguarding welfare on fish farms is largely driven by laws that enact best practices. However, Asian regulations on fish welfare are far less stringent than, for example, those in the EU.

On a trans-national level, aquaculture regulation in Asia is guided by the Association of Southeast Asian Nations ([ASEAN](#)), the World Organisation for Animal Health ([OIE](#)), and the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals ([AHRL](#)). **All of these guidelines suggest vague best practices and offer little to no enforcement.** Individual countries may also have their own laws and regulations in place, but a comprehensive account of these is beyond the scope of this report.

ASEAN

⁶⁶ Ibid.

⁶⁷ Ministry of Agriculture and Rural Affairs of the People's Republic of China. (2017). [Five Year Plan](#).

⁶⁸ Vietnam Department of Aquaculture. (n.d.). [Aquaculture in Vietnam](#). (p.20) & Dao, T. (August 9, 2018). [Vietnam poised to become top player in ocean aquaculture](#).

⁶⁹ Blue Revolution [India](#) and [Indonesia](#)

⁷⁰ For an example, see [Harvest Returns](#).

⁷¹ [Fishing the Feed](#); Roebuck, K. (August 9, 2019). [Is aquaculture the answer to overfishing and world hunger?](#) and Hongzhou, Z. (March 26, 2018). [Can aquaculture solve the fishing problems in the south china sea?](#)

⁷² For more information see [Fishing the Feed](#).

Countries represented in the ASEAN include Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam (Fig. 11).



Figure 11: ASEAN and OIE (dark blue) and OIE only (light blue) member countries and territories in Asia.

The ASEAN has guidelines for Good Aquaculture Practices ([ASEAN GAqP for Food Fish](#)). Welfare-relevant components include water quality monitoring, provision of nutritious feed, minimizing injury, welfare training for staff, and general compliance with the OIE Aquatic Animal Health Code (see below). However, these guidelines are left vague (e.g. minimize physical damage) and aim at assuring food safety and production efficiency rather than preserving welfare.

OIE

All Asian countries and territories except Hong Kong and Palestine are part of the OIE (Fig. 11). Regulations for farmed fish are formulated in the [Aquatic Animal Health Code](#). During [transport](#), welfare must be safeguarded and if animals are injured, they have to be killed humanely. [Stunning and slaughter](#) activities should be conducted with minimal injury and stress, and there are recommendations given such as water quality & best equipment for transfer. OIE regulations improve upon the ASEAN ones by, for example, giving guidelines

on how to assess effective stunning.⁷³ However, its recommendations are still vague, and only give suggestions rather than hard rules to be followed. This is largely because none of their recommendations are species-specific and welfare needs vary across species. Most alarmingly, the OIE does not prohibit slaughter methods that cause severe suffering such as asphyxiation.

AHRL

The [AHRL](#) focuses on the identification and prevention of diseases and outbreaks. This indirectly impacts fish welfare, but their guidelines appear to be largely motivated by ensuring food security, for which purpose they perform well. They frequently draw upon the OIE and include all necessary parameters to successfully detect and act upon parasites and diseases. As such, the AHRL includes an import risk analysis, quarantine measures, and lists of potential pathogens.

4.1. Law Enforcement

Most fish welfare legislation is vague, which makes enforcement challenging. What one farmer interprets as “safeguarding” might be insufficient for animal welfare specialists. **Asian countries and territories have a variety of different law systems which also influence animal welfare issues.**⁷⁴ For example, [common law systems](#) leave more room for interpretation. Judges can set the legal agenda by, for example, excluding fish in anti-cruelty laws. These rulings can actually be written into law afterward. This means that judges have the power to interpret the definition and applications of laws. In [civil law systems](#), if there is no legal regulation banning cruelty towards fish, enforcement is not legally binding either. Thus, common law systems leave room for educating judges about animal issues, while non-common laws close that door.

Using Indexes to Infer Law Enforcement

While assessing law enforcement is a complex undertaking, indexes can give guidance. The [Rule of Law Index](#) (RLI) measures how “the rule of law [reducing corruption, poverty, and disease] is experienced and perceived around the world.” RLI scores range from 0 to 1, with 1 showing the strongest adherence to the rule of law. The [Corruption Perceptions Index](#) (CPI) shows “how corrupt a country’s public sector is perceived to be by experts and business executives”. CPI scores range from 0 to 100, with 100 indicating the least corruption perception. The [World Animal Protection Index](#) (API) ranks countries according to their animal welfare policy and legislation. One section of the assessment is “Government Accountability for Animal Welfare” which includes “Enforcement Mechanisms.” The API ranges from A to G with A being the best.

