

# **Driving change in South East Asian trawl fisheries, fishmeal supply, and aquafeed**

Summary Report for

IFFO, The Marine Ingredients Organisation  
and the Global Aquaculture Alliance (GAA)

by

Nicki Holmyard

March 2019

## Executive summary

This summary paper condenses information contained in a report of the same name, produced by Duncan Leadbitter (Fish Matter Ltd), and focuses on Thailand and Vietnam, two of South East Asia's largest producers of wild and farmed seafood. Both countries support large trawl and purse seine mixed fisheries producing fish for food and feed.

The challenge of applying good fisheries management principles to tropical mixed fisheries has resulted in chronic and widespread overfishing. Where this issue has been tackled, benefits have been short-lived, transferring from one community to another, as fishing fleets move to new areas to avoid regulation.

Aquaculture production is also important to Thailand and Vietnam, and production of species including shrimps and groupers has increased dramatically over the past few decades. This has led to a consequent increase in demand for high quality protein in the form of raw fish or fishmeal.

The main report identifies that:

- Thailand and Vietnam invested heavily in developing their fisheries from the 1960s through the 1980s, which significantly increased fishing effort.
- Poor fisheries management resulted in too many fishing vessels, overfishing, zero net profits and a lack of incentives to fish legally.
- A consequence of excessive fishing pressure has been a major decline in larger fish and slower growing species, in favour of smaller, faster growing species. Initially this led to increased catches, but ongoing overfishing has led to an overall decline in the catch.
- Thailand has far more information available on its fisheries and aquaculture than Vietnam.
- Fisheries management in developed and higher latitude countries focuses on selective fishing and maximising the production of a small number of target species. This approach does not work well in a tropical Asian context, where the combination of high species diversity and efficient use of the catch requires new and different management approaches.
- The government of Thailand has developed and implemented a comprehensive set of fishery management plans for the Gulf of Thailand and the Andaman Sea fisheries. These address the need to cut fishing effort, improve enforcement, increase mesh size in trawls and rebuild fish stocks.
- The fishmeal sector has experienced rapid growth, as low value species from trawl catches were used in the fast-growing aquaculture sector, especially for shrimp.
- Fish for fishmeal represent a small component of the catch, which is generally focused on providing fish for human food. Little of the catch is discarded or wasted, and it supports large numbers of jobs in fishing, processing and aquaculture.
- The low value fish directed into the fishmeal supply chain would benefit from better handling and refrigerated storage, which would result in a higher quality fishmeal.
- Market pressure from processors, aquaculture producers and exporters can have a positive effect on encouraging a transition to responsible production. This approach has worked in the human food sector for two decades and is well established.
- The IFFO RS program has developed a system for managing Fishery Improvement Projects (FIPs) and is experiencing growth in engagement with FIPs either approved or in development in Thailand and Vietnam and other parts of the world.
- Management improvements are needed, especially in Vietnam. Market based involvement in Thailand could usefully provide support for the implementation of management plans.

## **Introduction**

Management of fisheries in the South East Asian (SEA) region has long attracted world-wide criticism for poor practices. Greater understanding of such fisheries is therefore vital, in order to bring about reform and an end to overfishing.

Fisheries in Thailand and Vietnam that supply raw material for fishmeal and fish oil (FMFO) are species rich, compared to the important cold water fisheries for small pelagic fish in South America and northern Europe. This makes them more challenging to manage.

Information on tropical multispecies fisheries is generally poor in terms of their biology and fishing practices, as well as their environmental, social and economic impacts. However, their importance as a contributor to feed for aquaculture production, intrinsically links them to global food security.

Projects such as those run by IFFO and the IFFO Responsible Sourcing scheme (IFFO RS), are developing methods for evaluating multispecies fisheries and putting in place workable management regimes based on global best practice.

