



ISSUES FOR  
RESPONSIBLE  
INVESTORS

# THE FUTURE OF FISH IN ASIA

SEP 2011

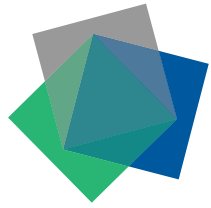
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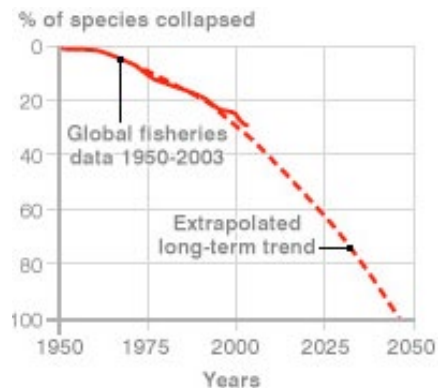
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# EXECUTIVE SUMMARY

Global investors across a wide range of asset classes now recognise the materiality of issues such as climate change, corruption and human capital management on portfolio returns. Many have implemented related policies to address the risks and opportunities presented in certain sectors and markets. Very few, however, have developed policies to lessen the negative impacts their investments may have on the critical and time sensitive issue of marine sustainability. This despite the fact marine-based products are a key raw material for sectors as diverse as hotels, retail, pharmaceuticals, airlines and, of course, the fishing industry itself.

The oceans meanwhile are at crisis point. The question is no longer whether we have passed the point of 'peak fish' – the year in which harvests of fish from the wild peak in terms of quantity, before going into decline. The question now is can we stop the decline at all? As the graph below shows, if we continue at our current rate, we will have fished out the seas by the middle of this century.

Figure 1: Global loss of seafood species



Source: The journal 'Science' using FAO data<sup>1</sup>

At stake economically is a multi-billion dollar global industry, one of the oldest in the world. As a society, we seem to be knowingly destroying a vital source of food and income at a time when the global population is predicted to swell to 9.3 billion.<sup>2</sup>

In Asia, the impact will be felt more deeply than in other regions. Statistically, the region dominates the fishing industry in capture quantities, number of people employed, consumption and number of vessels in operation. Over 85 percent of all fishers and fish farmers in 2008 were Asian, as were six of the top ten producer countries in capture fishing.<sup>3</sup>

Certain Asian countries and other developing nations are also

substantial net exporters of fish – even above other important agricultural commodities.<sup>4</sup> As global trade in fish and seafood has increased over the past decades, basic processing like filleting and de-heading has migrated to developing countries where labour is cheaper.

At stake ecologically is the entire marine ecosystem, which may never recover from a catastrophe as complete as a total loss of commercial fishing stocks. Even now, it is impossible to know if ocean habitats will be able to recover from the damage already done by ubiquitous but destructive fishing methods such as bottom trawling, dynamite and cyanide fishing – most marine environments are fragile and take decades, if not centuries, to return to their original state.

It may already be too late for certain marine species, which the fishing industry continues to capture despite clear signals that they are being pushed to a point of no return. These include targeted species, like bluefin tuna and cod, but also non-target species caught as 'by-catch', including many species of sharks, turtles, and rays.

## More action needed

Despite all of the above, investors are not alone in remaining largely inactive on the issue of marine sustainability to-date.

The convoluted chain of custody and overall lack of traceability typical of the seafood value chain has limited awareness of and action upon this crucial issue. Consumers assume that if they can buy a type of seafood easily, it must be widely available; retailers and caterers argue that if the customer wants it, they need to sell it; wholesalers and processors cite the dynamics of supply and demand; and the fishing industry itself says it is up to scientists and governments to impose any necessary standards or limitations on fishing – although they will not necessarily comply when they do.

For many industries and sectors, the sustainability of marine resources may not immediately seem a material enough issue to be incorporated into their sourcing policies. The retail sector is a case in point. A typical supermarket might derive only around 1 to 5 percent of its revenues from direct seafood-related sales. However, if that supermarket were to consider the role of seafood throughout its supply chain, it would also need to factor in the fishmeal used as feed in its pork, poultry and farmed fish products; the fish in its pet food range; the fish oil in certain nutraceuticals and Omega-3 enhanced nutritional products; and potentially even the traces of fish in some household and personal care products. There are currently very few supermarkets willing to take such an in-depth look into their supply chains, and very few shareholders prepared to challenge them to do so.

Yet even among those companies whose entire business model depends on the presence of certain kinds of fish in the sea, there is an incomprehensible level of inertia. This report, supported by The David and Lucile Packard Foundation, with contributions from experts in the fields of science and conservation, looks at a broad universe of Asian companies involved across the seafood value chain and finds public disclosure of marine sustainability-related policies or initiatives to be minimal.

Action and commitment is required now, from many parties, to ensure the sustainability of marine resources and seafood supply in Asia and globally. Success will safeguard marine ecosystems and improve the quality of earnings for the seafood industry and its customers. This report identifies many of the areas for improvement and highlights the business case for action for the companies and industries involved.

### 'Direct impact' sectors

The sectors most sensitive to the marine crisis are those involved in primary production and distribution of fish and seafood: fisheries, aquaculture producers and specialist processors and wholesalers. This report looks at 40 listed companies from across Asia with core business activities in these 'direct impact' sectors and analyses their public disclosure on marine sustainability (see page 56).

Assessment of public disclosure reveals that only 16 of the 40 companies refer to marine sustainability and only one, Thai Union Frozen Products, can really be considered to have a publicly disclosed marine sustainability policy.

Of the 40 companies, 16 are involved directly in wild capture fishing activities. These include some of the world's largest fishing-related companies, operating some of the world's biggest and most technologically sophisticated international fishing fleets. In many cases, though the company operating the vessels is Asian, the hunting grounds of the fleet are anything but – the pursuit of commercially valuable stocks has taken them to the high seas or, frequently, to exploit the fishing grounds of Africa, Europe or Latin America.

Of these 16 companies, only a quarter disclose related sustainability initiatives, revealing a staggering disregard for the conservation of the marine resources that enriched them in the first place – a resource that after all they can claim no ownership of. In contrast, of the 15 companies involved in aquaculture production, there were only four that did not mention related sustainability initiatives.

Tuna is a key target for many Asian fisheries and fisheries-related businesses. However, many commercially valuable tuna species are considered to be over-exploited. Shockingly, over half our universe of 40 companies disclosed tuna species included on this year's IUCN

red list of threatened species as being among their key products – this included 12 out of the 16 companies directly involved in wild capture fishing.

In terms of fishing methods used, trawling, purse seining and long-lining dominate, all of which are generally considered to be destructive and indiscriminate - though methods exist to mitigate by-catch for long-lining. Seven of the 16 companies directly involved in wild capture fishing mentioned plans to upgrade or expand their fishing fleet as an investment to drive future growth – only two of these companies claim not to target sensitive tuna stocks.

In general, analysis of public disclosure on sustainability points to a lack of acknowledgement of the seriousness of the crisis in our oceans – especially among the companies operating fishing fleets.

There seems to be little awareness for example that depletion of key stocks, such as IUCN-listed tuna species and Atlantic cod, affects not only marine ecosystems, but also the medium- to long-term viability of a business model based on fishing these species. If certain companies do not take steps to refocus their fisheries activities, they may literally fish themselves out of business.

### 'Indirect impact' sectors

In order to assist responsible investors in their engagement with the marine product supply chain, this report examines the procurement policies of some of the largest Asian listed companies in retail, hotels, airlines, restaurants, and pharmaceuticals for evidence of sustainable sourcing of marine products.

A summary of the assessments of these policies is contained in the following table. Out of 66 companies across the various sectors, 25 disclose supplier policies, of which 15 mention the environment and only three specifically mention seafood sourcing.

Sector	Number of companies covered	Number disclosing supplier policy	Number where policy mentions environment	Number where policy mentions seafood
Airlines	13	6	6	1
Hotels	9	3	2	1
Restaurants	7	0	0	0
Retail	17	9	4	1
Pharmaceuticals	20	7	3	0
<b>TOTALS</b>	<b>66</b>	<b>25</b>	<b>15</b>	<b>3</b>



These results highlight that Asian companies have a long way to go in addressing supply chain sustainability. Even where they do have supplier policies, these frequently do not relate to the environment and less than five percent consider sustainable seafood sourcing. However, the presence of three progressive corporate groups, Cathay Pacific and its subsidiary Dragonair, Hong Kong and Shanghai Hotels and Aeon, with policies in place to increase sustainable seafood offerings also indicates that this is an issue that is coming onto the radar for leading operators.

The logic for adopting more sustainable sourcing practices is different for each of the industries we consider. Hotels are increasingly undertaking sustainability programmes as these offer cost savings. Seafood sourcing has not been a top priority, but it does make sense for luxury brands and particularly for marine or eco resorts where a healthy ocean is integral to the offer.

The managers of restaurant chains are often unclear as to how to begin sustainability initiatives. None of those covered in our report currently has a supplier policy, even though this is one of the areas where they have the most impact on the environment. For many, seafood sourcing may be a good place to start.

For airlines sustainable seafood sourcing is not a material concern compared to fuel and carbon efficiency. However, long distance carriers building brands around trust and safety may find some reputational benefits from putting in place a sustainable sourcing policy for marine products, particularly where they are attempting to capture the younger executive market. This is also an issue that can be managed independently of the more significant operational factors and in any event will be delegated to the catering company.

For retailers, NGO criticism of sourcing policy is always a concern and both consumer safety and reputational factors may drive increased consideration of traceability and sourcing. Finally, for pharmaceuticals, the premium product positioning of nutraceuticals in particular suggests that there are potential benefits to sustainable fish oil sourcing, plus the obvious business strategy of protecting new product development coming from marine sources.

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# INTRODUCTION

# INTRODUCTION

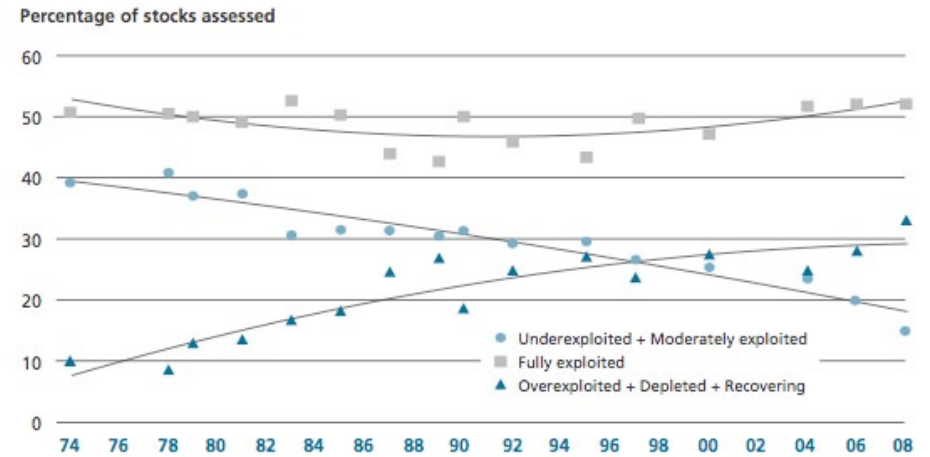
The fish value chain is complex and opaque. Few would suspect, for example, that by-products from seafood processing end up as ingredients in products as obscure as hairspray and household chemicals.

Even the journey from sea – or farm – to plate is cluttered with intermediaries such as fish processors, providers of chilled storage and transportation, and finally retailers. A fish, perhaps a Jack Mackerel from the waters of the eastern North Pacific, could be caught and frozen at sea, taken to China for processing, and then canned and sold on the shelf of a supermarket anywhere in the world. Oftentimes the consumer is none the wiser about the origins, or even the exact species, of the fish they are eating.

This convoluted chain of custody and overall lack of traceability has limited awareness of and action upon marine sustainability issues. Consumers assume that if they can buy it easily, it must be widely available; retailers and caterers argue that if the customer wants it, they need to sell it; wholesalers and processors will also cite the dynamics of supply and demand; and the fishing industry itself will say it is up to scientists and governments to impose any necessary standards or limitations on fishing – although they won't necessarily listen when they do.

While industry and governments have turned a blind eye, the state of our oceans has reached critical levels of overfishing. According to FAO statistics, in 2008 the number of marine stocks that were fully- or overexploited stood at 85 percent. This has increased from 60 percent of stocks fully- or overexploited in 1970 (see Figure 1). Total annual capture from marine and inland waters combined has remained roughly static for the last ten years at around 90 million metric tonnes. However, this is despite an increase in fishing effort and a decline in the portion of catch coming from the seas and oceans.

Figure 2: Global trends in the state of world marine stocks since 1974

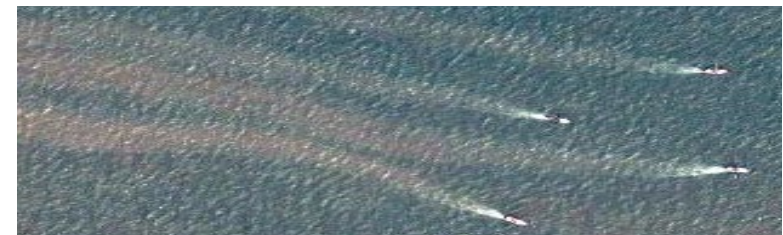


Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

Globally, many fish species have been pushed to the brink of extinction, among them the valuable and highly prized bluefin tuna, the ever-popular cod and several species of shark.

Not only that, but the quest to catch every commercially valuable fish in the sea is having a huge impact on our oceans' ecosystems. Many fishing methods are destructive and wreak havoc on ocean habitats. The ubiquitous bottom trawling, which literally drags a heavy net across the ocean floor destroying everything in its path, is a case in point – the resultant sediment trails can be seen from space.

Figure 3: Bottom trawling (around 15m) off the coast of Ecuador in 2004, as seen from space



Source: © DigitalGlobe/Marine Photobank<sup>4</sup>



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Many mass commercial fishing methods, meanwhile, are indiscriminate and frequently produce by-catch of 40 percent and over - oftentimes including endangered species such as marine turtles, sharks, and rays. This by-catch is often thrown, dead, back into the sea.

Besides the damage done in the actual act of fishing, there is the longer-term impact the persistent plundering of certain species is having on fragile marine eco-systems. The historical focus on the apex predators of the sea, tuna, cod and shark for example, depletes the top link in the food chain. This upsets the delicate balance of nature by allowing unchecked growth in the populations of their prey, which in turn exhaust stocks of their habitual prey – causing disruption to spread down through the food chain. Human consumption has also had to move further down the food chain in search of more abundant stocks, behaviour that led a group of Canadian and American scientists to predict in 2006 that seafood stocks viable for human consumption could be exhausted by 2048.<sup>5</sup>

This combined with other human-led impacts on the ocean, such as acidification, pollution, and climate change, has placed the future of our oceans in real peril.

### **The importance of fishing**

Fishing is one of the world's oldest industries and remains vitally important both to the global economy and as a source of food.

According to the FAO, fish accounted for almost 16 percent of the global human consumption of animal protein and just over 6 percent of all protein consumed by humans in 2007. Fish caught in the wild, whether in inland or marine waters, accounted for 54 percent of all fish consumed by humans in 2008.<sup>6</sup> In economic terms, the 90 million tonnes of wild caught fish and marine life in 2008 had an estimated "first-sale value" of USD93.9 billion.<sup>7</sup> First-sale value is the first economic value attached to seafood – i.e. the price paid to the harvester of the fish, before any 'value-add' processing is carried out.

As an employer, fishing and fish-farming were estimated by the FAO to directly employ around 45 million people in some capacity – of these roughly 75 percent were believed to work in capture fishing. For every job in primary production, the FAO estimates a further three are generated in "secondary activities", for example processing. In total, factoring in likely familial dependence on sole breadwinners, the FAO believes fishing and fish farming supported around 8 percent of the total world population in 2008. Over 85 percent of all fishers and fish farmers were Asian, as were six of the top ten producing countries in terms of wild catch (China, Indonesia, Japan, India, the Philippines and Myanmar).<sup>8</sup>

### **The role of aquaculture**

Globally, the human population is predicted to reach 9.3 billion by 2050 and 10.1 billion by 2100 from its current status of around 7 billion.<sup>9</sup> As incomes rise in many of the world's developing countries, like China, India and Brazil, so will demand and appetite for seafood. The decline of capture fishing as an industry is being compensated for to a certain extent by the rise of aquaculture, which is poised to overtake capture fishing as the primary source of seafood for human consumption.

In fact, aquaculture as an industry is growing faster than the pace of human population growth according to the FAO and is crucial to food security. Not only that, but it has significant advantages over livestock farming. A recent study by The WorldFish Center in Malaysia concluded that from an "ecological efficiency and environmental impact perspective", aquaculture has "clear benefits over other forms of animal source food production for human consumption".<sup>10</sup>

However, aquaculture itself imposes demands on marine life. The species humans have historically farmed aquatically have been chosen for taste rather than for their suitability for efficient and low impact farming. Carnivorous fish like salmon and tuna, for example, require huge inputs of marine-caught 'forage fish', such as anchovies, pilchards, herrings and mackerel, whether live or in the form of fishmeal and fish oil. Even species that have risen to prominence because they are better adapted to farming, such as the omnivorous tilapia, require some input of fishmeal as they mature from juveniles to adults.

The original broodstock for fish farms comes from the wild. Though most species are now successfully bred in captivity, there are some notable exceptions that continue to restock their farms by taking juveniles from the wild: the Atlantic Bluefin Tuna is one example of this. This practice, known as 'ranching', imposes greater strain on the species than the capture of mature adults in the wild as it prevents entire cohorts of the wild population from ever spawning and replenishing wild stocks.

Coastal or marine aquaculture – by virtue of operating from cages or pens placed within the marine ecosystem – is also particularly susceptible to contamination of the surrounding waterways with waste, antibiotics, feed and escaped fish if not managed properly. This runs the risk of interfering with the natural balance of species native to the location. In many cases, the construction of coastal aquaculture facilities requires the 'conversion', i.e. destruction, of natural habitat, including mangrove swamps, which provide an important breeding ground and nursery for many marine species. This practice is particularly prevalent in the construction of shrimp farms, common in Southeast Asia.





## Inertia on marine sustainability

Given the dependence of large sections of the population and economy on the fish and seafood industry, it is staggering how little is being done by companies involved in the seafood value chain to protect valuable marine resources.

Even among those companies whose entire business model depends on the presence of certain kinds of fish in the sea, there is an incomprehensible level of inertia. Among the Asian companies covered in the 'Direct impact' section of this report, the blinkers are on when it comes to tuna in particular. Tuna as a genus is targeted by many Asian fishing fleets due to the high market value of many species, especially within Japan, and rising global demand for sushi and sashimi products.

Five species of tuna were included on the latest 'Red list of threatened species' from the International Union for the Conservation of Nature (IUCN): Southern Bluefin Tuna (critically endangered), Atlantic Bluefin Tuna (endangered), Bigeye Tuna (threatened), Yellowfin Tuna (almost threatened), and Bonito (almost threatened).<sup>11</sup> However, these remain among the target fish of many of the 40 companies reviewed in this report, several of which cite the construction of new tuna-fishing vessels among their plans for future expansion.

There seems to be a real disconnect between reality – ever-dwindling tuna stocks – and company-level forward planning. Even looked at from a purely financial standpoint, if there is nothing to fish, it is hard to see how companies will generate a return on the average USD40 million investment needed for the construction of a new fishing vessel.

On the other hand, companies can protect their seafood-related income and livelihood, not to mention the future of our oceans, if they switch to a longer-term view – rather than simply switching target species and fishing grounds once one resource has been depleted. A greater focus on sustainability and responsibility now would reap dividends in the long term, not least by ensuring they still have a valid business model. The alternative for businesses directly involved in capture fishing, as it is for much of marine life, is extinction.

## Next steps

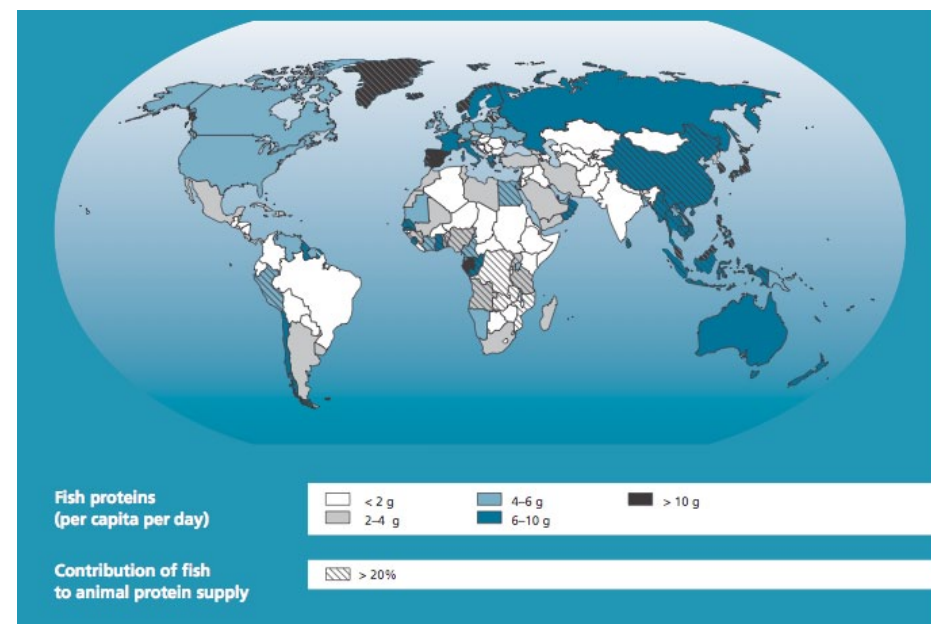
If humans are to continue to benefit from marine resources, whether farmed or fished, urgent changes in business practice need to take place at companies involved in the entire fish value chain. For change to be effective, consumers, governments, and other regulatory bodies will also need to play their role, but that is outside the scope of this report.

Written for an audience of investors, this report functions as a guide to current practice with regards to marine sustainability across

a broad spectrum of sectors and industries: capture fisheries; aquaculture; seafood processors and wholesalers; retail; hotels; restaurants; airlines; and pharmaceuticals. It also offers case study examples of best practice within different industries and policy and engagement notes for investors wishing to engage on this issue.

The report focuses primarily on Asian companies due to the region's statistical dominance in the seafood industry: not only do Asian countries fish and farm the most fish, they also process the most seafood and are among the world's largest seafood consumers in terms of both per capita consumption and percentage of animal proteins derived from seafood.

Figure 4: Contribution of fish to animal protein supply (2005 – 2007)



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

From an ecological point of view, Asia is also of critical importance, not least as the home of The Coral Triangle. This area, spanning the coastal and marine areas of Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands and Timor Leste, is considered to be the most ecologically significant epicentre of marine diversity in the world. However, its future is also threatened and as such it serves as a useful case study to showcase the many sustainability issues mentioned in this introduction.

# HOW TO USE THIS REPORT

The Future of Fish in Asia aims to equip investors and lenders with the tools to engage with companies across a broad spectrum of sectors and industries on the issue of marine sustainability.

In order to do this, it is divided into two key sections: Industry (see page 19) and The Marine Crisis (see page 143).

Industry considers current practice with regards to marine sustainability in sectors operative across the fish value chain. It is divided into two parts: 'Direct impact sectors' and 'indirect impact sectors'.

Direct impact sectors are those involved in the primary production of seafood: capture fisheries (see page 21) and aquaculture (see page 36), and the handling of primary product, processors and wholesalers (see page 50). Within each sector, the key sustainability issues are discussed and pertinent issues and case studies of best practice are highlighted. In addition, some 40 listed companies involved in direct impact sectors from across Asia have been analysed individually according to their public disclosure of marine sustainability initiatives and policies and the results are presented in this section (see page 56). Additional notes on each of these 40 companies aim to highlight particular areas of concern regarding marine sustainability and potential steps for improvement.

Indirect impact sectors are those found towards the middle or end of the seafood value chain: retail (see page 102), hotels (see page 112), restaurants (see page 117), airlines (see page 108), and pharmaceuticals (see page 120). Again, within each sector, the key sustainability issues are discussed and pertinent issues and case studies of best practice are highlighted. In these sectors, where marine sustainability is a considerably less material issue, results of select Asian company analysis are presented in brief and are grouped by sector.

The Marine Crisis section is intended to provide an overview of the myriad marine-related sustainability issues.

The first part of this section, 'Threats to Marine Resources', briefly outlines the key human ecological impacts on the seas and oceans, such as over-fishing, pollution and climate change (see page 144). In the second part, a case study of Asia's Coral Triangle presents an example of how these many human impacts are in danger of destroying an ecosystem crucial to the health of all our oceans (see page 156).

'Regulatory Oversight' takes a brief look at the governance of our seas and oceans, which for the most part fall outside of any legal jurisdiction – a key factor enabling fishing to remain as rampant and unchecked as it has been (see page 161). This section also explains how fishing quotas and Total Allowable Catches are set and enforced.

This report focuses on resource depletion and over-fishing as a prime sustainability issue affecting the seafood value chain. However, there are many other pressing sustainability issues related to the fishing sector that responsible investors may want to consider. The section on 'Social issues and forced fishing' gives a brief description of the appalling workers' rights and health & safety conditions found among many fishing crews, especially in Asia, which in extreme cases can amount to slavery (see page 168).

Completing The Marine Crisis section, 'Preventing catastrophe' outlines some of the steps being taken to conserve marine life and salvage our oceans (see page 170).

Further resources are presented in the Appendix. These include descriptions and images of common fishing methods and their impact (see page 179), details of NGOs and associations active in marine conservation (see page 178), and a list of useful resources and background reading (see page 186).





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## INDUSTRY





## DIRECT IMPACT SECTORS

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## WILD CAPTURE FISHERIES



Source: © Ulrich Karlowski 2008/Marine Photobank

Fishing is one of the world's oldest industries and remains vitally important both to the global economy and as a source of food.

According to the FAO, in 2007 fish accounted for almost 16 percent of the global human consumption of animal protein and over 6 percent of all protein consumption by humans. Fish caught in the wild, whether in inland or marine waters, accounted for 54 percent of all fish consumed by humans.<sup>12</sup>

Some 90 million tonnes of fish and marine life were caught in the wild in 2008, of which around 80 million came from marine waters. This haul had an estimated "first-sale value" of USD93.9 billion.<sup>13</sup> First-sale value is the first economic value attached to seafood – i.e. the price paid to the harvester of the fish, before any 'value-add' processing is carried out.

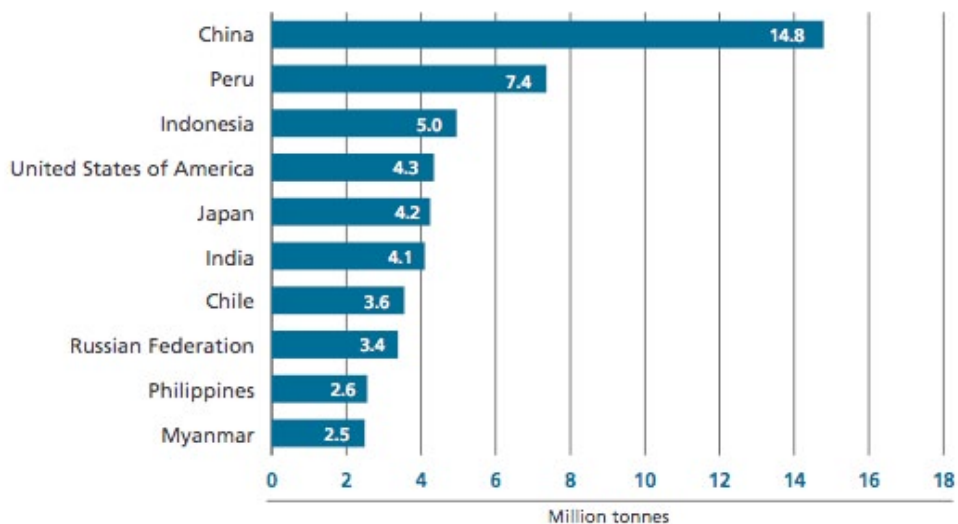
### Fishing and Asia

Statistically, Asia dominates the fishing industry in capture quantities, number of people employed, consumption and number of vessels in operation. As an employer, fishing and fish-farming were estimated by the FAO to directly employ around 44.9 million people in some capacity in 2008 – of these roughly 75 percent were believed to work in capture fishing. Over 85 percent of all fishers and fish farmers were Asian, as were six of the top ten producer countries in capture fishing.<sup>14</sup>

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Figure 5: Marine and inland capture fisheries: Top ten producer countries in 2008



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

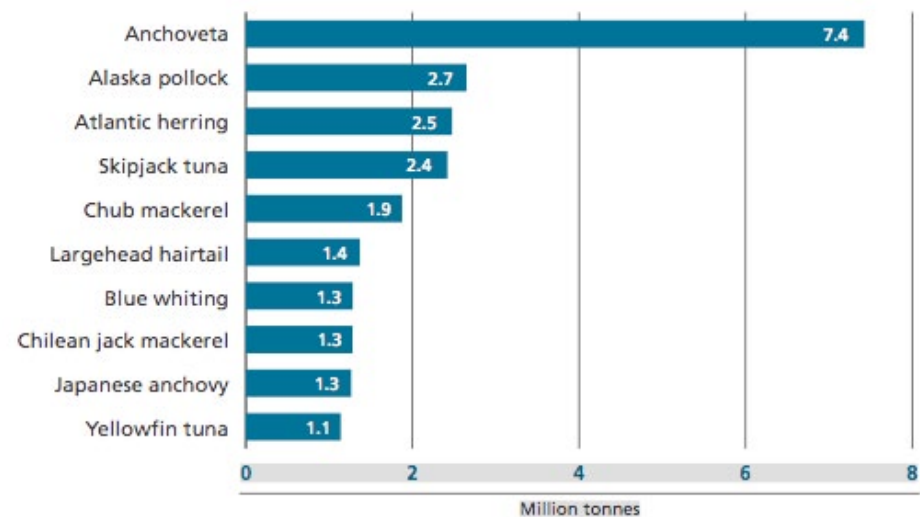
### The problem with fishing

The total quantity of seafood captured annually has remained static over the past decade at around 90 million tonnes.<sup>15</sup> However, this figure belies certain truths that point to the steady decimation of marine resources.

