Sustainable Fisheries Partnership

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FishSource, Reduction Fisheries and Aquaculture

Executive Summary

This briefing describes the current scoring for the main reduction fisheries worldwide by the assessment methodology known as FishSource (www.fishsource.org) which has been devised by the Sustainable Fisheries Partnership. The scoring does not currently cover data poor 'trash fish' fisheries in Asia even though they account for very large catches (perhaps in total as large as Peruvian Anchovy) and supply significant amounts of fishmeal to aquaculture.

The briefing examines the implications of current FishSource scores for aquaculture certification schemes and concludes that:

- The requirement that aquaculture (and animal) feed manufacturers disclose information concerning source fisheries is the fundamental building block for establishing the sustainability of the marine elements of feeds regardless of 'scores' or 'standards'. Such disclosure is not yet common practice among stakeholders within the aquaculture supply chain although it could be achieved without compromising commercial confidentiality.

- No reduction fishery is currently managed within an eco-system based fisheries management regime. This situation needs to improve significantly. Fisheries that have established a successful single species stock management regime should now be looking to evolve an ecosystem based approach to ensure sustainability in the future.

- 8.8% of the global catch from reduction fisheries comes from fisheries that score more than 8 across all FishSource criteria. The target stocks for these fisheries are in good shape from the perspective of single stock management regimes.

- 13.8% of the global catch from reduction fisheries comes from fisheries that score above 6 in all criteria (and where no more than one of five scores may be missing) BUT the score for biomass is at least 8 or more meaning biomass is above target levels. This is important because reduction fisheries typically target forage fish which occupy a low trophic level and where great precaution is required with regards to biomass in the absence of good ecosystem data and an ecosystem based fisheries management regime.

- 66.9% of the global catch from reduction fisheries comes from fisheries that score above 6 across all criteria with only one criteria unscored (and that unscored criteria is NOT biomass).

- Aquaculture certification schemes that intend to use FishSource as a guide to feed sustainability can choose to set the standard at different levels but adopting a minimum score of 6 (for all criteria) will provide a very wide range of fisheries to choose from to create compliant feed. Adopting this approach but insisting on a minimum biomass score of 8 (to ensure adequate precaution when sourcing from low trophic level fisheries) will still allow large amounts of fish to be found in the market place (13.9% of global catch).

- Aquaculture supply chain stakeholders that are utilising feed fisheries not yet scored by FishSource (eg: single species Asian pelagic fisheries) should identify these fisheries immediately so that they can be effectively scored and included in the overall FishSource global database.

- The issue of mixed species trawl fisheries in east and south-east Asia supplying aquaculture and animal feeds needs to be examined as a matter of urgency. Feed manufacturers relying on such fisheries should disclose information regarding species, location and fisheries-related data such as biomass and harvest estimates consistent with requirements for commercial confidentiality.

Introduction

Up to a third of fish from the world's fisheries are destined for non-food products, with the vast majority being converted into fishmeal and fish oil. Such fisheries are frequently referred to as 'reduction fisheries'.

The fish that provide meal and oil are typically the so-called forage species - small, short-lived, pelagic (mid-water) species that can be found in large shoals in specific regions and occupy a low trophic level in the eco-system (eg: anchovy, herring, pilchard, sprat, sardine and menhaden).

However, mixed species fisheries which utilise fish not suitable for human consumption (whether because of size or palatability) can be found in some parts of the world and particularly east and south-east Asia. These fisheries – sometimes referred to as 'trash fish fisheries' – can be deliberately targeting a mixed species catch for the purpose of creating feeds or they may be targeting other species (eg: shrimp) with relatively indiscriminate gear types and generating a high 'by-catch' which has a marketable value. These fisheries are generally poorly characterised with little data in the public domain but the total catch may be as high as 5 million tonnes [reference: Asian Fisheries Today: the production and use of low value/trash fish from marine fisheries in the Asia Pacific region, Asia Pacific Fishery Commission, FAO, 2005]

Concerns over fishery status and sustainability of aquaculture feeds

Recent interest in the sustainability of seafood has generated considerable scrutiny of the stocks and management regimes for fisheries that provide wild caught fish and crustacea direct for human consumption and this interest has inevitably now extended to questions around aquaculture. One significant trend is the emergence of certification schemes for aquaculture and there are now several either available or in preparation, eg:

- The Aquaculture Dialogues, sponsored by WWF, which will create standards for an Aquaculture Stewardship Council when completed
- The Global Aquaculture Alliance, which previously had great focus on shrimp, has now covered tilapia and is extending its range to other species
- Global Gap, which covers supply chains for many agricultural commodities but has recently developed aquaculture standards

Although there are many aspects to defining sustainable aquaculture the key area where questions around marine sustainability emerge is via the feed issue – that place where wild fisheries and farmed fisheries 'meet'. The desire to create standards for certifying sustainable aquaculture which effectively address the feed question has lead to vigorous debate within the stakeholder community. The vast majority of reduction fisheries have not yet been certified by the most widely accepted sustainability standard for wild fisheries – the Marine Stewardship Council (MSC) – and there are no currently available alternative certifications that would command wide acceptance.