For example, IFFO RS has established an Improver Programme with a structured plan for fisheries that want to meet the level of performance required by its certification scheme, which is applicable to fishmeal/fish oil production facilities. This scheme requires transparent and accountable improvements in fisheries management. The GAA, via its Best Aquaculture Practices certification scheme, also allows access to certified feed supply chains for fisheries that are in an approved Fishery Improvement Project (FIP).

### **What are the issues?**

The majority of existing feed fisheries operate in cold water ecosystems where the primary objective is to catch fish for reduction purposes. These tend to be single-species fisheries that have effective management plans.

The complex nature of tropical multispecies trawl and purse seine fisheries can make it difficult to put management regimes in place that can balance the interests of a diverse range of user groups and satisfy societal expectations for sustainable use and biodiversity protection.

Reasons for overfishing and the results of overfishing are varied, many of which are linked, as illustrated in Figure 1. Addressing one issue may fail to tackle the underlying cause or may cause issues in other related areas. The productivity of fisheries can be increased with effective management, so it is important to understand how all the factors interact if improvements are to be made. A fishery assessment system that evaluates multiple factors, such as IFFO RS, is invaluable.

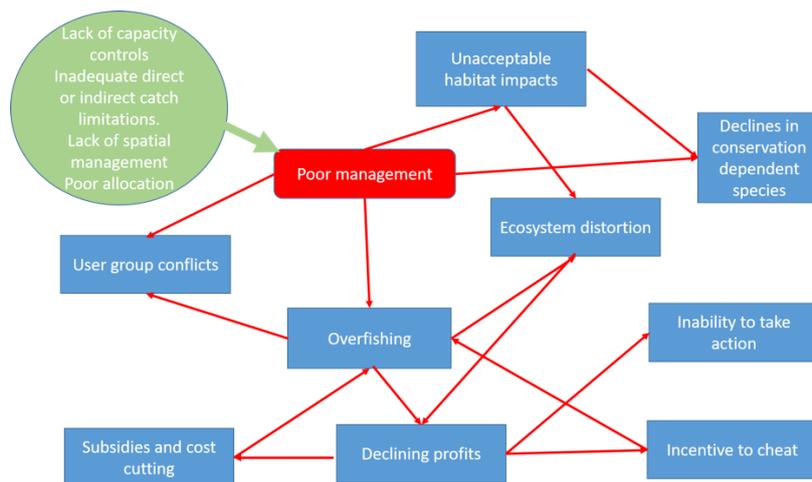


Figure 1. Illustration of links between fisheries issues

### Fishmeal and fish oil industry in Thailand and Vietnam

In South East Asia, there is a long history of farmers using small fish in a mix to feed animals and farmed fish. In recent years, as demand for farmed seafood has increased around the globe, there has been a shift away from using unprocessed raw material, towards fishmeal, which offers greater security in terms of food safety and consistent nutrition.

Fishmeal made from tropical fisheries differs from its counterpart from eg Peru, in terms of protein content, variability in supply volume and species, and use of feed-fish, trimmings and byproduct.

Tropical fisheries supplying raw material for aquaculture feed are primarily (80%) dedicated to catching for human consumption. The feed-fish is used for feed. The type of fishing gear affects catch composition, but fishmeal may originate from:

- Fish caught in domestic fisheries and used as whole fish –targeted or incidental catch
- Fish caught outside territorial waters and used as whole fish
- Imported wild or farmed whole fish that are processed, with the processing waste made into fishmeal
- Locally produced wild or farmed whole fish that are processed, with the processing waste made into fishmeal
- Fish that have exceeded their shelf life at local retail outlets

The small fish are generally low in fats and oils, but there is sufficient in the fish for rancidity to develop, which can result in a short shelf life. This situation is exacerbated by high ambient temperatures, inadequate onboard storage with no ice, and poor handling of raw material.

Issues with poor quality fishmeal are gradually being resolved, particularly in Thailand.

### Thai Fisheries and Fishmeal

The Thai trawl fisheries were developed in the early 1960s to target shrimp for export, but with no market for the large volumes of feed-fish generated, it was used directly in animal feed and processed into fishmeal.

