Sustainable Fisheries Partnership

Sustainable Fisheries Partnership Briefing:

Executive Summary

The issue of 'sustainable seafood' has been important for the seafood supply chain for several years but the emphasis has been on obtaining fish directly for human consumption from sustainable sources. In recent years aquaculture has hugely increased in importance in terms of supplying seafood but questions around the sustainability of such products have tended to focus on local environmental impacts and human health.

However, recent developments throughout the aquaculture supply chain and among campaign groups indicate that this is changing and that wider sustainability questions are now being more forcefully raised. One particular aspect of this trend is a new interest in the sustainability of the fisheries – known as 'feed', 'reduction', 'industrial' or 'forage' fisheries – that supply the feeds for fish farms.

This briefing uses data from Fishsource (Sustainable Fishery Partnership's database of information for key fisheries at www.fishsource.org), a telephone survey of retailers, processors and relevant campaign groups along with web research to describe the current state of the issue. The briefing identifies high levels of activity throughout the supply chain including:

- The development of sustainability certification standards that will incorporate criteria for the sustainability of feed fisheries
- The development of business-to-business systems to give assurance around the quality of fishmeal and fish oil including sustainability of fish stocks
- The emergence of individual policies by retailers including the direct prohibition of fishmeal and oil from certain fisheries
- A renewed enthusiasm among campaign groups to engage on the issue

The briefing also identifies real threats to stakeholders in the aquaculture supply chain including:

- Confusion around the final certification standards that will emerge in the marketplace – there is a clear danger that two separate aquaculture certifications will emerge offering different standards.
- A danger for retailers and processors that have corporate commitments to source seafood from fisheries certified by the Marine Stewardship Council (MSC) that they will source aquaculture products fed on non-MSC fish. In such circumstances retailers would be open to the charge of 'blue-washing' – taking fish from poorly managed stocks and converting them into desirable aquaculture products while simultaneously holding public commitments to sustainably caught wild seafood.
- Reputational risks for all parts of the aquaculture supply chain from using feeds derived from fisheries that have been identified as particularly unsustainable and are the subject of campaigns by non-governmental organisations (NGOs).
- Confusion among campaign groups around the role of the Marine Stewardship Council in assuring sustainable aquaculture feeds. Some are pressing for the fish content of feeds to only come from MSC certified fisheries while others are actively working to stop MSC certifying any further forage fisheries that supply fishmeal and oil.
- Real practical difficulties in achieving visibility down the entire aquaculture supply chain. Salmon is relatively straightforward because of the centralised nature of the industry but farmed tropical shrimp is extremely complex and opaque. This may result in different species being certified according to different standards.

The briefing makes three recommendations for businesses currently attempting to understand this complex issue:

- Achieving a good working knowledge of the entire supply chain including the origin of marine species used in feed formulations.

- Adopting specific policies around aquaculture, and particularly feed ingredients, and communicating these policies to other stakeholders.

- Playing an active role in creating pressure for the improvement of aquaculture sustainability and particularly the management of fisheries that provide fishmeal and oil. This could include participation in Fisheries Improvement Partnerships convened by Sustainable Fisheries Partnerships.

Introduction

There has been significant debate and activity around the sustainability of wild fisheries in the past decade including global campaigns by non-governmental organisations (NGOs) and major initiatives from leading seafood processors and retailers.

Alongside the debate about the sustainability of wild fisheries have been concerns around the global growth of aquaculture. These concerns have focussed on issues such as the localised impact of aquaculture on the natural environment (eg: through concentration of parasites, genetic disturbance of wild stocks through inter-breeding with farm escapes) and human health (eg: the role of anti-biotics and pesticides). There has been much less focus on the relationship between the feeds used to support aquaculture (particularly of carnivorous species) and the sustainability of source fisheries.

This situation is changing. Retailers, processors, aquaculturalists, feed manufacturers, fishmeal and oil producers and NGOs have all begun to pay much more attention to the state of the fish stocks that supply the aquaculture sector. These fisheries – confusingly referred to as 'feed', 'reduction', 'industrial' or 'forage' fisheries – usually consist of small pelagic fish that can be economically trawled or purse seined in large volumes and are not always well managed.

This increase in attention has been manifest in the engagement around feed criteria in the development of aquaculture certification standards and NGO campaign activity around the management of some of the fisheries that supply fishmeal and oil. There have also been individual initiatives by some retailers and processors to set and maintain specific sustainability standards for aquaculture feed.