⁷³ [OIE Article 7.3.6. f](#): “signs of correct stunning include i) loss of body and respiratory movement (loss in opercular activity); ii) loss of visual evoked response (VER); iii) loss of vestibulo-ocular reflex (VOR, eye rolling).”

⁷⁴ See [this map](#) for law systems worldwide.

While these indexes are human-centered, they can give a better understanding of the local effectiveness of laws in general, which ultimately affects fish welfare laws. Table 2 shows the respective scores for the top-producing countries. **RLI and CPI scores suggest a medium law enforcement in the Asian countries assessed** with Bangladesh having a particularly low CPI score of 26. The API scores suggest a very low overall score for China, Indonesia, and Vietnam. However, India scores high on the government's accountability for animal welfare issues. One possible explanation is that the API rating not only takes into account law enforcement, but also the general existence of laws.

Index/ Country	Rule of Law Index	Corruption Perceptions Index	World Animal Protection Index
China	0.48	41	G
India	0.51	41	B
Indonesia	0.53	40	F
Vietnam	0.49	37	G
Bangladesh	0.41	26	n.d.

Table 2: [RLI](#) (2020 numbers), [CPI](#) (2019 numbers), [API](#) (2014 numbers)

4.2. Certification

The five dominant certification schemes across Asia are Organic, the Aquaculture Stewardship Council (ASC), Global Good Agricultural Practices (G.A.P.), Global Aquaculture Alliance Best Aquaculture Practices (GAA BAP), and Friend of the Sea (FOS). In 2015, these schemes certified 6% of global aquaculture production. A large share of these farms were shrimp operations.

Scheme/ Country	ASC	FOS	GAA BAP	Global G.A.P.	Organic
China	0.5%		18%		59%
Vietnam	28%	1%	7%	6%	2%
Indonesia	10%		4%		1%
Malaysia	1%		0.5%		
India		0.5%	0.5%		
Thailand			4%		1%
Bangladesh			0.5%		

Table 3: Percentage of Asian farms certified (numbers indicate the share of total production volume (mt)). Source: [Potts et al., 2016](#)

There are no legally binding certifications, but individual countries have national requirements. For example, in Vietnam, all commercial pangasius farms must be certified by the national scheme VietGAP or similar international certifications since December 31, 2015.⁷⁵ Indonesia also has many national, small-scale certifications, such as Indonesian Good Aquaculture Practices (IndoGAP) and the Indonesian Catfish Industry Association (APCI) with the Standar Nasional Indonesia (NSI). These harmonize with international standards (ISO, HACCP, SPS) and enable export to the EU and other Western regions.

Local governments and the FAO work towards enabling more certification, especially for small-scale farms.⁷⁶ **Because of small-scale farms' inability to provide the money necessary for certification, government involvement appears to be a prerequisite for their access to international, certified markets.**

Certification and Fish Welfare

All standards mentioned are based on environmental and social sustainability. **Until now, most commercial certification schemes that include welfare solely focus on the alleviation of extreme pain and suffering, with guidelines that are often neither species-specific nor precise enough to effectively safeguard welfare.**⁷⁷ After the realization that welfare is a major pillar of sustainability, schemes have recently started to lay out plans for the inclusion of welfare.⁷⁸

The purpose of certification schemes is to create transparency, allowing consumers to choose high welfare and sustainability-oriented products. This process only works, however, if consumers trust the institutions certifying farms. In certain countries such as Japan, consumers have expressed little trust in NGO labels like the ones mentioned above.⁷⁹ Overall, consumers purchasing their seafood in developing Asian countries' local markets seem to have little interest in certification.⁸⁰

⁷⁵ VASEP. (2020). Certifications Vietnam.

⁷⁶ Tsantiris, K. et al. (2018). Seafood Certification and Developing Countries: Focus on Asia.

⁷⁷ Webster, B. (July 13, 2020). Eco-friendly supermarket fish 'die in pain'.