Firstly, though total capture amounts have not changed, the proportion coming from marine capture has declined from a peak of over 85 million tonnes in 1996 to just under 80 million tonnes in 2008, despite an increase in fishing effort.<sup>16</sup> This has increased conviction among the marine biology community that production has passed the point of 'peak fish' – the year in which harvests of fish from the wild peak, before going into decline.

According to FAO statistics, in 2008 the number of marine stocks that were fully- or overexploited stood at 85 percent – up dramatically from 60 percent in 1970.<sup>17</sup> Additionally, of the top ten species by tonnage caught in 2008, which between them accounted for 30 percent of the annual catch in quantity, only two – skipjack tuna and some geographies of chub mackerel – were deemed not to be fully- or overexploited.

Figure 6: Marine capture fisheries production: top ten species in 2008



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

Human consumption has moved further down the food chain in search of more abundant stocks, behaviour which led a group of American and Canadian scientists to predict in 2006 that seafood stocks viable for human consumption could be exhausted by 2048.<sup>18</sup>

In addition to this, many commercial methods of fishing are highly indiscriminate, producing unsustainable levels of by-catch, and some are damaging to the ocean habitat (see box text).

### KEY SUSTAINABILITY ISSUES IN WILD CATCH FISHING

*(These issues are explained in full in The Marine Crisis section on page 143. A full description of common fishing methods and their environmental impacts is provided in the Appendix on page 179)*

Commercial wild catch fishing can be damaging to the marine environment in three ways. Through the destruction of habitat; overfishing of fish stocks; and by-catch.

#### Destruction of habitat

Destructive fishing methods like bottom trawling, dynamite fishing and cyanide fishing cause lasting physical damage to the marine environment. If habitat is destroyed, there is no breeding ground

for the target (and non-target) species. Stocks, as well as the rest of the eco-system in the area, will quickly die out. Most marine environments are fragile and take decades, if not centuries, to return to their original state. Many, due to phase-shift phenomenon (see footnotes), will never recover.

Using less destructive fishing methods can prevent this devastation and ensure that wildlife and commercial stocks have suitable habitats in which to grow and reproduce.

### **Overfishing**

When wild stocks of any species are caught, attention must be paid to their reproductive biology. If individuals are taken out from the community faster than they are able to reproduce, population numbers will decrease. The speed of reproduction, and therefore replenishment of the stock, depends on time taken to reach sexual maturity as well as the numbers of juveniles produced in one breeding season. These factors vary from species to species. For example, Atlantic Bluefin Tuna can take more than nine years to reach sexual maturity and spawn for just four weeks every year.

Overfishing can be avoided by restricting the numbers of fish caught and by selecting only larger fish that have already reproduced – unless these happen to be the most significant ones in terms of breeding (see footnotes).

### **By-catch**

By-catch is the incidental catching and killing of species that the fisher did not intend to catch and sell. Depending on the fishing method used, and whether steps are taken to mitigate by-catch, incidental capture of non-target species can range from a tiny percent of the catch to 40 percent, or even more. This by-catch may be non-target fish and/or juveniles of the target species that are smaller than regulations allow the fisher to land. It is often ecologically important or endangered species that are caught in this way, such as sharks, rays, turtles, dolphins, whales, seals, sea lions and even sea birds.

Trawling, purse seining and long-lining are all fishing methods renowned for the generally high percentage of by-catch they produce. Fishermen targeting tuna frequently use long-lining to target higher value species like yellowfin, bigeye and bluefin tuna. Mitigating devices such as streamers, pingers and circle hooks can be used to make long-lining more species specific and less likely to catch non-target species. If these are used, it can be a more sustainable means of capture than many other commercial capture methods. Purse seining meanwhile is also common for tuna harvesting and is often accompanied by the use of Fish Aggregating Devices (FADs) – floating man-made objects designed to attract schools of tuna. FADs function by attracting schools of juveniles

and prey fish, which in turn attract larger, more predatory fish like mature tuna, allowing fishermen to increase the efficiency of their harvesting operation. However, the widespread use of FADs is generally held responsible for producing some of the highest levels of incidental by-catch in the fishing industry, since FADs attract all kinds of marine life. For this reason, campaigns by Greenpeace targeted at tuna brands have focused on stopping the use of FADs.

### **Impact**

Ecosystems are not self-contained and a profound change in one local environment can have a domino effect into a number of interlinked habitats. Removal of habitat or high volumes of keystone species from the food web, accidentally or on purpose, artificially changes the local eco-system and damages predator-prey dynamics. This, in turn, can lead to the unbalancing of the complex marine system and perhaps even extinction of global aquatic communities.

Unsustainable fishing practices, as is common with environmental issues, have parallel long-term social impacts, particularly, but not exclusively, in third-world coastal communities. For many, the sea provides these communities with their only source of protein. Commercial fishing operators frequently encourage villagers to sell all that they catch, leaving them with little or with low quality food for themselves. A lucrative market for their catch also encourages them to fish more, leading to over-fishing. Once their stocks are gone, the fishing company moves on to the next village and the villagers are left with severely damaged resources and no income.

Managing fisheries well and using responsible fishing methods can reduce detrimental impacts such as habitat destruction and over-fishing, and reduce by-catch.

### *Footnotes:*

\* Phase-shift is when an ecosystem passes a 'tipping point' where the habitat shifts from one type of habitat to another. For example, if coral reefs (an important habitat for grouper, coral cod and other reef fish) are badly damaged by natural or unnatural impacts, algae can overgrow the corals and take over the reef. The habitat will switch from a coral dominated one to an algal dominated one, which is far less diverse and productive. Due to the complex and slow nature of coral growth, this switch is permanent.

\* Sustainable size selection of fish target can be a complicated issue. Larger, older fish that have had the chance to replenish stocks are suggested to be the more sustainable choice, however, in some fish species, larger individuals produce exponentially more offspring/gametes than smaller, sexually mature individuals. This suggests that sometimes removing the largest fish from the breeding pool causes more damage than smaller ones.





## Investor engagement notes

Some of the world's largest fishing-related companies, operating some of the world's biggest and most technologically sophisticated international fishing fleets, are found in Asia.

Our analysis of 40 listed Asian companies involved in activities related to the primary production of seafood includes 16 companies directly involved in wild capture fishing. Of these 16, only four disclose sustainability initiatives related to their fishing activities, one of which refers to targeting stocks from Marine Stewardship Council-certified fisheries. Some 12 of the 16 meanwhile disclosed tuna species included on this year's IUCN red list of threatened species as being among their key products.

In terms of fishing methods used, trawling, purse seining and long-lining dominate, all of which are generally considered to be destructive and indiscriminate - though methods exist to mitigate by-catch for long-lining. Seven of the 16 companies directly involved in wild capture fishing mentioned plans to upgrade or expand the capacity of their fishing fleet to drive future growth - only two of these companies do not target sensitive tuna stocks.

Overall the fishing companies have not acknowledged the seriousness of the crisis in our oceans. There seems to be little awareness that depletion of key stocks affects not only marine ecosystems, but also the medium- to long-term viability of a business model based on fishing these species. If certain companies do not take steps to refocus their fisheries activities, they will literally fish themselves out of business.

Consumer and public awareness around the fishing industry is currently low in Asia. However, as public awareness of marine sustainability issues has grown in Europe and North America, NGOs such as Greenpeace have challenged the reputations of some of the leading brands' policies on fish procurement. This has included, for example, Greenpeace's campaign in the UK which publicly ranked the major tuna canners. Greenpeace's campaign has been so successful in the UK - the second largest market for tinned tuna globally - that as of July 2011, all of the country's leading tuna brands committed to stop sourcing fish caught using FADs and shift purchasing away from purse seine fishing to the more sustainable pole and line capture.<sup>19</sup> Notably, the last of the major UK brands to agree to the change was John West, a portfolio company under the MW Brands subsidiary of Thai Union Frozen Products.

Even if Asian fishing companies are not yet under pressure from their upstream clients to change harvesting methods, it is likely this will come as similar NGO campaigns take off around the world. For example, Greenpeace launched a campaign replicating its successful UK strategy against the three leading US tinned tuna brands in August 2011.<sup>20</sup> In Asia meanwhile, WWF partnered with advertising agency Ogilvy & Mather in 2010 to develop an advertising campaign

in support of the launch of its consumer-focused Sustainable Seafood Guide in Singapore. The ads, done on a pro bono basis by Ogilvy & Mather, aim to shame consumers into reconsidering their seafood eating habits, particularly at wedding banquets, and have been visible across the island state.<sup>21</sup> A move to more sustainable harvesting methods now would preserve corporate reputations as well as improve quality of earnings.

Investors should approach engagement with fisheries by asking about their target species, capture methods and investment plans and future growth drivers.

Investors should ask the company what it is doing to help conserve stocks for the future. Practical steps for fishing companies to take to maintain stock levels could include the following, often in partnership with an appropriate NGO such as WWF:

- Voluntarily lower catch quota for the sensitive stock or stop fishing it altogether
- Employ more selective fishing methods, thereby reducing by-catch of juveniles (and other species)
- Contribute biomass data collected on fishing expeditions to further scientific assessment of the stock in question
- Collaborate on Property Based Management of fisheries, based on good science
- Support the establishment of Marine Protected Areas (MPAs), which create a safe haven for marine life and have been found to enhance catch volumes for fishermen in surrounding areas (see page 171)
- Invest in R&D programmes
- Ensure fishing methods used are neither destructive nor indiscriminate
- Consider switching to more selective fishing methods such as pole and line (for tuna)
- Invest in or support R&D into (1) technology to make capture methods more species-specific, thus reducing by-catch, and/or (2) technology that allows the safe release of by-catch

*If the fishery includes expansion of fleet among its investment plans and future growth drivers*

Investors should ascertain the business logic behind the fleet expansion. If new boats with better catch technology are being bought to target dwindling stocks of endangered species, this is unlikely to be the most productive use of capital. Investors may

prefer money to be returned or for investment in alternative projects, including:

- Equipping the fleet and fishing crews to use more sustainable fishing methods, such as pole and line
- Investment in the upgrading or expansion of upstream activities, such as fish processing
- Funding the sustainability assessment of well-managed fisheries. Sustainability certification is becoming a requirement for shortlisting suppliers for increasing numbers of buyers. Certification now could result in new markets and a premium on the sale price of fish from certified stocks

Investors may also wish to encourage fishing companies to:

- Focus their activities on stocks considered to be sustainable, for example Skipjack Tuna, rather than other species of tuna
- Consider investment into responsible aquaculture joint ventures
- Build transparency around their activities and consider reputational risk as a key business driver

Finally, it is essential that fishery companies have robust traceability systems which ensure governance from boat to table. IUU fishing, globally, is a major threat and undermines the work of good actors in the sector.

## CERTIFICATION OF SUSTAINABLE FISHERIES<sup>22</sup>

There are now several organisations globally that have developed standards and certification programmes for sustainable fisheries. Of these, the Marine Stewardship Council (MSC), is among the best known.

Founded in 1997 by WWF and Unilever, the MSC developed 'The MSC environmental standard for sustainable fishing' for marine and inland capture fisheries based on the FAO Code of Conduct for Responsible Fisheries, among other things. The organisation became independent in 1999 and has to-date certified 129 fisheries globally, with a further 129 under assessment. According to the MSC's website, this represents over 10 percent of the annual global harvest of wild caught seafood.

The standards for fisheries focus on three principle areas: Sustainable fish stocks, minimising environmental impact, and effective management. Fisheries must volunteer for assessment, which is carried out by independent third party auditors, and also bear the cost of the process.

Once a fishery is certified, there is a second set of MSC standards, the 'MSC chain of custody standard for seafood traceability', applicable to all businesses involved in the seafood supply chain. Only if every business involved in getting the MSC-certified fish from the fishery to the plate submits for assessment can the final product bear the consumer-facing MSC label.

Though the entire process can be onerous and expensive, many believe the rewards are worthwhile. As more and more consumers, especially in Western markets, seek out sustainable seafood products, those with logos certifying this are able to charge a premium.

### Example of the MSC label on a product



Source: The Co-operative, UK

### The MSC eco-label



Source: MSC

## SUGGESTED POLICY STEPS FOR WILD CATCH FISHERIES

- Company should put in place a marine sustainability policy. Sustainability-related KPIs should be implemented at board level and down through the chain of command – for example, fishing boat captains should be incentivised to stick to quotas
- Company policy should prevent IUU fishing by any of its vessels
- Company should reduce targets related to Cites/IUCN listed fish, with the aim of cutting these out of catch quotas altogether
- Company should stop using destructive fishing methods such as bottom trawling, dynamite or cyanide fishing
- Company should stop using Fish Aggregating Devices (FADs)
- Company should stop investing capital into fleet expansion or upgrades designed to target sensitive stocks
- Company should consider investing capital (1) to convert its fleet to more sustainable harvesting methods, (2) in R&D into technology to make capture methods more species-specific, thus reducing by-catch, and (3) into technology that allows the safe release of by-catch
- Company should ensure capital investment into fleet expansion or upgrades incorporate measures that mitigate environmental damage, destruction of habitat and by-catch
- Company should implement targets related to by-catch reduction
- Company should participate in Fisheries Improvement Programmes to realise better management and more robust stocks
- Company should consider investment into assessment for an appropriate fisheries sustainability certification scheme
- Company should aim to have 100 percent of catch from fisheries that are third party certified as sustainable within a realistic timeframe
- Company should support collaborative processes that enable good fisheries management frameworks such as property rights systems
- Company should have a robust traceability system in place

## Best practice examples

### CASE STUDY: CHINA FISHERY GROUP AND PACIFIC ANDES (see also page 132)



Though China Fishery Group and its parent, Pacific Andes Resources, are far from being perfect examples of sustainable fisheries, several factors set them apart from their peer group within the 16 fisheries analysed for this report.

- They are included among the four fisheries that reference marine sustainability in their public disclosure. Both companies in fact make several very strong statements about the importance of marine sustainability to their business on their websites
- Neither company targets tuna
- Both companies include stocks certified as being sustainable, such as Alaskan Pollock and Jack Mackerel, among their target species, although only Pacific Andes refers to several of its fisheries being MSC-certified
- Following a significant investment from private equity firm The Carlyle Group, China Fishery Group has formed a Corporate Social Responsibility (CSR) Committee of the Board of Directors, charged with developing CFG's sustainability policy and then working with management to put in place an action plan. It is expected that this Committee will work with experts, scientists and NGOs to develop policies and solutions for implementation







## CASE STUDY: SUSTAINABLE TUNA FISHING IN THE MALDIVES

Wild caught tuna is most often caught using purse seines or long lines. Both methods are highly indiscriminate and have very high levels of by-catch and are therefore considered unsustainable ways of catching the fish. Around 70 to 80 percent of tuna across the globe is caught this way.<sup>23,24</sup>

The Maldives is an archipelago of 1,192 small islands in the Indian Ocean. The islanders rely heavily on their ocean resources, as their 180km<sup>2</sup> of land is not enough to sustain the population of over 300,000 alone.<sup>25</sup> In fact, the associated 200 nautical miles (370km) EEZs add up to a much larger area than the land. It is therefore not surprising that Skipjack Tuna, nicknamed the Maldives fish, is the islands most plentiful form of animal protein and fishing for Skipjack and Yellowfin tuna makes up 30 percent of the islands' industry.<sup>26</sup>

Traditional fishing practices have been used in the Maldives for generations, and in order to protect their important resource, these methods are the only techniques that are allowed. Pole and line fishing is used for Skipjack tuna and hand lines are used for Yellowfin. These methods are very selective with no associated by-catch and numbers caught make up only around 10 percent of the total population.<sup>27</sup> For this reason, Skipjack and Yellowfin tuna caught in the Maldives EEZ are among the most sustainable in the world and have been certified by the MSC.<sup>28</sup>

Pole and line fishing uses wide, low boats with a large aft deck. A number of fishermen stand along the deck each equipped with a pole. The poles are increasingly commonly made with fiberglass and have a line with barbless hook attached. Once a school of fish is spotted, the fishermen throw small bait fish into the water to cause a feeding frenzy. Then they cast their lines into the school. The fish bite the hook and the fishermen immediately pull the fish from the water by flicking the line over their heads. The tuna lands on the large deck and comes free from the hook, where it is immediately killed and frozen or chilled.

Hand lines are a very traditional method where each fisherman, instead of using a pole, just uses a fishing line with a hook. Once a school is encountered, fishermen cast their lines and then, by hand, haul in each fish individually. A second fisherman is often required to hook and pull in the heavy fish. Again, the fish is immediately killed, gutted and frozen. Killing the fish quickly ensures good quality, clear flesh. This is in contrast to purse seining, during which the fish is slowly squeezed to death causing a build up of lactic acid that degrades the quality of the meat.

The Maldives fishery is well protected by the nation's government, which should mean an enduring industry and food security for the local community. However, IUU fishing does still occur and purse seiners outside of the Maldives EEZ's continue to take as many of the fish as possible, causing a negative impact on the global migratory Skipjack and Yellowfin populations. This impact may lead to a downturn in the Maldives fishery too, despite its own laudable efforts to sustain populations.



## CASE STUDY: BLUEFIN TUNA BREEDING, THE HOLY GRAIL IS IN SIGHT

Tuna as a genus makes up 8 percent of the world's seafood trade. Our voracious appetite for the fish has seen tuna harvesting and processing develop into a multi-billion dollar industry globally. Unfortunately, the relentless exploitation of tuna stocks in the wild has taken its toll and five of the fish's commercially valuable species are under threat of extinction. Of these, bluefin tuna is both the most commercially valuable and the most critically endangered.

### Bluefin tuna on the block at Japan's Tsukiji Market



Source: © Luis Alvarez

Bluefin tuna are the biggest of the tuna genus: mature adults can reach weights of 400 - 500kg. Their creamy, firm flesh has made them the most luxurious of sushi and sashimi ingredients and one of the most sought after marine resources – high quality bluefin

tuna is on average USD50 per kilo, but at auction it can reach much higher prices. In January 2011, at Tsukiji central fish market a single 342kg bluefin tuna sold for almost USD400,000<sup>29</sup> and at Masa, a top New York sushi restaurant, a single portion of 'toro' rolls can be enjoyed for USD68.<sup>30</sup> Its two sub-species, Southern Bluefin and Atlantic Bluefin are listed on the IUCN Red List as critically endangered and endangered respectively. Intensive fishing of the species is the key reason for this decline in numbers, exacerbated by its slow and infrequent reproductive cycle. An individual takes nine or more years to reach sexual maturity out of a potential lifespan of up to 40 years and females spawn for just four weeks a year. There are just two major spawning grounds for Atlantic Bluefin, the Mediterranean sea and the Gulf of Mexico. Southern Bluefin meanwhile spawn in the Eastern Indian ocean between the north west coast of Australia and Indonesia.

Aquaculture would seem to be the obvious answer, ensuring a plentiful supply to market whilst allowing wild stocks to recover. However, the breeding of these apex predators in captivity has proved no easy feat. Challenges include the aforementioned time taken to reach sexual maturity and infrequency of spawning, knowing which early feeds to use, keeping bacteria levels down and the fact that Bluefins turn cannibalistic if left in pens with their young.

For these reasons, tuna farming has so far consisted of the capture of juvenile bluefin tuna, to be fattened and raised to maturity in sea-cages. This practice, known as 'ranching', has severe sustainability implications. The juveniles captured have not reached sexual maturity and will therefore never have the chance to spawn and contribute to replenishment of wild stocks. Before the recent introduction of quotas for ranching, tuna ranching was considered even less sustainable than catching wild adults.

As bluefin tuna stocks have dwindled, the sustainable breeding and farming of bluefin tuna in captivity has become the holy grail of the tuna industry. And although the breeding of these giant fish from egg to adult has yet to be achieved on a commercial scale, a number of research and development units, some funded by the fishing industry, have had some success with breeding programmes.

Japan's Kinki University started a fish-breeding program in 1948 and turned its hand to Bluefin soon after inception. Finally, in 2002, Kinki University was the first organisation to succeed in raising Atlantic Bluefin Tuna full-cycle and in 2007 the university sold and shipped 1,500 third generation cultured tuna fry to seed commercial tuna ranches.<sup>31</sup>

Meanwhile, Australia Securities Exchange-listed Clean Seas (CSS AU), a self-described "sustainable" fish farming company, has also made strides in this area. Its research and development programme for tuna breeding began in 2000. The company focused on Southern

Bluefin Tuna and to-date remains the only Southern Bluefin Tuna-breeding programme in the world. Six years after establishment, Clean Seas carried out the precarious task of lifting 150 kg tuna from ocean pens into breeding pens, to begin harvesting eggs. It took a further two years for the eggs to successfully hatch into larvae; then in 2011 Clean Seas released its first batch of 149 Southern Bluefin Tuna fingerlings into ocean-based growing pens. According to the former Managing Director, Clifford Ashby, Clean Seas estimates that by 2013/14 it should be ready to sell adult, full-cycle tuna to commercial markets.

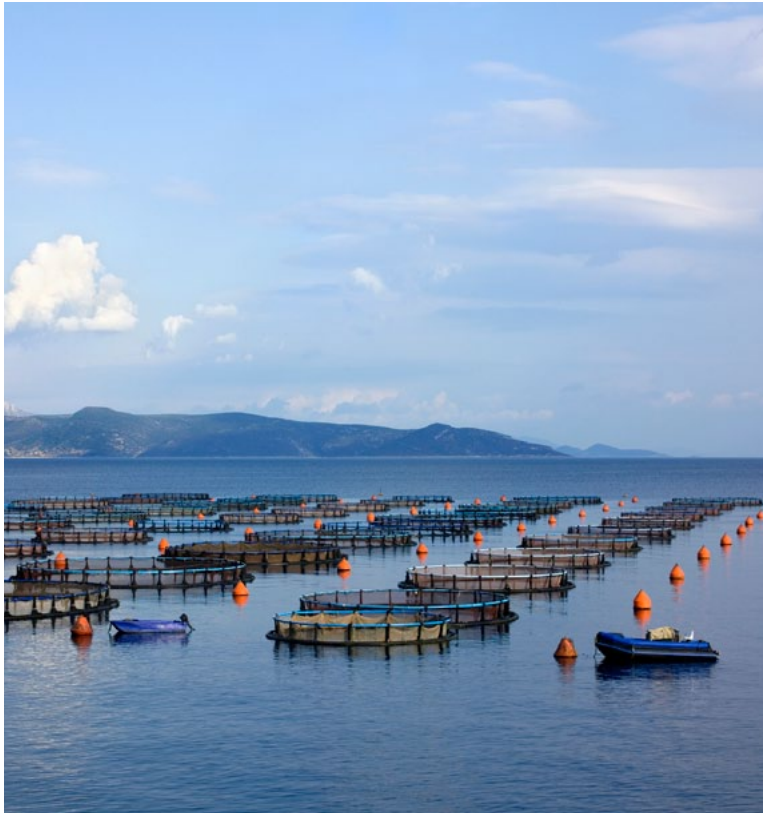
Business groups that have set up Atlantic Bluefin Tuna breeding programs around the world include Futuna Blue España in Spain, established in 2007 and granted planning permission to construct the world's largest bluefin tuna farm in 2010.<sup>32</sup> Umami (UMAM OBB) is another that has succeeded in hatching tuna, first achieving this at its Croatian bluefin tuna farms in 2009. Currently, young, cultured full-cycle blue-fin tuna can be bought from both of these companies to be ranches.<sup>33, 34</sup>

Though the outlook is good for the commercial rearing of bluefin tuna, there are still a few challenges to meet. Aquaculture – especially of a carnivorous marine-reared fish like bluefin tuna – comes with inherent sustainability issues. It takes up space that was once pristine natural habitat, it can allow feed, chemicals and fish waste to enter natural water ways, and it requires a feed input of several times the body weight of the farmed fish in wild-caught fish. Farmed bluefin tuna needs around 15-20 kilos of feed per one kilo of live tuna produced – one of the highest Food Conversion Ratios (FCR) in aquaculture. In order to be truly sustainable, this FCR will need to be reduced. Clean Seas does not use chemicals or antibiotics in its open sea pens, but Ashby acknowledges that FCR is still a problem in the fledgling tuna breeding industry.

Despite these problems, the tuna breeding industry has come a long way in the last ten years and research and development is not stopping at spawning. Further development in the field of wild-fish free feed and elimination of hormones and other chemicals is continuing so truly sustainable tuna could be just on the horizon.



# AQUACULTURE PRODUCERS

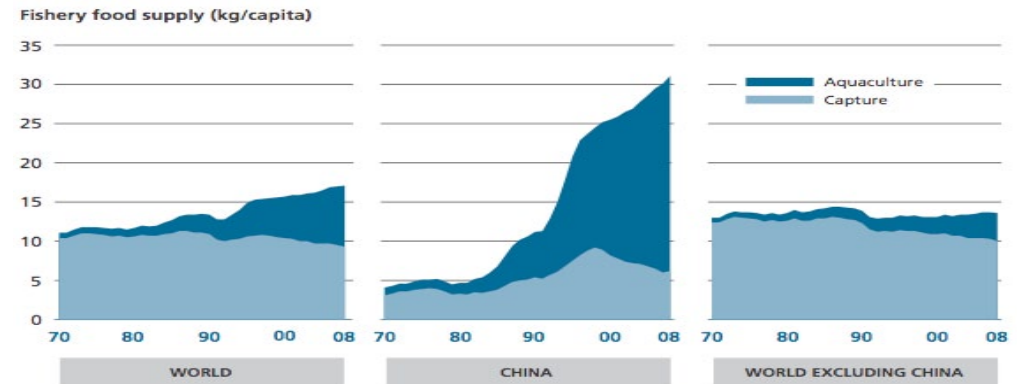


Source: © Panagiotis Milonas

While the wild catch fishing industry is stagnating, aquaculture continues to be a huge growth industry.

According to the FAO, it is the fastest-growing animal food-producing sector. Global per capita supply of fish from aquaculture has grown at an average annual rate of 6.6 percent since 1970 and reached 7.8 kilos in 2008.<sup>35</sup> In the same year, aquaculture provided 46 percent of all food fish supply.<sup>36</sup> As fisheries production declines, aquaculture is poised to overtake wild catch as the main source of seafood.

Figure 7: Relative contribution of aquaculture and capture fisheries to food fish consumption



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010.

Figure 8: The relative importance of aquaculture in global fish production by species group

Species Group	Capture production (Mt)		Aquaculture production (Mt)		Proportion of total production from aquaculture (%)		
	2003	2008	2003	2008	2003	2008	Difference
Carp	2.02	2.21	15.04	19.72	88.2	89.9	1.8
Catfish	2.33	2.77	1.03	2.78	30.8	50.1	19.3
Tilapia	3.95	3.14	1.59	2.80	28.6	47.1	18.4
Eels	0.65	0.62	0.32	0.48	32.9	43.4	10.5
Salmonids	1.16	0.84	1.85	2.26	61.5	72.8	11.3
Other Finfish	50.81	51.79	4.40	5.79	8.0	10.0	2.1
Bivalves	18.43	19.72	11.06	12.65	37.5	39.1	1.6
Gastropods	0.30	0.32	0.21	0.37	41.4	53.7	12.3
Crabs and Lobsters	0.93	0.78	0.49	0.76	34.4	49.4	15.0
Shrimps and Prawns	8.85	8.47	2.59	4.35	22.7	33.9	11.3
Other Invertebrates	1.14	1.18	0.12	0.31	9.7	20.5	10.8
Seaweeds	0.34	0.07	9.02	13.24	96.3	99.5	3.1
<b>TOTAL</b>	<b>91.31</b>	<b>92.3</b>	<b>47.9</b>	<b>65.81</b>	<b>34.4</b>	<b>41.6</b>	<b>7.2</b>

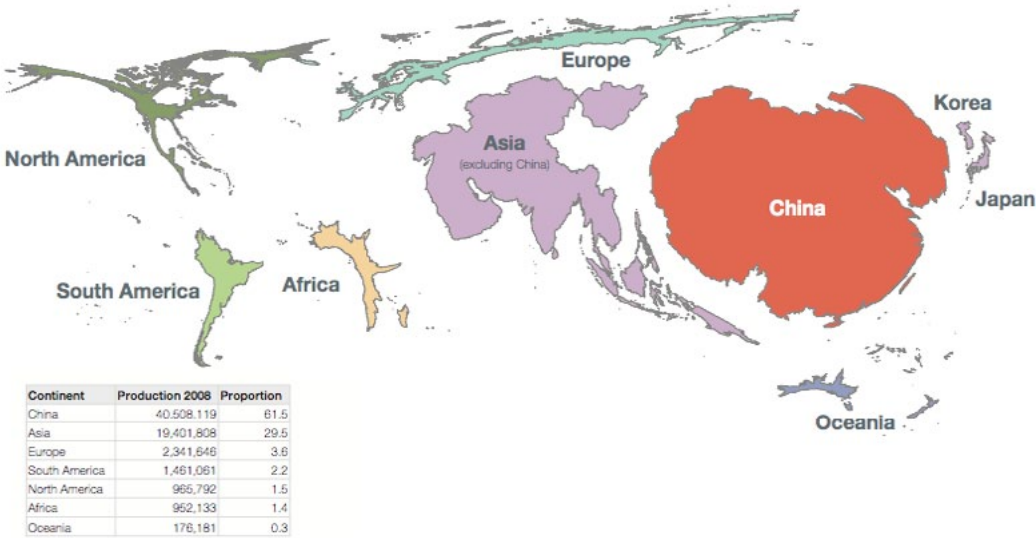
Source: FAO FishStat



## Aquaculture and Asia

Asia dominates world aquaculture production, accounting for 89 percent of it in terms of quantity. China alone is responsible for 62 percent of global aquaculture production by quantity and 51 percent by value.<sup>37</sup> The growth rate of aquaculture within the region is also high – between 2003 and 2005 annual average growth was 11.2 percent across Asia with 6 percent in China specifically, although it has slowed since then.<sup>38</sup>

Figure 9: World aquaculture production by continent in 2008 (China treated separately). Land areas adjusted proportionately to reflect production volumes.