As shrimp catches increased, so too did the demand for fishmeal. From a standing start, there were 100 fishmeal plants in 2003, feed-fish production was at 700,000 metric tons (MT), down from a peak of 1.8 million MT in 1995, and farmed shrimp production was 350,000 MT. The growth in domestic fishmeal consumption is illustrated in Figure 2.



**Figure 2 Growth in domestic fish meal use coincident with the growth in shrimp production ([www.indexmundi.com](http://www.indexmundi.com))**

Since 2010 there has been a gradual decline in domestic fishmeal consumption, which is reflected in overall production figures, which show a peak of around 505,000 MT in 2010, declining to around 381,000 in 2015 (IFFO). It is likely that this decline reflects a combination of the impacts of shrimp disease outbreaks and recent efforts to control illegal fishing.

The Thai industry is characterised by a large number of small players who work collaboratively with the Thai Fishmeal Producers Association (TFPA), which currently has 73 factory members around the Andaman and Gulf of Thailand coasts, where the main fishing fleets are based.

To protect local companies from competition, the Thai government imposed a tariff system for exports/imports of fishmeal, which does not apply to ASEAN countries. Whilst these have decreased in recent years, initial high tariff barriers probably contributed to the low quality of product, as there was little incentive to invest in the equipment required to produce better quality fishmeal. Thailand developed a reputation for producing low quality meal, which is now improving, thanks to a greater use of trimmings, which have been stored at the correct temperature and provide a higher quality raw material.

The trimmings originate from the growing seafood processing industry in Thailand, which specialises in tuna, small pelagics and surimi. Estimates of the amount of fishmeal from whole fish versus trimmings vary, but one estimate from TFPA puts the origin of fishmeal from trimmings at around two thirds of production.

Primary export markets for fishmeal are China, Vietnam and Japan, with smaller quantities sold to Taiwan, Indonesia, India, Bangladesh and the Philippines. Vietnam, Taiwan, Indonesia and Australia import more high protein fishmeal (>60% protein) than low protein fishmeal (<60% protein), whilst China and Taiwan take both. At present, the import of high protein meals into ASEAN countries from eg Peru, remain subject to a tariff of 5%.

### Trends

- Major disease outbreaks on shrimp farms over the past few decades have cut production and reduced the demand for local fishmeal.

- The Thai government has implemented training and certification programs in Good Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Points (HACCP) to improve the quality of domestic fishmeal production. This has opened up export markets.
- Feed-fish production has declined significantly due to a combination of overfishing and the increasing use of these species in higher value production chains such as surimi

### Vietnamese fisheries and fishmeal

In Vietnam there remain significant challenges related to the sustainability of raw materials from wild capture fisheries. The industry is facing a future which demands the production of sustainable, high quality meals, which means that wild fish stocks need to be rebuilt and tightly managed.

Information available on fishmeal production in Vietnam is fragmented. Until recently there was no fishmeal producer's association to coordinate the collection of data, and the Vietnamese Association of Seafood Exporters and Processors (VASEP) does not have fishmeal production in its remit.

Figures 3 and 4 show domestic production and consumption for the period 2005 to 2016, but the source of figures available from IndexMundi is unknown. The deficit suggests that there is an export market for Vietnamese fishmeal, but export data is not available.

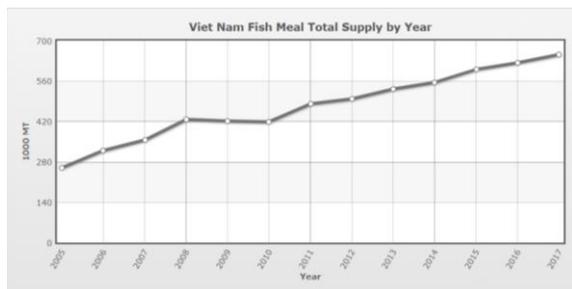


Figure 3. Total supply of fish meal for Vietnam 2005 to 2016  
(Source: [www.indexmundi.com](http://www.indexmundi.com))