Consequently there is significant interest in using alternative sustainability indicators as an interim measure while reduction fisheries go through an ISEAL-compliant certification process such as the MSC.

Two of the most well known indicators that are currently available are:

1. International Fishmeal and Fish Oil Organisation (IFFO) Global Standard for Responsible Supply - a business to business code which gives assurance along the supply chain and which uses third party assessment against the UN Food and Agriculture Organisation Code of Conduct for Responsible Fisheries. So far one fishmeal and fish oil producer - Tecnológica de Alimentos S.A. (TASA) of Peru - has been certified against the IFFO standard.

2. FishSource – a methodology created by Sustainable Fisheries Partnership which assesses fisheries against five criteria:

- Is management precautionary?
- Do fishery managers follow scientific advice?
- Do fishers comply?
- Is the stock healthy?
- Will the stock be healthy in the future?

Each criteria is assessed by applying a formula which uses simple ratios (eg: actual biomass against target biomass) to calculate numerical values between 0 and 10. The FishSource methodology and resulting scores for reduction fisheries are described below.

The FishSource methodology

The FishSource methodology provides a rough guide to how individual fisheries are performing by assessing five key criteria (identified above) using a transparent methodology (available at www.fishsource.org) and data that is in the public domain. It is not a comprehensive assessment of sustainability nor can high FishSource scores across all criteria be considered to define a 'sustainable' fishery. However, high FishSource scores can be considered a strong indicator of a well managed fishery as assessed by existing fishery sustainability measures.

Determining a complete set of FishSource scores requires: (a) limit and target reference points are set for both biomass and harvest rate; (b) a formal harvest control rule that defines how managers

must set fishing mortality or TACs (total allowable catch) when biomass levels fall dangerously low, and (c) publication of the advised and set TACs and formal estimates of total actual catch.

The criteria are assessed using various formulae to calculate numerical values. Some examples of these formulae include:

- A fishery scores 10 out of 10 if mortality is reduced to zero at biomass levels below the limit reference point but only 6 out of 10 if fishing mortality is only held at the target reference point level.
- A fishery scores 10 out of 10 if managers always set the TAC equal to or below scientific advice. The score drops to 8 out of 10 if managers set the TAC at 12.5% above scientific advice and 6 out of 10 if the TAC is 25% higher than advised.
- A fishery scores 10 of 10 if current spawning biomass is 50% above the target reference point. A fishery at Bmsy scores 8 while a fishery at 0.5 Bmsy scores 6.

The scores from FishSource are intended to be directly comparable to the Marine Stewardship Council scheme, and the formulae themselves are based on how MSC has scored certified fisheries in the past. So a FishSource score of 6 is broadly equivalent to an MSC score of 60% against that criteria, a FishSource score of 8 is equivalent to an MSC score of 80% and so on.

If a fishery scores above 8 in all categories it is highly likely that it would receive an unconditional pass against the equivalent criteria under the MSC assessment methodology. If a fishery scores above 6 in all FishSource scores it may be certifiable by the MSC but it should be remembered that the MSC requires an 80% average score with no single score lower than 60%. If a fishery falls below 6 in any FishSource criteria it is a strong indicator that this fishery would score lower than 60% against the equivalent MSC criteria and thus not be certified by the MSC under current circumstances.

From a Sustainable Fisheries Partnership perspective, a fishery that is relatively well managed with respect to the target stock will score 8 out of 10 and a fishery that would be judged to be ‘doing ok’ but in need of improvement would score 6 out of 10. Fisheries that score below 6 out of 10 would be considered to fall short of existing measures of fisheries sustainability and require significant improvements.

FishSource does not explicitly score the eco-system effects of individual fisheries but FishSource does include a discussion section on target reference points, which, in fisheries where ecosystem issues have been explicitly included in determining targets would describe the methodology and results.