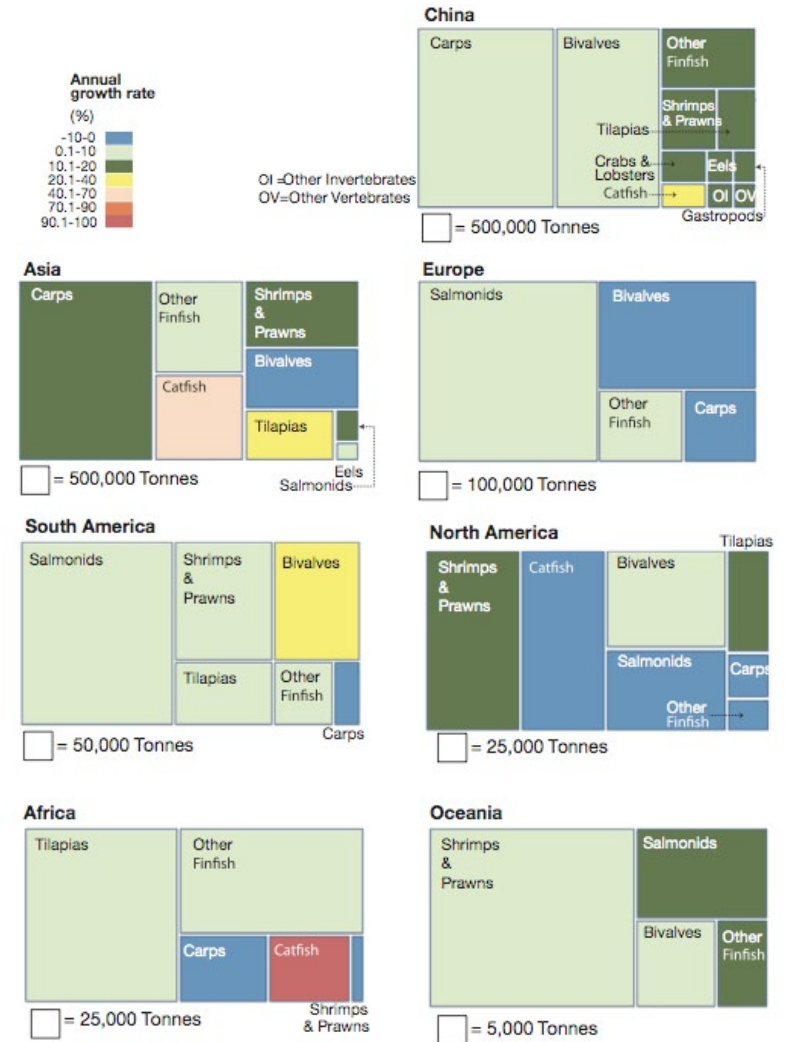


Source: Hall, S.J., A. Delaporte, M. J. Phillips, M. Beveridge and M. O'Keefe. 2011. Blue Frontiers: Managing the Environmental Costs of Aquaculture. The WorldFish Center, Penang, Malaysia.

In terms of types of aquaculture production, Asia is dominated by freshwater fish production and carp in particular. Shrimp and bivalves, such as oysters and mussels, are also significant products. Thailand, Vietnam and Indonesia in particular are significant markets for the production of shrimp.

Figure 10: Aquaculture production by continent, species and growth rate (2008 figures)

The area for each species is proportional to production. Scale is different for each map. Colour of blocks shows rate of increase from 2003 to 2008.



Source: Hall, S.J., A. Delaporte, M. J. Phillips, M. Beveridge and M. O'Keefe. 2011. Blue Frontiers: Managing the Environmental Costs of Aquaculture. The WorldFish Center, Penang, Malaysia

## The importance of aquaculture

The global population is predicted to reach 9.3 billion by 2050 and 10.1 billion by 2100 from its current status of around 7 billion.<sup>39</sup> As incomes rise in many of the world's developing countries, like China, India and Brazil, so will demand and appetite for seafood.

Given these projections, aquaculture – which as an industry is growing faster than the pace of human population growth according to the FAO – is crucial to food security. In fact, a recent study by The WorldFish Center in Malaysia concluded that from an “ecological efficiency and environmental impact perspective”, aquaculture has “clear benefits over other forms of animal source food production for human consumption”.<sup>40</sup>

However, the same study, which based its research on life cycle analysis, noted significant discrepancies in the ecological efficiency and environmental impact of farming different species of marine life. Importantly, it also found variation according to the production system used and the country farmed in, even for the same species. For shrimp and prawn production, for example, the study concluded China “is much less efficient, in relative terms, than other producer countries when considering impact on acidification, climate change and energy demand”.<sup>41</sup>

Figure 11: A comparison of environmental efficiencies across countries growing the same species group (per tonne produced)



Source: Hall, S.J., A. Delaporte, M. J. Phillips, M. Beveridge and M. O’Keefe. 2011. Blue Frontiers: Managing the Environmental Costs of Aquaculture. The WorldFish Center, Penang, Malaysia

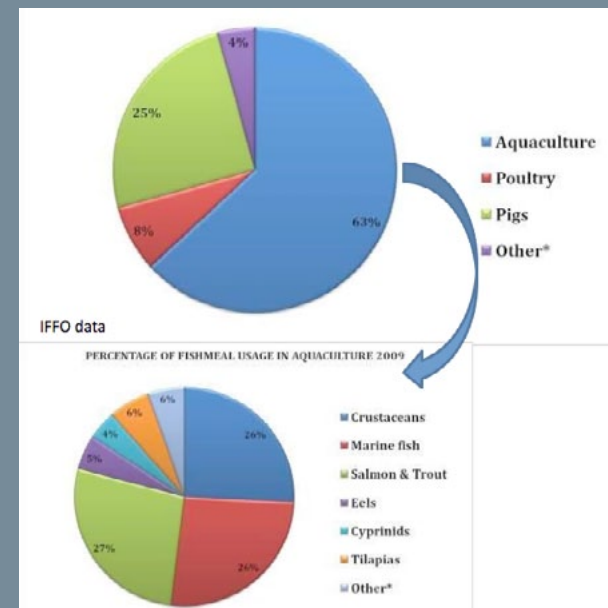
## KEY SUSTAINABILITY ISSUES IN AQUACULTURE

### Reliance on wild stocks

Much aquaculture still relies on wild fish stocks. In some cases, ‘farmed fish’ really means fish taken from the wild as juveniles and raised and fattened on farms. This is a technique called ‘ranching’ or ‘catch and grow’, which may be more unsustainable than catching adults in the wild as juveniles do not get the chance to spawn and replenish wild stocks.

Even when fish are hatched in captivity, they may still be depleting wild stocks. Many farmed fish species with the highest market demand are carnivorous, so their feed consists of wild-caught fish processed into fishmeal or fish oil. Many of these fish require several kilos of forage fish or fishmeal in feed to produce only one kilo of farmed fish, for example, farmed salmon needs 3lbs of wild fish to produce one pound of salmon and tuna needs closer to 15lbs of feed per pound produced.<sup>42</sup> In fact, as the pie chart below shows, aquaculture is the biggest single market for fishmeal usage. For this reason, Food Conversion Ratio (FCR) is one of the key areas of debate around the sustainability of aquaculture.

Figure 12: Percentage of fishmeal usage per market 2009



Source: International Fishmeal and Fish Oil Organisation, February 2011<sup>43</sup>

## Pollution and disease

Aquaculture often means raising fish in crowded, unnatural conditions, in ponds or cages or pens. As with other intensive livestock husbandry, such as poultry farming, this close proximity allows fish to pass diseases and parasites quickly between each other. In addition, intensive aquaculture has developed strategies to increase the speed of growth and reproduction by adding hormones and antibiotics to the feed. Open systems are designed to allow water to circulate from natural eco-systems, such as lakes, rivers and oceans. This is beneficial to the farm, however, it often carries diseases, parasites, antibiotics, fish waste, uneaten food and pesticides back into the wild. These by-products pollute the waterways, alter environmental conditions and frequently have a considerably detrimental effect on the local wild species.

## Escapes

Farmed fish may escape into the surrounding environment from open systems. This introduction of non-native species can impact the native individuals by out-competing them for space and food as well as introducing new pathogens and parasites.

## Loss of Habitat

Farms take up space and many aquaculture systems need to be placed in natural environments to ensure the survival of the farmed species. As a result, hundreds of thousands of acres of coastal environments have been converted to aquaculture, with mangroves being the worst hit. Coastal habitats such as wetlands, mudflats and mangroves are breeding and nursery grounds for marine and aquatic species and habitats for prey species. Development onto or close to these habitats runs the risk of physically damaging or wiping out these important parts of the ecosystem.

Figure 13: Mangrove clearance for shrimp aquaculture in Southwest Thailand



Source: Mangrove Action Project/Marine Photobank

## Investor engagement notes

With a massive increase in the demand for farmed fish, the business model behind aquaculture is set to remain strong and continue to grow in the medium to long term.

That said, there are clearly more or less responsible approaches to aquaculture production. The short-term approach, often driven purely by quick economic return, tends to focus only on the quick, maximum yield, pushing the farm to deliver the maximum in the minimum timeframe. This can result in significant local and more extensive environmental impacts. Over-crowding, reliance on antibiotics and other synthetic inputs to encourage growth and fend off disease, contamination of surrounding habitat with waste/feed/drugs – all can be symptomatic of this kind of aquaculture, the equivalent of battery farming for fish.

Other signs of an unsustainable approach in aquaculture can be a reliance on wild stocks for juveniles and fingerlings to restock the farm, and unchecked use of live fish, fish oil and fishmeal in feed.

The more responsible, long-term approach aims to strike a balance between farming and nature in order to remain consistently productive. The ultimate goal of some of the world's most responsible producers is to create a 'closed circle' eco-system, where no external inputs (or outputs) are needed and aquaculture production becomes entirely self-sustaining. This comes closest to being achieved by using a poly-cultural ecosystem-based approach and raising animals from several trophic levels, for example a larger fish alongside bi-valves and seaweed, which will mop up some of waste from the large fish.

The good news for investors is that many aquaculture producers already seem to be thinking about sustainability in some way. The analysis of 40 listed Asian companies involved in activities related to the primary production of seafood includes 15 companies active in aquaculture. Of these, only four do not mention some kind of related sustainability initiative.

Investors should question aquaculture producers on these key areas:

- Breeding/stocking programmes
- Feed ingredients
- Inputs such as medicines, antibiotics, growth promoters etc
- Management of waste-water and other by-products
- Stocking densities



Certain marine species are more adaptable to farming and – when cultivated in open water systems – place less demands on their host environment. The key attributes that determine a species' adaptability to farming are its life cycle and eating habits, which must be coupled with appropriate stocking densities. Large, slow maturing, carnivorous fish with voracious appetites like salmon and tuna are not ideal candidates for husbandry – they require large feed inputs and generate the most waste. That said, their cultivation in captivity is now a firmly established practice and the subject of continuous research to improve efficiencies.

A more considered choice of fish is the omnivorous tilapia, which is particularly well suited to husbandry. Filter feeders, like bi-valves and sea cucumbers for example, are also easily cultivated – they require the minimum of feed inputs and can be placed into an open habitat with little contamination threat. Though market demand will always be a determining factor, new aquaculture ventures should consider carefully which species to focus on.

Figure 14: Tilapia farm in Sarawak, Malaysia



Source: FAO<sup>44</sup>

Any aquaculture producer that does not include a hatchery among its facilities is relying on external sources for its supply of juvenile stock. If this external source is wild stocks (as opposed to other hatcheries), then it is impacting on marine/inland waters resources – depending on the species in question and the harvesting method, this could be a major sustainability issue. Research into captive breeding would be advised.

Certain species have large Feed Conversion Ratios (FCRs) and

require significant inputs of protein. Typically this is sourced from live forage fish, fishmeal and some fish oil. There is much research into (a) how to maximise efficient FCRs and (b) finding a substitute for wild fish in feed. Aquaculture producers should be aware of this research, if not also contributing to it themselves either through their own R&D initiatives or through direct financial support. Where fishmeal is being used, it should be sourced from responsibly managed, ideally certified, fisheries.

By definition, coastal aquaculture facilities are built in ecologically significant natural habitats. The construction of new or expanded aquaculture facilities should involve consultation with marine biologists or conservationists on how to minimise destruction of natural ecosystems. The potential for escapes, pollution or feed and antibiotic contamination should also be considered in any open system farm and steps taken to mitigate these risks.

## CERTIFICATION OF SUSTAINABLE AQUACULTURE PRODUCERS

There are now several organisations that have developed global standards and certification programmes for sustainable aquaculture producers.

One of these is the Global Aquaculture Alliance Best Aquaculture Practices (BAP) standard, developed by the US-based Global Aquaculture Alliance (GAA), formed in 1997. The GAA says of its standards: "by implementing Best Aquaculture Practices standards, program participants can better meet the demands of the growing global market for wholesome seafood produced in an environmentally and socially responsible manner."<sup>45</sup>

Described as a "primarily 'process' certification", BAP currently certifies "shrimp hatcheries, shrimp, tilapia, channel catfish, pangasius and salmon farms, feed mills and seafood processing plants" globally.<sup>46</sup> Successful certification and assurance of traceability through the supply chain allows the use of consumer-facing labels on products.



**The GAA BAP consumer-facing label**

*Source: The Global Aquaculture Alliance<sup>47</sup>*

A separate programme of standards is that currently being developed under the Aquaculture Stewardship Council (ASC), a Netherlands-based non-profit organisation established by WWF and IDH (Dutch Sustainable Trade Initiative) in 2009.

According to its website, the "ASC will be the world's leading certification and labelling programme for responsibly farmed seafood".

ASC standards are being developed through a series of species-specific 'Aquaculture Dialogues' led by WWF and involving a wide variety of stakeholders. The resultant standards will also be species-specific. Like the MSC standards for wild-catch fisheries, aquaculture producers will need to volunteer for assessment and fund the costs of the independent third-party audits. Further assessment of the chain of custody of farmed seafood products will enable the use of a consumer-facing sustainability label.

To-date, ASC standards have been developed for tilapia, pangasius, bivalves and abalone. Discussions on standards for shrimp, salmon, trout, and seriola and cobia have been complex but are progressing.<sup>48</sup>

Though different in their approach, both the GAA BAP standards and the emerging ASC standards can lead to a consumer-facing label. However, by dint of their origins, one expert from within the aquaculture industry commented that while the GAA BAP was already well-established within the US market, the ASC label was likely to get more traction with producers targeting Europe.

## SUGGESTED POLICY STEPS FOR AQUACULTURE PRODUCERS

### 'Open system' aquaculture

- Systems should be in place to minimize contamination of the surrounding ecosystem
- Conversion of ecologically sensitive marine sites, like mangrove swamps, to aquaculture farms should be prohibited
- Wastage should be minimised and dealt with to eliminate negative impact on the surrounding areas. For example, fish excrement could be used as fertilizer or feed input to an alternate crop such as seaweed or bi-valves

- Aquaculture producers, especially those using saltwater 'open systems', must demonstrate robust management systems that address appropriate stocking densities, minimal use (not routine) of antibiotics and other medicines, measures to guard against escapees and protect the surrounding environment from disease such as lice

### All aquaculture

- Companies should seek to share best practices across the industry and across geographies to lead to greater consistencies in efficiency and environmental impact
- Where relevant sustainability standards exist, for example the Global Aquaculture Alliance Best Aquaculture Practices (BAP) or Aquaculture Stewardship Council (ASC) standards, companies should seek certification
- Research into efficiency of and substitutes for fish oil and fishmeal feed stocks should be undertaken
- Where fishmeal or fish oil must be used, its use is kept to a minimum and suppliers accredited with the MSC or the 'IFFO Global Standard for Responsible Supply' (see page 53) are given preference
- Where alien species have been introduced for farming purposes, the IUCN's "Alien species in aquaculture: Considerations for responsible use", should be followed
- If the aquaculture producer operates a so-called "catch and grow" production facility which involves the harvesting of juveniles in the wild either (a) from an endangered species or (b) via an environmentally damaging harvesting method, it should stop this unsustainable practice unless it is also investing in R&D to develop a captive breeding programme
- A proportion of earnings should be channelled towards research for advancement on all of the above points





## Best practice example

### CASE STUDY: REGAL SPRINGS; A LEADER IN SUSTAINABLE TILAPIA FARMING

Regal Springs began with one small tilapia farm in a remote location on the Indonesian island of Java in the 1980s. From small beginnings it has grown to become the largest vertically integrated tilapia producer in the world, with total annual production around 70,000 tonnes of live fish and farms in Honduras, Mexico and Indonesia.

It is also a market leader on the issue of sustainable aquaculture, and led the tilapia stream of the recent WWF-led Aquaculture Dialogues. Following the close of the tilapia dialogue, it was the first tilapia producer to be audited against the resultant International Standards for Responsible Tilapia Aquaculture (ISRTA), which will in time fall under the jurisdiction of the Aquaculture Stewardship Council (ASC). Regal Springs' Honduras farms received approval for certification in November 2010, with the Indonesian farms following suit in January 2011.

In fact, says Martin Sukkel, COO of Regal Springs, some of the ISTRA guidelines on best practice in water treatment have been based on a water quality monitoring programme the company had designed and implemented six years ago in Honduras and five years ago in Indonesia. In effect, Regal Springs became a case study used by the stakeholders in the tilapia dialogue.

This is not surprising when you consider sustainability has been a core tenet of its business model from the outset. In fact Regal Springs specifically chose to farm tilapia – at the time a little-known fish with no commercial market – precisely because it could be easily adapted to efficient farming. Tilapia, otherwise known as St. Peter's Fish, is a low-fat, high protein, inexpensive and versatile fish with many health benefits.

That the emphasis on sustainability has not waned since inception is down to three key factors, says Sukkel. Firstly, Regal Springs farms its tilapia in public bodies of water (such as Lake Toba in Indonesia), so in Sukkel's words the company has an obligation to make sure the community is "happy to have it there". Community outreach therefore forms a part of Regal Springs' mandate – it invests heavily in local communities, through practices such as operating ambulance services, supporting teacher's salaries, providing books and other teaching materials, assisting with potable water supply and electrification, and organising and implementing re-forestation.

Secondly, Regal Springs has a vested interest in maintaining the purity and environmental health of the water it farms in. As Sukkel points out, farming in cages in an open body of water means any contamination of the surrounding ecosystem will ultimately come back to bite the company by impacting the quality of their tilapia product.

Thirdly, Sukkel says that unlike many aquaculture producers operating in similar regions, privately owned Regal Springs' shareholders have always envisioned it to be a long-term, sustainable business model. "Sustainability is for us not just a thought or desire. It is an everyday business practice and when you think long term, it is the only profitable practice," he states.

This belief is borne out across the company's business practices – for example, in the creation of synergies wherever possible. Food Conversion Ratio (FCR), the number of kilos of feed needed to produce one kilo of live fish, is one of the thorny issues of aquaculture, especially as much of the feed input in the industry tends to be fishmeal or fish oils produced from wild caught forage fish.

Tilapia are naturally omnivorous to herbivorous and therefore need less fish-based feed than many other farmed species, typically only receiving it in the "grow out" phase, when juveniles mature to adults. The ISTRA mandates the use of less than 800 grams of wild fish per kilo of live tilapia produced and stipulates that the feed supplier should also have a sustainable sourcing policy in place to ensure the overall sustainability of the feed supply chain.

At Regal Springs, the quantity of fishmeal used in the grow-out phase is roughly equalled by the amount produced from fish off-cuts and waste at the slaughter stage – although this must be sold to other species aquaculture producers and cannot be used by Regal Springs itself. At a processing plant in Sumatra, residual heat from freezers and coolers is used to produce fish oil from by-products. This fish oil is then used as a fuel to power the boiler in the feed factory, creating energy efficiencies.

The next step for Regal Springs will be to seek ISRTA certification for its chain of custody later this year. Should this be forthcoming, Regal Springs tilapia products will be among the first in the world to carry the ASC consumer sustainability logo – something Sukkel believes will grow to be a valuable marketing tool, especially in Europe.



# FISH PROCESSORS AND WHOLESALERS

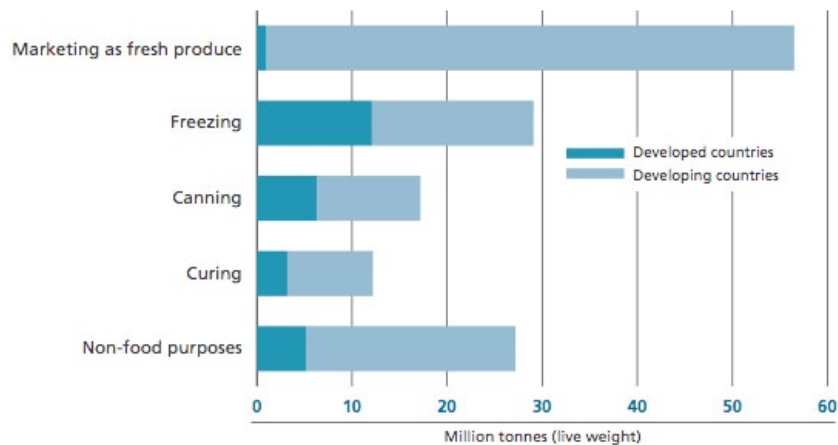


Source: Kieran Kelleher/Marine Photobank

After harvesting, processors and wholesalers are the next link in the chain before wild caught and farmed fish and seafood continue on the journey to the end consumer.

According to the FAO, over 80 percent (equivalent to 115 million tonnes) of global fish production was used for human consumption in 2008. Of the portion of catch not eaten by humans, 76 percent was processed into fishmeal and fish oil, with the remainder sold live as aquarium fish, used as bait or as live feed for aquaculture and other animal husbandry, or used for pharmaceutical applications.<sup>49</sup>

Figure 15: Use of world fisheries production (breakdown by quantity), 2008



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

Of the fish destined for human consumption in 2008, around 50 percent reached the market as live and fresh fish, 25 percent as frozen fish, 15 percent as 'prepared' or preserved, and around 10 percent as cured.<sup>50</sup>

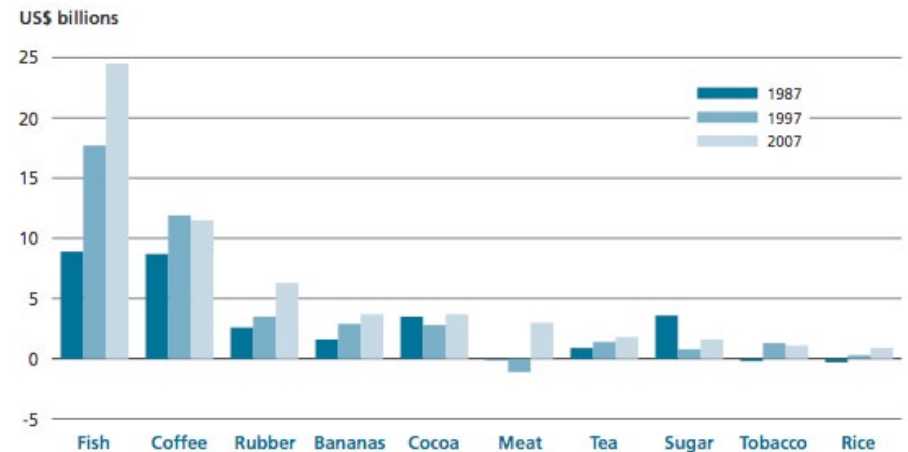
Globally, an increasing proportion of caught fish is being processed, rather than eaten fresh. Around half of all processing is by freezing. Between 1998 and 2008 the quantity of seafood processed for human consumption rose to 58.6 million tonnes from 46.7 million tonnes.<sup>51</sup>

## Processing, wholesalers and Asia

As a region, Asia is among the world's top producers and consumers of fish and seafood. In 2008 Japan was the world's single largest importer of fish and seafood, importing a total of almost 15 million tonnes.<sup>52</sup>

In the past few decades, Asia – and especially China – has also become important as one of the world's top processing regions, regardless of where the fish was actually caught. As global trade in fish and seafood has increased, basic processing like filleting and de-heading has migrated to developing countries where labour is cheaper, like much of the world's manufacturing processes. This has made certain Asian countries and other developing nations substantial net exporters of fish – even above other important agricultural commodities.

Figure 16: Net exports of selected agricultural commodities by developing countries



Source: The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

## Investor engagement notes

The key sustainability issue for the processing and wholesale industries is the source of the input fish and seafood.

Many of the large aquaculture producers and large Asian fishing companies have vertically integrated value chains including processing and distribution. Consequently, improvement in the sustainability of the source seafood for processors and wholesalers will be driven primarily by action taken at the harvesting and production levels of associated businesses, though not all of the supply will come from internal sources.

For other processors and wholesalers, which purchase fish to sell on at a higher price after 'adding value', there is more flexibility in sourcing options and therefore more room to make sustainable choices. Processors and wholesalers that can prove their credentials in ensuring traceability is maintained in the supply chain for sustainably harvested fish will be well-positioned going forward for three reasons: (1) the proportion of the annual seafood harvest that is certified as sustainably sourced is growing; (2) stocks of many unsustainably harvested species are declining; and (3) consumer demand for sustainably sourced seafood is increasing. Certification is expected to command a price premium, which can then be passed back through the entire supply chain.

A second sustainability issue for processors is wastage. The more parts of the fish that can be used for some purpose the more sustainable and efficient the processing system becomes.

A common usage of by-products from processing for human consumption is as input material for fishmeal and fish oil production. In fact, according to the International Fishmeal and Fish Oil Organisation, in 2008 the proportion of input product to the fishmeal and fish oil manufacturing process coming from fish by-products stood at 25 percent.<sup>53</sup>

However, as this excerpt from the FAO publication 'The state of world fisheries and aquaculture 2010' shows, fish by-products have multiple other usages:

"Chitin and chitosan obtained from shrimp and crab shells have a variety of uses, such as in water treatments, cosmetics and toiletries, food and beverages, agrochemicals and pharmaceuticals. Fish skin is used as a source of gelatine as well as leather in making clothing, shoes, handbags, wallets, belts and other items. Larger fish are more suited to leather production owing to the size of the skins. Common sources of leather include shark, salmon, ling, cod, hagfish, tilapia, Nile perch, carp and seabass. Shark cartilage is used in many pharmaceutical preparations and reduced in powder, creams and capsules, as are other parts of sharks, e.g. ovaries, brain, skin and stomach. Fish collagen is used in the pharmaceutical industry, as are carotenoids and astaxanthins – pigments that can

be extracted from crustacean wastes. Fish silage and fish protein hydrolysates obtained from fish viscera are finding applications in the pet feed and fish feed industries."<sup>54</sup>

An important caveat to this is that while maximum usage of by-products from seafood production makes the processing industry more sustainable in and of itself, maximum usage of by-products from *sustainably sourced* seafood production is the ideal goal.

The creation of increased efficiencies from processing requires sophisticated technologies. However, investments into technological upgrades could potentially be rewarded by the sales of the resultant fish by-products.

## CERTIFICATION OF PROCESSORS AND FISHMEAL AND FISH OIL MANUFACTURERS

Depending on the sustainability credentials of the fish being processed, there are several certification schemes that can apply to processors and fishmeal and fish oil manufacturers.

As a vital link in the supply chain of sustainable seafood, processors can be assessed under the 'MSC chain of custody standard for seafood traceability' (see page 29), or as a follow-on to farm-level certification of the various aquaculture standards (see page 45). Only once traceability through the supply chain has been guaranteed are fish products from certified fisheries or farms able to use a consumer-facing sustainability logo.