⁷⁸ For example: ASC Fish Welfare Project, GAA Best Aquaculture Practices

⁷⁹ Onozaka, Y. (2010). Uninformed or uninterested? Surveys examine Japanese consumers' interest in sustainable seafood & Hishamunda, M. et al. (2009). Analysis of aquaculture development in Southeast Asia - A policy perspective.

⁸⁰ Tsantiris, K. et al. (2018). Seafood Certification in Developing Countries: Focus on Asia.

5. Socio-Economic Factors

5.1. Fish Consumption

The consumption of fish is deeply embedded in the cultures and recipes of many Asian countries,⁸¹ especially in island nations and less developed countries where fish is often the only affordable source of animal protein.⁸² In 1961 Asian countries accounted for 48% of the global food fish consumption. In 2017, their share was 71% with China consuming 36% of the world's food fish.⁸³ To put this in perspective, the combined fish consumption of Japan, the US, and Europe represented 19% of worldwide consumption in 2017. From 2015 to 2017, consumers in Asia and Oceania ate an average of 24 kg of food fish per person (Fig. 12). This consumption includes both aquaculture and fishery products, and two-thirds of the food fish consumed is finfish.

The share of fish protein in overall protein intake varies greatly across countries. For example, in India, fish only contributes 2% to the total protein intake.⁸⁴ In Cambodia and Myanmar, on the other hand, fish contributes 37% and 22%, respectively.⁸⁵

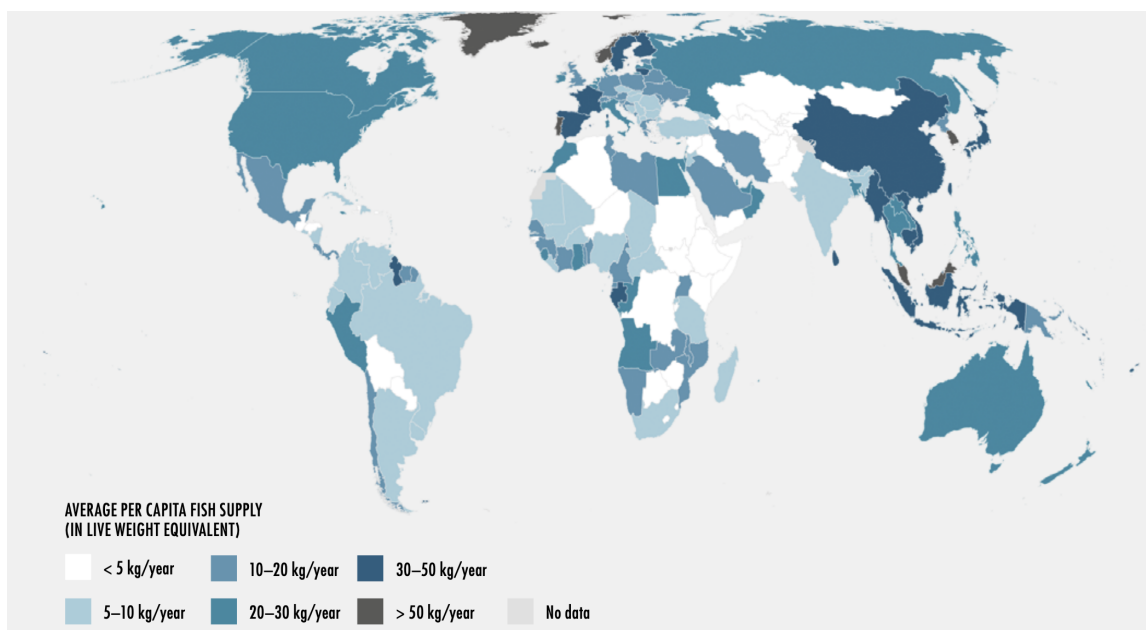


Figure 12: Apparent fish consumption per capita, average from 2015 to 2017. Source: [FAO, 2020](#)

⁸¹ Dey, M. M. (2008). Demand for fish in Asia. & Belton, B. (2018). Not just for the wealthy.

⁸² Dey, M. M. (2008). Demand for fish in Asia; Belton, B. (2018). Not just for the wealthy, and WorldFish. (2011). Promoting small-scale aquaculture.

⁸³ FAO. (2020). The State of World Fisheries and Aquaculture.

⁸⁴ ILO Report. (2016). Precarious in the Asian Seafood Global Value Chain.

⁸⁵ Ibid.