These developments however have not yet coalesced into any kind of consensus and there are few direct connections between concerns over sustainability at the consumer/retail end of the chain and actions taken in the fisheries themselves (although improvements may be happening for other reasons). There is still significant potential for stakeholders within the supply chain to find themselves under-informed and unsure about which future actions they should take to meet their commercial and wider corporate objectives, particularly with regard to sustainability and security of supply.

This briefing identifies current developments within the aquaculture supply chain around feed sustainability based on information held on Fishsource (Sustainable Fishery Partnership's database of information for key fisheries at www.fishsource.org), telephone interviews with major stakeholders and web-based desk research to give a rapid snap shot of how the issue is developing and where the risks and opportunities may lie.

The briefing deliberately avoids the current discussions around minimising the fish component of aquaculture feeds and reducing the ratio of feed fish to farmed fish – the so-called "Fish in, Fish out" (FIFO) debate. This decision was not made because the FIFO issue has no merit but rather because marine protein will continue to be an important part of aquaculture feed in the short and medium term and so FIFO has less relevance to the matters covered in this briefing which address events happening now and in the next two years.

Why is sustainability important?

In the past decade there has been a growing awareness throughout the entire seafood supply chain that sustainability has moved from a 'nice to have' optional extra to a core component of any successful business plan. This recent awareness is based on two elements:

- That sustainable stocks of wild fish are essential to secure the supply of raw material that the seafood industry relies on and are vital in maintaining volumes and quality as well as stabilising price. Environmental sustainability is now seen as a principal building block of a sustainable business.
- That large commercial organisations - particularly those that are customer facing such as retailers, food service companies and consumer brands – are expected to operate above a certain minimum level of sustainability both through formal standards and also through informal criteria that are set by NGOs, consumers and the media. This informal 'licence to operate' – closely linked to concepts of 'corporate reputation' - varies widely from country to country but the trend is expanding and its effects can be seen through the actions of major global retailers, the growth of certification schemes and the expansion of activities by NGOs.

Concerns over the sustainability of seafood originally focussed on wild caught fish intended for the plate but this focus has now broadened to other wild seafood and to aquaculture. There is now significant interest in all aspects of aquaculture sustainability – whether localised water pollution, clearance of mangrove areas for shrimp farms, genetic pollution through farm escapes or whatever – and this includes the sustainability of feeds.

There have been discussions and research around the sustainability of several elements of aquaculture feeds, for instance the associated impacts of soya cultivation on rainforests, but the principal focus has always been on the marine protein component which represents that place where wild fisheries and aquaculture 'meet'. Consequently the sustainability of fisheries used to provide feeds to farmed fish has now become a key concern for the entire aquaculture supply chain and an area of great activity and innovation.

Current developments in sustainability standards for aquaculture feeds

In response to rising concerns around the sustainability of aquaculture there are now a number of different initiatives which have some bearing on the feed issue. The most important of these initiatives are:

WWF Aquaculture Dialogues & Aquaculture Stewardship Council

The conservation NGO 'Worldwide Fund for Nature' (WWF) has been developing a series of 'Aquaculture Dialogues' intended to bring together different stakeholders such as aquaculturalists, processors, retailers, feed manufacturers and environmental NGOs to develop a common set of standards for 12 different species (shrimp, salmon, abalone, clams, mussels, scallops, oysters, pangasius, tilapia, trout, seriola and cobia). The Dialogues have reached

different stages of development depending on the species – for instance there are currently draft standards for tilapia and pangasius while work on shrimp and salmon has yet to reach this stage. It is intended that there should be sustainability standards for aquaculture feeds within each species-specific standard.

WWF is also creating the Aquaculture Stewardship Council which will work with third party bodies to certify aquaculture farms against the standards developed by the Dialogues. The ASC will become operational in 2011.

Given historic WWF support for the Marine Stewardship Council (MSC – see below) it is likely that standards for feed will require source fisheries to be either MSC certified or to reach a comparable measurable standard and indeed the current draft standards for tilapia and pangasius do contain such requirements.