Unfortunately none of the forage fisheries considered in this briefing have target reference points set using ecosystem methods. However, this is a particularly important consideration for those concerned with low trophic level species such as the small pelagic fish taken in reduction fisheries. If a user wishes to identify a FishSource score which provides some degree of precaution in relation to forage fisheries – and be consistent with current MSC practice – it is advised that a minimum biomass score of 8 be adopted.

FishSource scores cannot be averaged together to form a meaningful single score. This is because a high score in one category might offset a low score in another to provide some kind of ‘pass’ mark while in reality a properly managed fishery should score well against all criteria.

Sometimes fisheries have a criteria that is unscored (designated as n/a). This can happen because there is no data in the public domain or because a particular fishery is managed in such a way that

the key components of the FishSource calculation are not available. An n/a does not automatically mean a fishery is managed badly and in these instances it is essential to identify the underlying reason for the n/a score.

The FishSource scores are only part of the information covered for each fishery on FishSource, and focus on quantitative data available on the target stock and its management. FishSource also contains extensive narrative sections on broader governance, quality of science, by-catch, and environmental and biodiversity impacts.

FishSource scores for reduction fisheries

The FishSource scores for the principal reduction fisheries are tabulated below. The scores are based on the most recently available public data. These scores were taken from FishSource on March 15th 2010. As FishSource is updated, the scores will become out of date, and are provided below only as a snapshot of the global situation at the time of writing. At the current time FishSource only reports scores where point estimates can be determined. However, FishSource often contains sufficient information to determine whether a fishery is above or below a certain score even if a precise estimate is not possible. For instance, if a fishery publicly reports a biomass estimate and a lower reference point but not a target reference point, then FishSource cannot determine a point estimate (see the FishSource methodology for more details). However, an estimate of biomass and a lower reference point is sufficient to determine whether the FishSource score is >6 or <6, and these interval estimates are reported in the table below.

SFP has suggested some evaluation categories that may be useful to standard setters, and the fisheries below are ranked from the lowest scoring category (G) to highest (A). Standard setters are free to use these categories or develop their own.

Table 1 – FishSource scores for global reduction fisheries

Fishery	2007 catch '000 t	Score 1	Score 2	Score 3	Score 4 Biomass	Score 5	Evaluation category
Herring (Canada NAFO 4TVn – Spring spawner	4	8.6	≥6	8.4	4.5	10	G
Capelin (Icelandic)	202	10	10	0	<6	n/a	G
Chilean jack mackerel	1292	n/a	n/a	10	<6	n/a	G
Horse mackerel (S stock, NE Atlantic)	23	<6	6.1	10	≥6	n/a	G
Herring (N Sea)	388	7.2	10	5.5	7	5.7	G
Blue Whiting (NE Atlantic)	1612	8.9	10	10	10	5.6	G
Iberian sardine	96	≥6	n/a	≥6	≥6	n/a	F
Chilean sardine	270	n/a	9.1	10	≥6	n/a	F
Sandeels (N Sea)	206	≥6	n/a	10	7	n/a	F
Menhaden (US, Gulf of Mexico)	457	≥6	n/a	n/a	7.7	7.4	F
Menhaden (US, Atlantic)	201	≥6	n/a	n/a	10	8.4	F

Peruvian anchovy	5800	6	10	9.1	≥6	n/a	E
Sprat (N Sea)	84	≥6	10	10	≥6	n/a	E
Capelin (Barents Sea)	0	≥8	10	10	≥6	n/a	E
Japanese anchovy*	1648	≥6	10	10	≥6	7.1	D
Herring (US, Atlantic)	86	≥6	≥6	10	7.9	9.9	D
Norway pout	6	≥6	10	10	9	n/a	C
Horse mackerel (w stock, NE Atlantic)	123	≥6	9.5	10	9.7	n/a	C
Herring (Icelandic summer spawning)	159	6	10	9.8	8.6	6.9	B
Sprat (Baltic Sea)	388	≥6	6.1	10	10	6.8	B
Herring (Canada, NAFO 4TVn – Autumn spawner)	48	≥6	≥6	10	10	9.3	B
Herring (Norwegian Spring spawner)	1267	8.4	10	9.7	10	8	A

*Japanese anchovy catch figure and scores based on reported catches by Japanese fleet, catches on this stock by other fleets are not publicly reported. The scores above apply only to the Japanese fishery.

KEY
Score 1 - Is management precautionary?
Score 2 - Do fishery managers follow scientific advice?
Score 3 - Do fishers comply?
Score 4 - Is the stock biomass healthy?
Score 5 - Will the stock be healthy in the future?