Future trends

Worldwide, per-capita fish consumption is expected to increase by 18% from 2018 to 2030. This growth will be particularly strong in Asia, where the middle class is growing.⁸⁶ By 2030, the average person in China is expected to consume 41 kg of food fish each year. There are no country-specific predictions for South and Southeast Asian countries, but fish consumption is expected to continue growing.⁸⁷ **Aquaculture seems highly likely to answer this growing demand and will produce up to two-thirds of the fish consumed globally by 2030.**⁸⁸ This production increase will only become reality through the intensification of aquaculture practices. This intensification must heavily rely on improved fish welfare to avoid mass mortalities.

5.2. Attitudes Towards Farmed Fish

Research on the public perception of fish welfare issues in Asian countries is scarce. However, there is some research on terrestrial farmed animals. **One study on Chinese pork consumers suggested a willingness to pay for higher welfare products,** finding that animal welfare perception is a driver for willingness to pay.⁸⁹ A different survey suggested that Asian consumers are usually not willing to pay more for sustainability labeling.⁹⁰ These findings raise the question of whether consumers in Asian countries would be incentivized to pay more for higher welfare products overall.

A recent study questioned livestock producers in China, India, Malaysia, Thailand, Vietnam, and Bangladesh, highlighting the perception of major welfare constraints.⁹¹ Farmers seem to be aware of the welfare challenges on their farms but largely neglect certain welfare challenges, such as the positive welfare indicator boredom as being of low concern to them. The interviewed farmers identify training, more education, and public awareness campaigns as critical components to successfully integrating welfare improvements. Additionally, different needs and developmental statuses drive countries' priorities. For example, **in China and Vietnam, food safety is a major concern. In countries such as India and Bangladesh, human health and improved livelihoods are the top priority.**⁹² In India, invoking animal welfare to change production conditions seems to be a little more

⁸⁶ Neo, P. (December 3, 2018). *Expert analysis: Meat and seafood consumption in Asia will rise 78% by 2050*.

⁸⁷ FAO. (2020). *The State of World Fisheries and Aquaculture*.

⁸⁸ *World Bank* projection for 2030

⁸⁹ Shimin, S. et al. (2019). *A Empirical Study of Consumers' Willingness of Purchase Pork for Animal Welfare-Based on the Data from Shandong Province*.

⁹⁰ Jacquet, J. L. & Pauly, D. (2007). *The rise of seafood awareness campaigns in an era of collapsing fisheries*.

⁹¹ Sinclair, M. and Philips C. J. C. (2019). *Asian livestock industry leaders' perceptions of the importance of, and solutions for, animal welfare issues*.

⁹² Ibid.

compelling than in other Asian countries. This is also true for Bangladesh, although animal welfare is less compelling there than in India.

An important aspect concerning slaughter is the fact that compared to many Western countries, **Asian countries have a stronger preference for seeing fish killed in front of them or doing so themselves.**⁹³ This appears to be deeply embedded in local cultures where live sale markets offer a source of fresh produce.

On the other hand, young people from Asian countries are increasingly concerned about animal welfare. Therefore, the valuation of humane-labeling may soon increase. That being said, Laura Nielsen from the World Trade Organization suggests that low-income households are more concerned with providing food to their families than with how the animal was treated. Furthermore, many Asian countries with low-income communities are island nations for whom fish has a strong place in their culture. Therefore, advocacy campaigns for fish welfare may be challenging and must be undertaken with great cultural sensitivity in Asian low-income communities.

5.3. Counterfactuals

We surveyed 52 organizations worldwide and asked whether they work on fish welfare or plan to do so.⁹⁴ Of these, **20 organizations either already work or plan to work on fish welfare issues in Asia, three of which plan to do so exclusively in Asian countries.** Fourteen of these organizations already work on fish welfare issues right now. In Europe, 36 organizations work or plan to work on fish welfare, and in North America, there are 25. Of the organizations working or planning to work in Asia, the most common countries they work in were China, Indonesia, India, and Vietnam. This survey showed that organizations are aware of the issue, and there is room for collaboration on fish advocacy work in Asian countries.

Concerning the limitations of this survey, there might very well be more organizations in Asia and other regions that work on fish welfare but did not receive our survey. Efforts likely cluster in priority countries with high production and an abundance of low-hanging fruit. Finally, these results should be taken more as a partial picture rather than a holistic assessment of animal advocacy organizations.