Global Aquaculture Alliance

The Global Aquaculture Alliance describes itself as, "an international, non-profit trade association dedicated to advancing environmentally and socially responsible aquaculture" which exists, "both to promote the aquaculture industry and to advance environmental and social responsibility throughout the process of raising, processing and distributing aquaculture products". The GAA has a set of certification standards for shrimp farms and hatcheries, tilapia and channel catfish farms, and seafood processing plants. The standards do contain some awareness of the feed sustainability issue – for instance in the tilapia standard there is a requirement that "Farms shall accurately monitor feed inputs and minimize the use of fishmeal and fish oil derived from wild fisheries" and there is an intention that "Fishery-based ingredients from wild sources should come from sustainable fisheries". However, there is no clear metric by which the sustainability of source fisheries could be measured.

The GAA currently has draft guidelines for Best Aquaculture Practice concerning feed mills. The draft text states that: "Feed mills shall not source fishmeal and fish oil from fish stocks for which the International Council for the Exploration of the Sea (www.ices.dk), Food and Agriculture Organization (FAO) of the United Nations or the Sustainable Fisheries Partnership (FSP [sic], www.fishsource.org) have reported a recommendation of no fishing, unsustainable harvesting, closed fisheries or overexploitation, or identified a stock as being in a critical condition. Products from illegal, underreported and unregulated fishing shall also be avoided. Instead, aquafeed producers should actively favor marine oils and proteins derived from fisheries that are classified by reputable international third parties, such as the FAO, Marine Stewardship Council or FSP [sic], as sustainably fished, fully fished or underexploited. In addition, to bolster sustainable sourcing, aquafeed producers should actively favor the sourcing of marine oils and proteins from suppliers certified by programs such as the pending Global Responsible Sourcing Standard defined by the International Fishmeal and Fish Oil Organisation".

The GAA is expanding the range of species for which it can provide aquaculture standards. There is currently a working group on salmon aquaculture which intends to produce a technical standard by 2010 and this may include more explicit feed sustainability criteria.

GlobalGap

GlobalGap describes itself as "a private sector body that sets voluntary standards for the certification of agricultural products around the globe" and that "certification is carried out by more than 100 independent and accredited certification bodies in more than 80 countries" and includes "annual inspections of the producers and additional unannounced inspections".

GlobalGap currently sets standards for the aquaculture of shrimps, salmonids, tilapia and pangasius. There is no specific sustainability standard for feed ingredients but feeds do need to come from a source approved by GlobalGap (although the compound feed standard doesn't have a sustainability criteria either). One of the criteria used within the aquaculture standard is: "Is there a research and implementation plan applied to reduce the amount of fishmeal and fish oil used during production?" So clearly GlobalGap is aware of concerns around the marine protein element of aquaculture feeds even if it has not yet set a sustainability standard.

On February 1, 2009, the GAA and GlobalGap

announced an agreement "to work cooperatively to develop and harmonize certification systems for the aquaculture sector worldwide."

International Fishmeal and Fish Oil Organisation

The International Fishmeal and Fish Oil Organisation (IFFO) is an international body that represents fishmeal and fish oil producers. In May 2008 IFFO announced that it was producing a Code of Responsible Practice for Fishmeal and Fish Oil. The code will be a business-to business certification scheme that will ensure, amongst other things, that compliant fishmeal and fish oil products have been derived from fisheries that meet the key elements of the Food and Agriculture Organisation (FAO) Code of Responsible Fishing and that all national laws relating to fishing are complied with. Compliance will be established via third party audit based on a desk study. Fisheries already certified by the Marine Stewardship Council (MSC) will automatically be considered as compliant in terms of sustainability.

The creation of the code has been guided by a Technical Advisory Committee which includes a range of stakeholders such as fishmeal and oil producers, traders, processors, feed manufacturers, retailers and environmental NGOs.

The code has been piloted around one specific fishery and will be given a full public roll out in 2010.

Marine Stewardship Council

The Marine Stewardship Council is a high profile, not-for-profit organisation that has developed standards for sustainable fishing and seafood traceability. Fisheries can be audited against the MSC standards by a competent third party body and if compliant will be awarded an eco-label which can be used in business and consumer facing communications. The MSC scheme is widely supported and generally considered to be the most robust and rigorous seafood ecolabel.

Those members of the aquaculture supply chain with an interest in defining sustainability standards for feed have been enthusiastic about the potential for sourcing fishmeal and fish oil from MSC certified fisheries but until recently there have been few feed fisheries that have attempted certification or met the required standards.