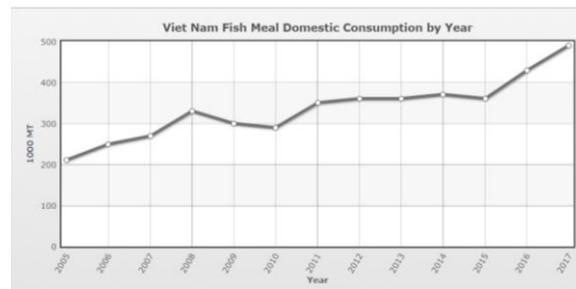


Figure 4. Domestic use of fish meal in Vietnam  
(Source: [www.indexmundi.com](http://www.indexmundi.com))

A 2017 survey of known fishmeal operations based in Vietnam identified 96 fishmeal factories, 86 of which were in the southern region, 6 in central Vietnam and 5 from Hue to the Chinese border.

Of these, 25 reported production capacity for 2016. Eighty one factories nominated sea fish as their source of raw material, one made use of tuna processing waste, three used pangasius processing waste and one used freshwater material, which is likely to be pangasius. The rest did not nominate a raw material source. Of the 81 citing sea fish as their main raw material source, 20 reported a production capacity totalling 450,506 MT. This equates to almost 2 million MT of whole fish, which is almost the entire 2016 marine catch of 2.186 million MT, suggesting that processing capacity is far higher than the wild resources can sustain.

Pangasius production in 2016 was estimated at 1.2 million MT, with around 100 processing plants providing a waste stream for fishmeal production. Fishmeal yields from Pangasius processing wastes are not known, but could be 15%, assuming a yield from whole fish of 60% waste.

One unknown is the amount of whole fish used for direct feeding by small scale farmers, which would include a contribution from freshwater species.

### Fisheries producing fishmeal and oil

Major fisheries commonly supplying raw material outside of Thailand and Vietnam include Peruvian anchoveta, United States menhaden and North Sea sand eel, all of which are well managed. These

fisheries focus on low trophic level species and are generally undertaken for the specific purposes of producing raw material for fishmeal and fish oil.

In contrast, there has been little research or documentation of the existence of directed fisheries for small pelagics for reduction purposes in South East Asia. More importantly, small pelagics are commonly used for direct human food, which contrasts with many developed countries. It is known that more than 2300 species of fish exist in the South China Sea.

Instead, fishmeal in Thailand and Vietnam is sourced from:

- Fish caught in domestic fisheries and used as whole fish
- Fish caught outside territorial waters and used as whole fish
- Fish imported as whole fish (wild or farmed) for processing, with the processing waste made into fishmeal
- Locally produced fish (wild or farmed) that are processed, with the processing waste made into fishmeal.
- Fish that have exceeded their shelf life at local retail outlets

### **Assessing stocks**

Development of the industrial fisheries in Thailand and Vietnam came through an expansion of fishing areas, a lack of control on the number of fishing vessels, and an increase in the Catch Per Unit Effort (CPUE). This resulted in the reproductive capacity of many species being overwhelmed and stocks becoming depleted. As boats moved further afield, evidence of depleted fish stocks was also documented in Vietnam, Malaysia, Indonesia, Philippines, China and beyond during the 1980s.

The preferential removal of some species groups (commonly, large predatory species valued as human food like groupers, snappers and croakers) through overfishing led to a proliferation of low trophic level species such as shrimps and squids, along with low value species that make up feed-fish. This created the illusion that catches could be expanded almost indefinitely and the number of vessels grew far beyond the recommendation of scientists.

Undertaking stock assessments on these multi-species fisheries was virtually impossible at the time, which in turn hampered efforts to improve fisheries management.