Table 2 – definitions of potential evaluation categories

Evaluation Category	Description
A	All scores ≥8
B	All scores ≥6, no criteria unscored (n/a) and biomass ≥8
C	All scores ≥6, one criteria is unscored but biomass ≥8
D	All scores ≥6, no criteria unscored
E	All scores ≥6, biomass is scored but one other criteria is unscored
F	All scores ≥6, biomass is scored but more than one other criteria are unscored
G	One or more criteria scores are below 6

What does this mean for aquaculture certification and feed standards?

Table 3 below provides some examples of the different FishSource thresholds that might be considered by organisations creating feed standards as part of an aquaculture certification regime. The percentage of fish available from the global supply of reduction fisheries (not counting trash fish fisheries) that would meet these thresholds is identified alongside.

Table 3 – evaluation categories as percentages of global catch of reduction fisheries

Evaluation Category		Catch in tonnes (2007)	% global catch (2007)	Cumulative % catch (2007)
A	All scores ≥8	1267	8.8%	8.8%
B	All scores ≥6, no n/a and biomass ≥8	595	4.1%	12.9%
C	All scores ≥6, one n/a and biomass ≥8	129	0.9%	13.8%
D	All scores ≥6, no n/a	1734	12.1%	25.9%
E	All scores ≥6, one n/a, no n/a for biomass	5884	41.0%	66.9%
F	All scores ≥6, more than one n/a, no n/a for biomass	1230	8.6%	75.5%
G	One or more scores below 6	3521	24.5%	100%

From the table above it can be seen that aquaculture certification schemes have a range of options in terms of setting FishSource-based standards for feeds.

A very high standard which rewarded only the very best aquaculture practices would insist on feeds based on fish that were only caught from Category A fisheries but this limits sourcing to just 8.8% of the global catch.

A certification scheme that wanted to require that feeds were derived from fisheries that operated within acceptable industry norms but also wanted to provide a level of precaution for low trophic level species might require that feed fish only come from fisheries that meet Categories A, B or C. This would provide some reassurance with regard to eco-system impacts of reduction fisheries while allowing 13.9% of the global catch to be used as source material.

An aquaculture certification scheme that wanted to reward 'average' practice and stay within industry norms while excluding the worst aquaculture practices might require feed fish to only come from feed fisheries that achieved Category A, B, C, D or E. This would provide reassurance that the fisheries were relatively well managed and that biomass was at least scoring at 6 or above (0.5 Bmsy).

The ultimate aim of any standard however should be to improve the fisheries which fall short of current requirements. Achieving such an aim would increase the volume of acceptable fishmeal and fish oil on the market, while generating significant environmental benefits. A simple "don't buy" message may not achieve the aim if it only serves to divert product to less discerning markets and allow the fishery to continue without making improvements. Standard setters should seek to encourage stakeholders in the fishery to make improvements and reward them for doing so.

Aquaculture certification schemes may have different objectives – to reward the very best, to exclude the very worst, or to help the 'middle' to improve. The objectives of the schemes will be crucial in determining which category of fishery to incorporate into the overall standards.

The trash fish issue

One aspect of reduction fisheries that this analysis does not address is the issue of '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, either as by-catch from other fisheries or as directed fisheries, 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.

Improving the current state of trash fish fisheries is an ecological imperative but making progress is not always easy. Supply chains for species such as shrimp which may utilise trash fish are not always entirely transparent and enquiries from retailers and processors not always encouraged.

It is also important to engage with the issue in ways that bring genuine improvement to fisheries management. There would be little benefit in encouraging aquaculture producers to switch feed sources to imported fishmeal based on more sustainable pelagic stocks if the trash fish fisheries continued only with different markets. The key to success will lie in engaging aquaculture producers and feed manufacturers in key locations – particularly in east and south-east Asia – to work alongside the fishing community to actively improve fisheries management and build sustainable fisheries in the future.

Ecosystem-based fisheries management

One of the most striking aspects of the management regimes currently in place for reduction fisheries is the weakness of ecosystem-based fisheries management (EBM), and the complete absence of EBM methods in setting target reference points for biomass.

EBM represents an approach that goes beyond a focus on single stocks of target species and includes other elements of the eco-system in the management framework. The Food and Agriculture Organisation Code of Conduct for Responsible Fisheries states that: "Management measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species". This approach is particularly

important for species that are at a low trophic level – such as forage fish – because of the importance of such species as food for species at higher levels.