Currently the only MSC certified fisheries used for fishmeal and fish oil are North Sea herring (388,000 tonnes caught in 2007 - 2.4% of the total global catch destined for fishmeal and oil) and Norwegian spring spawning herring (1,267,000 tonnes caught in 2007 - 7.8% of the total global catch destined for fishmeal and oil). Consequently, only slightly more than 10% of the total catch used for fishmeal and fish oil is MSC certified.

It is unlikely that very large volumes of fishmeal and fish oil from MSC certified fisheries will be available in the short term although there are causes for longer term optimism. Demark has the largest fishmeal and oil fisheries in the European Union and has pledged to have all fisheries MSC certified before the end of 2012. Perhaps even more significant, in July 2009 it was announced that the giant Peruvian anchovy fishery (5.8 million tonnes caught in 2007 - 35.6% of the total global catch destined for fishmeal and oil) will go into the pre-assessment phase of MSC certification. It may be some time before the fishery becomes certified given the demanding nature of the standard but if certification ever happens it will ensure very large volumes of sustainable fishmeal and oil will become available.

Retailer, processor and feed manufacturer policies

In addition to the significant amount of work undertaken by certification bodies, trade associations and environmental NGOs there are also a number of policies adopted by individual retailers, processors and feed manufacturers.

For instance, Marks and Spencer in the UK have developed feed standards for the aquaculture products they sell that require that, "Feed manufacturers must take adequate steps to ensure that all of the raw materials which they use are derived from properly managed, sustainable sources. Feed manufacturers should be able to provide documentary evidence that they comply with this requirement. Fish meal and fish oil must come from known managed and sustainable sources and are not damaging to the environment".

Sainsbury, another UK retailer which accounts for 27% of all UK salmon sales, has a pledge that all fresh farmed salmon is 'responsibly sourced' which includes, "Sustainable feed: our salmon feed contains only fish species that are in plentiful supply". Sainsbury is also blunt in asserting that "depleting stocks of other endangered species, such as eel and blue whiting, to feed farmed fish is in no way sustainable".

Outside of Europe, the US retailer Whole Foods requires that aquaculture feed for salmon, other finfish and shrimp, "cannot be sourced from fisheries determined by independent, peer-reviewed science to be overfished, over-exploited, depleted, or in decline" and that, "Whole Foods Market will review fisheries to determine acceptability using the best available science from national and international agencies and nongovernmental organizations." Whole Foods also excludes 'trash fish' from feed, defining such fish as "fish with low economic value that is used unprocessed for feed."

Processors have also been active in this field. For instance, The Seafood Company has made significant efforts to understand the sources of aquaculture feeds that underpin their business and considers the sustainability of source forage fisheries when developing strategy.

The manufacturers of aquaculture feeds have also paid close attention to the sustainability of source fisheries. Skretting for instance states that: "The global production of fishmeal and fish oil has declined significantly over the last ten years and it is unlikely that production will increase again substantially. In contrast to the downward trend in production, there has been an increasing demand for fishmeal and fish oil driven mainly by the growing aquaculture sector, the use of omega-3 supplements in functional food and capsules and the escalating consumption of meat by developing countries...Skretting is concerned that wild stocks, as a strategic raw material caught for fishmeal and oil production, are not overexploited and that catches are managed within the maximum sustainable yield. **"Our purchasing policy is to source fishmeal and fish oil only from fisheries that are regulated and monitored as being sustainable"** [our emphasis].

EWOS has a commitment to source fishmeal and fish oil from, "sustainable and well managed fishery resources" and is active in the development of the IFFO Code of Responsible Practice.

BioMar, "makes an active contribution to sustainability by using ingredients from sustainable resources. This entails that marine raw materials are manufactured from regulated fisheries, done without depleting natural stocks. BioMar's suppliers of marine raw materials are required to document the origin of the raw materials. Sustainable fishery is regulated by accredited national and international organizations such as the International Council for the Exploration of the Sea (ICES) and the Food and Agriculture Organization of the United Nations (FAO)."

There has also been some government action. The State of California's Sustainable Oceans Act, 2006, requires consideration of, "(8) The effects of feed, fish meal, and fish oil on marine ecosystems." There is also a federal bill in the US – The National Offshore Aquaculture Act – which seeks to minimize the use of fishmeal and fish oils.

Current attitudes of retailers

Retailers and processors are the most consumer-facing element of the aquaculture supply chain and are the focus of campaigns around seafood sustainability (at least in North America,

Europe, Australia and New Zealand with an increasing number of countries being added to the list).