The 'IFFO Global Standard for Responsible Supply' (IFFO RS) is a sustainability standard specific to fishmeal and fish oil production. The standard was developed by the UK-based International Fishmeal and Fish Oil Organisation (IFFO) in response to "a need for industry to demonstrate its commitment to the responsible sourcing of raw materials and the safe production of ingredients for aquaculture, agriculture and directly in the production of consumer products". According to a statement on IFFO's website, part of this need was derived from "concerns of the origins of 'trash fish' and also of the legality of catches used in the supply of fishmeal and fish oil".<sup>55</sup>

Like similar certification schemes, assessment for the IFFO RS is undertaken by an independent third party and successful certification allows the use of a logo.



The IFFO RS label

Source: IFFO<sup>56</sup>

## SUGGESTED POLICY STEPS FOR FISH WHOLESALERS, PROCESSORS AND MANUFACTURERS OF FISHMEAL

### Sourcing

- Sources with external certification of sustainability, for example ASC or MSC certified, are given first priority and processors and wholesalers themselves show willing to undertake assessment for traceability certification
- No CITES or IUCN listed fish are bought or traded
- Black-market fish from IUU fishing are not bought
- Undersize/juvenile fish are not bought

### Processing

- Wastage is minimized – all parts of the fish that can find a market are used

### Fishmeal and fish oil manufacture

- Trimmings from other fish production processes are given priority as input material over whole fish

In 2010, the company target was to be able to offer a sustainably sourced option for 75 percent of its traded species. In its 'Sustainability Review 2011', it announced it had surpassed that target, hitting 90 percent.<sup>58</sup>

In its sustainability goals for 2011, Anova includes increasing market penetration in sustainable fish and certifying its products to recognisable sustainability standards.

In one sustainability initiative, Anova has partnered with WWF in Indonesia on a project named 'Fishing and Living'. Part of the WWF's Coral Triangle Seafood Savers scheme (see page 105), the project is a fisheries improvement scheme focused on securing the sustainable supply of yellowfin tuna from local fishermen. Fishermen in the scheme use hand lines and are taught to fish more selectively and care for their catch better, protecting its market value. The eventual aim of the project, as with many of the fisheries under the Seafood Savers scheme, is to secure MSC certification.<sup>59</sup>

### Best practice case study

#### CASE STUDY: ANOVA SEAFOOD

Dutch company Anova Seafood is a privately owned seafood wholesaler supplying fresh and frozen seafood to retail and food service buyers in Europe and North America. It sources a wide variety of species globally, from wild capture fisheries and aquaculture producers alike.

Anova is a market leader on sustainable sourcing and states its corporate policy as "sustainability" on its website, adding:

"The greatest crime against our future is to fish a species to extinction. Whether we source our products from natural stocks or set up controlled fish farms to manage supply, our vision is firmly set on the future. Not only from a moral commitment, but also because it makes sound business sense. Without fish, we have nothing."<sup>57</sup>





# COMPANY ANALYSIS

## Introduction

We examined the public disclosure on marine sustainability issues of 40 listed companies with total annual seafood-related revenues of USD38 billion. These companies, from eight Asian markets, all have a direct involvement in fishing, fish farming and/or seafood wholesale and processing.

These included some of Asia's (and the world's) largest fishing companies, such as Hong Kong-listed Pacific Andes Resources, Vietnam's Minh Phu Seafood Group, Thailand's Thai Union Frozen Products, and Japan's Nippon Suisan Kaisha and Maruha Nichiro Holdings. It also included some much smaller companies, including Malaysia's Borneo Aqua Harvest, which derives revenues of only around USD9.5 million from its aquaculture activities.

For each company we noted the principal shareholders, key seafood-related business activities, portion of overall revenues derived from these, key marine species involved and – where possible – harvesting methods used. We then recorded future growth drivers and investment plans, marine sustainability initiatives, and any other sustainability disclosure. We have used selective colour coding to highlight noteworthy disclosure items to investors: red denotes unsustainable target species or harvesting methods, while green shows target species or harvesting methods considered to be more sustainable.

We then overlaid commentary highlighting any notable areas of concern to responsible investors with regards to sustainability based on the company's disclosure. Where appropriate, we suggest possible steps the company should consider taking to improve its approach to marine sustainability.

China Fishery Group	CFG SP	540	Wild capture fishing Seafood processing Seafood wholesale Manufacturer of fishmeal and fish feed
China Ocean Resources	900050 KS	180	Wild capture fishing Seafood wholesaler
CNFC Overseas Fishery	000798 CH	49	Wild capture fishing Seafood processing Import/export of fishing equipment
Chuo Gyorui	8030 JP	2200	Seafood wholesaler and supplier to food service sector
Dalian Yi Qiao Marine Seeds	002447 CH	31	Aquaculture Seafood processing
Dalian Zhangzidao Fishery Group	002069 CH	350	Aquaculture Seafood processing and sales
Dong Won F&B	049770 KS	940	Seafood processing
Dong Won Fisheries	030720 KS	91	Wild capture fishing Seafood processing
Hansung Enterprise	003680 KS	230	Wild capture fishing Seafood processing
Hohsui Corporation	1352 JP	470	Seafood wholesaler and provider of cold storage Aquaculture joint venture
Kyokuyo	1301 JP	2100	Wild capture fishing Ranching Import/export and seafood wholesaler Seafood processing
Maruha Nichiro Holdings	1334 JP	3600	Wild capture fishing Ranching Aquaculture joint venture Seafood processing Seafood wholesaler
Maruichi	8228 JP	1400	Seafood processing
Minh Phu Seafood Group	MPC VN	220	Aquaculture Seafood processing
Mitsubishi Corporation	8058 JP	1600	Seafood procurement and trade Seafood processing Seafood logistics
Nichimo	8091 JP	1000	Import and seafood wholesaler Supplier of fishing and fish farming equipment

Company	Ticker	Fishing/ seafood related revenue* (approx USDm)	Seafood-related business activities:
Asian Seafoods Coldstorage	ASIAN TB	Not disclosed	Seafood processing and export
Borneo Aqua Harvest	BORN MK	9.5	Aquaculture
Central Proteinaprima	CPRO IJ	730	Aquaculture Seafood processing Manufacturer of shrimp and fishmeal
Charoen Pokphand Foods	CPF TB	1700	Aquaculture Seafood processing and export Manufacturer of fishmeal and fish feed

Nichirei Corporation	2871 JP	840	Aquaculture Seafood processing
Nippon Suisan Kaisha	1332 JP	6500	Seafood procurement Seafood processing Aquaculture Ranching Manufacturer of fishmeal and fish feed
Oceanus Group	OCNUS SP	120	Aquaculture Seafood processing 70% interest in restaurant franchise subsidiary
OUG Holdings	8041 JP	4200	Ranching Aquaculture Seafood wholesaler Restaurant operator
Oyang Corporation	006090 KS	120	Wild capture fishing Seafood processing
Pacific Andes Resources Development	PAH SP	950	Wild capture fishing Procurement, transportation and logistics Seafood processing Manufacturer of fishmeal and fish feed
Pakfood PLC	PPC TB	250	Procurement Seafood processing
Sajo Industries	007160 KS	230	Wild capture fishing Seafood processing
Sajo Seafood	-	Undisclosed	Wild capture fishing Seafood processing Sashimi restaurant franchise
Sajodaerim Corporation	003960 KS	110	Wild capture fishing Seafood processing Seafood wholesaler
Shandong Homey Aquatic Development	600467 CH	69	Wild capture fishing Aquaculture Seafood processing
Shandong Zhonglu Oceanic Fisheries	200992 CH	65	Wild capture fishing Seafood processing Cold storage provider
Shanghai Kaichuang Marine International	600097 CH	90	Wild capture fishing Supplier of fishing equipment
Silla	004970 KS	220	Wild capture fishing Seafood wholesaler Sashimi restaurant operator Seafood processing

Sojitz	2768 JP	Partly disclosed	Aquaculture Ranching Cold storage provider
Thai Union Frozen Products	TUF TB	2400	Seafood procurement Seafood processing and export Manufacturer of fishmeal and fish feed
Tohto Suisan	8038 JP	1800	Seafood wholesaler
Tsukiji Uoichiba	8039 JP	1100	Seafood wholesaler Cold storage provider
Yokohama Reito	2874 JP	1100	Seafood procurement Seafood processing Cold storage provider
Zhanjiang Guolian Aquatic Products	300094 CH	190	Aquaculture Seafood processing Fishmeal and fish feed manufacturer

\* Source: Company disclosures. USD translation as at 18 August 2011

### Key findings

- Surprisingly, of all 40 companies, only Thai Union Frozen Products could be considered to have a publicly disclosed sustainability policy related to its seafood-related business activities
- Though many of the companies make some reference to marine sustainability on their websites or in their annual report, over half (24 out of the 40 companies) make no mention of it at all
- On the whole, aquaculture producers have greater disclosure on sustainability, and stronger sustainability initiatives in place, than companies involved in wild capture fishing. Of 16 companies directly involved in wild capture fishing, only a quarter disclose related sustainability initiatives. In contrast, of 15 companies involved in aquaculture productions, only four have no disclosure on related sustainability initiatives
- Of utmost concern is that 22 companies in our universe disclose tuna species included on this year's IUCN red list of threatened species as being among their key products
- Twelve out of the 16 companies directly involved in wild capture fishing target these particular tuna species



# COMPANIES

- In terms of regional variation, all eight South Korean companies and ten out of 14 Japanese companies included in our analysis target threatened tuna species
- Five companies of the 40 covered disclose bluefin tuna farming (ranching) among their business activities. Of these, only one, Japan's Maruha Nichiro Holdings, mentions investment into R&D to develop tuna breeding in captivity
- In terms of fishing methods used, trawling, purse seining and long-lining dominate, all of which are generally considered to be destructive and indiscriminate - though methods exist to mitigate by-catch for long-lining. Not one of the 12 companies directly involved in fishing for high-value tuna discloses the use of pole and line fishing, considered to be the most sustainable catch method
- Seven of the 16 companies directly involved in wild capture fishing mention plans to upgrade or expand their fishing fleet as an investment to drive future growth. Only two of these companies do not target sensitive species of tuna. None of them mention the adoption of more sustainable fishing methods as part of their fleet upgrade
- Several of the 16 companies directly involved in wild capture fishing appear to be fishing sustainable stocks from MSC-certified fisheries. However, only one company, China's Pacific Andes Resources, mentions MSC certification of its fisheries on its website
- Four of the 15 companies involved in aquaculture production mention the receipt of some kind of sustainability certification on their websites

NOTE: Bloomberg is the source for listed companies information relating to overall revenue, market cap and major shareholders in the following company assessments.

<b>Asian Seafoods Coldstorage</b> <b>Ticker:</b> ASIAN TB <b>Country:</b> Thailand <b>Market Cap:</b> USD 52m		<b>Overall revenue:</b> FY 2010 THB 10.2bn (USD 340m)  <b>Fishing/seafood-related revenue:</b> Not disclosed
<b>Major Shareholders:</b> Amornrattanachaikul Somsak (44%), Capital Rice Co Ltd (15%), Amornrattanachaikul Somchai (13%)		
<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>• Production and processing of frozen seafood products</li> <li>• Export of processed seafood products</li> </ul>		<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>• A.S.S. BRAND</li> <li>• T.C.C. BRAND</li> <li>• IQF SAKURA BRAND</li> <li>• CHAIYO BRAND</li> <li>• Asian Seafoods Coldstorage (Suratthani) Co., Ltd. Asian Feed</li> </ul>
<b>Future drivers for growth and investment:</b> <ul style="list-style-type: none"> <li>• The company views the rising cost of raw materials as a challenge to its bottom line, but does not indicate steps it is taking to mitigate or move beyond the problem</li> </ul>		
<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>• <b>Black Tiger Shrimp</b></li> <li>• Sillago fish</li> <li>• Whiting fish</li> <li>• Cuttlefish</li> <li>• Squid</li> <li>• Octopus</li> <li>• Clam</li> </ul>		
<b>Marine sustainability initiatives:</b> None disclosed		<b>Other sustainability disclosure:</b> None disclosed
<b>NOTES FOR RESPONSIBLE INVESTORS:</b> <b>Seafood sustainability policy on website?</b> No <b>Relevant policy notes:</b> Fish wholesalers, processors and manufacturers of fishmeal There is no information disclosed on the Asian Seafoods Coldstorage website about how any of the species they use in their products are farmed or fished. Black Tiger Shrimp, for example, are rarely harvested sustainably: if farmed, the fry are typically caught from the wild, and if wild-caught, then the bottom-dredging process used to catch them is damaging to the seabed. Asian Seafoods Coldstorage's overall lack of transparency on sourcing makes analysis of business risks from sourcing problematic. Improving the traceability of seafood procured and produced would be an obvious first step towards improvement.		



<b>Borneo Aqua Harvest</b>	
<b>Ticker:</b> BORN MK	<b>Overall revenue:</b> FY2011 MYR 28.2m (USD 9.5m)
<b>Country:</b> Malaysia	<b>Fishing/seafood-related revenue:</b> USD 9.5m (100% of total)
<b>Market Cap:</b> USD 50m	
<b>Major Shareholders:</b> Fui Ming Lo (28%), Leong Kam Heng (12%), Lembaga Tabung Haji (8.5%), Joymore Capital Inv Ltd (6.4%)	
<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>Integrated marine aquaculture holding company based in Sabah. It has four wholly-owned subsidiaries involved in marine fish broodstock management, research and development (R&amp;D), breeding, hatching, rearing, production of live feed, marketing, transportation of live fish and distribution</li> </ul>	<ul style="list-style-type: none"> <li>Four wholly owned subsidiaries: Plentiful Harvest Sdn Bhd, Marine Terrace Sdn Bhd, Salient Horizon Sdn Bhd, and Well Sky Logistics Ltd</li> </ul>
<b>Future growth drivers and investment plans:</b>	
<ul style="list-style-type: none"> <li>The company plans to broaden its fish species base through research.</li> <li>It plans to add to its existing 1300 broodstocks of over 20 high value species.</li> <li>It plans to continuously expand and improve its <b>hatching, rearing and breeding</b>-related facilities and capacities to facilitate increases in sales volume.</li> <li>It has not indicated any plans for expansion beyond Sabah</li> </ul>	
<b>Key seafood species and catch methods (if disclosed):</b>	
<ul style="list-style-type: none"> <li><b>Coral Trout Grouper</b></li> <li><b>Brown marbled Grouper</b></li> <li>Humpback Grouper</li> <li>Coral Rockcod Grouper</li> <li>Barrel-Cheek Coral Trout</li> <li>Tomato Rockcod Grouper</li> <li><b>Camouflage Grouper</b></li> <li><b>Giant Grouper</b></li> <li>Malabar Red Snapper</li> <li>Cross-bred species:</li> <li>Sabah Giant Grouper</li> <li>Sabah Coral Rockcod</li> <li>Sabah Giant Camouflage Grouper</li> <li>Sabah Giant Rockcod</li> <li>Sabah Camouflage Grouper</li> <li>Other species of broodstock:</li> <li>Humpback/Baramundi cod grouper</li> <li>Chinese footballer</li> <li>Potato Cod Grouper</li> <li>Speckled Blue Grouper</li> <li>Speckled Yellow Grouper</li> <li>Speckled White Grouper</li> <li>Estuary Cod</li> <li>Humphead Maori Wrasse</li> <li>Maori Seaperch</li> <li>Star Snapper</li> <li>Asian Sea Bass</li> </ul>	
<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
<ul style="list-style-type: none"> <li>Certified by SPLAM, a voluntary scheme managed by the Department of Fisheries, Malaysia with the purpose of promoting responsible and eco-friendly aquaculture practices</li> <li>The above mentioned scheme is also compliant with the Aquaculture's Code of Practice (COP) and Good Agricultural practices (GAqP), as determined by the Malaysian Department of Fisheries</li> </ul>	<ul style="list-style-type: none"> <li>Offers opportunities to fresh graduates from Malaysian universities to undergo training at its hatchery, nursery and rearing centres.</li> </ul>

## NOTES FOR RESPONSIBLE INVESTORS:

### Seafood sustainability policy on website? No

### Relevant policy notes: Aquaculture producers

Borneo Aqua Harvest is doing some very interesting R&D work in the area of fish breeding. One of the concerns with aquaculture is the reliance on wild-caught juveniles to stock and restock farms. However, Borneo Aqua Harvest is breeding a number of fish species from captive broodstock, which removes the need to deplete wild stocks.

There is still a need for increased transparency around certain other aspects of the farming process, which can also be cause for concern in aquaculture production. The company does not disclose what feed is used for the growing fish, its use of chemicals or antibiotics, or the treatment of waste-water. Neither does it disclose how it prevents escapes of bred fish into the wild. All these processes could be polluting the natural wildlife around the farm - wildlife that, as acknowledged by the company, is particularly ecologically important due to its proximity to the Coral Triangle.

## Central Proteinaprima

**Ticker:** CPRO IJ

**Country:** Indonesia

**Market Cap:** USD 250m

### Overall revenue:

FY2010 IDR 6200bn (USD 740m)

### Fishing/seafood-related revenue:

USD 730m (99% of total revenue)

**Major Shareholders:** PT Surya Hidup Satwa (23%), PT Pertiwi Indonesia (9.5%), Red Dragon Pte Ltd (6.7%)

### Seafood-related business activities:

- Aquaculture: shrimp production
- Shrimp processor
- Manufactures shrimp and fish feed
- Manufactures shrimp and fish probiotics

### Key seafood-related brands and subsidiaries:

- Bird River
- Ocean's Pride

### Future growth drivers and investment plans:

- Over 100,000 ha of land available for future shrimp farming expansion
- Developing higher value ready-to-serve packages for consumer markets

### Key seafood species and catch methods (if disclosed):

Shrimp farming in ponds

### Marine sustainability initiatives:

- Produces 100% antibiotics-free shrimp in closed water management system with low flushing rate ~3-5% and modular pond layout
- Strict policy of Specific Pathogen Free (SPF) and Specific Pathogen Resistant (SPR) shrimp fry stocking with shrimp breeding and harvesting in 120-day cycles
- CP Prima employs non-lethal predator controls and devices to ward off potential predators
- At year-end 2009, CP Prima had re-planted 3,220 hectares of mangroves, of a total targeted area of 5,200 hectares by 2011. This is part of the Company's green belt restoration efforts
- Aquaculture Certification Council certifies that CPB has been implementing responsible shrimp culture across the supply chain (from hatchery to farm and through out the processing plant)

### Other sustainability disclosure:

- GLOBALGAP certificate is based on the principles of risk prevention, risk analysis and HACCP, sustainable agriculture by means of Integrated Pest Management (IPM) and Integrated Crop Management (ICM), using existing technologies for the continuous improvement of farming systems
- All of CPB's farmers, employees and their families live on-site at the Company's facilities which include primary and secondary schools for children, healthcare clinics, places of worship, civic centers, provisionary stores, recreational facilities, banking service and a police station



**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers

Formerly the world's largest shrimp producer, CP Prima has struggled since 2009 to bounce back from an outbreak of the deadly myonecrosis virus, which decimated its stocks and caused it to default on debt repayment. The spread of the disease has been attributed by some sources to its "old-fashioned" open pond farming system.<sup>150</sup> Most recently, the company has been reported in the media as being on track to recovery in terms of virus control, volumes of shrimp produced and therefore financial performance.<sup>151</sup> Curiously, there is no mention of this in English on the company's website. The company does, however, mention the "upgrading" of its infrastructure, and now states of its farming methods: "A closed water management system and modular ponds layout allows CP Prima to isolate each pond into an operating unit of its own. This mitigates against diseases spreading or contamination of one pond from another."

CP Prima's website shows the company has many initiatives in place to avoid the environmentally damaging pitfalls of shrimp farming. It breeds shrimp from captive bred populations, thereby eliminating reliance on wild stock. It uses closed cycle system ponds to reduce pollution of natural habitats and is attempting to restore previously damaged sensitive mangrove habitats. It uses SPF and SPR shrimp fry and non-lethal predator controls. CP Prima has also sought advice and confirmation of sustainable aquaculture practices from expert groups such as the Aquaculture Certification Council and GLOBALGAP. Avoiding the use of antibiotics – even though disease has been an issue in the past – is also positive from a health perspective.

**Charoen Pokphand Foods**

**Ticker:** CPF TB

**Country:** Thailand

**Market Cap:** USD 8.1bn

**Overall revenue:**

FY2010 THB 190bn (USD 6.3bn)

**Fishing/seafood-related revenue:**

USD 1.7bn (27% of total)

**Major Shareholders:** Charoen Pokphand Group (43%), Thai NVDR Co Ltd (5%)

**Seafood-related business activities:**

- Aquaculture of both fish and shrimp
- Production and distribution of various forms of shrimp and fish feed such as concentrate, powder and pellet
- Production of fresh and frozen seafood products
- Distribution & export of seafood products

**Key seafood-related brands and subsidiaries:**

- 98 subsidiaries which manage brands such as:
- CP Freshmart
  - Five Stars
  - CP

**Future growth drivers and investment plans:**

- Future growth appears primarily centered around expansion of overseas agricultural operations, particularly poultry and swine.
- In seafood, it appears to be looking to increase exports to North America and the EU, particularly of shrimp products.
- Domestically they appear to be making ongoing investments into their in-house R&D projects focused on breeding varieties of livestock and fish/shrimp both for their own production purposes and for sale to third party producers

**Key seafood species and catch methods (if disclosed):**

- Vannamei White Shrimp (farmed)
- Tubtim fish, developed by CPF from Tilapia (farmed)
- Morakot fish, developed by CPF from Pangasius (farmed)
- Yok fish developed by CPF from grouper (farmed)

**Marine sustainability initiatives:**

- Closed farming system used
- No antibiotics are used at any stage of production
- Successfully developed a pilot shrimp farming system that prevents salt water permeating into nearby rice paddy, and has minimum effect on the neighboring eco-system
- Mangrove Planting and Community Reforestation Project. According to its website, the company has been supporting the mangrove planting activities of university students, shrimp farmers, and Office of Wetlands International in Thailand for over 18 consecutive years

**Other sustainability disclosure:**

- Use of biogas and other alternatives to power their production process. Use of alternative energy has increased from 12% in 2008 to 24% in 2010

**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers

Charoen Pokphand Foods' business model suggests the company breeds shrimp from captive broodstock, however, this is not clarified on its website. If it does, this could relieve pressure on shrimp populations in the wild. If not, this product could be having a detrimental impact on the environment. Charoen Pokphand Foods could be more transparent on this subject in order for stakeholders to better understand the issues.

More clarity would also be welcomed on its R&D projects, specifically, if it is further investing in breeding or just rearing of captive shrimp. It uses closed farming systems, does not use antibiotics and prevents salt-water from leaking into neighbouring farms. These are all good practices as are the mangrove planting and the biogas initiatives. However, there is no formal sustainable seafood policy discussed and the method of breeding new fish sub-species is also not disclosed – CPF should state whether it has simply used selective breeding methods, or whether it has instead genetically modified any species.

There are social considerations in addition to the environmental ones. Thailand's shrimp industry has come under fire for involvement in a range of social issues, including child labour, poor health and safety standards and undermining the physical security of coastal communities through mangrove deforestation.

Investors may wish to question the company relating to improved disclosure as well as their possible involvement in such controversial activities. From an environmental perspective, the company' practices are strong, so there could be good marketing potential relating to sustainability with very little extra effort by the company.

**China Fishery Group**

**Ticker:** CFG SP

**Country:** China (listed in Singapore)

**Market Cap:** USD 930m

**Overall revenue:**

FY2010 USD 540m

**Fishing/seafood-related revenue:**

North Pacific trawling: USD 390m (72%)  
South Pacific trawling: USD 17m(3.2%)  
Peruvian fishmeal: USD 130m(25%)

**Major Shareholders:** Pacific Andes Resources Group, Carlyle Asia Partners III LP (11%)

**Seafood-related business activities:**

- Deep-sea fishing
- Fish processing for human consumption
- Fish processing to make fishmeal and fish oil
- Fish wholesale

**Key seafood-related brands and subsidiaries:**

N/A

**Future growth drivers and investment plans:**

- During the South Pacific non-fishing season, the Group plans to deploy its South Pacific fleet to Mauritania – a fishing ground in Africa rich in target species such as horse mackerel and sardines, to further enhance fleet utilization
- Sees growth in global demand for fish as a protein source as a driver for both its fishing and fishmeal businesses



**Key seafood species and catch methods (if disclosed):**

- Alaska Pollock
- Jack Mackerel
- Hake
- Halibut
- Pacific Cod
- Pacific Herring
- Anchovy – for fish meal
- Squid
- Sole

**Marine sustainability initiatives:**

- Company formed a Corporate Social Responsibility Advisory Committee in 2010, stating in its annual report: “With the establishment of the Corporate Social Responsibility Advisory Committee, the Group will monitor and enhance its operations to support marine sustainability, environmental best practices and safe food practices. It will also endeavour to set higher standards in sustainable practices for the industry as a whole”

**Other sustainability disclosure:**

None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:****Seafood sustainability policy on website?** No**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

China Fishery Group (CFG) discloses a fleet of supertrawlers and purse seiners on its website. Purse seining, used by CFG to catch anchovies for its Peruvian fishmeal business, is known generally to produce unsustainable levels of by-catch. It is stated on CFG’s website that its trawlers are mid-water trawlers, which is a lot less destructive than bottom trawling as it does not inflict damage on the seabed, although by-catch can still be considerable. However, certain of CFG’s key species, such as sole (which is highlighted by Greenpeace as a fish to avoid) are typically bottom dwellers, implying the use of bottom trawling in harvesting. Mackerel, herrings, and sardines meanwhile are pelagic fish usually caught using mid-water trawling. Additionally, these species are generally considered to come from unthreatened stocks and therefore have a higher level of sustainability.

More information is needed about the deployment of the South Pacific supertrawler fleet to Mauritania during the South Pacific non-fishing season. The wording suggests CFG has purchased access to the fishing grounds within the African country’s EEZ from the government. Though legal, this type of agreement between large corporates or developed countries and developing countries has in the past been linked with over-fishing of the developing country’s stocks, leading to a loss of livelihood and food source for the local population. In Somalia, this led to the explosion in piracy, as local fishermen were left with no source of income. Further disclosure is required to understand CFG’s access rights to Mauritanian waters, the stock levels there and its plans to fish responsibly in those waters. In June 2010, private equity investor The Carlyle Group invested USD190m in China Fishery, resulting in a holding of around 13.6% of the company’s stock. In a press release, Carlyle stated its intention post-investment to “further enhance fishing sustainability practices with the Company through the establishment of a Corporate Social Responsibility Advisory Committee”. CFG’s 2010 annual report acknowledged the committee had been formed. Though no further details have been publicly disclosed as yet on the committee’s plans to improve sustainability, its very existence and CFG’s apparent commitment to improvement place the company ahead of many of its peers.

**China Ocean Resources****Ticker:** 900050 KS**Country:** South Korea**Market Cap:** USD405.48m**Overall revenue: Overall Revenue:**  
FY2010 KRW 190bn (USD 180m)**Fishing/seafood-related revenue:**  
USD 180m (100% of total)**Major Shareholders:** Zhang Huoli (53.81%)**Seafood-related business activities:**

- Deep-sea fishing. Global Management Center had a fleet of 32 vessels (29 fishing vessels and 3 transport vessels) as of September 30, 2010
- Seafood wholesaler. Market share of key seafood species sales in China in FY07: **shark’s fin** 7%, **snapper** 2.7%, **sailfish** 22%, **groupers** 0.3%

**Key seafood-related brands and subsidiaries:**

- The Company holds 100 percent of Fujian Lianjiang Far-Sea Fishery Co., Ltd. Overall business is managed by Global Management Center of Fujian Lianjiang Far-Sea Fishery Co., Ltd.

**Future growth drivers and investment plans:**

- The company is considering entering the seafood processing business and aquaculture industry in the future. However, it disclosed no specific plan to do this as of December 31, 2010
- Management planned to add 10 additional vessels to its fleet in Q4 2010 – it is not clear whether this took place

**Key seafood species and catch methods (if disclosed):**

- **Shark - Silky Shark, Smooth Hammerhead Shark, Pelagic Thresher Shark, Gummy Shark (long-line fishing)**
- **Snapper - Ruby snapper (Etelis carbunculuc cuvier), Red seabream (Pagrus major)**
- **Grouper**
- **Sailfish, Swordfish**
- Skipjack Tuna
- Cutlass fish
- Squid

**Marine sustainability initiatives:**

None disclosed

**Other sustainability disclosure:**

- A statement on the website by the CEO declares that its products are “safe” as they are captured far from the shore and therefore escape pesticides, additives or preservatives
- **Website claims long-lining is “eco-friendly”**

**NOTES FOR RESPONSIBLE INVESTORS:****Seafood sustainability policy on website?** No**Relevant policy notes:** Wild catch fisheries

China Ocean Resources targets sharks on their long-line fishing fleets and is a leading supplier of lucrative shark’s fin. It is not clear whether the company is harvesting the entire shark, or just their fins. If the latter, shark finning is a wasteful and barbaric practice, which violates the FAO’s Code of Conduct for Responsible Fisheries. In finning, the shark’s fin is sliced from the body of the live shark, which is then thrown back into the ocean. Unable to swim, the shark either suffocates, starves or is predated on. Sharks are being killed at such a rate that a large number of species are considered threatened and endangered, which will have unknown consequences on global marine ecology.