The Marine Stewardship Council assessment tree requires that: “To ensure precaution in relation to ecological role, consideration should be given to the trophic position of target species, in particular species low in the food chain”.

The MSC also states that “To reflect the concern that harvesting a low trophic level species poses a greater inherent risk to ecosystems than harvesting mid and high trophic level species, in the absence of specific consideration, an appropriate default assumption would be that low trophic level species should be maintained at stock levels higher than Bmsy [maximum sustainable yield]. An alternative approach, that of managing to higher levels of probability that the stock is above target and limit reference points, could also be acceptable.”

For a fishery to achieve MSC certification without conditions it is required that: “Should the consideration of the ecological role of the target species indicate a strong interdependence such that maintaining the stock at levels consistent with Bmsy would cause significant changes to the ecosystem…an expectation…would be that the target reference point should have been appropriately adjusted.”

Examples of an EBM approach could include:

- Maintaining biomass above levels needed to prevent significant change to the ecosystem (as indicated by the MSC)
- Using ‘no take’ zones to maintain prey abundance in areas of importance to predators (eg: the intent of Steller Sea Lion protection measures in Alaska)
- Adjusting the seasonal pattern of fishing to prevent any seasonal depletions of prey abundance (eg: seasonal measures used in the North Sea sand eel fishery to maintain prey for seabirds)
- Protect habitats of importance to fisheries and other marine life (eg: defining areas that are off limits to bottom trawling)
- Define and monitor thresholds and limits for impacts on marine life, and target levels for other marine life.

Developing a robust EBM regime is not easy and there are reasons why this approach has yet to be widely adopted. EBM requires significant amounts of ecological data to be effective and cannot always be easily integrated into existing management regimes so progress has inevitably been slow. However, given the importance of maintaining healthy stocks of forage fish and the need to maintain the ecosystems which they inhabit it is inevitable that elements of an EBM approach will begin to be adopted in some regions. It is also likely that retailers, aquaculture producers and aquaculture feed manufacturers will call for such measures as a way of both protecting the sustainability of a vital resource and as an important element of corporate reputation.

Conclusions

FishSource can provide guidance on how individual fisheries shape up against conventional measures of sustainability that are widely accepted within a commercial fishing and seafood environment. However, FishSource is not an alternative to an ISEAL compliant scheme such as the MSC nor can it define sustainability through a particular score and it must be used in context.

An analysis of how the main global reduction fisheries score against FishSource reveals that most operate within limits that would be considered consistent with current good industry practice in the

context of single species management regimes. However, a few fisheries are experiencing significant difficulties, many could benefit from improvements in single stock management and all would be significantly enhanced by the incorporation of ecosystem principles into the overall management regime.

Users of FishSource are free to adopt whichever thresholds they consider suitable for meeting their objectives and this is clearly true for aquaculture certifications. However, it is important to consider the adoption and compliance with sustainability standards in a wider context. Setting particular sustainability thresholds for fish should not just lead to avoidance behaviour by purchasers who shun particular fisheries. It would represent a more responsible and constructive approach if purchasers were to engage with 'problem' fisheries and work in partnership to generate improvement. Through these 'Fisheries Improvement Partnerships' it will be possible to move non-qualifying fisheries to a condition where they can be relied on as sustainable sources of fish in the long term.

Underpinning all of the information and opinion put forward in this briefing is the fundamental requirement for transparency within the supply chain. Fisheries that have no data cannot be assessed by FishSource or indeed by any methodology or standard setting regime. Retailers, processors, producers and feed manufacturers should all take responsibility for asking questions of their suppliers about the origins and sustainability of feed ingredients. Even the most basic data can provide a starting point for an assessment and the identification of improvement needs (if required).

Perhaps the most urgent cases with regards to fisheries data are the 'trash fish' fisheries. The use of mixed species trawls in under-regulated fisheries (particularly in east and south-east Asia) to provide feed material to the aquaculture and animal feed sectors is highly problematic and undoubtedly having severe biodiversity impacts as well as eroding the long term basis for productive fisheries. Retailers, processors, producers and feed manufacturers in the aquaculture supply chain – and particularly for shrimp and pangassius – should take responsibility for achieving high levels of transparency around the origins of feed ingredients.

Lastly, this briefing has concerned itself to a significant degree with the needs of the aquaculture sector in defining sustainable ingredients for fish feeds but there is no logical reason why exactly the same challenge should not face terrestrial farming. Pigs and poultry are both large consumers of fishmeal and producers, processors and retailers should expect to be questioned about the sustainability criteria that they are applying to animal feed rations.