The development of sophisticated tools such as ecosystem and aggregate yield models, was a turning point in understanding the true nature of the problem. These models allowed fishery scientists and managers to explore options for the future management of the fisheries, including the identification of species that may be fished beyond their individual maximum sustainable yield. These models, and the issues they confront, are also used in fisheries management in developed countries. Improvements in fish handling and the development of new products have improved the value of the catch and shifted a greater proportion into the human food category.

Protective measures may therefore need to be enacted, to ensure that vulnerable species are not put at risk of serious reproductive impairment, even if they are maintained at levels below MSY.

A variety of stock assessments, since the 1970s, have put the sustainable yield for demersal stocks in Thai waters of the Gulf of Thailand anywhere between 400,000 MT and 715,000 MT, with 250,000 MT estimated for both South West Vietnam (Gulf of Thailand coast) and Cambodia. The potential yield of pelagic stocks is estimated at around 380,000 MT.

For Vietnam, information is less available but the biomass is estimated to be around 2 million tonnes of pelagic species and 1.4 million tonnes of demersal fish such as lizardfish, threadfins, croakers, goatfish and bigeye snappers, with the rest comprising other species such as crustaceans.

In recent years the Asia Pacific Fisheries Commission (APFIC) has published overviews of the status of species in member countries, but these are highly generalised. Other bodies involved in monitoring fishing activity, running research projects, or advising on regional arrangements to manage marine resources shared by Thailand and Vietnam include the South East Asian Fisheries Development Centre (SEAFDEC) and the Association of South East Asian Nations (ASEAN).

Multiple lines of evidence point to an ongoing issue with overfishing in Thailand and Vietnam, and more widely in Asia, largely linked to the open access nature of the fisheries and a lack of control.

As well as catching undersized/juvenile fish, at-risk species such as turtles, stingrays and sharks, are also taken as a feed-fish.

Understanding how fisheries in Thailand and Vietnam operate is based on information from resource assessment surveys, commercial catch monitoring, monitoring of landing sites, and scientific studies. From these it is clear that in order to fully evaluate and manage multispecies fisheries, policy makers need to include biological, economic and social objectives and indicators.

### **Managing stocks**

Both Thailand and Vietnam have ratified the United Nations Convention on the Law of the Sea (UNCLOS), and Thailand has ratified the Straddling Fish Stocks Agreement. Both have adopted the FAO Code of Conduct for Responsible Fisheries (CCRF) and have ratified the Convention on Biological Diversity (CBD).

These agreements variously establish Exclusive Economic Zones (EEZs) that enable sovereign states to have full control over the use of fish resources out to 200 nautical miles offshore (unless constrained by the waters of neighbouring states), and put in place requirements for the conservation and management of the fisheries such that:

- Target stocks are managed to achieve Maximum Sustainable Yield (MSY)
- Feed-fish, or other fishery dependent species, are managed to ensure that their reproduction is not seriously threatened
- Biodiversity is protected
- The precautionary approach is applied
- Regulations are enforced, catches monitored and research undertaken.

However, multispecies fisheries still present challenges in meeting these requirements, and these are not confined to tropical Asia.

Other measures in place include International Plans of Action which are voluntary instruments that provide specific guidance on some key areas. Those of relevance to fisheries in South East Asia are:

- International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated (IUU) fishing.
- International Plan of Action for the Management of Fishing Capacity
- International Plan of Action for the Conservation and Management of Sharks

A regional Plan of Action covers IUU fishing in Thailand and Vietnam, and Thailand has a national plan for IUU, and another national plan for sharks.

Estimating the scale of IUU fishing is extremely difficult, and investigators have to identify proxies or conduct risk-based analyses to generate estimates of the possible level of removals from fish stocks. Contributory factors to IUU include poor governance, poor monitoring control and surveillance, inadequate data collection, illegal transshipment, official tolerance of illegal activity that provides material for local processing companies, corruption of officials and minimal deterrence.

As countries have increasingly sought to reduce the impacts of IUU fishing there is evidence of a growing intolerance of fish theft that impacts on local people and jobs, as demonstrated by photos of vessels caught fishing illegally, being blown up.