Unless steps are taken to mitigate by-catch, long-line fishing is considered to be unsustainable. At a minimum, the company would need to demonstrate mitigation methods (streamers, pingers and circle hooks) to reduce incidental catch of non-target species. Many grouper species are also known to be threatened – however it is not possible to discern which species the group targets from its disclosure. Sailfish and Swordfish are also species of concern.

China Ocean Resources appears to be at a strategic cross-roads, considering aquaculture as well as a significant fleet expansion of almost a third. Revenues from fishing may come under increasing threat due to fishery depletion as well as greater scrutiny of practices such as shark finning, as awareness of the threats to marine sustainability grows. Both these factors favour aquaculture investment over fleet expansion. Consequently responsible investors may wish to prompt the company in this direction, even though there may be risks in pursuing a new business direction.





<b>CNFC Overseas Fishery</b> <b>Ticker:</b> 000798 CH <b>Country:</b> China <b>Market Cap:</b> USD 600m	<b>Overall revenue:</b> FY2010 RMB 360m (USD57m) <b>Fishing/seafood-related revenue:</b> Fishing - USD 44m (76.7%) Distribution - USD 5m (8.2%)
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**Major Shareholders:** China National Agriculture Development Group owns 59% of China National Fisheries Corp, which is a significant shareholder in CNFC Overseas Fishery

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Deep-sea fishing in international waters, including North Pacific, South Atlantic Ocean, Indian Ocean and Southwest Pacific Ocean</li> <li>Seafood processing, storage, and trading</li> <li>Import and export of the material used in fishing such as fishing boats, fishing machinery and fishing gear</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> No disclosure
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**Future growth drivers and investment plans:**  
Invest RMB28m to construct four more vessels for tuna fishing

<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Pollock (Wild caught)</li> <li>Squid (Wild caught)</li> <li>Tuna (Wild caught)</li> <li>Shrimp (Wild caught)</li> </ul>
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<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal  
 CNFC Overseas Fishery has a number of fishing vessels that operate across the world's oceans. Its products are all wild caught but there is insufficient disclosure to ascertain methods used and location of catch.  
 Tuna species targeted are also undisclosed. Although skipjack tuna as a species is still unofficially considered a 'sustainable' catch (in that insufficient assessment of stocks has been undertaken to prove it is not), five other of the main commercial species are classed as 'near threatened' or 'threatened'. Additionally, popular tuna fishing methods are known to result in significant of by-catch. Tuna should therefore always be regarded as a species of concern to responsible investors.  
 Finally, shrimp are often wild caught using damaging dredging methods around sensitive mangrove and coral reef habitats - a highly unsustainable practice.  
 In summary, CNFC Overseas Fishery has a number of sustainability issues to tackle with regard to its product line. Its recent investment in four vessels for tuna fishing suggests long-term sustainability may not yet be an active consideration at the board level. Investors may wish engage the company on their proposed investment in fleet expansion and consider whether it will really generate returns in the long run. The company could alternatively consider allocating capital to aquaculture, notwithstanding their inexperience in fish-farming.

<b>Chuo Gyorui</b> <b>Ticker:</b> 8030 JP <b>Country:</b> Japan <b>Market Cap:</b> USD 97m	<b>Overall revenue:</b> FY2011 JPY 170bn (USD 2.2bn) <b>Fishing/seafood-related revenue:</b> USD 2.2bn (100% of total)
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<b>Major Shareholders:</b> Nippon Suisan Kaisha Ltd (11%), Ashikaga Honten (6.7%)	
<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>One of the biggest wholesalers of fresh/frozen fish at the Tsukiji Fish Market in Tokyo</li> <li>Supplier to food service sector</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>HOHSUI Co.</li> <li>Funabashi Chuo Gyorui Co.</li> <li>Kashiwa Uoichiba Co.</li> <li>Chiba Chuo gyorui Co.</li> </ul>

**Future growth drivers and investment plans:**  
Expand its product line

<b>Key seafood species and catch methods (if disclosed):</b>	
<ul style="list-style-type: none"> <li>Sardines</li> <li>Horse mackerel</li> <li>Mackerel pike</li> <li>Yellowtail</li> <li>Bonito</li> <li>Sea bream</li> <li>Flounder</li> <li>Octopus</li> <li>Squid</li> <li>Spanish mackerel</li> <li>Salmon</li> <li>Trout</li> <li>Crab</li> </ul>	<ul style="list-style-type: none"> <li>Octopus</li> <li>Black cod</li> <li>Salmon + herring roe</li> <li>Scallops</li> <li>Abalone</li> <li>Oysters</li> <li>Sea urchins</li> <li>Eels</li> <li>Dungeness crab, King crab, snow crab</li> <li>Freshwater fish</li> <li>Bluefin tuna, bigeye tuna, yellowfin tuna</li> <li>Striped marlin, swordfish</li> </ul>

<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal  
 Chuo Gyorui's clear disclosure of species traded is a positive. However, many of the species traded are threatened or near threatened, such as all the tuna species, marlin and swordfish. Flounder, salmon and eel, although not threatened, are species of concern due to the methods of wild capture and instability of stocks. It is possible to farm these species, however, associated farms are often stocked with wild-caught individuals and use open systems that negatively impact the surrounding natural environment.  
 A number of other species listed, such as abalone, crab, scallops etc are also commonly farmed. However, aquaculture methods vary from very sustainable to very damaging and Chuo Gyorui needs to ensure that its suppliers employ responsible methods in order to appeal to responsible investors.  
 No policy exists for sustainable procurement and this should be seen as a potential first step towards improving sustainability and upping the quality of earnings over time.

<b>Dalian Yi Qiao Marine Seeds</b> <b>Ticker:</b> 002447 CH <b>Country:</b> China <b>Market Cap:</b> USD820m	<b>Overall revenue:</b> FY2010 RMB 200m (USD31m) <b>Fishing/seafood-related revenue:</b> USD 31m (100% of total)
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**Major Shareholders:** Dequn Liu (49%), Xiaoqing Liu (11%)

<b>Seafood-related business activities:</b> Seafood breeding, farming, fishing, processing and sales. Largest market share of Yesso scallop, Atlantic Bay scallop and Sea Cucumber in China in 2009	<b>Key seafood-related brands and subsidiaries:</b> YIQIAO Sea Cucumber
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<b>Future growth drivers and investment plans:</b>	
<ul style="list-style-type: none"> <li>Increase available space for breeding by 57,000 m<sup>3</sup></li> <li>Finish the conversion of 6.7 million m<sup>2</sup> sea area for sea cucumber farming</li> </ul>	
<b>Key seafood species and catch methods (if disclosed):</b>	
<ul style="list-style-type: none"> <li>Yesso scallop (breeding and farming)</li> <li>Atlantic Bay scallop (breeding and farming)</li> <li>Farrer's scallop (breeding and farming)</li> <li>Sea Cucumber (breeding and farming)</li> </ul>	
<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
None disclosed	None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Aquaculture producers

Aquaculture is mainly conducted in large 'farms' along the coast. Often these coastal areas are sensitive habitats that are cleared to build aquaculture tanks or re-conditioned for the species in question. In addition, artificial chemicals and feed can be added to the tanks and these can leach out into surrounding environments. Dalian Yi Qiao Marine Seeds discloses no environmental policies for the construction and maintenance of its farms and this leads to concerns current and planned farms may damage sensitive Chinese coastal habitat. The key species raised by Dalian Yi Qiao Marine Seeds are herbivorous filter-feeders and therefore may require less input in terms of feed and chemicals than carnivorous marine species, since they can often be sustained by nutrients found within the ocean environment. This makes farming less demanding on marine habitats and more environmentally friendly. More transparency is required to determine if this is the case.

It appears that the company does not source juveniles from the wild to grow in captivity, but instead has a captive broodstock. This is a more sustainable method as reliance on wild stock is eliminated. Again, more transparency will be required.

Investors may find that the nature of Dalian Yi Qiao Marine's aquaculture business – filter-feeders and captive-grown juveniles – is quite sustainable. If the company increases its focus on environmental protection during expansion it may be able to demonstrate strong sustainability credentials. However, investors may want to check the quality of the water in the area in and around the company's farms, as Dalian is a heavily industrialised area of China and spills or pollution from industry could pose a contamination risk.

<b>Dalian Zhangzidao Fishery Group</b>	<b>Overall revenue:</b>
<b>Ticker:</b> 002069 CH	FY 2011 RMB 2.3bn (USD 350m)
<b>Country:</b> China	<b>Fishing/seafood-related revenue:</b>
<b>Market Cap:</b> USD 3.4bn	USD 350m (98% of total)

**Major Shareholders:** Chanchai Zhangzidao Investment D (46%), Changchai Zhangzidao Dalian Eco (7.2%), Chanchai Zhangzidao Dahao Eco (6.9%), Hougang Wu (5.4%)

<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>Cultivation and farming (43% of total revenue)</li> <li>Seafood processing (34%)</li> <li>Trading of aquatic products (22%)</li> <li>Transportation services (1%)</li> <li>60% of total revenues generated domestically</li> </ul>	ZHANGZIDAO Seafood

**Future growth drivers and investment plans:**

- To expand its farming areas to the Liaotung, Shandong and Korean Peninsulas
- To expand its markets in USA, EU, Australia, Japan, Taiwan and Southeast Asia
- To maintain domestic share of live Yesso scallops market (currently over 70%). Grow to number one sea cucumbers in China
- To improve pricing for the abalone products
- Cooperation with research institutes with an emphasis on new technology applications

<b>Key seafood species and catch methods (if disclosed):</b>	
<ul style="list-style-type: none"> <li>Yesso Scallops (farmed)</li> <li>Sea cucumbers (farmed)</li> <li>Abalones (farmed)</li> <li>Sea Whelks (farmed)</li> <li>Sea urchins (farmed)</li> </ul>	

<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
<ul style="list-style-type: none"> <li>Fry of all species listed above are propagated in a laboratory and then scattered in sheltered, certified areas of ocean or on floating rafts. Fry survive off naturally occurring food, except in rafts where feed is added. No other adjustments to the natural environment are made</li> <li>Since 2010, the company has been publishing monthly updates about its research and development</li> <li>In 2010, the company attended Davos WEF to discuss low carbon and sustainable development issues. It was the only Chinese aquaculture company present</li> </ul>	<ul style="list-style-type: none"> <li>The company passed the ISO9000, HACCP, BRC, Organic, Green Food Quality and Chinese GAP (Good Aquaculture Practices) certificates</li> <li>In October 2010, it became China's first food product company to disclose the carbon footprint of its scallop production</li> <li>It has implemented high-standard biological laboratories with sufficient sophisticated testing equipment to meet the FDA and EU test requirements</li> <li>The company advocates a "Low Carbon, Ecological, Green and Sustainable (低碳、生态、绿色、可持续)" development strategy</li> </ul>

**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Aquaculture producers

Dalian Zhangzidao Fishery Group appears to have made great progress in using natural methods of aquaculture that have minimal effects on the surrounding environment. Its product range is inherently sustainable: all species are sedentary herbivorous filter feeders. This means that, unlike other farmed fish species, which rely on large inputs of environment-contaminating and ocean-depleting fishmeal and fish oil, Dalian's farms are likely to be largely self-sufficient in terms of feed – in fact the company states as much when it says "fry survive off naturally occurring food, except in rafts where feed is added". In addition, the company does not remove juveniles from the wild to stock its farms. Disclosure, in general, is very good and with its carbon footprint initiative and participation in the Davos WEF, the company has demonstrated an active interest in implementing sustainability initiatives across all areas of its business.

Investors may wish to use Dalian as a large company example of better practice when engaging with other aquaculture and even fishing companies.

<b>Dong Won F&amp;B</b>	<b>Overall Revenue:</b>
<b>Ticker:</b> 049770 KS	FY2010 KRW 1400bn (USD 1.3bn)
<b>Country:</b> South Korea	<b>Fishing/seafood-related revenue:</b>
<b>Market Cap:</b> USD 250m	USD 940m (72% of total)

**Major Shareholders:** Dongwon Enterprise Co 71%

<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>Seafood processing. Market share in Korea in FY2010: canned tuna 75%; fish ball cake 8.8%; crab stick 18%</li> </ul>	<ul style="list-style-type: none"> <li>Dongwon Chamchi (tuna, own brand)</li> </ul>

**Future growth drivers and investment plans:**

- No information given

**Key seafood species and catch methods (if disclosed):**

- Tuna

<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
None disclosed	None disclosed

## NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal

Dong Won F&B Co. sources its tuna from its sister company, Dong Won Industries, which catches a number of threatened and endangered fish with its large long-lining and trawling fleet. Likely unsustainable catch by Dong Won Industries includes threatened species of tuna that are probably canned by Dong Won F&B. Little is disclosed by this company with regards to the source of the raw materials that go into its fish balls and crab sticks. This lack of transparency combined with the absence of disclosed sustainability policies is a concern for responsible investors. Dong Won F&B will need to demonstrate major changes to its supply chain in order to become a more responsible company.

### Dong Won Fisheries

**Ticker:** 030720 KS

**Country:** South Korea

**Market Cap:** USD 40m

**Overall Revenue:**

KRW 105bn (USD 97m)

**Fishing/seafood-related revenue:**

USD 91m (94% of total)

**Major Shareholders:** Yoon-Kook Wang 17%

#### Seafood-related business activities:

- Deep-sea fishery for sashimi grade tuna (64% of total revenue). Fleet of **14 tuna long-liners** in the Pacific Ocean, Indian Ocean, and South Indian Ocean and three **trawlers** targeting non-tuna stocks in the seas around New Zealand
- Seafood processing (29% of total revenue)
- Sashimi grade tuna exporting to Japan

#### Key seafood-related brands and subsidiaries:

- Weihai Dongwon Food (Chinese seafood processing subsidiary)
- Sanwon Ltd (New Zealand subsidiary with 10,000 tonne capacity cold storage)

#### Future growth drivers and investment plans:

- No information

#### Key seafood species and catch methods (if disclosed):

- Southern bluefin Tuna (long-liner)
- Yellow fin tuna (long-liner)
- Big eye tuna (long-liner)
- Albacore (long-liner)
- Squid (stern trawler)
- Hoki (stern trawler)
- Silver snapper (stern trawler)
- Ling (stern trawler)
- Hake (stern trawler)

#### Marine sustainability initiatives:

- None disclosed

#### Other sustainability disclosure:

- None disclosed

## NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

Dong Won Fisheries Co. has a very large long-lining fleet and three trawler ships. Without mitigation, long-lining is associated with high levels of by-catch. Trawling also has high levels of incidental by-catch and can be damaging to the marine habitat. At a minimum, the company should use mitigating methods (streamers, pingers and circle hooks) in its long-lining fleet. In addition, Dong Won fishes for Southern Bluefin tuna, a critically endangered and ecologically very important top predator species. Other Tuna species targeted are classified as threatened or near threatened and concerns have also been raised over Hoki stocks in New Zealand's waters. Dong Won Fisheries Co. does not have a marine sustainability policy, nor does it make any statements regarding other environmental concerns. Additionally it was among the five companies targeted by Greenpeace in 2008 for destructive fishing practices.

There is no information on future investment disclosed, but given the range of unsustainable practices, investors could engage management on the potential to move the fleet to more sustainable practices and fish stocks to improve the prospects for revenues in the longer term.

## Hamsung Enterprise

**Ticker:** 003680 KS

**Country:** South Korea

**Market Cap:** USD 53m

**Overall Revenue:**

FY2010 KRW 250bn (USD 240m)

**Fishing/seafood-related revenue:**

USD 230m (96% of total)

**Major Shareholders:** Woo-Kun Lim (19%), Kukdong Fisheries (17%), Oyang Fisheries Co Ltd (12%)

#### Seafood-related business activities:

- Deep-sea fishing (45% of total revenue)
- Hamsung Enterprise has **four long-liners** and **one purse seiner** in the South Pacific, four squid jiggers in Argentina, **three stern trawlers** in the North Pacific, and **one** Indonesia-based **stern trawler**
- Formed Russian joint-venture to secure share of pollock resources in North Pacific after Russian Pollock Quotas were substantially reduced in 2002

#### Key seafood-related brands and subsidiaries:

- Hamsung Crami
- Seafood Nugget
- Hamsung (salted & seasoned products)

#### Future growth drivers and investment plans:

About KRW 6bn has been invested recently to purchase a food processing factory in Kimhae, South Korea

#### Key seafood species and catch methods (if disclosed):

- Alaskan Pollock (North Pacific **stern trawlers**)
- Cod (North Pacific **stern trawlers**)
- Sole (North Pacific **stern trawlers**)
- Yellow Croaker (Indonesia-based **stern trawlers**)
- Cutlass fish (Indonesia-based **stern trawlers**)
- Stingray (Indonesia-based **stern trawlers**)
- Yellowfin tuna, Bigeye tuna (purse seiner, South Pacific ocean)
- Yellowfin tuna, skipjack tuna (**long-line**, South Pacific ocean)
- Squid (jiggers, Argentina)

#### Marine sustainability initiatives:

None disclosed

#### Other sustainability disclosure:

None disclosed

## NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

Hamsung Enterprise Co. has a number of fishing vessels, including purse seiners, trawlers and long-liners. These practices are associated with very high levels of by-catch, causing unnecessary killing of non-target and often endangered species - though mitigating methods such as streamers, pingers and circle hooks can be used in long-lining. In addition, many of Hamsung Enterprise's target species are threatened or their stocks are considered severely depleted. Pacific cod and sole, although not listed on the IUCN red list as threatened, are recommended by Greenpeace to be avoided by consumers. Many species of stingray are endangered and yellowfin and bigeye tuna are near threatened and vulnerable. Although skipjack tuna, yellow croaker and cutlass fish are not species of concern, they are all caught using unsustainable methods.

If Hamsung's fishing activities are to remain viable in the medium to long term, it will need to start to consider sustainability now. Thorough understanding of the status of its target stocks should be sought and appropriate conservation measures put into place. As an initial step, these could include reducing or stopping capture of threatened species and transitioning to more sustainable target stocks, and employing less environmentally damaging capture methods.

Without these steps the quality of earnings from wild-catch is likely to deteriorate over time. Investors may also wish to establish whether the new processing facilities will be used solely for the company's own catch or whether there is the potential to process more sustainable seafood. This may be a way for the company to maintain returns over the longer term.



<b>Hohsui Corporation</b>	
<b>Ticker:</b> 1352 JP	<b>Overall revenue:</b> FY2010 JPY 36bn (USD 470m)
<b>Country:</b> Japan	<b>Fishing/seafood-related revenue:</b> USD 470m (100% of total)
<b>Market Cap:</b> USD 97m	
<b>Major Shareholders:</b> Chuo Gyorui Co Ltd (55%), Nippon Suisan Kaisha Ltd (28%)	
<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>• Importer and wholesaler of fish</li> <li>• Cold storage facilities provider</li> <li>• Processes seafood for retail customers</li> <li>• Owns a shrimp joint venture in Indonesia</li> </ul>	<ul style="list-style-type: none"> <li>• Keiko Suisan</li> <li>• Suisan Ryutsu</li> <li>• Chuo Foods</li> </ul>
<b>Future growth drivers and investment plans:</b>	
<ul style="list-style-type: none"> <li>• Expand products and customer base</li> <li>• Deepen collaboration with parent company Chuo Gyorui</li> </ul>	
<b>Key seafood species and catch methods (if disclosed):</b>	
<ul style="list-style-type: none"> <li>• Crab</li> <li>• <b>Shrimp</b></li> <li>• Fish eggs</li> <li>• Fish (undisclosed species)</li> </ul>	
<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
None disclosed	Disclosure is very limited even in Japanese (no English disclosure)

#### NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal

**Note: This company is a subsidiary of Chuo Gyorui (55%). Nippon Suisan also holds 28% of this company's shares**

Hohsui Corp discloses very little about its business activities. As a processor, Hohsui Corp is not directly involved in capture, however, it should concern itself with the issues to ensure sustainability and responsibility of its supply chain.

In addition, it seems to be involved in shrimp aquaculture in Indonesia and there are various the sustainability issues associated with shrimp farming. Destruction of habitat to make way for farms, pollution of natural water ways with chemicals, pesticides and fish waste and damage to wild populations as a source for stocking are some of the challenges that Hohsui Corp should either be addressing, or if already addressed, disclosing. A seafood sustainability policy would be a suggested first step.

<b>Kyokuyo</b>	
<b>Ticker:</b> 1301 JP	<b>Overall revenue:</b> FY2011 JPY160bn (USD 2.1bn)
<b>Country:</b> Japan	<b>Fishing/seafood-related revenue:</b> USD 2.1bn (100% of total)
<b>Market Cap:</b> USD 250m	
<b>Major Shareholders:</b> Japan Trustee Services Bank Ltd (5.6%), Mitsui Sumitomo Insurance (5.2%)	

<b>Seafood-related business activities:</b>		<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>• Engages in the export, import, domestic purchase, and sale of marine products, as well as in the manufacture and sale of processed and frozen foods in Japan and internationally</li> <li>• <b>Entered Bluefin tuna farming business in 2007 (which now accounts for around 15% of total revenues)</b></li> <li>• Subsidiary Kyokuyo Suisan launched a joint venture with the Kiribati Republic, a South Pacific island state with a population under 100,000 in 2010 to fish for tuna in sovereign waters</li> </ul>		Company has 20 subsidiaries including Kyokuyo Marine Ehime Co. (tuna farming) and Kyokuto Fresh Co. (processes and freezes marine products for use in sushi and other added value businesses)
<b>Future growth drivers and investment plans:</b>		
<ul style="list-style-type: none"> <li>• Develop new value added processed products</li> <li>• Expand sushi-related business</li> <li>• Invest in expanding tuna farming business</li> </ul>		
<b>Key seafood species and catch methods (if disclosed):</b>		
<ul style="list-style-type: none"> <li>• Salmon</li> <li>• Mackerel</li> <li>• <b>Tuna (farmed; and caught with purse seine, largely in Western Central Pacific Ocean)</b></li> <li>• Scallops</li> </ul>		
<b>Marine sustainability initiatives:</b>		<b>Other sustainability disclosure:</b>
CSR report (in Japanese) states the company started its bluefin tuna farming business to conserve tuna from extinction		None disclosed

#### NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Wild catch fisheries; Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal

Kyokuyo states in its CSR report that it began farming bluefin tuna in an effort to conserve it from extinction. However, this is highly misleading since it appears to have no active breeding programme. Instead it catches wild bluefin tuna, 'ranching' the fish into pens and fattening for market. As such, without any plans to launch a captive tuna breeding programme, its plans to invest further in the tuna farming business are likely to contribute further to the depletion of tuna stock. In addition, Kyokuyo uses purse seining for wild tuna capture – widely regarded as the least sustainable capture method. Pole and line and trolling are the most sustainable methods for catching wild tuna and skipjack tuna is the only widely-used commercial tuna stock considered unthreatened globally.

Kyokuyo Suisan's formation of a joint venture tuna fishing company with the Kiribati Republic also raises questions. In many cases, agreements between island and/or developing nations to sell fishing rights to companies and/or more developed nations have led to 1) rampant over-fishing in the host nation's waters, and 2) loss of livelihood for local fishermen as stocks are depleted. There are oftentimes complex political and developmental issues tied up in these agreements. Kyokuyo Suisan should disclose the exact nature of its access rights and also how it plans to fish responsibly in the Kiribati Republic's waters.

It was also among a number of Japanese seafood companies, which were called upon in 2007 by NGOs to prevent whaling.

There are a number of reputational issues that investors could usefully raise with the company. Improved stakeholder management and sustainable sourcing would progressively reduce sources of risk to earnings.

<b>Maruha Nichiro Holdings</b>	
<b>Ticker:</b> 1334 JP	<b>Overall revenue: Overall Revenue:</b> FY2011 JPY 820bn (USD11bn)
<b>Country:</b> Japan	<b>Fishing/seafood-related revenue:</b> USD 3.6bn (34% of total)
<b>Market Cap:</b> USD 890m	
<b>Major Shareholders:</b> Daitoh Trading Co (10%)	



<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>• Deep-sea tuna fishing; far seas/ offshore purse seine fishing</li> <li>• Fish farming for select species with higher added value, such as bluefin tuna and greater amberjacks</li> <li>• Overseas joint ventures including shrimp aquaculture and shrimp trawl fishing</li> <li>• Seafood processor and wholesale retailer</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b></p> <ul style="list-style-type: none"> <li>• Fishery subsidiaries in Namibia, Peru and New Zealand</li> <li>• Shrimp aquaculture producers in Indonesia, Bangladesh and Malaysia</li> <li>• Viver-Atun Cartagena, S.A. (Tuna aquaculture company in Spain)</li> <li>• Philippine Taiyo Aqua Farming Corp. (Grouper aquaculture company in Philippines)</li> </ul>
<p><b>Future growth drivers and investment plans:</b></p> <ul style="list-style-type: none"> <li>• Expand tuna farming business and invest in research to hatch bluefin tuna</li> <li>• Target overseas markets through M&amp;A</li> </ul>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <ul style="list-style-type: none"> <li>• Alaskan Pollack</li> <li>• Pacific cod</li> <li>• Salmon/trout</li> <li>• Crab</li> <li>• Lobster</li> <li>• Fish eggs</li> <li>• Tuna</li> <li>• Shrimp</li> </ul>	
<p><b>Marine sustainability initiatives:</b></p> <p>CSR report (in Japanese) states: "Since marine resources are not unlimited, we have to work on farming fishes to protect marine sustainability"</p>	<p><b>Other sustainability disclosure:</b></p> <p>Excerpt from message from the company president, Toshio Kushiro, on website:          "Taking pride in upholding Japanese culinary culture as food product professionals providing safe food solutions, the Maruha Nichiro Group will continue as a producer of seafood products to bring delight in delicious food to all the world, contributing to the creation of a global seafood-based culinary culture with the most efficient use of the Earth's limited resources"</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b></p> <p><b>Relevant policy notes: Seafood sustainability policy on website?</b> No</p> <p><b>Relevant policy notes:</b> Wild catch fisheries; Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal</p> <p>The methods employed by Maruha Nichiro for harvesting are of considerable concern. Purse seining and shrimp trawling are known to produce considerable amounts of by-catch; shrimp trawling also damages the seabed.</p> <p>Maruha Nichiro's tuna-related activities are of particular concern – both for the method of harvesting and for the focus on a species with severe sustainability issues – five species of tuna are threatened or near-threatened. In particular, the Spanish tuna-farming subsidiary is likely to be involved in Bluefin tuna ranching in the Mediterranean, as that is a hotspot for this highly unsustainable practice and there are very few farms globally which combine their activities with a captive breeding programme. For this reason, the company's plan to expand its tuna farming business is not in itself a positive step. However, investment into research to hatch bluefin tuna in captivity could be positive – only when tuna can be bred from captive broodstock can tuna farming have a hope of becoming sustainable.</p> <p>Pacific cod, although not as rare as the Atlantic version, is often harvested by bottom trawling or long-lining. Bottom trawling damages the seabed; both capture methods are associated with high by-catch, though for long-lining by-catch mitigation is possible through the use of specific hooks, baits and deterrents.</p> <p>The company appears to have begun the process of reinvesting capital from wild-catch into aquaculture. Investors may wish to confirm the relative levels of spend on the different businesses to ensure that the investments are made in areas of the business with strong longer-term prospects. Many companies undergoing changes in the business model suffer where management and individuals have incentives out of alignment with the new strategy and this governance issue is a further area that investors may wish to discuss with the board.</p>	

<p><b>Minh Phu Seafood Group</b></p> <p><b>Ticker:</b> MPC VN</p> <p><b>Country:</b> Vietnam</p> <p><b>Market Cap:</b> USD 71m</p>	<p><b>Overall revenue:</b> FY2010 VND 5100bn (USD 250m)</p> <p><b>Fishing/seafood-related revenue:</b> USD 220m (90% of total)</p>
<p><b>Major Shareholders:</b> Binh Chu Thi (25%), Van Quang Le (23%), Red River Holdings Ltd (7.8%), Vietnam Invest Fund II (6.8%), Vietnam Fund Mgmt (5.0%)</p>	
<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>• Shrimp farming</li> <li>• Shrimp processing</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b></p> <ul style="list-style-type: none"> <li>• Minh Quy</li> <li>• Minh Phat</li> <li>• Minh Phu</li> <li>• Mseafood Corporation</li> </ul>
<p><b>Future growth drivers and investment plans:</b></p> <ul style="list-style-type: none"> <li>• Expansion of shrimp processing capacity to 90,000 tonnes per year</li> <li>• Plans to have 5,000 ha of commercial shrimp farming by 2015</li> <li>• Establishing distribution branches in EU, Russia and China to increase export sales and enhance logistic efficiency</li> </ul>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <p>Black tiger shrimp (hatched and farmed)</p>	
<p><b>Marine sustainability initiatives:</b></p> <ul style="list-style-type: none"> <li>• GLOBALGAP certification</li> <li>• Global Aquaculture Alliance Best Aquaculture Practices certificate holder across every step of its business, from hatchery, to farm, to processing plant</li> </ul>	<p><b>Other sustainability disclosure:</b></p> <p>None disclosed</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b></p> <p><b>Seafood sustainability policy on website?</b> No</p> <p><b>Relevant policy notes:</b> Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal</p> <p>Minh Phu Seafood Group Joint Stock Co. breeds and hatches its own stock of shrimp, which makes it more sustainable in practice than any shrimp farm which is stocked from wild-caught juveniles. Best Aquaculture Practices certification across the company's various business processes from hatchery to processing also implies Minh Phu is operating according to best practice with regards to sustainability.</p> <p>However, although the relevant certification is transparently displayed on the company's website, there is little information disclosed on the actual business processes themselves. Minh Phu could benefit from offering more information on its website.</p> <p>A challenge for Minh Phu as it presses ahead with ambitious expansion plans will be to maintain its high standard in terms of sustainability. In particular, sites for expansion of the shrimp farming business will need to be carefully chosen as construction of farms can damage sensitive habitats, diversion of water sources can dry up other areas, use of chemicals can pollute the natural waterways, and escaped shrimp can pollute the natural shrimp population.</p>	
<p><b>Mitsubishi Corporation</b></p> <p><b>Ticker:</b> 8058 JP</p> <p><b>Country:</b> Japan</p> <p><b>Market Cap:</b> USD 40bn</p>	<p><b>Overall revenue: Overall Revenue:</b> FY2011 JPY 5,200bn (USD68bn)</p> <p><b>Fishing/seafood-related revenue:</b> USD 1.6bn (2.4% of total)</p>
<p><b>Major Shareholders:</b> Japan Trustee Services Bank (7.5%), Tokio Marine &amp; Nichido Fire Insurance Co (5.3%)</p>	