Consequently retailers have frequently played a leading role in developing sustainable seafood initiatives and this trend is continuing with the issue of sustainable aquaculture feeds (for instance the examples of Sainsbury, Whole Foods and Marks & Spencer quoted above). However, despite the leadership role of a few retailers the majority still lack sufficient interest or knowledge around the feed issue and are slow to act on matters relating to aquaculture. The reasons for this lack of engagement could be summarised as:

- Some retailers still fail to accept the need for any sustainability standards around seafood – this is a diminishing group in countries where consumer awareness is high but significant nonetheless.
- The development of industry or NGO standards for the sustainability of aquaculture has been very slow and is still unresolved even though considerable progress has been made – many retailers are waiting for the various standard-setting processes to complete before making strategic decisions.
- NGOs and other stakeholders have not generated pressure on the issue of aquaculture feeds – these organisations have been significant in pushing for action on wild caught species but noticeably quieter on the feed issue.
- There is little consumer or media interest in the feed issue – aquaculture has been high profile both in terms of food safety questions and local environmental impacts but the wider sustainability issue remains relatively invisible.
- There is poor transparency in some aquaculture supply chains so the application of standards to suppliers is not straight-forward. For instance the farmed salmon supply chain is relatively easy to characterise because of great industry concentration in terms of farming and feed manufacture but tropical farmed shrimp can be extremely opaque.

Where there has been a significant interest in the feed question it is almost invariably focussed around farmed salmon because of the commercial importance of the product while other farmed species with more complex supply chains receive less attention.

Current attitudes of NGOs

NGOs have historically been less interested in aquaculture than in other seafood issues but there have been high profile campaigns that relate to the direct environmental impacts of aquaculture – for instance open water pens in North America and Scotland, tropical mangrove destruction for shrimp farms and other issues.

Wider sustainability issues such as aquaculture feeds are often referenced in campaign materials but rarely feature as a high profile issue and there are a number of reasons for this:

- The sustainability of wild caught species seems like a more pressing issue and is perceived to affect the ocean environment more directly. There are also other aspects of aquaculture that seem more urgent at the moment eg the debate over open water pens.
- Consumers and the public don't really understand aquaculture. Many purchasers of, for instance, salmon don't even realise the fish has been farmed. If understanding of aquaculture is low, understanding and awareness of feed issues is almost non-existent. This makes campaigning on the issue a long slow process and doesn't offer any quick results.
- There are divisions between NGOs about what does

or does not constitute acceptable aquaculture practice and no complete consensus on even the Marine Stewardship Council as a useful standard for source fisheries. Some NGOs are actively demanding that the fish component of aquaculture feeds come from MSC certified fisheries while others are working to stop MSC from certifying the forage fisheries that provide fishmeal and oil.

- The complexity of aquaculture supply chains can make engagement difficult.

However, none of the above should be taken to mean that NGOs will not become active in the area of sustainable aquaculture feeds. WWF is addressing this question via its Aquaculture Dialogues and all of the NGOs spoken to in researching this briefing – including many of those prominent in campaigning on sustainable seafood issues in Europe and the US – stated that the sustainability of feeds was either "their greatest concern" or in the "top three" of concerns over aquaculture and that this was an area they were likely to work on in the next two years.

In addition to the potential for NGOs to work on the sustainability of aquaculture feeds via engagement with retailers, processors and others at the top end of the supply chain there is also significant work being done by NGOs directly around major fisheries used for fishmeal and fish oil. These initiatives include the Antarctic Krill Conservation Project, the Lenfest Foundation Forage Fish Taskforce and species specific campaigns around menhaden, Californian sardine and Atlantic herring.

These initiatives do not currently make direct links with aquaculture feeds or indeed any consumer-facing part of the seafood supply chain but tend to focus on the importance of eco-system based fisheries management. For instance, several US NGOs would prefer that the MSC cease to certify reduction fisheries until a comprehensive eco-system based approach is incorporated into the certification standard.

However, with strong NGO interest in both the beginning and end of the aquaculture supply chain the potential exists for linkage between fisheries-focussed work and processor/retailer campaigns which together would constitute a powerful set of forces applied to the issue.

Likely developments over the next two years

A number of important developments will take place over the next two years that will have a significant bearing on the issue of sustainable aquaculture feeds. Specifically:

- The WWF Aquaculture Dialogues will conclude for some species which will presumably include salmon and shrimp. These will set standards for aquaculture feed which are likely to be based around MSC certification of source fisheries or more likely an effective analogue (eg: specific scores from the Sustainable Fisheries Partnership 'Fishsource' database) until certification has been achieved.