In April 2015 the European Union issued a 'yellow card' warning in response to a failure by Thailand to sufficiently tackle the problem of IUU fishing, a step also taken for Vietnam in October 2017. Thailand has also been embroiled in an outcry over labour violations on some Thai vessels and in seafood processing plants, which has prompted greater scrutiny by international seafood buyers.

Thailand has since taken steps to address the concerns raised by the EU, including the establishment of Port In-Port Out (PIPO) reporting measures, a large electronic vessel tracking system, and better traceability.

In deciding to issue Vietnam's yellow card, the EU cited poor control over illegal fishing by Vietnamese vessels outside of Vietnam's EEZ, inadequate local control systems prior to processing for export, and a lack of effective sanctions.

### **Managing Thai and Vietnamese fisheries for future productivity**

Within the past decade, both Thailand and Vietnam have produced strategic policy documents that set out the broad objectives for their seafood sectors.

Thailand's Marine Master Plan for Marine Fisheries Management (2008) covers the decade 2009 to 2019 and sets out the importance of the seafood sector, which includes earning 70-80 billion Thai Baht in export revenue, supporting 400 processing business, and directly or indirectly employing 2 million people. It acknowledges issues relating to the depletion of fishery resources, conflicts between fishery sectors, and the complexity of supply chains and competition. Two areas noted for urgent action are reducing fishing capacity and effort, and minimizing IUU fishing through effective compliance and enforcement.

Vietnam's Master Plan for Fisheries Development 2020 – 2030 (2013) includes both aquaculture and wild harvest production. It aims to reduce the number of inshore vessels by 70-82%, stabilize and maintain a landing volume that supports a sustainable yield of 2.45 million MT, modernize fishing vessels, and mitigate post-harvest losses. In support of efforts to reduce fishing capacity and effort, the Plan proposes a Total Allowable Catch (TAC) for each gear type based on 90% of the multispecies MSY for the stock.

Both countries have also enshrined fisheries management issues in law. Thailand's Royal Ordinance on Fisheries was updated in 2015 and Vietnam's Fisheries Law came into operation in 2001.

Standard management tools used by Thailand and Vietnam include vessel licensing and zoning of fishing areas to control fishing effort and prevent conflict. Technical measures in place include seasonal closures to protect spawning and juvenile fish, closed areas to protect habitats and species at risk, minimum landing sizes, and restrictions on engine size, trawl mesh size, the number of nets towed, and headrope length, the latter of which regulates the size and spread of the opening of the net.

## **Fishery Improvement Projects for responsible fish feed**

### **FIPS**

Recent emphasis placed by international buyers on certification schemes for sustainable, responsibly produced seafood, has raised the importance of sourcing FMFO through certification schemes such as the IFFO RS.

Increasing market demand for sustainable seafood has led to the development of Fishery Improvement Projects (FIPs), which have evolved as a mechanism for directly engaging companies and seafood stakeholders in the fisheries management process.

The basic elements of a FIP are:

1. Establishment of a stakeholder group to drive the process
2. Preparation of a gap analysis to identify gaps in performance between the fishery and the desired goal - generally the requirements of a credible standard such as MSC or IFFO RS
3. Preparation of an action plan with time-bound actions needed to address the gaps
4. A mechanism for reporting on progress on a timely basis

FIPs have proved to be successful in helping to manage and improve challenging fisheries around the world, improving stock status and ecosystem impacts, and increasing the number of fisheries certified as sustainable.

However, one of the criticisms levelled against FIPs is the slow progress achieved by many fisheries entering the process.

GAA's BAP and the ASC, the two largest global responsible aquaculture programs, both have requirements for the feed used in certified farm production. These specify that raw material derived from whole fish must be proven as sourced from responsible/sustainable fisheries.

The GAA BAP and ASC feed standards also provide an opportunity for product that may be in a state of transition, such as through a FIP, to enter the supply chain under certain conditions. In this case there must be verifiable proof of achieving improvement objectives within a realistic and defined timescale, as laid out in the FIP action plan.