⁹³ Zhong et al., 2020, Westcott et al., 2020, Lynteris et al., 2020

⁹⁴ Billington, T. and King-Nobles, H. (2020). Fish Movement Survey Results.

6. Discussion: Fish Welfare Work in Asia

6.1. Opportunities

Below are some suggestions for projects we would like to see more research and experimentation into. This is a general list and each country and region within that country will have its own list of effective and ineffective methods going forward. This list serves as a starting point for potentially successful approaches.

1. **Corporate outreach:** With the centralization of aquaculture operations, corporate outreach is becoming increasingly important. However, the extent of its success is highly dependent on the individual country.
2. **Training of farmers:** Some farmers may lack knowledge about how to improve welfare and thereby increase efficiency. Sharing knowledge of best practices and providing training can avoid the deaths of fish on farms.
3. **Certification schemes:** If institutions succeed in certifying more small-scale farms, it is essential to make sure these schemes include welfare. This can be achieved by urging the schemes that don't yet include welfare to do so and guiding the ones that want to include welfare standards. Another avenue is helping farmers acquire welfare-oriented certification.
4. **Regulatory agencies:** Guidelines from international institutions such as the FAO and OIE are frequently adopted by certification schemes and alliances. Thus, improving fish welfare standards in these guidelines can be impactful.
5. **Advocacy:** There seems to be a growing number of people caring for animals' needs. Finding cost-effective ways to expand and mobilize this group through advocacy campaigns can lay the groundwork for future change.
6. **Producer-level reforms:** There exist opportunities for reforms that are mutually beneficial to the farmers and the animals they work with.
7. **Identifying policy windows:** Often, societal and governmental structures do not allow for changes. For example, if consumers value live fish, changing slaughter practices in processing facilities will not have an impact. In these cases, changes are possible during specific windows of opportunity like, for example, when local governments express doubt about the biosecurity of live fish sale.
8. **Big picture:** Fish welfare impacts [public health, the environment, and business success](#). Therefore, animal protection organizations should not be the only ones

with an interest in improving fish welfare and raising awareness for aquaculture issues.

6.2. Challenges

The following factors can compromise impactful fish welfare work in Asian countries and should be considered thoroughly before commencing projects.

6.2.1. Potential Production Decrease

In the future, aquaculture production may stall or decrease because of factors that limit production and yield.

1.1. Infrastructure

Rural and less developed regions often lack infrastructure, which can be clearly seen when comparing the road density in various Asian countries and territories.⁹⁵ Insufficient road networks challenge value chains and will eventually hinder growth.

1.2. Diseases and Parasites

With the intensification of operations, the spread of diseases and parasites increases even more.⁹⁶ Outbreaks cost the global aquaculture industry an estimated \$6 billion per year and are the major breaking point for the sector's predicted growth.⁹⁷

1.3. Water Quality

Water quality is another breaking point of aquaculture operations.⁹⁸ Controlling water quality and keeping it at a high standard requires several tools which are often expensive or not readily available.⁹⁹

1.4. Climate Change

Climate change not only decimates marine fish numbers but will also challenge aquaculture in the future.¹⁰⁰ For systems that cannot control water temperature, fish are expected to suffer from poor dissolved oxygen levels and mortality rates will likely rise.¹⁰¹

⁹⁵ See [road density data](#).

⁹⁶ Arthur, J. R. & Subasinghe, R. P. (2002). [Potential adverse socio-economic and biological impacts of aquatic animal pathogens due to hatchery-based enhancement of inland open-water systems](#).

⁹⁷ Stentiford, G. (2017). [Solving the \\$6 billion per year global aquaculture disease problem](#).

⁹⁸ Piper, R. G. (1982). [Fish hatchery management](#).

⁹⁹ Summerfelt, R. C. (2000). [Water quality considerations for aquaculture](#).

¹⁰⁰ For more information see our blog post on [climate change, aquaculture, and fish welfare](#).

¹⁰¹ Barange, M. et al., (2018). [Impacts of climate change on fisheries and aquaculture](#).

1.5. Increased Popularity of Meat Alternatives

Around the world, the number of people foregoing meat is on the rise.¹⁰² Grocery stores now offer a variety of vegetarian and vegan options as well as cell-based fish.¹⁰³ Large companies such as Nutreco and BlueNalu have stated that they see themselves as protein companies and if the market demands vegan alternatives, they will invest in these instead.