- The IFFO Code of Responsible Practice will become fully operational. The Code will accept MSC certification as an effective standard for the sustainability of source fisheries but given the limited amount of certified stock will inevitably have to make judgements about non-certified fisheries. This may be contentious if a source fishery is judged acceptable under the IFFO Code but other stakeholders disagree.

- A GAA standard for salmon will emerge which may set a standard for feed sustainability. It's not possible to speculate about how demanding such a standard might be but it may be less strict than the WWF Aquaculture Dialogue standard.

- Some individual stakeholders in the aquaculture supply chain will press ahead with specific initiatives around sustainable feeds which will incorporate standards either from the Aquaculture Dialogues or GAA or IFFO or indeed elements from each.

- There will be an increase in NGO activity around the need for sustainability in aquaculture feeds and the sustainable management of the fisheries that provide fishmeal and fish oil.

- More feed fisheries will achieve MSC certification – it is impossible to speculate which fisheries and over what timescale but it is fairly clear that more certifications will be achieved.

- There may well be nasty surprises! For instance, the debate around Antarctic krill has so far been surprisingly low profile given the iconic nature of the issue. Concerns around the use of 'trash fish' (see below) in Asian aquaculture – and particularly shrimp production - may become more public and there may be species-specific campaigns around feed fisheries that are in a poor condition (eg: blue whiting). There may even be a public debate about the ethics of using forage fisheries to create feed for high value aquaculture products for rich markets (like salmon) at the potential expense of the global poor who could consume the forage fish directly – this debate has already been rehearsed around biofuels.

These developments represent both risks and opportunities for all those within the aquaculture supply chain and particularly those at the consumer facing end – the retailers, processors and brands – that can be held publicly accountable for the sustainability of the products they create and sell.

These risks and opportunities are identified below.

Risks for retailers and processors

In any period of great change there will be both threats and opportunities for those that have the capacity to directly influence events.

In the case of aquaculture feeds the main threat comes from the possible emergence of two standards – a standard set by the WWF Aquaculture Dialogues (and eventually administered by the Aquaculture Stewardship Council) and a standard set by the GAA.

The creation of two standards would almost certainly mean that retailers and others would have to chose between a 'higher' standard, with the feed standard pegged to MSC certified fisheries or similar, and a 'lower' standard where expectations of sustainability for source fisheries were less rigorous.

Retailers might split into two groups – one 'high', one 'low'. If this were to happen it would cause practical difficulties for the whole supply chain and there might be questions about whether for any given species such a differentiated supply chain could really exist.

There will also be problems for retailers that have MSC-related commitments for the sustainability of wild caught fish but seek to adopt a standard for aquaculture feed that is less rigorous. It would be a significant threat to corporate reputation to be seen to hold a higher sustainability standard for fish used directly for human consumption than species used indirectly via aquaculture. In such circumstances retailers would be open to the charge of 'blue-washing' – taking fish from poorly managed stocks and converting them into desirable aquaculture products while simultaneously holding public sustainability commitments to wild caught seafood.

Several leading retailers have already earned substantial plaudits for adopting sourcing policies that incorporate the MSC certification scheme and adopting a non-MSC approach to aquaculture feeds might undermine past achievements and generate hostility on the part of civil society.

Individual retailers and processors might also find themselves in a position where they have to adopt different standards for different aquaculture species. For instance, the farmed salmon supply chain is highly centralised in terms of producers, feed manufacturers etc and it would be relatively straight-forward to ensure that a 'high' sustainability standard for aquaculture feeds was adhered to (assuming availability of supplies).

Farmed tropical shrimp, on the other hand, is far more complex in terms of the supply chain – there are

many producers of varying size and a multitude of feed sources (including 'trash fish' – see below). The chain is frequently opaque and many retailers and processors have limited visibility. Attempting to secure adherence to a particular standard for feed will be difficult under such circumstances (unless there is total control over the entire supply chain) and meeting even a 'low' standard might be challenging.

Retailers and processors might therefore be in a position where different species meet different standards or where some aquaculture products are certified to some degree of sustainability while others have no certification at all. Such a situation will inevitably generate problems for those organisations that need to maintain consistency across their sustainability communications and might cause confusion among consumers, NGOs, the media and others with an interest in the issue.