Standards developed by organic aquaculture certification bodies such as Naturland, similarly include requirements for biodiversity protection, animal welfare and feed.

### **IFFO RS Improver Program**

The IFFO RS IP was developed in recognition of the fact that many of the larger, better managed reduction fisheries had been approved by IFFO RS but there remained a need to create a pipeline for new suppliers of raw material.

The process is owned and managed by IFFO RS as part of its certification programme, which leaves the organisation in a good position to suspend a FIP in cases of non-performance.

Two pilots are underway to enable IFFO RS to evaluate its draft method for evaluating multispecies fisheries; the Gulf of Thailand FIP and the Vung Tau FIP in Vietnam.

As of December 2018, The Gulf of Thailand FIP has a draft Fishery Action Plan which has been discussed with stakeholders and is under revision.

As of November 2018, the Vung Tau FIP, had undergone an assessment of the fishery against the multispecies method, which is being used as the basis for a Fishery Action Plan.

A few other FIPs are underway in Vietnam, but progress on these is uncertain.

### **Wider opportunities in Thailand**

Whilst the main fishery producing raw material for fish meal is currently engaged in a FIP, other fisheries producing raw material include:

- Demersal and pelagic trawl sector on the Andaman coast producing around 54,000 MT per year of feed-fish for reduction, compared to 240,000 MT from the Gulf of Thailand. This fishery is engaged with WWF on a Fishery Conservation Project.
- Purse seine sector in the Gulf of Thailand and the Andaman Sea for the capture of a wide variety of small pelagics, neritic tunas and anchovies. Fish is destined for both food use - canning, fish sauce etc, and for fishmeal. Thailand has IFFO RS approvals for small pelagics byproducts including goldstripe sardinella and Indian mackerel, and the kawakawa, frigate and bullet neritic tunas, and longtail tuna.

### **Wider opportunities in Vietnam**

Vietnam is a larger producer of fishmeal than Thailand, and second only to China in Asia. Its large animal feed sector is a major user of fishmeal.

Vietnam requires some strategic thought as it provides a range of opportunities for IFFO, as well as IFFO RS and GAA. The country is a major producer of shrimp and pangasius, and shrimp has now overtaken salmon in terms of aquaculture production. There appear to be several opportunities for FIPS, full details of which are in the main report.

### **Recommendations\***

The main recommendations in the full document are:

- IFFO RS could finalise its assessment system for multispecies fisheries and provide a pathway to approval as soon as possible. The IFFO RS system, via the Improver Programme, is the key mechanism for involving industry in supporting improvements in fisheries management. The IFFO RS assessment system needs to ensure that it can also cover species diverse, tropical purse seine fisheries.
- IFFO and GAA could facilitate the process for fisheries to engage in FIPs, be it by providing information on FIPs in general and on fishery assessments and fishery action plans more specifically, by coordinating contacts and improving communications among stakeholders, or maybe even the establishment of a source of funds aimed at providing assistance to fisheries that want to engage in FIPs.
- IFFO and GAA need to maintain an up to date appreciation of developments in the understanding and management of tropical multispecies fisheries. There is a considerable degree of interest in this area and there are links to developments in approaches to fisheries elsewhere in the world.
- GAA and IFFO could consider reviews of other countries that have similar fisheries that link to the farm shrimp industry. Examples include India, China and Bangladesh.

- GAA and IFFO could consider outreach work to feed and other related sectors aimed at promoting formulated feeds as a mechanism for reducing the incidence of direct feeding of feed-fish to species such as groupers, spiny lobsters, crabs, snakeheads etc. This would have both resource management and fish health benefits.
- GAA and IFFO could consider evaluating the purse seine fisheries as these are common but their contribution to the fishmeal sector is unknown beyond anecdotes.
- The structure of the industry and its links with the food processing sector is not well documented, and a better understanding would be positive for industry development purposes and for understanding supply chains and traceability.

\*Resource permitting