<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>Seafood-related businesses fall under Mitsubishi's 'Living Essentials' group – one of seven groups under the umbrella of Mitsubishi Corporation</li> <li>Involved across seafood value chain: procurement, handling and transportation, processing, distribution and retail</li> <li>World's largest trader of bluefin tuna – accountable for 35% of world trade of sashimi grade sushi in 2006.<sup>126</sup> Involved in tuna ranching in Mediterranean</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b></p> <ul style="list-style-type: none"> <li>Toyo Reizo (tuna trading)</li> <li>Sanyo Foods (tuna trading)</li> <li>Princes (UK's leading tinned tuna brand)</li> </ul>
<p><b>Future growth drivers and investment plans:</b> The marine products business is not included in the strategic growth area of Mitsubishi's mid-term plan (for 2012)</p>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <ul style="list-style-type: none"> <li>Tuna</li> <li>Shrimp</li> <li>Cod</li> <li>Salmon</li> <li>Octopus</li> <li>Cuttlefish</li> </ul>	
<p><b>Marine sustainability initiatives:</b></p> <ul style="list-style-type: none"> <li>Global Coral Reef Conservation Project supporting reef research in three locations</li> <li>Published a Position Paper in July 2010 on the Atlantic Bluefin Tuna in which it stated it was "committed to proactively working with all concerned parties to improve the conservation of BFT stocks. Our goal is to source all of our BFT in an environmentally sustainable manner and from sustainably managed fisheries"</li> </ul>	<p><b>Other sustainability disclosure:</b> Excerpt from Mitsubishi Corporation Environmental Charter: "We will promote the sustainable use of natural resources including energy, minerals, food stocks and water throughout our business operations. We recognize the critical importance of what ecosystems can provide and are committed to protecting ecosystems and mitigating any potential impacts on biodiversity. We will strive to create and enhance environmental benefits by undertaking conservation activities and reducing our environmental footprint"</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b> <b>Seafood sustainability policy on website?</b> No <b>Relevant policy notes:</b> Fish wholesalers, processors and manufacturers of fishmeal Though only a small percentage of Mitsubishi's revenues are derived from seafood, it is still one of Asia's largest seafood companies. Its activities have been the focus of Greenpeace, other Asian based NGOs and the media for its dominance of the global trade in the critically endangered Bluefin Tuna. Mitsubishi's Position Paper on the Bluefin Tuna, published in July 2010, stated its "goal" was to source all of its Bluefin Tuna sustainably and the company promised it would carry out its activities in this area "transparently and responsibly". There is currently no way to harvest Bluefin Tuna commercially in a sustainable manner and no public disclosure from Mitsubishi in the meantime on its sourcing methods. This issue may undermine the reputation of other Mitsubishi branded products. One tuna-related sustainability issue the company has taken action on is the slaughter of dolphins and whales as by-catch in tuna harvesting: it has a 'Dolphin-safe corporate tuna policy' in which it states it will "exclusively purchase and distribute tuna only from a packer/supplier that has a dolphin-safe corporate policy confirmed by Earth Island Institute (EII)". Mitsubishi's Global Coral Reef Conservation Project supports research on coral reefs in Okinawa, Midway and the Seychelles in collaboration with universities and NGOs. This is equivalent to a carbon off-setting programme, i.e. while it contributes to marine sustainability overall, it does not contribute towards the improved sustainability of Mitsubishi's revenue-generating marine activities. Key questions relate to Mitsubishi's progress on the issue of Bluefin Tuna and its timelines for implementing its goal of sustainable sourcing. The location of cod sourcing is also significant, as many cod fisheries are severely depleted.</p>	

<p><b>Nichimo</b> <b>Ticker:</b> 8091 JP <b>Country:</b> Japan <b>Market Cap:</b> USD68.2m</p>	<p><b>Overall revenue:</b> FY2011 JPY 85bn (USD1.1bn) <b>Fishing/seafood-related revenue:</b> USD 1.0bn (86.7% of total)</p>
<p><b>Major Shareholders:</b> Nichimo Co Ltd (Fishing) (10%), Asahi Mutual Life Insurance (7.9%), Nippon Suisan Kaisha Ltd (6.3%)</p>	
<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>Imports marine products from fisheries around the world and supplies them to food processing manufacturers, restaurants and high-volume retailers</li> <li>Sells fishing/fish farming related products, such as ocean fish cages, fishing nets, fishing gear and fishing vessels</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b> Company has 15 subsidiaries including Nichimo Foods Co., Ltd., Haneuo Shokuhin Co., Ltd., and Nichimo International Inc.</p>
<p><b>Future growth drivers and investment plans:</b> Expansion of processed food business</p>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <ul style="list-style-type: none"> <li>Crab</li> <li>Pollack roe</li> <li>Alaskan Pollock</li> <li>Tuna</li> </ul>	
<p><b>Marine sustainability initiatives:</b> None disclosed</p>	<p><b>Other sustainability disclosure:</b> None disclosed</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b> <b>Seafood sustainability policy on website?</b> No <b>Relevant policy notes:</b> Fish wholesalers, processors and manufacturers of fishmeal Nichimo has not disclosed any sustainability initiatives, despite the high likelihood that its tuna product line, at the very least, incorporates some high-risk species and environmentally damaging harvesting methods. More positively, one of Nichimo's core products is the sustainable fish stock Alaskan Pollock. For investors to assess reputational risks and the sustainability of its methods, greater transparency is needed around Nichimo's sourcing of fish stocks as well as around its business selling fishing and fish farming equipment. Given many wild capture fishing methods, including purse seining, long line and bottom trawling, are deemed to be unsustainable both for the high amount of by-catch they produce and/or the damage they wreak on the surrounding environment, its procurement policies should be reviewed carefully. Similarly, if Nichimo is selling ocean fish cages to the tuna ranching industry, or ocean fish farms with no environmental controls in place, then these will also be contributing to the destruction of the marine environment, exposing the company to long term depletion and reputational risks.</p>	
<p><b>Nichirei Corporation</b> <b>Ticker:</b> 2871 JP <b>Country:</b> Japan <b>Market Cap:</b> USD 1.4bn</p>	<p><b>Overall revenue:</b> FY2011 JPY 440bn (USD 5.7bn) <b>Fishing/seafood-related revenue:</b> USD 840m (14.6% of total revenue)</p>
<p><b>Major Shareholders:</b> Japan Trustee Services Bank Ltd (8.2%), Nippon Life Insurance Company (5.4%), Master Trust Bank of Japan Ltd (5.1%)</p>	





<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Imports, processes and sells seafood procured from around the world</li> <li>Shrimp-farming (the biggest business in Nichirei's seafood business) in Madagascar, Saudi Arabia, Thailand, Indonesia and Brazil</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> Nichirei Fresh (procures, processes and sells seafood and meat)
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<b>Future growth drivers and investment plans:</b> <ul style="list-style-type: none"> <li>Expand marketing activities to build premium brands and increase gross profit margin; it also expects to increase sales in the ready meal market by further developing its processed marine products</li> <li>Increase sushi ingredients business to respond to international demand for Japanese style foods</li> </ul>
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<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Shrimp (accounts for 25% of marine product revenue, estimated)</li> <li>Herring roe</li> <li>Octopus (Caught individually with a specialised tool)</li> <li>Norwegian Crab (Caught with a special crab net. Stated policy is to return females and juveniles to the sea)</li> </ul>
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<b>Marine sustainability initiatives:</b> <ul style="list-style-type: none"> <li>Nichirei introduced a mangrove-planting initiative to one of its Indonesian shrimp farms in 2006 in collaboration with Tarakan City officials and WWF Indonesia. Ten hectares of natural pond have been set aside for an "organic" shrimp farm, which will not use any artificial inputs, like fertilizer. This initiative is only disclosed in Japanese</li> <li>Nichirei says on its website it works with local governments in Norway and Mauritania to ensure annual fishing quotas are observed</li> </ul>	<b>Other sustainability disclosure:</b> <ul style="list-style-type: none"> <li>Nichirei has a general environment policy, but this focuses more on CO2 reduction than marine sustainability</li> </ul>
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal  
 Nichirei has taken positive steps towards sustainability in certain areas of its business, for example the discriminate sourcing of Norwegian crab and the organic Indonesian shrimp farm initiative. Its next move should be disclosure on the sourcing and capture methods of other seafood stocks and measures to improve sustainability if appropriate. Nichirei has not stated whether there are plans to roll out mangrove plantations and "organic" farming methods across the company's many other shrimp farms – this would be a positive step. Its plans to expand its sushi topping business may involve increased use of tuna, a popular sushi ingredient. Nichirei should take into account all of the many sustainability issues associated with the harvesting and use of tuna and incorporate this into its procurement policy.

<b>Nippon Suisan Kaisha</b> <b>Ticker:</b> 1332 JP <b>Country:</b> Japan <b>Market Cap:</b> USD 1bn	<b>Overall revenue:</b> FY2011 JPY 490bn (USD6.5bn)  <b>Fishing/seafood-related revenue:</b> USD 6.5bn (100% of total)
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**Major shareholders:** Marathon Asset Management LLP (8.7%), Master Trust Bank of Japan Ltd (7.8%), Nikko Asset Management Co Ltd (5.9%), Mitsubishi UFJ Trust & Banking (5.6%)

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Procures and processes a variety of seafood</li> <li>Manufactures "value-add" products including frozen prepared seafood, food service seafood and canned seafood products</li> <li>Aquaculture production including salmon farming in Chile, shrimp farming in Indonesia, eel farming in China, tilapia farming in Brazil, and yellowtail, Bluefin Tuna and coho salmon farming in Japan</li> <li>Operates plants producing fishmeal and fish oils</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> Directly seafood related activities fall under the Marine Products Business, one of four divisions, and include: Nippon Suisan Kaisha, Ltd.; Onagawa Fish Feed & Oil Plant; Imari Fish Feed & Oil Plant; Oi Seafood Processing Plant; Sakaiminato Plant; Kurose Suisan Co., Ltd.; and Nakatani Suisan Co., Ltd
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<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Pollack roe</li> <li>Alaskan Pollock</li> <li>Tuna (farmed)</li> <li>Yellowtail (farmed)</li> <li>Salmon (farmed)</li> <li>Shrimp (farmed)</li> <li>Eel (farmed)</li> <li>Tilapia (farmed)</li> </ul>
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**Future growth drivers and investment plans:**  
 The company is increasingly relying on new markets overseas

<b>Marine sustainability initiatives:</b> <ul style="list-style-type: none"> <li>The marine farming cycle of the 'Koruse Yellowtail' in Japanese waters has been designed to be sustainable, incorporating initiatives such as a feed pellet that does not scatter in the ocean, thereby minimising contamination of the surrounding environment</li> <li>Yellowtail farming has also been integrated with other complementary areas of the business, such as fishmeal production (which uses discards from yellowtail processing, such as innards)</li> </ul>	<b>Other sustainability disclosure:</b> <ul style="list-style-type: none"> <li>Nissui has had an environmental policy in place since 2003</li> <li>Nissui has produced Environmental Reports for six consecutive years</li> <li>Statement from the website: "NISSUI is engaged in businesses that rely on the bounty of nature. We, therefore, believe that it is our responsibility to take that bounty and use it for the people of the world, as well as to pass it on to future generations. In order to realize this mission, NISSUI upholds the "effective utilization of the earth and marine resources in a sustainable manner and taking good care of the environment" as one of its management policies, and engages in environmentally friendly aquaculture around the world to produce safe and high-quality fish"</li> </ul>
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**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal

Nissui has acknowledged the issue of sustainability and taken proactive steps to incorporate sustainable practices into various areas of its business, including aquaculture. However, though the company states that it “engages in environmentally friendly aquaculture around the world”, details are only given of the initiatives used in the rearing of the Koruse Yellowtail. The next step would be to disclose practices used in the rearing of Nissui’s other farmed species. Moreover, though Nissui’s Yellowtail farming process has incorporated many positive initiatives, such as integration with the fishmeal production business to avoid wastage, it is still stocked through the capture of wild juveniles. This means it falls into the category of ranching. Aquaculture is only truly sustainable when it is stocked through a captive spawning programme, as the practice of removing juveniles from the wild reduces the number of fish able to reach sexual maturity and replenish wild stocks.

The company was among a number of Japanese seafood companies that were called upon in 2007 by NGOs to prevent whaling.

Investors seeking to better understand long-term risks to revenues should question the company further about the progress of the yellowtail farming business and its involvement in the whaling industry.

**Oceanus Group**

**Ticker:** OCNUS SP

**Country:** Singapore

**Market Cap:** USD 250m

**Overall revenue:**

FY2010 RMB 790m (USD 120m)

**Fishing/seafood-related revenue:**

USD 120m (100% of total)

**Major Shareholders:** Bestglobal Enterprises Co (22%), Cher Yew Ng (11%)

**Seafood-related business activities:**

- Research and development, breeding and production of Japanese breed abalone. Farms located along the Fujian and Guangdong provinces of China
- World’s largest land-based abalone producer (178.3 million caged abalones as of December 2010)

**Key seafood-related brands and subsidiaries:**

- Wholly owned subsidiary, Long Ze Aquaculture Co Ltd, is involved in R&D, breeding and production of Japanese breed abalone
- 70% owned subsidiary, Zhangzhou Oceanus Food Co Ltd, processes and vacuum packs, cans, dries and cures abalone at its facilities in China
- 70% owned subsidiary, Oceanus (Shanghai) Restaurant Management Co Ltd, operates and grants franchises for food outlets under the brand “Ah Yat Tian Xia”, serving abalone-based meals in China, Hong Kong, Taiwan and Singapore

**Future growth drivers and investment plans:**

- It is in the process of adding a new cohort of baby abalones (200-300 million pieces) Expansion will depend on the ability to secure land or existing farms that are suitably located
- The Company was unable to grow its tank capacities at its planned rate because of its inability to source land/existing farms in FY2010
- The Company expects that its new partnership with a Singapore-based water treatment company and the access to its technology will help boost productivity

**Key seafood species and catch methods (if disclosed):**

- Species of Japanese abalone (coastal aquaculture farms)
- Shark’s fin soup is served at its associated “Ah Yat Tian Xia” restaurant chain

**Marine sustainability initiatives:**

- Has tied up with SIF Agrotechnology, a water treatment and environmental engineering company, for the application of the latter’s chemical free water treatment technologies. Oceanus claims that this will help it to scale up aquaculture productivity and also make it ecologically sustainable

**Other sustainability disclosure:**

None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers

Abalone farms have been established in response to severely depleted stocks in the wild. Abalone farming is generally seen as sustainable as abalone can be bred and cultivated from captive individuals, once a captive population has been established. It is not 100% clear from Oceanus’ website that it is breeding within its established population, rather than taking eggs from the wild, however, the former is standard practice in this industry. One area for concern is feed. Oceanus does not disclose the feed source for its stock, but abalone is usually fed on kelp (large seaweed plants) and sometimes this is collected from the wild. Currently, this is not problematic, but as with any species harvested from the wild, dramatic increases in harvesting rates or quantities could affect natural ecosystems. Oceanus recently signed an MoU with Singapore-based technology firm SIF Agrotechnology Asia, which will see it roll out the use of SIF’s chemical-free water treatment technology across its Chinese farms. SIF’s technology employs a closed-loop system, making it more ecologically sound than traditional water treatment technologies used in land-based farming. Possibly the biggest sustainability concern at Oceanus is its association with the “Ah Yat Tian Xia” restaurant chain, which counts Shark’s Fin Soup as one of its most prominently displayed menu items.

**OUG Holdings**

**Ticker:** 8041 JP

**Country:** Japan

**Market Cap:** USD 110m

**Overall revenue:**

FY2011 JPY 330bn (USD 4.2bn)

**Fishing/seafood-related revenue:**

USD 4.2bn (100% of total)

**Major Shareholders:** Maruha Nichiro Holdings Inc (13.39%), Nippon Life Insurance Co (6.62%)

**Seafood-related business activities:**

- Marine product wholesaler (including frozen imported seafood)
- Aquaculture operator
- Restaurant operator
- Logistics

**Key seafood-related brands and subsidiaries:**

- Uoichi (Wholesaler in Osaka fish market)
- Shokuryu (Wholesaler for customers outside of fish market)
- Hamashoku (Aquaculture business)

**Future growth drivers and investment plans:**

None disclosed

**Key seafood species and catch methods (if disclosed):**

- Prawns/Shrimp (imported)
- Tuna (ranching, open system aquaculture)
- Yellow tails (farmed, open system aquaculture)
- Amberjacks (farmed, open system aquaculture)

**Marine sustainability initiatives:**

None disclosed

**Other sustainability disclosure:**

None disclosed



**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal

OUG Holdings sources products from other producers as well as producing fish itself through aquaculture. There is no procurement policy disclosed on its website, which prevents investors from assessing this aspect of their business.

Shrimp are one species of concern, both when farmed and when caught from the wild. Shrimp are caught using dredgers that cause significant damage to the bottom environment and farmed shrimp have a number of aquaculture related issues. OUG Holdings would be wise to develop and disclose a sustainable procurement policy to avoid these issues and improve security of supply for this business area.

Tuna ranching is also an area of considerable concern. Despite much research, tuna cannot as yet be bred in captivity and so farmed tuna are individuals that have been removed from the wild as juveniles and fattened in farms, a practice that could be more damaging to the natural population than catching adults. It is also not clear how Amberjack and Yellowtail farms are stocked and the open system used is considered irresponsible due to chemicals, pesticides and fish waste escaping into the natural environment.

OUG Holdings is advised to develop more sustainable aquaculture practices and to be more transparent in its literature and marketing material. This is the first step in improving the sustainability of sourcing and so increasing the quality of earnings over time.

**Oyang Corporation**

**Ticker:** 006090 KS

**Country:** South Korea

**Market Cap:** USD 64m

**Overall Revenue:**

FY2010 KRW 130bn (USD 120m)

**Fishing/seafood-related revenue:**

USD 120m (100% of total)

**Major Shareholders:** Sajodaerim Corp (20%), Castlex Jeju (20%), Myeong-Hwan Kim (13%), Sajo Seafood Co (12%), KB Asset Management (10%), Sajo Systems (8.4%)

**Seafood-related business activities:**

- Deep-sea fishing (52% of total revenue). Fleet includes **one long liner** fishing for **yellowfin** and skipjack tuna, using line 1.6 km in length and fishing to a depth of 200m, in mid-West Pacific ocean; eight **purse seiners** fishing for **bigeye** and **yellowfin tuna** in the Pacific Ocean; **two trawlers** fishing for **cod** and pollock in North Okhotsk and Northwest Bering Sea in Russian EEZ; and **one trawler** fishing for squid, **hoki**, silver snapper, red-catfish, and cod in Christchurch, New Zealand. Annual catch given as 15,500-20,000 tonnes of Pollock; 18,000 tonnes of squid/**hoki**/snapper/red-catfish/cod; 3,300 tonnes of **bigeye tuna/yellowfin tuna** for sashimi, and 10,000 tonnes of **yellowfin tuna**/ skipjack tuna for canned tuna
- Seafood processing. Product line includes pollock fillets (accounting for 25% of total revenue) and crab sticks and fermented fish (21% of total revenue)
- Collaborations with Sajo Industries and Sajodaerim on Pollock-related business activities

**Key seafood-related brands and subsidiaries:**

- Oyang mat-sal, Crabia (processed crab stick, Sajo Daerim & Sajo Oyang)
- Tralkom Co., Ltd (Korea-Russia joint-venture company to secure pollock catchment in North Pacific ocean)
- Southern Storm Fishing Ltd. (subsidiary in New Zealand catching squid, hoki, snapper, red-catfish, cod)
- Arctic Storm, INC. (Korea-US joint venture company based in Seattle, US, with one trawler in Bering Sea and Alaska)

**Future growth drivers and investment plans:**

None disclosed

**Key seafood species and catch methods (if disclosed):**

- **Yellowfin tuna (long liner & purse seiner)**
- Skipjack tuna (**long liner**)
- **Bigeye tuna (purse seiner)**
- Pollock (**trawler**)
- Cod (**trawler**)
- Squid (**trawler**)
- **Hoki (trawler)**
- Silver snapper (**trawler**)
- Red-catfish (**trawler**)

**Marine sustainability initiatives:**

None disclosed

**Other sustainability disclosure:**

None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

Oyang Corporation employs long lining, purse seining and trawling to fish for wild marine seafood. These methods can cause serious damage to the environment either by catching unsustainable numbers of non-target species and/or damaging sea beds as the gear is dragged along scooping up all in its path - though in the case of long-lining, by-catch can be reduced through the use of streamers, pingers and circle hooks.

Many of the species targeted by Oyang Corporation are also considered to be unsustainable. Yellowfin and bigeye tuna are near threatened and vulnerable, according to the IUCN. Hoki stocks in the waters of New Zealand are known to be severely depleted and stocks of pacific cod and Russian caught pollock are under immense pressure. Many species of catfish are listed as threatened too.

There are no future plans disclosed, but Oyang Corporation could usefully put a marine sustainability policy in place.

Investors may wish to discuss any potential plans for significant capital spend that the company may have and that check the company is progressively investing to improve its quality of earnings.

**Pacific Andes Resources Development**

**Ticker:** PAH SP

**Country:** China (listed in Singapore)

**Market Cap:** USD 570m

**Overall revenue:**

FY2010 HKD 7.4bnm (USD 950m)

**Fishing/seafood-related revenue:**

Frozen Fish: USD 410 (43% of total)  
Fishing: USD 540 (57%)

**Major Shareholders:** Clamford Holding Ltd (67%)

**Seafood-related business activities:**

- Deep-sea fishing. Operates one of the world's most sizeable fishing fleets
- Integrated operations in fishing, sourcing, transportation and logistics
- Operates fishmeal processing facilities in some of the world's most important fishing grounds

**Key seafood-related brands and subsidiaries:**

None disclosed

**Future growth drivers and investment plans:**

- During the South Pacific non-fishing season, the Group plans to keep its South Pacific fleet fully deployed in Mauritania, a rich fishing ground in West Africa, to catch sardines and horse mackerel
- Upgrade its North Pacific fishing fleet and continue to streamline its Peruvian fishing fleet and fishmeal processing plants to augment efficiency gains

**Key seafood species and catch methods (if disclosed):**

- **Alaska Pollock**, North Pacific Ocean, **MSC certified fishery**
- **Black Cod**, North Pacific Ocean, **MSC certified fishery**
- **Atlantic cod** and **Pacific cod**, North Atlantic, Arctic Oceans, and North Pacific Ocean, **MSC certified for Pacific cod fisheries**
- Flounder, North Pacific Ocean
- Greenland Halibut, Arctic Ocean & North Atlantic Ocean
- **Saithe**, Atlantic Ocean, **MSC certified fishery**
- Rock Sole and Yellow Fin Sole, North Pacific Ocean
- **Wild caught Pink Salmon**, **Chum Salmon** and **Sock-eye salmon**, North Pacific Ocean, Japan, Russia, **MSC certified fisheries**



#### Marine sustainability initiatives:

- Marine Sustainability Council certified for many of their fisheries
- An independent auditing firm is appointed to ensure all fish are accompanied by the proper certification and documentation issued by the relevant governments or other appropriate authorities
- Pacific Andes states that: "Sustainability is an issue that we take very seriously. In our industrial fishing division, we advocate sustainable fishing practices and abide all fishing regulations"

#### Other sustainability disclosure:

Statement in regards to its procurement online:  
"Pacific Andes is keenly aware of its responsibilities to ensure that our supplies are in total compliance with environmental, legal, and social regulations. Thus, we are committed to supporting a responsible and efficient fishing industry dedicated to striking a balance between consumer demand and conservation of stock for the future"

#### NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

**Note: Pacific Andes is one of the major shareholders of China Fishery Group**

Pacific Andes Resources, one of the world's biggest fishing companies, discloses clearly the source of its main products online. Many of its products come from MSC certified fisheries. It clearly demonstrates a responsible attitude towards sustainable fishing practices and tracing supplies to responsible suppliers. It also employs an independent firm to confirm proper documentation for its various certifications.

However, there are some areas for concern, notably the products from Atlantic cod, a species which is listed as vulnerable on the IUCN Red List, sole, flounder and halibut. Stocks of these species in some areas are known to be under pressure and it is unclear how these fit with Pacific Andes Resources strong statements on sustainability.

More information is needed about the deployment of the South Pacific fleet to Mauritania during the South Pacific non-fishing season. The wording suggests Pacific Andes has purchased access to the fishing grounds within the n country's EEZ from the government. Though legal, this type of agreement between large corporates or developed countries and developing countries has in the past been linked with over-fishing of the developing country's stocks, leading to a loss of livelihood and food source for the local population. In Somalia, this led to the explosion in piracy, as local fishermen were left with no source of income. Further disclosure is required to understand Pacific Andes' access rights to Mauritanian waters, the stock levels there and its plans to fish responsibly in those waters. There is a discrepancy between the products displayed on-line and the company's future plan to keep its fleet deployed in mackerel and sardine rich waters, because sardines and mackerel are not mentioned in their current product line. However, mackerel and sardine stocks are not currently considered to be threatened and expansion of fishing operations in this direction would seem to be a responsible choice.

In recent years, Pacific Andes seems to have focused many of its expansion plans – and capital – on its upstream capabilities. One example is the 2008 opening of new processing facilities in Qingdao, which have the capacity to process 60,000 metric tonnes of fish fillet annually, and the \$100 million investment in factory vessel the Lafayette.

The Lafayette, the largest factory ship of its kind, launched in August 2010 and a company spokesman said at the time it would focus on the South Pacific and in particular the Peruvian anchovy and Chilean jack mackerel fisheries. Although the Lafayette significantly increases Pacific Andes' catching capacity – the ship is reportedly able to catch some 300,000 tonnes of fish a year – it is also designed to improve efficiencies at the processing stage as it can freeze 1500 tonnes of fish, from various vessels, a day. In fact, according to a spokesperson the Lafayette would raise the profit margins of the overall Fishery business at Pacific Andes to 50% from 35%.<sup>149</sup>

The Lafayette's sheer catch capacity in tonnage means it is not the best representation of Pacific Andes' stated advocacy of marine sustainability, though it can in theory only catch as many fish as quotas allow. However, the policy of focusing on raising profit margins through improved efficiencies upstream, rather than solely on increased catch downstream, does speak to a focus on sustainability. Finally, though Pacific Andes clearly addresses the topic of sustainability on its website, the company does not appear to have produced an official policy stating its commitment to sustainable seafood. This would provide much greater clarity for all stakeholders, including investors.

#### Pakfood PLC

**Ticker:** PPC TB

**Country:** Thailand

**Market Cap:** USD 26m

#### Overall revenue:

FY2010 THB 7.9bn USD 260m

#### Fishing/seafood-related revenue:

USD 250m (97% of total)

**Major Shareholders:** Areecharoenlert Yong (18%), Areecharoenlert Kitti (145%), Areecharoenlert Aurasarin (13%), Kanokwatanawan Wiwat (11%), Areecharoenlert Rinrutai (10%), Kanokwatanawan Uraiwan (7%), Areecharoenlert Pongpan (5.8%)

#### Seafood-related business activities:

Procurement, production, packaging and export of shrimp and crab products

#### Key seafood-related brands and subsidiaries:

- Okeanos Foods
- Asia Pacific (Thailand) Co., Ltd.