The potential inconsistencies around adopting different sustainability standards for wild caught fish and aquaculture and for implementing different standards between species will all present opportunities for campaigning organisations that are advocating for higher sustainability standards across the seafood sector but there are other risks as well.

The feed fisheries themselves that produce fishmeal and oil are hardly beyond criticism. Some have been poorly managed and others are managed only as single stocks and not within an eco-system based fisheries management regime. There are already fishery-specific NGO campaigns around certain feed fisheries and in the absence of a certification scheme retailers and processors might find their products (and themselves) publicly associated with fishmeal and oil from badly managed fisheries that are in the public eye. The fact that some retailers have chosen to publicly distance themselves from northern blue whiting gives an indication of how sensitive this issue can be.

Retailers and processors also need to be aware that

'Trash Fish'

'Trash fish' is the term used to describe the hundreds of species of fish and invertebrates unsuitable for direct human consumption that are typically caught in trawls to provide material for aquaculture feeds or to be processed into sauces and other products. The use of trash fish is typically viewed as an Asian phenomenon – for instance Thailand, Indonesia, Vietnam and China - although it happens elsewhere.

Trash fish fisheries are usually unregulated and indiscriminate in catching large volumes of heterogenous marine life including sharks and other species at risk. There is evidence that these practices can be extremely damaging – for instance, research in the Gulf of Thailand has documented major ecosystem change on a large scale.

Trash fish are utilised in aquaculture production in two main ways – direct feeding to carnivorous species such as groupers and conversion into fishmeal for the production of shrimps and omnivorous fish. Trawling for trash fish can cause serious economic damage to coastal communities because it can destroy the ecosystem basis for healthy fisheries. Economically valuable species may be over-harvested or harvested at less than optimal size and the overall modification of the ecosystem undermines the populations of valuable species. Poorer fishing communities can find themselves 'trapped' into trash fishing because there are few commercially sized fish left and alternative fishing livelihoods have ceased to exist.

There is a lot of pressure to reduce the catch and use of trash fish but little progress is being made. Efforts by fisheries agencies to reduce fishing effort and introduce by-catch reduction devices have been slow and there are substantial financial incentives for fishermen to avoid and resist laws. Fish farmers also frequently prefer trash fish because it is cheap and locally available.

buried within the aquaculture debate are specific issues that may generate significant friction. The use of Antarctic krill for aquaculture feeds for instance poses many dilemmas, not least in terms of communications, and although there is relatively little publicity at present it may become a lightning rod for wider arguments about the use of marine resources, eco-system based fisheries management and other issues.

The use of 'trash fish'(see box) in shrimp aquaculture is also potentially a highly emotive subject that poses a major reputational risk to retailers and processors that have worked hard to maintain credibility across the whole seafood sector. If investigations, whether by media or NGOs or both, revealed significant destruction of tropical biodiversity (and associated loss of high profile iconic marine species) because of shrimp products manufactured or retailed by well known brands there would inevitably be considerable publicity and associated damage to corporate reputation.

NGOs and the media have historically exerted significant pressure on the retail sector - at least in Europe and North America – and although the issue of sustainable aquaculture feeds has proven difficult in the past it might offer better opportunities for leverage in the future with publicly available standards and potential inconsistencies both within and between retailers and processors.

Lastly, it needs be remembered that there are other commercial sectors that use fishmeal and oil apart from aquaculture. Agricultural products, nutritional supplements and pet foods all use materials derived from feed fisheries and might adopt particular sustainability standards. It would be interesting to see what effect this might have on the aquaculture sector in terms of highlighting good performance or deficiencies.

Conclusion

The issue of sustainable aquaculture is in considerable flux with a range of initiatives, potential standards and campaigns all contributing to what has become an intense debate. How these forces resolve is of great importance to all stakeholders in the aquaculture supply chain but there are no easy predictions.

However, even with high levels of uncertainty there are still simple measures that stakeholders within the aquaculture supply chain can take to best position themselves for future events. Such measures could include:

- Achieving a good working knowledge of the entire supply chain including the origin of marine species used in feed formulations.
- Adopting specific policies around aquaculture, and particularly feed ingredients, and communicating these policies to other stakeholders.
- Playing an active role in creating pressure for the improvement of aquaculture sustainability and particularly the management of fisheries that provide fishmeal and oil. This could include participation in Fisheries Improvement Partnerships convened by Sustainable Fisheries Partnerships.

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