¹⁰⁴

We believe that barring significant changes in food production systems, a production decrease in the next years is unlikely. This assumption is grounded on the strong investment into Asian aquaculture and the fact that aquaculture will always carry the burden of absorbing decreased wild-caught fish yields. Even if overall fish production (wild-caught and farmed) decreases, aquaculture production could still increase or stay stable.

6.2.2. Operational Challenges

With **over 2,300 languages spoken**,¹⁰⁵ Asia is amongst the most diverse continents in the world. This abundance of languages, which often vary greatly within countries, makes communication in many Asian countries challenging even for nationals.

In many of the Asian countries we have reviewed, it is very difficult to **register an organization**. Governments frequently prevent nonprofits from accepting foreign donations without special permits. Fish Welfare Initiative researched registration processes in some Asian countries. If you would like to learn about our findings, please [reach out to us](#).

Further factors playing into the success of working in Asian countries are the **centralization of the local market and the size of the countries**. For example, India is a massive country with both national and federal laws. At the same time, only four Indian farm groups currently farm tilapia, which makes for a high centralization of this species' market sales.¹⁰⁶

Change always takes time, in a recent survey, animal advocacy leaders pointed out that particularly in Asia, "no one should be coming into this continent if they're not prepared for a long, long slog."¹⁰⁷ A common theme was for the desired change to take at least 20-30 years. This lengthy timeline is mostly due to the importance of relationship and

¹⁰² Leahy, E. (2010). [An estimate of the number of vegetarians in the world](#).

¹⁰³ The Good Food Institute is currently working on [plant- and cell-based seafood](#).

¹⁰⁴ [Nutreco](#), [BlueNalu](#), [BlueNalu](#)

¹⁰⁵ Kiprop, V. (2018). [Major Languages Spoken in Asia](#).

¹⁰⁶ Mitchell, A. (2015). [Tilapia farming in India: A billion dollar business](#).

¹⁰⁷ Sinclair, M. and Phillips, C.J.C. (2018). [Key Tenets of Operational Success in International Animal Welfare Initiatives](#).

trust-building, both of which are time-intensive endeavors. When deciding to work in Asia, organizations need to be aware that change does not happen overnight.

7. Conclusion

A few Asian countries are, and will likely remain, the top-producers of finfish worldwide. Local production is growing fast and this adds a wide range of welfare problems. **Tapping into existing challenges and a dynamic industry, now is an important time to explore high leverage opportunities for fish welfare work in this region.** Meanwhile, many open questions remain: How will land availability affect aquaculture? What are levels of public awareness? Were past animal advocacy campaigns successful in Asian countries? How skilled is the local farm workforce now? Do they have the tools to enact change? How will future technologies and the potential end of small-scale farming affect the aquaculture landscape?

There is no single Asian country that is most promising for fish welfare work. Rather, they all have opportunity for and constraints to impactful work. But with 73 to 180 billion fish alive on farms right now and even more in the future, effective work in any of these top-producing countries could affect billions of lives. Choosing the right country depends on an organization's expertise, approach, and position toward the industry. Additionally, we strongly believe that local people are best suited to bring about changes in their respective countries. **International groups looking to promote work in these countries should do so in collaboration with these countries' nationals, either by supporting local groups or establishing a team of local experts.**

If you or your organization would like to learn more about opportunities in fish welfare work, either in Asian countries or across the globe, feel free to [contact us](#).

Further Resources

- Charity Entrepreneurship (2019) provides an [assessment of which factors contribute to successful advocacy work](#), which gives factors that organizations need to consider when choosing a country to work in.
- For welfare issues of farmed fish, see the [report](#) by Animal Charity Evaluators.
- Fondation Droit Animal, 2019: [Animal welfare in Asia: specific flaws and strengths, future trends and objectives](#).
- [Vietnam Scoping Report](#), Fish Welfare Initiative.
- [India Scoping Report](#), Fish Welfare Initiative.
- [Aquaculture - an investigation on trends and practices in India](#), FIAPO
- [China Scoping Report](#), Fish Welfare Initiative.
- [Philippines Scoping Report](#), Fish Welfare Initiative.
- Animal Advocacy in [India](#) by Animal Charity Evaluators.