#### Drivers for future growth and investment:

Not disclosed

#### Key seafood species and catch methods (if disclosed):

- Vannamei White shrimp - farm-raised product, CCP controlled
- Tiger shrimp, white shrimp, pink shrimp, and fresh water shrimp
- Blue swimming crab (Portunus pelagicus)

#### Marine sustainability initiatives:

Global Aquaculture Alliance's 'Best Aquaculture Practices' logo appears on the website

#### Other sustainability disclosure:

- Claims to "only buy from authority approved sources"
- Claims traceability from growers/suppliers all the way up the supply chain
- Waste water from all plants is "treated to the highest standard"

#### NOTES FOR RESPONSIBLE INVESTORS:

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal

Pakfood's website indicates the company sources a majority of its raw products from farms. Shrimp farming is considered problematic as many farms rely on post larval stage shrimp collected from the wild and reared in farms. The usual farming sustainability issues such as destruction of habitat and pollution of nature are relevant to both shrimp and crab farming. On a video on its website, Pakfood PLC claims to treat its waste water before discharging it into the ocean. This indicates a responsible attitude, however, there is no disclosure on the process used to treat water and/or the standards adhered to in this process. Pakfood displays the Global Aquaculture Alliance's 'Best Aquaculture Practices' logo on its website. This certification is available to seafood processors adhering to a series of environmentally and socially responsible standards set by the GAA. However, though a positive indicator, Pakfood's website gives no information about its GAA BAP certification, including when it was awarded.

#### Sajo Industries

**Ticker:** 007160 KS

**Country:** South Korea

**Market Cap:** USD 250m

#### Overall Revenue:

FY2010 KRW 1,400bn (USD 1.25bn)

#### Fishing/seafood-related revenue:

USD 230m (18% of total)

**Major Shareholders:** Jin-Woo Ju (35%), Sajohaepyo Corp (9.9%), KB Asset Management (6.3%), Sun-Geon Kim (5.3%)



<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>Deep-sea fishing (46.02% of total revenue). Owns and operates <b>34 tuna long-liners – the world’s biggest such fleet</b> fishing for <b>bluefin tuna, bigeye tuna, yellowfin tuna, albacore, and marlins</b>, mostly in the Pacific ocean around the equator, the Indian ocean, the Atlantic ocean, and South Indian ocean; <b>four purse seiners</b> fishing for skipjack and <b>yellowfin tuna</b> with a <b>2km purse seine</b> in the mid-West Pacific ocean; and <b>two trawlers</b> fishing for <b>cod</b> and pollock in the North Okhotsk and Northwest Bering Sea (Russian EEZ)</li> <li>Seafood processing (19.53% of total revenue). Canned tuna, tuna fillet, mackerel pike, and mackerel are key seafood products</li> <li>Collaborations with Sajodaerim Corporation and Oyang Corporation (both subsidiaries of Sajo Group) on pollock-related business activities</li> <li>Collaboration with Sajo Haepyo (a subsidiary of Sajo Group) on canned tuna distribution</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b></p> <ul style="list-style-type: none"> <li>Sajo Chamchi, Sajo Myeong-tae (tuna and pollock products, own brand)</li> <li>Oyang mat-sal, Crabia (processed crab sticks, Sajo Daerim &amp; Sajo Oyang)</li> <li>Yantar (Korea-Russia joint-venture company for pollock catchment in North Pacific ocean)</li> </ul>
<p><b>Future growth drivers and investment plans:</b></p> <ul style="list-style-type: none"> <li>Expanded tuna long-line business to high value fishing grounds including Minami, Mozambique and Solomon Islands in order to improve profit in FY10</li> <li>Upgraded all tuna long-liners with low price oil-using system in order to overcome continuing increase in oil prices in 2010</li> <li>Invested in two purse seiners to replace an older boat in 2010 and 2011</li> <li>Envisages growth in sales of canned tuna as an alternative protein source which is safe from bird flu, mad cow disease, and foot-and-mouth disease</li> <li>Collaborating with Sajodaerim and Oyang Corporation in order to extend pollock market share beyond the domestic market and into Europe and China</li> </ul>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <ul style="list-style-type: none"> <li>Yellowfin tuna (long line &amp; purse seiner, using 2 km purse)</li> <li>Bigeye tuna (long line)</li> <li>Bluefin tuna (long line)</li> <li>Skipjack tuna (purse seiner)</li> <li>Albacore (long line)</li> <li>Striped marlin (long line)</li> <li>Sword fish (long line)</li> <li>Blue marlin (long line)</li> <li>Black marlin (long line)</li> <li>Sailfish (long line)</li> <li>Pollock (trawler)</li> <li>Cod (trawler)</li> </ul>	
<p><b>Marine sustainability initiatives:</b> None disclosed</p>	<p><b>Other sustainability disclosure:</b> None disclosed</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b></p> <p><b>Seafood sustainability policy on website?</b> No</p> <p><b>Relevant policy notes:</b> Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal</p> <p>Sajo Industries Co. owns the largest tuna long-lining fleet in the world. Investors should confirm that it systematically uses methods such as streamers, pingers and circle hooks to mitigate the high levels of by-catch associated with long-lining. The company’s fleet also consists of 2km long purse seiners and bottom trawlers. These methods have high levels of by-catch, are seriously damaging to ocean habitats and collect such immense catches even of target species that they are truly unsustainable.</p> <p>Many of the species targeted by Sajo Industries are listed as threatened or near threatened, except for pollock and Pacific cod. However, though not formally recognized as threatened, popular Bering Sea fish stocks like pollock and cod are considered to be under immense pressure.</p> <p>Skipjack tuna is usually seen as the sustainable tuna choice, but not when caught using purse seines. Bluefin tuna is possibly the most irresponsible target of all species fished by Sajo Industries as they are considered critically endangered. The company has been publicly criticised for over-fishing Pacific tuna.</p> <p>Given the size of its long-line fleet, one step Sajo may wish to consider is to follow guidelines, such as those offered by the UK website <a href="http://www.fishcount.org.uk">www.fishcount.org.uk</a>, into reducing (a) the suffering of fish in long-line fishing and (b) mortality rates among by-catch.</p> <p>Investors will wish to discuss how to help the company recycle capital into areas with more positive long term prospects.</p>	

<p><b>Sajo Seafood</b></p> <p><b>Ticker:</b> N/A</p> <p><b>Country:</b> South Korea</p> <p><b>Market Cap:</b> N/A</p>	<p><b>Overall Revenue:</b> FY2010 KRW 220bn (USD210m)</p> <p><b>Fishing/seafood-related revenue:</b> Not disclosed</p>
<p><b>Major Shareholders:</b> Not disclosed</p>	
<p><b>Seafood-related business activities:</b></p> <ul style="list-style-type: none"> <li>Deep-sea fishing. Fleet includes <b>two long liners</b> fishing for <b>bluefin tuna, bigeye tuna, yellowfin tuna, albacore, and marlins</b> in the equatorial Pacific ocean, Indian ocean, Atlantic ocean, and South Indian ocean; <b>one purse seiner</b> fishing for skipjack and <b>yellowfin tuna using a 2km net</b> in mid-West Pacific</li> <li>Seafood processing. Owns and operates two factories in Korea, all HACCP certified</li> <li>Operates <b>42 tuna sashimi franchise restaurants</b> in South Korea</li> </ul>	<p><b>Key seafood-related brands and subsidiaries:</b> Sajo Hoi Chamchi (Korean tuna sashimi restaurant franchise)</p>
<p><b>Future growth drivers and investment plans:</b> None disclosed</p>	
<p><b>Key seafood species and catch methods (if disclosed):</b></p> <ul style="list-style-type: none"> <li>Yellowfin tuna (long liner &amp; purse seiner)</li> <li>Skipjack tuna (purse seiner)</li> <li>Blue fin tuna (long liner)</li> <li>Big eye tuna (long liner)</li> <li>Albacore (long liner)</li> <li>Marlins (long liner)</li> </ul>	
<p><b>Marine sustainability initiatives:</b> None disclosed</p>	<p><b>Other sustainability disclosure:</b> None disclosed</p>
<p><b>NOTES FOR RESPONSIBLE INVESTORS:</b></p> <p><b>Seafood sustainability policy on website?</b> No</p> <p><b>Relevant policy notes:</b> Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal</p> <p>All of Sajo Seafood’s target species are species of serious concern and are listed on the IUCN Red list as near threatened or threatened, with the exception of skipjack tuna. While skipjack tuna are not at risk in themselves, the method with which they are caught is considered extremely detrimental to ocean health. Long-lining (without the use of by-catch mitigating measures such as streamers, pingers and circle hooks) and purse seining are known to catch high numbers of non-target species, many of which are endangered species such as sharks, turtles and birds. In addition, habitats around the equator where the company operates tend to be especially sensitive and slow to recover, including coral reefs and mangroves.</p> <p>Sajo Seafood also operates a chain of tuna sashimi restaurants. Since it is generally high-grade tuna, such as bluefin, yellowfin and bigeye, which is used in sashimi, this restaurant chain is likely to also have serious sustainability issues related to its operation.</p> <p>If Sajo Seafood’s fishing activities are to remain viable in the medium to long term, it will need to start to consider sustainability now. Thorough understanding of the status of its target stocks should be sought and appropriate conservation measures put into place. As an initial step, these could include reducing or stopping capture of threatened species and transitioning to more sustainable target stocks. Investors should confirm Sajo Seafoods is employing by-catch mitigation methods within its long-lining fleet and moving to less environmentally damaging methods overall. In the restaurant business, a sustainable sourcing policy should be put in place – for example, yellowfin tuna could be sourced through fisheries improvement programmes in the Philippines and Indonesia, which use artisanal methods such as hand lines.</p> <p>These steps can only improve the long term sustainability of revenues and present a fruitful avenue of engagement for investors.</p>	



<b>Sajodaerim Corporation</b> Ticker: 003960 KS Country: South Korea Market Cap: USD 89m	<b>Overall Revenue:</b> FY2010 KRW 450bn (USD 420m) <b>Fishing/seafood-related revenue:</b> USD 110m (26% of total)
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**Major Shareholders:** Sajo Industries (30%), Sajohaepyo Corp (26%), Sajo Seafood (18%), Castlex Seoul Corp (10%)

<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>Seafood processing (around 24% of total revenues). Market leader in Korean fish ball cakes and crab sticks</li> <li>Deep-sea fishing (8% of total revenues). Fleet of <b>six long-liners</b> fishing for <b>tuna</b> in the Pacific ocean and <b>two trawlers</b> fishing for <b>cod</b> and pollock in the North Okhotsk and Northwest Bering Sea (Russian EEZ)</li> <li>Wholesale trade (7.6% of total revenues)</li> <li>Sales representative of Oyang Corporation products in South Korea</li> <li>Collaborations with Sajo Industries and Sajo Oyang on pollock-related business activities</li> </ul>	<ul style="list-style-type: none"> <li>Oyang mat-sal, Crabia (processed crab stick, Sajo Daerim &amp; Sajo Oyang)</li> <li>Yantar (Korea-Russia joint-venture company to secure pollock catchment in North Pacific ocean)</li> </ul>

**Future growth drivers and investment plans:**  
None disclosed

<b>Key seafood species and catch methods (if disclosed):</b>
<ul style="list-style-type: none"> <li>Tuna (long liner)</li> <li>Pollock (trawler)</li> <li>Cod (trawler)</li> </ul>

<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal  
 Sajodaerim Corporation has a fleet of long-liners and trawlers, catching fish in the Pacific Ocean and Bering Sea. Long-liners are considered to be an indiscriminate method of fishing, unless they are combined with mitigating measures such as streamers, pingers and circle hooks to reduce the levels of by-catch. Investors will want to confirm Sajodaerim uses these mitigating measures on its vessels. Trawling can also be indiscriminate as a capture method.. Sajodaerim Corporation uses these methods to target threatened and pressured species such as cod and tuna. Pollock fisheries are officially in a better state than tuna or cod, however, those caught in the EEZ of Russia are under immense pressure and should be regarded with caution.  
 Sajodaerim Corporation has not disclosed any information on future growth drivers and investment plans – one option could be to direct capital towards expansion and upgrade of the company’s upstream processing activities, rather than expansion of the unsustainable fishing activities. However, facilities should be able to take supply from sustainable sources not just own-caught. Investors may want to question the company on steps it is taking to mitigate reputational risk that can result from its choice of capture methods and target species.

<b>Shandong Homey Aquatic Development</b> Ticker: 600467 CH Country: China Market Cap: USD 1.3bn	<b>Overall revenue:</b> FY2010 RMB 770m (USD 120m) <b>Fishing/seafood-related revenue:</b> Farming – USD 53m (44%) Fishing – USD 16m (13%) By product: Sea Cucumber – USD 40m (33) Jellyfish – USD 11m (9%)
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**Major Shareholders:** Homey Group Co Ltd (46%)

<b>Seafood-related business activities:</b>	<b>Key seafood-related brands and subsidiaries:</b>
<ul style="list-style-type: none"> <li>Aquaculture of sea cucumber, jellyfish, abalone, prawn and scallop (owns and operates the biggest sea cucumber farm in Asia)</li> <li>Fishing</li> <li>Seafood processing</li> <li>Seafood sales</li> </ul>	<ul style="list-style-type: none"> <li>Homey</li> <li>Instant &amp; Frozen seafood</li> <li>Functional Food (Mainly produced from sea cucumber extract)</li> </ul>

**Future growth drivers and investment plans:**

- Since many big retailers bypass the wholesale market, their domestic business is decreasing
- They are aiming to expand exports, primarily high margin products such as sea cucumber and jellyfish
- Development of processed products such as instant sea cucumber and sea cucumber drink
- Expand business from traditional fishing industry to high and new technology industries such as functional food and compound microorganisms
- In 2011, the company will purchase four more trawl boats and one more freezer carrier

<b>Key seafood species and catch methods (if disclosed):</b>
<ul style="list-style-type: none"> <li>Sea cucumber (farmed)</li> <li>Jellyfish (farmed)</li> <li>Abalone (farmed)</li> <li>Prawn/Shrimp (farmed)</li> <li>Scallop (farmed)</li> <li>Flounder (farmed)</li> <li>Perch (farmed)</li> <li>Porgy (farmed)</li> <li>Cod</li> <li>Pollock</li> <li>Yellow Croaker</li> <li>Halfbeak</li> <li>Sardines</li> <li>Horse Mackerel</li> <li>Salmon Squid</li> <li>Oster (farmed)</li> <li>Kelp (farmed)</li> </ul>

<b>Marine sustainability initiatives:</b>	<b>Other sustainability disclosure:</b>
<ul style="list-style-type: none"> <li>Water exchange according to the tide</li> <li>Uses naturally occurring plankton and diatoms in the sea as natural feed for farmed species</li> </ul>	Promoting energy saving in the plants

**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal  
 This company is involved in wild-capture, aquaculture and processing of seafood. There are environmental and sustainability issues in each of these areas, but Shandong Homey Aquatic Development discloses very little about policies it has in place regarding these issues. Further, the company does not disclose information about its farms, so commenting on its sustainability is difficult.  
 There are a number of concerns in regards to aquaculture and investors should ask questions about the source of the stock for the farm. Many farms collect juveniles from the wild to grow out, as is common with shrimp, which puts pressure on the natural environment. Other issues with aquaculture include use of chemicals, wild-caught feed and escapes of farmed species to the wild.  
 Shandong Homey Aquatic Development has over 50 fishing vessels, however, the methods used by these ships are not clear. There are severe sustainability concerns attached to many methods of fishing, including purse seining, long-lining and bottom trawling. Looking at the list of species specialized in by the company, it seems likely purse seining is used. The species of cod target is not described, but it should be noted that Atlantic cod is a threatened species.  
 To ensure the sustainability of its operations Shandong Homey Aquatic Development should consider fishing in MSC certified fisheries and avoid fishing grounds that are known to be under pressure. It should also develop a sustainable aquaculture and fishing policy to mitigate damage to the environment and ensure that productivity remains high in both areas.



<b>Shandong Zhonglu Oceanic Fisheries</b> <b>Ticker:</b> 200992 CH <b>Country:</b> China <b>Market Cap:</b> USD 150m	<b>Overall revenue:</b> FY2010 RMB 480m (USD 75m)  <b>Fishing/seafood-related revenue:</b> USD 65m (86% of total)
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**Major Shareholders:** No individual/company with over 5% shareholding identified.

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Processing, cold storage of aquatic products (53% of total revenue)</li> <li>Oceanic fishing and re-processing (33% of total revenue)</li> <li>Lease and management of refrigerated vessels (14%)</li> <li>The company's foreign markets (Japan, Singapore, US, Spain, Ghana and other) cover 87% of total revenue</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Shandong Zhongly Oceanic (Yantai) Foods Co Ltd, a joint venture between Shandong Zhonglu Oceanic Fisheries Co., Ltd. and Habitat International Corp.</li> </ul>
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**Future growth drivers and investment plans:**

- Peninsula Blue Economic Region of Shandong province was formally nominated in a national strategy which aims to build capacity for tuna buying and distributing, establish overseas fishing bases and improve opportunities for participating in the distribution of resources from those bases. Shandong Zhonglu Oceanic Fisheries Company plans to use these opportunities
- Project to build refrigerated, tuna long-line fishing boats

**Key seafood species and catch methods (if disclosed):**

- Tuna (30% of total revenue, tuna long-line fishing boat)
- Mackerel

<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal

Shandong Zhonglu Oceanic Fisheries Company discloses very little about the source of its catch or the methods used. Tuna is of concern because five of the commercially most popular species are threatened or near threatened so the company needs to disclose whether it focuses on one of these species or a non-threatened species such as Skipjack tuna. Given the company uses long-line fishing, it is more likely to target higher value tuna species like bigeye, yellowfin, or bluefin, which are also the species under threat. Unless the company uses mitigating devices such as streamers, pingers and circle hooks, by-catch levels are generally considered to be unsustainably high in long-lining. The by-catch can include many endangered species such as sea turtles, sharks, rays and seabirds that are usually then thrown back, dead.

Considering the global decrease in tuna catch, despite increased effort, plans to build more tuna long-liners seem misguided. Shandong Zhonglu Oceanic Fisheries Company may want to consider constructing tuna pole and line vessels instead and shift to targeting the more financially and ecologically sustainable Skipjack tuna. It may also consider focusing more on its more sustainable mackerel products.

<b>Shanghai Kaichuang Marine International</b> <b>Ticker:</b> 600097 CH <b>Country:</b> China <b>Market Cap:</b> USD 410m	<b>Overall revenue:</b> FY2010 RMB 580m (USD 90m)  <b>Fishing/seafood-related revenue:</b> USD 90m (99% of total)
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<b>Major Shareholders:</b> SH Fisheries General Corp (43%), Holley Indus Group Corp (13%)	
<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Deep-sea fishing, food distribution and management</li> <li>Sale of fishing equipment and products</li> <li>The company's foreign market covers 66% of its total revenue</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Shanghai Kaichuang Marine Fishing Co., Ltd.</li> <li>Pan Pacific Foods (RMI) Inc.</li> <li>Pan Pacific Fishing (RMI) Inc.</li> <li>Cape St. Vincent (FSM) Inc.</li> </ul>

**Future growth drivers and investment plans:**

- To enhance the capture capability of its large trawl fleets and tuna seiner fleets
- To explore more alternative fishing areas in addition to current Chile Fisheries by participating in Chinese National Antarctic Marine Biology Resource R&D projects, especially focusing on Antarctic krill
- Try to send more tuna products to China to expand its domestic market

**Key seafood species and catch methods (if disclosed):**

- Tuna (49% of total revenue, wild-caught, purse seining)
- Cavalla/King Mackerel (44.4%, wild caught, trawling)
- Antarctic krill (Euphausia superba Dana) (0.7%)
- Squid (0.1%)

<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> <ul style="list-style-type: none"> <li>During 2010, the company signed "Letter of Commitment on Work Safety Responsibility" in order to reduce work accidents</li> <li>Obeys all national Ship Pollutant Emission Standards, including (GB3552-83), IMO 73/78 and MEPC anti-pollution requirements</li> </ul>
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries

Shanghai Kaichuang Marine international does not disclose what species of tuna it focuses on, but many species are threatened or near threatened. Tuna stocks across the world, with the exception of skipjack tuna, are declining. Consequently plans to increase capacity, if aimed at any species other than skipjack, may not realise expected returns.

There are also concerns within the scientific community about the sustainability of fishing of Antarctic Krill, an incredibly important food source for nearly every marine fish and mammal and a vital link at the bottom of the food chain. Any plan to expand fishing activities focused on Antarctic Krill would need to be very carefully considered as intensive fishing of this tiny shrimp could have far-reaching effects on the entire marine ecosystem. In addition, krill cannot be eaten by humans, but are instead used in fish food and oil, so the fishing of them will not contribute directly to food security.

King Mackerel, on the other hand is a sustainable fish with many health benefits and the company may want to consider developing this side of the business instead.

<b>Silla</b> <b>Ticker:</b> 004970 KS <b>Country:</b> South Korea <b>Market Cap:</b> USD 190m	<b>Overall Revenue:</b> FY2010 KRW 310bn (USD290m)  <b>Fishing/seafood-related revenue:</b> USD 220m (76% of total)
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**Major Shareholders:** Jun-Hyeong Park (40%), Seong-Hyeong Park (19%), Korea Investment Trust Mgmt Co (6.4%), Korea Value Asset Mgmt Co (5.7%)





<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Deep-sea fishing. Silla owns and operates <b>11 tuna long-liners, six purse seiners</b>, and <b>two pollock trawlers</b></li> <li>Panofli Co., Ltd (joint-venture fishing company formed in 2002 with the harbour city of Tema in Ghana, Africa). Panofli has <b>eight tuna long-liners</b> and two fish carrier vessels</li> <li>Exports tuna by direct trade with overseas buyers; sells tuna and other seafood domestically by auction and private contract. (Sales of sashimi-grade tuna to South Korea and Japan accounted for 10% of total revenue in 2010; sales of tuna for canning to South Korea and Thailand accounted for 42% of total revenues in 2010)</li> <li>Wholesaler of pollock (sales of seafood including Pollack accounted for 28% of total revenues in 2010)</li> <li>Owns and operates tuna sashimi restaurant</li> <li>Seafood processing</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Silla Darangwon (tuna sashimi restaurant, direct subsidiary of Silla)</li> <li>Fish meat sausage brands such as Hamtory, Maxbong (produced by Silla SG, a direct subsidiary)</li> </ul>
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**Future growth drivers and investment plans:**  
Silla is investing in two long-liners in 2011; one is a replacement for an older long-liner

<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Tuna (purse seiners used for canned tuna)</li> <li>Yellowfin tuna, Bigeye tuna (long-lines used for sashimi)</li> <li>Pollack (deep-sea trawl fishing in North Okhotsk and Northwest Bering Sea, in the Russia EEZ)</li> </ul>
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<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Fish wholesalers, processors and manufacturers of fishmeal  
 Silla Co. discloses detailed information about its activities, which allows investors to make informed decisions. However, the information disclosed is of considerable concern. Long-lining (without the use of by-catch mitigating devices such as streamers, pingers and circle hooks), purse seining and trawling are three of the most damaging methods of wild-capture as they have very high by-catch levels. In addition, the tuna species mentioned are near-threatened (yellowfin) and vulnerable (bigeye) and continued focus on capture of these species could wipe them out. Pollack can be a sustainable choice, however, Russian stocks are thought to be under pressure and are therefore not considered to be sustainable in this case. In addition, Silla is planning to invest further in two tuna long-liners in 2011 at a net increase to the fleet of one vessel. When technology creep is taken into account, this is likely to increase Silla's high-grade tuna-catching capacity substantially, which will increase pressure on these fragile stocks.  
 From an investment perspective the unsustainability of these activities may start to undermine returns, where species depletion results in no further fish being caught. Consequently it makes sense for Silla to progressively invest in its fleet to equip it for more sustainable practices. Excess capital could be reinvested into aquaculture rather than more ships, notwithstanding the company's inexperience in this field. A further question for investors is whether the company is taking steps to manage reputational risk by mitigating incidental by-catch in long-lining.

<b>Sojitz</b> <b>Ticker:</b> 2768 JP <b>Country:</b> Japan <b>Market Cap:</b> USD2.32bn	<b>Overall revenue:</b> FY2011 JPY 4,000bn (USD 52bn)  <b>Fishing/seafood-related revenue:</b> Lifestyle business: USD 14bn (34.5% of total). This division comprises wheat, marine product, apparel and timber businesses.
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<b>Major shareholders:</b> Japan Trustee Services Bank 11%	
<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Seafood business is part of marine products segment of consumer lifestyle division</li> <li>Aquaculture of shrimp + tuna</li> <li>Also engages in cold storage business</li> <li>Alliance w/ Dalian Zhangzidao Fishery Group</li> <li>Alliance w/ National Prawn Company (NPC) of Saudi Arabia to farm shrimp</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Sojitz Foods Corp</li> <li>Sanyo Food Co, SOFCO Seafoods Inc</li> <li>Sojitz Tuna Farm Takashima Cox</li> </ul>

**Future growth drivers and investment plans:**  
Expand sales channels in Japan, Asia, Europe and North America in order to significantly increase the volume of products handled by the Sojitz Group

<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Shrimp (Breeding)</li> <li>Tuna (Ranching)</li> </ul>
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<b>Marine sustainability initiatives:</b> <ul style="list-style-type: none"> <li>Shrimp are hatched and bred in Saudi Arabia with NPC, a Saudi Arabian partner</li> </ul>	<b>Other sustainability disclosure:</b> None disclosed
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Wild catch fisheries; Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal  
 Shrimp are often a species of concern, however, by working with NPC and breeding shrimp from captive populations, Sojitz has eliminated its reliance on wild stock. Further challenges associated with aquaculture may still need to be overcome. These include destruction of habitat and pollution of natural water systems.  
 Sojitz is also involved in tuna ranching, which is considered to be a highly unsustainable practice as tuna are removed from the wild as juveniles and grown in farms. Removing them from the wild as juveniles prevents populations from breeding and replenishing stocks. This results in faster overfishing and stock depletion. Consequently, the shrimp aquaculture business has more stable long-term characteristics.  
 Investors may wish to discuss with Sojitz the benefits of focussing more on its aquaculture interests and progressing to an even higher level of responsibility in farming methods. There is also information lacking related to its partnership with Dalian Zhangzidao Fishery Group and fishing activities – though it can be assumed that some of the notes provided for Dalian Zhangzidao Fishery Group will also be relevant to Sojitz in the context of this alliance.

<b>Thai Union Frozen Products</b> <b>Ticker:</b> TUF TB <b>Country:</b> Thailand <b>Market Cap:</b> USD 1.9bn	<b>Overall revenue:</b> FY2010 THB 72bn (USD 2.4bn)  <b>Fishing/seafood-related revenue:</b> USD 2.4bn (100% of total)
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**Major Shareholders:** Chansiri Kraisor (9.0%), Mitsubishi Corp (7.6%), Chansiri Thiraphong (5.8%). The Chansiri family stake is collectively higher due to additional smaller holdings

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Production and export of canned and frozen food products</li> <li>Production and distribution of related packaging and packaging products</li> <li>Production and distribution of feed and agricultural/aquaculture products</li> <li>Domestic food business</li> <li>Overseas investment</li> <li>Fishing vessels</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> Approximately 30 subsidiaries and associated businesses, including such well known brands as: <ul style="list-style-type: none"> <li>Chicken of the Sea</li> <li>John West</li> <li>Century Tuna</li> <li>Mareblu</li> <li>Sealect</li> </ul>
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**Future growth drivers and investment plans:**

TUF, already possessing massive processing & distribution capacity, is making strategic acquisitions to secure and increase its ability to procure raw materials as it seeks to fulfill rising global demand. This is evidenced with its recent acquisition of MW Brand Holdings. Additionally, such investments serve to geographically diversify its supply and production infrastructure in order to mitigate the risks presented by trade barriers and country of origin requirements.

**Key seafood species and catch methods (if disclosed):**

- Salmon: Trout, Atlantic, Pink and Chum
- Tuna: Skipjack, Yellowfin, Albacore, and Big Eye, Bonito, Tonggol
- Mackerel
- Responsibly-farmed black tiger and white shrimp
- Squid
- Cuttlefish
- Sardines

**Marine sustainability initiatives:**

- TUF co-founded the International Seafood Sustainability Foundation (ISSF), with objectives to promote sustainable utilization of marine resources, to develop science-based resource management measures to ensure ecological balance, and to minimize or eliminate environmental impacts from tuna fishery in order to promote healthy ecosystem health and maintain abundance of marine resources through responsible use by consumers
- Provides guidance for partner shrimp farms & hatchery to achieve GAA Best Aquaculture Practice (BAP) certification
- Works with its allied shrimp feed mill to ensure overall sustainability of shrimp farming practice as regards:
  - Sustainability of feed raw materials
  - Impact of feed usage on surrounding ecosystems

**Other sustainability disclosure:**

TUF recycles its office waste as well as endeavoring to use waste from fish and shrimp production in other processes such as petfood and fishmeal. It also claims to conserve energy and water use

**NOTES FOR RESPONSIBLE INVESTORS:****Seafood sustainability policy on website?** Yes

**Relevant policy notes:** Aquaculture producers; Fish wholesalers, processors and manufacturers of fishmeal

TUF has a clear statement on its website with regards to its stance on sustainability. It seems dedicated to improving its performance in this arena, judged by its participation in the foundation of the ISSF, gaining of GAA BAP certification and focus on ensuring overall sustainability of its shrimp farming practice. Other sustainability practices such as waste, energy and water management are also admirable.

However, the methods used by their suppliers to harvest tuna and salmon are not disclosed and there are substantial sustainability concerns related to both the farming and wild catch of these species. TUF's UK tuna brand, John West, was placed seventh out of eight tuna brands in Greenpeace's 2011 Tuna League Table, which ranks brands on the sustainability of their sourcing practices. It finally capitulated to sustained pressure from campaigners in July 2011, agreeing to stop the use of controversial Fish Aggregating Devices (FAD) in tuna harvesting and shift to pole and line capture – a method of catching tuna which does not produce unsustainable levels of by-catch.

As a further note for responsible investors, TUF has also been involved in a scandal through its recently acquired MW Brands Holdings SAS, which reportedly supplied retail giant Tesco with seafood with mislabeled or potentially misleading sustainability claims given the significant by-catch involved in its harvesting.

TUF would benefit from applying the same emphasis on traceability and sustainability it shows in its shrimp-related businesses across all business lines. As such, a more formal marine sustainability policy would be advised. This would protect the company from further reputational considerations as well as improve long term security of supply, thus reducing risks to earnings.

**Tohto Suisan****Ticker:** 8038 JP**Country:** Japan**Market Cap:** USD 71m**Overall revenue:**

FY2011 JPY 140bn (USD1.8bn)

**Fishing/seafood-related revenue:**

USD 1.8bn (over 99% of total)

**Major Shareholders:** Matsuoka Reizo KK (7.9%), Japan Trustee Services Bank (5.8%), Nomura Asset Management Co (5.3%)

**Seafood-related business activities:**

- Wholesale fresh, cold and processed fish for retailers
- Manage fish markets in local cities of Japan (in Tokyo, Saitama, Chiba, etc)
- Currently in the process of opening a fish wholesale market place

**Key seafood-related brands and subsidiaries:**

8 subsidiaries such as Saitamaken Uoichiba, Chiba Gyorui and Tokyo Ota Uoichiba

**Future growth drivers and investment plans:**

Expand business partners in order to increase volume

**Key seafood species and catch methods (if disclosed):**

- Tuna
- Undisclosed fish
- Shellfish
- Fresh water fish
- Lobsters
- Prawn

**Marine sustainability initiatives:**

None disclosed

**Other sustainability disclosure:**

None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:****Seafood sustainability policy on website?** No

**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal  
As a wholesaler, Tohto Suisan is not directly involved in capture. However, as a vital link in the seafood supply chain, it should be placing prime importance on the sustainability of its seafood sources, not least for the sake of ensuring future revenue streams. Species and catch methods are not disclosed on Tohto Suisan Co.'s website, which makes assessment of the company very difficult.

The company deals with tuna, which is a species of concern for responsible investors. Bluefin (Southern and Atlantic), yellowfin, bigeye and albacore tuna are very popular commercial fish, however, they are all threatened or near-threatened species. Skipjack tuna stocks are more stable and seem to cope better with exploitation and it is suggested that Tohto Suisan Co. focus more on this species or other species with more stable stocks, if they do not already.

Shellfish and fresh water fish are also part of its product line. Another area in which this company can improve its sustainability is to procure these products from farms, as aquaculture can reduce pressure on wild stocks as long as responsible methods are used.

A seafood procurement policy would be a useful first step for Tohto Suisan Co in indicating to investors that the company is acting to increase the quality of earnings.

**Tsukiji Uoichiba****Ticker:** 8039 JP**Country:** Japan**Market Cap:** USD 29m**Overall revenue:**

FY2011 JPY 85bn (USD1.1bn)

**Fishing/seafood-related revenue:**

USD 1.1bn (100% of total)

**Major Shareholders:** Benirei Corp (7.6%), Tokyo Suisan Kaisha Ltd (5.6%)



<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Wholesale Live, Fresh &amp; Frozen Fish and other marine products, and processed seafood</li> <li>Cold storage business</li> <li>One of the main operators at Tsukiji fish market</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Kyodo Suisan (Wholesale)</li> <li>Hachioji Uoichiba (Wholesale)</li> <li>東市築地水産貿易（上海）有限公司 (Wholesale in Shang-hi)</li> </ul>
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**Future growth drivers and investment plans:**  
None disclosed

**Key seafood species and catch methods (if disclosed):**

<ul style="list-style-type: none"> <li>Tuna – Blue fin, Yellow fin, Big eye, Skipjack</li> <li>Swordfish</li> <li>Marlin</li> <li>Crab</li> <li>Shrimp</li> <li>Cod</li> <li>Salmon</li> </ul>	<ul style="list-style-type: none"> <li>Rock fish</li> <li>Sablefish</li> <li>Scallops</li> <li>Octopus</li> <li>Cuttlefish</li> <li>Horse mackerel</li> <li>Sardines</li> </ul>
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<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> No disclosure on ESG issues except for employee benefits
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal Tsukiji Uoichiba, Co. is a large wholesaler and is not involved in aquaculture or wild-capture. However, it is creating the market for products from these places and therefore has an opportunity to make sustainable choices that echo back into the part of the industry with more direct impact on marine sustainability. There is currently no policy in place for the procurement of sustainable items and the company currently deals with threatened species and depleted stocks such as bluefin tuna, swordfish, marlin and cod. Shrimp and salmon are also traded and these species are associated with damaging farming and wild-capture methods.  
 There is no disclosure about where the products come from and sustainability is not mentioned on its website. If the company wants to ensure it has a reliable supply of stock for many years to come, a policy and statement should be its first step. It may want to consider focusing on products from responsible aquaculture farms and focus on its more sustainable current products such as mackerel and sardines.

<b>Yokohama Reito</b> <b>Ticker:</b> 2874 JP <b>Country:</b> Japan <b>Market Cap:</b> USD 390m	<b>Overall revenue:</b> FY2010 JPY 120bn (USD 1.6bn)  <b>Fishing/seafood-related revenue:</b> USD 1.1bn (69% of total)
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**Major Shareholders:** Dai Ichi Life Insurance Co (5.9%)

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Fish division engages in purchase, manufacture, processing + sale of seafood</li> <li>Also engages in cold storage business</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Alliance Seafoods (purchase, manufacture, processing + sale of seafood)</li> <li>Clover Trading (eel trading)</li> <li>Thai Yokorei (Subsidiary in Thailand)</li> </ul>
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**Future growth drivers and investment plans:**

- Invest in new cold storage facilities (two in Japan, one in Thailand) to increase capacity
- Increase international trades

<b>Key seafood species and catch methods (if disclosed):</b> <ul style="list-style-type: none"> <li>Shrimp</li> <li>Squid</li> <li>Scallops</li> <li>Chum Salmon</li> <li>Eel</li> <li>Mackerel</li> </ul>
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<b>Marine sustainability initiatives:</b> None disclosed	<b>Other sustainability disclosure:</b> Although the company discloses some environmental initiatives, it focuses more on reducing CO <sub>2</sub> emissions
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**NOTES FOR RESPONSIBLE INVESTORS:**  
**Seafood sustainability policy on website?** No  
**Relevant policy notes:** Fish wholesalers, processors and manufacturers of fishmeal  
 This trading company is not directly involved in the collection of seafood, however, as part of the chain from ocean to plate, it also has responsibilities towards protecting the sustainability of this food source. Yokohama Reito does not disclose methods with which their suppliers collect their fish or where they are from. These details are important in ascertaining the sustainability of their products.  
 One species that could be sustainably sourced is mackerel. These are smaller fish with fast reproductive cycles that allow them to replenish their stocks quickly. They are also often caught using mid-water trawls, which, although associated with some by-catch, are not as damaging as other methods.  
 Shrimp, salmon and eel are species that responsible investors should be concerned about. Wild stocks of eels are under pressure, but farmed eels are also a concern as they are often sourced from the wild to stock farms. Shrimp have been associated with irresponsible farming practices, such as using open systems, and destroying natural habitat to make space for them. Chum salmon is a wild caught salmon, however, the location is not disclosed. Some stocks of this species are MSC certified, however, some are considered badly depleted, so disclosure of the source location is necessary to ascertain the reliability of supplies.  
 Overall Yokohama Reito is advised to investigate its supply chain and select species caught or farmed using responsible methods only. This would enable it to progressively improve earnings quality.

<b>Zhanjiang Guolian Aquatic Products</b> <b>Ticker:</b> 300094 CH <b>Country:</b> China <b>Market Cap:</b> USD 510m	<b>Overall revenue:</b> FY2010 RMB 1.2bn (USD 190m)  <b>Fishing/seafood-related revenue:</b> USD 190m (100% of total)
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**Major Shareholders:** ZJ Guotong Aquatic (45%), Guanlian Intl Inv (19%)

<b>Seafood-related business activities:</b> <ul style="list-style-type: none"> <li>Seafood breeding, farming, fishing, and sales globally. It is the only Chinese company that exports prawns to US with zero tariff</li> <li>Processes fresh and frozen prawn and tilapia products</li> <li>Produces feed for prawns and fishes</li> </ul>	<b>Key seafood-related brands and subsidiaries:</b> <ul style="list-style-type: none"> <li>Guo Lian</li> </ul>
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**Future growth drivers and investment plans:**

- Expand domestic market and build up prawn brand
- Increase input into processed tilapia products
- Expand and construct new farms for breeding prawns



**Key seafood species and catch methods (if disclosed):**

- White Shrimp (farmed)
- Tilapia (farmed)

**Marine sustainability initiatives:**

None disclosed

**Other sustainability disclosure:**

None disclosed

**NOTES FOR RESPONSIBLE INVESTORS:**

**Seafood sustainability policy on website?** No

**Relevant policy notes:** Aquaculture producers

Shrimp farming can be an area of concern due to the methods used. Shrimp farms are often built along the coast, requiring mangroves, coral reefs and other sensitive intertidal zones to be cleared. Artificial feed, pesticides and other chemicals can be introduced into the water, which is often not confined to the farm ponds and so seeps out into the surrounding natural habitat. The farms are sometime stocked with juvenile shrimp taken from the wild by dredging and grown in the farms. Zhanjiang Guolian Aquatic Products does not disclose any environmental policies for the construction and maintenance of its current farms, which leaves it open to the assumption that new farms will not be built with environmental sensitivity. The company appears to use captive bred shrimp as stock, which is a positive as this does not require juveniles to be taken from the wild.

Tilapia is one of the fish species best adapted to aquaculture – its largely herbivorous diet and natural lifecycle mean it can generally be farmed with minimum impact on the surrounding environment. However, there are still ways of farming tilapia that are better or worse for the environment – without the necessary transparency, or engagement in aquaculture certification programmes, it is hard to gauge Zhanjiang Guolian Aquatic Products' sustainability performance in this area. Disclosure of farming methods would be a constructive next step for Zhanjiang Guolian Aquatic Products, before it considers developing a sustainability and environmental policy for its current and new farms.



ISSUES FOR  
RESPONSIBLE  
INVESTORS

# INDIRECT IMPACT SECTORS





# RETAIL

Asian food supply chains are less concentrated than in developed markets, though the presence of large supermarket chains is growing fast. Supermarkets are involved in the whole range of sustainability considerations. These include issues as varied as the complex challenge of maintaining food supply in the face of water, energy and climate disruption, to the remodeling of communities as large store formats displace smaller family run grocers.

In developed markets, particularly the UK, in response to rising consumer awareness and demand, supermarkets have been a factor in shifting their supply chains to more sustainable practices. This has extended into seafood sourcing and many stores such as Waitrose and Sainsbury's show off their certificates and highlight NGO rankings in their in-store branding.

In general, Asian supermarkets have poor ESG disclosure. The 2011 ASR™, Responsible Research's proprietary ESG benchmarking tool covering a universe of 750 listed Asian companies, included nine retail companies with a sector average of just 30 percent compared to an Asian average for the airline sector of 40 percent.

There is not yet a widespread awareness in Asia of the severe environmental consequences of the continued over-exploitation of marine resources. Although a socially conscious middle class is developing across the region in tandem with rising incomes and improving education, consumer concerns over marine sustainability are not yet spurring the supermarkets into action. Even anti-shark's fin campaigners are finding it hard to get traction in many markets.

However, increased concerns over the safety of seafood, where contaminants such as heavy metals can be present, may yet trigger investment in traceability. A number of supermarkets have taken great steps to maintain their reputation and build brands to capture the rising middle class wealth. With food safety of paramount concern, supermarkets may perceive a risk to their brands where they sell fish directly without the intermediation of a processor.

Within Asia, supermarket growth is predicated on store opening programmes. Supermarkets compete mostly with wet markets for fish sales, with an offer based on convenience and quality. Consequently, certification may enhance the supermarket offering, highlighting quality, rather than resulting in a disadvantage due to slightly higher prices.

A further nuance in Asia is that for many middle class families a domestic helper is the purchaser rather than the householder. This introduces an extra layer of complexity in communicating messages relating to sustainability.

## Company analysis

The following table shows the results of a disclosure assessment of 17 of the largest supermarket chains in the Asia-Pacific region. Three

Japanese companies are included as their policies are important given the significance of the Japanese market in global seafood consumption. The two Australian supermarkets provide a point of comparison for other supermarkets in the region. A virtual duopoly exists in Australia so stores can, at times, be less responsive to consumer demand than operators in the EU or US.

Of the 17 companies, nine have statements concerning suppliers that relate to quality and procurement. Of these, only four refer to the environment. Only one of the companies, Aeon in Japan, refers to seafood sustainability in its disclosure. This is markedly different from large supermarket retailers in European markets, many if not most of which sell primarily sustainably sourced fish or marine products.

Where supplier policies cover the environment they refer to compliance with environmental legislation at a minimum and in the case of Seven & I Holdings include a requirement for conservation of biodiversity. It is not clear that seafood sourcing would fall within the scopes of all the environmental sections of the supplier policies disclosed as they are currently worded.

Company	Ticker	Listing	Is the supplier policy disclosed?	Does it cover environment?	Does it cover seafood?
Aeon Co.	8267 JP	Japan	Yes	Yes	Yes
Big C Supercenter	BIGC TB	Thailand	No	-	-
China Resources Ent	291 HK	Hong Kong	Yes	No	No
CP ALL plc	CPALL TB	Thailand	Yes	No	No
Dairy Farm Int	DFI SP	Hong Kong	No	-	-
E-Mart Co Ltd	139480 KS	S Korea	No	-	-
Hero Supermarket	HERO IJ	Indonesia	No	-	-
JG Summit	JGS PM	Philippines	No	-	-
Lawson Inc	2651 JP	Japan	No	-	-
Lianhua Supermarket	980 HK	China	No	-	-
Pantaloon Retail	PF IN	India	Yes	No	No
Seven & I Holdings	3382 JP	Japan	Yes	Yes	No
SM Investments Corp	SM PS	Philippines	Yes	No	No
Sun Art Retail Group	6808 HK	Hong Kong	Yes	No	No
Wesfarmers Ltd	WES AU	Australia	Yes	Yes	No
Woolworths Ltd	WOW AU	Australia	Yes	Yes	No
Wumart Stores	8277 HK	China	No	-	-

## Investor engagement notes

There are a number of different levels at which engagement and improvement may be effective. These range from encouraging buyers at the store level to trial certified sustainable seafood (or even just local sourcing) through to group level initiatives to promote sustainable seafood (as at Aeon in Japan) to a board level commitment to migrate all seafood sourcing to sustainable supply within a defined time horizon.

While it is most effective for a policy to sit alongside other sustainability commitments within sourcing policies across the range of high impact commodities, smaller initiatives can also be undertaken independently. Sustainability certification can be considered a component of brand enhancement and sold as such and, where promotion is successful in terms of sales or customer feedback, this may set the scene for boards to consider broader more philosophical commitments to sustainability later.

## SUGGESTED POLICY STEPS FOR RETAILERS

- The company has a sustainable seafood policy in place
- The policy covers fresh and frozen fish products, as well as shelf-stable fish products
- The policy covers third party brands as well as own-brand products
- The company does not add further IUCN-listed fish to its inventory
- The company undertakes to remove IUCN-listed fish from its inventory
- The company undertakes supply chain analysis to ensure sustainability of its fish products
- Suppliers with external certification, like ASC, GAA or MSC, are favoured
- Suppliers are encouraged to seek sustainability certification
- The retailer provides clear labeling for the consumer indicating species of fish (including original name where fish names have been changed); origin of fish; method of capture; sustainability of fish stock
- The retailer provides advice to customers on sustainable seafood choices
- The retailer is a participatory member of relevant seafood sustainability initiatives
- The retailer sets out commitments with timetables for implementing the various steps

## Best practice examples

### CASE STUDY: AEON CO

The following extract taken from the 2011 sustainability magazine of Japanese supermarket chain Aeon Co was the only clear statement on the use of certified sustainable seafood sold by retailers from the companies covered. It highlights increased awareness of the issues in Japan and is a clear sign of progress.

“Expanding the Number of MSC-Certified Products to Ensure that Wild Fish will Continue to Reach Dinner Tables

The Marine Stewardship Council (MSC) certification, also known as the marine eco-label, assures consumers that marine products were harvested through properly managed fishing practices. The aim of the MSC certification is to help protect limited marine resources.

Aeon has been selling Alaskan red salmon, salmon roe and other MSC-certified seafood since 2006 and added salted mackerel and seasoned cod roe to the list in fiscal 2010. In total, we now offer customers 11 MSC-certified products across 22 species—more than any other retailer in Japan. Since October 2010, we have been selling these products in approximately 1,200 stores and are gradually increasing that number.”<sup>64</sup>

## SOURCING SUSTAINABLY THROUGH WWF'S SEAFOOD SAVERS PLATFORM<sup>145</sup>

For many small, local fisheries in developing countries like Indonesia and the Philippines, MSC certification is a far-off goal. Not only would the expense of assessment be difficult to cover, but the fisheries themselves are currently such poor performers on a number of sustainability criteria that they would be ineligible. New approaches are needed to harness the power of the private sector (i.e. seafood buyers) to bring about positive changes in these fisheries.

With the support of their offices in major consumer markets in the US and Europe, WWF already has a number of fisheries improvement projects (FIPs) in place in and adjacent to the Coral Triangle to work with small-scale fisheries of this kind, with the eventual aim of raising them to the standard required for certification. FIPs draw on market forces to establish a broad and goal-based programme of improvement consistent with MSC sustainability criteria. FIPs typically tackle areas like fishery governance and regulation, harvest controls and catch monitoring, ecosystem impacts, post-harvest quality and hygiene, health and safety standards and market pricing.



In order to expand its portfolio of FIPs in the Asia-Pacific, WWF has devised an inter-regional B2B platform currently termed "Seafood Savers" to reward more responsible practices by matching supply with demand, to facilitate information exchange and to provide technical expertise. The scheme aims to partner seafood buyers with a sustainability remit with specific FIPs – securing an increasingly sustainable source of seafood for the buyer, and a stable source of income (generally at a price premium) for the fishery. One example of this in practice is Dutch seafood wholesaler ANOVA Seafood's partnership with WWF on a yellowfin tuna FIP in Indonesia under a programme called 'Fishing and Living' (see page 54).

With the endorsement of NGOs, certain US and Canadian retailers have modified their seafood sourcing policies recently to accommodate FIPs in tacit acknowledgement that the supplies of sustainably sourced seafood are not yet large enough to provide for all market demand. These include Wal-Mart, Supervalu, Kroger and Loblaw. WWF anticipates that more and more buyers will take this position. This will present new opportunities to transform supply chains in geographies where this has traditionally been notoriously difficult to do and to advocate the importance of more responsibly caught or farmed seafood to producers and processors.

### CASE STUDY: THE CO-OPERATIVE SUPERMARKET

Supermarket retailers in Asia, where sustainable seafood sourcing is in its infancy, would do well to look for examples of best practice in the US or UK, where it is becoming increasingly rare to find a supermarket without a sustainable seafood sourcing policy.

Often the prompt for supermarket retailers to put in place, or improve, a sustainable seafood sourcing policy has been external and tied to reputational risk. One example is Greenpeace USA's annual ranking of leading US supermarket chains according to the perceived merits of their seafood sourcing policies, 'Carting Away the Oceans', which is now in its fifth year.<sup>146</sup>

A UK equivalent might be the Marine Conservation Society's (MCS) biannual Supermarket Survey, which invites supermarkets to respond to a series of questions about their seafood sourcing policies, before ranking the results publicly.<sup>147</sup>

The results of the MCS's 2007 Supermarket Survey placed supermarket chain The Co-operative in seventh place out of a total of eight. As Andrew Nicholson, Agricultural Development Manager on The Co-operative's Commercial Team, explained in an interview, this was a spur to act for a Group that places ethics at the centre of its business remit.

The thorough review into seafood sourcing that followed, and resultant tougher policy, tackled every own-brand fish product down to the prawn crackers, Nicholson said. The only seafood product that falls outside the scope of the Co-operative's own-brand policy is pet food, which uses offcuts and waste material from processing for human consumption.

The changes had the desired effect – in the 2009 MCS Supermarket Survey, The Co-operative came out on top. Many of the chain's fish products now bear consumer-facing sustainability labels, such as the Marine Stewardship Council (MSC) certification for wild caught fish.

This has been made somewhat easier, says Nicholson, because the typically small individual store size of The Co-operative means there are no wet fish counters and all fresh seafood products are sold ready packaged from the processor. Supermarket wet counters constitute a final link in the chain of custody and as such need to undergo scheme assessment before they can themselves display consumer-facing sustainability logos like that of the MSC, regardless of the sustainability credentials of the produce in question.

The Co-operative continues to scrutinise and expand its policy and has introduced a traffic light-style rating system for its seafood suppliers. The company constantly re-visits its ratings, says Nicholson, with the aim of working with suppliers to help them move from amber to green, having already removed or replaced every product containing a red rated fish species.

It has also invested a significant sum of money into certain fisheries to support them through MSC assessment and worked with the British government to research by-catch. It is not uncommon for the retail sector to fund such projects "in the background", says Nicholson, adding that in total the Co-operative spent £200,000 on seafood sustainability-related research and investment over the last two years, and has a similar budget for 2011/12.

One project the co-operative is interested in working with next is the International Fishmeal and Fish Oil Organisation's (IFFO) 'Improvers Programme', says Nicholson. The IFFO programme works with fish farmers to help them move towards more sustainable feed sources for their stock. This especially important in relation to the heavy use of trash fish in warm water prawn farming in Asia, where the Co-operative sources many of its prawn products, he adds.

Nicholson says the Co-operative is also encouraging its branded seafood suppliers to put in place similarly stringent sourcing policies to its own, although he admits that NGOs like Greenpeace have more scope to promote change in this sector of the industry.

# AIRLINES

Asian airlines are in the middle of an extremely fast growth phase as the swelling ranks of Asian middle classes take to the skies. In general Asian airlines have above average ESG disclosure. In the 2011 ASR™, Responsible Research's proprietary benchmarking tool covering a universe of 750 listed Asian companies, there are 10 airlines with an average score of 40 percent compared to the benchmarked universe average of 32 percent.

The primary ESG considerations tend to revolve around fuel, which is a factor in both climate change and energy security. Labour relations are also frequently strained in the industry. As the pace of expansion continues there are likely to be increasing complaints at environmental conditions and noise at the community level.

The airlines are also very significant caterers and are exposed to the full range of food related issues. While seafood sourcing is not as material for airlines as, for instance, for restaurants or even hotels, in some ways this can make it easier for airlines to implement more responsible policies. For example, at hotels there is great pressure to keep shark's fin on the menu for wedding banquets, but this does not apply on flights.

The more international luxury carriers may face customer pressure to improve practices relating to catering and are less price-sensitive than the low cost carriers. Cathay Pacific in particular has taken a very clear lead on this issue with its approach to responsible seafood sourcing. This includes stating that it will not serve shark's fin and progressive movement to sourcing only MSC-certified seafood.

While airlines may face fewer barriers on the customer side than hotels and restaurants, they may face more difficulties in implementation. The catering facilities are by nature in internationally dispersed locations where different supply conditions apply. In addition, catering is commonly outsourced, so even if an airline wants to move to sustainable sourcing, if it is only a small client it may not be able to exert enough influence over the catering company to achieve its goals. Airlines can work with the international travel catering association to improve standards here.

## Company analysis

The following table looks at 13 of the largest airlines in Asia. Of the 13 companies, six have a supplier code, all of which reference the environment. The supplier codes are primarily focussed on engine and resource efficiency, in line with the most material issues for airlines. However, Cathay Pacific has a supplier code that specifically mentions responsible seafood sourcing and can be considered a leader in this area. Singapore and Thai Airlines did, however, remove shark's fin soup from their menus in 2001 in response to a targeted, and rare, local campaign.<sup>66</sup>

Company	Ticker	Listing	Is a supplier policy disclosed?	Does it cover environment?	Does it cover seafood?
Air China	601111 CH	China	Yes	Yes	No
Airasia	AIRA MK	Malaysia	No	-	-
All Nippon Airways	9202 JP	Japan	Yes	No	No
Cathay Pacific	293 HK	Hong Kong	Yes	Yes	Yes
China Airlines	2610 TT	Taiwan	No	-	-
China Eastern Airlines	670 HK	Hong Kong	Yes	Yes	No
China Southern	1055 HK	Hong Kong	Yes	Yes	No
Eva Airways	2618 TT	Taiwan	No	-	-
Hainan Airline	900945 CH	China	No	-	-
Korean Airlines	03490 SK	S Korea	No	-	-
Singapore Airlines	SIA SP	Singapore	Yes	Yes	No
Skymark Airlines	9204 JP	Japan	No	-	-
Thai Airways	THAI TB	Thailand	No	-	-

## Investor engagement notes

For those companies with a supplier policy, particularly where it mentions the environment, there is a clear rationale for companies to extend the policy to cover seafood sourcing.

However, there are good prospects even where companies have lower levels of environmental disclosure. While it may appear easier to position a seafood sourcing code within the context of a well-developed corporate responsibility or sustainability framework, this does not have to be the case. Catering will be a completely different line of responsibility to other issues, such as fuel and carbon efficiency. It is also less controversial than these other topics, which are more fundamental to the business. Consequently the company will be able to pursue responsible seafood sourcing independently of a broader programme or of disclosure in other areas.



## SUGGESTED POLICY STEPS FOR AIRLINES

- The company has a sustainable seafood policy in place
- The policy covers all seafood
- The company does not use IUCN-listed fish
- The company undertakes supply chain analysis to ensure sustainability of its fish products
- Suppliers with external certification, like ASC, GAA, or MSC, are favoured
- Suppliers are encouraged to seek sustainability certification
- Where appropriate, advice is given to customers on sustainable seafood choices
- Where appropriate, seafood source and species is clearly labeled, in the same way other livestock might be (for example, New Zealand lamb)
- The company is a participatory member of relevant seafood sustainability initiatives
- The company works with trade and catering bodies to improve their policies on sustainable seafood sourcing
- The company outlines specific goals and targets to be achieved over set timelines

### Best practice example

#### CASE STUDY: CATHAY PACIFIC

The following extract from Cathay Pacific's Sustainable Development Report 2010 shows what can be done. Cathay Pacific is in the vanguard on this issue both in its sector and across the catering industries in Asia.

"Discussions with stakeholders revealed that they view responsible food sourcing as an important issue. Cathay Pacific and Dragonair do not serve shark's fin soup either inflight, at Cathay Pacific City, Dragonair House or at any corporate events or meals which are organised or subsidised by the company. This is already enshrined into company practice as a matter of principle, and we are in the process of formalising this into company policy.

Cathay Pacific's inflight catering team has been working with suppliers to support sustainable seafood and fisheries. From early 2011, Cathay Pacific will be serving Marine Stewardship Council (MSC) certified fish in Economy class on all flights from our European ports. Whilst this may not be the most economical option in the short term, as the supply chain develops, we believe this is the right way forward and are therefore prepared to support it where possible. We are currently in discussion with meal suppliers with a view to serving certified sustainable fish on our other long haul routes from Australia and North America.

Why MSC fish – Healthy oceans produce sustainable seafood stock. As our business continues to expand, we aim to continue to provide a high quality and consistent catering service for our flights. It therefore makes business sense to be part of a secure, traceable supply chain providing certified sustainable seafood. Sustainable fishery management seeks to reverse the decline of fish stocks, safeguard livelihoods and deliver improvements in marine conservation worldwide. This is why we continue to work with our supply chain to make MSC fish more widely available."<sup>67</sup>



# HOTELS

Fish sourcing is a consideration for hotels due to their restaurant and catering revenues. Banqueting tends to be a highly significant business area for Asian hotel chains, both for its own profitability and also because it is a critical factor in drawing events and large groups to the hotel. This is particularly the case for larger prestige hotels that tend to be common in the Asian listed universe.

For hotels, particularly those with luxury brands, a seafood sourcing policy may make increasing sense as affluent Asian consumers become more aware of the problems of marine sustainability and seek providers that help reduce their impact. However, in some areas this may clash with Asian traditional or cultural behaviours such as the consumption of shark's fin soup and rare reef fish delicacies at weddings.

For some hotels there is a split between ownership and operation. In many cases when attempting to implement sustainability this separation can be a challenge – for instance the owner may have different views about appropriate policy for a refurbishment – however, for seafood sourcing it will be the operations team that is relevant as the outlay is in terms of time and management rather than capital.

Other models include franchising, in which the standards for the hotel are set by a brand manager. Intercontinental Hotels Group exemplifies this type of operation. Here the code for hotel operators running their brands is tightly specified. The code includes a large number of parameters relating to environmental management, though it does not currently extend to seafood sourcing.

A second agency split can occur where the management of the catering is handled by a separate organisation from the management of the hotel. Here the nature of the relationship and contractual terms will determine whether there are barriers to moving forward with sustainable sourcing. In general, the caterer will decide what is served, but they may have to follow the hotel owner/managers' preferences for sustainability at the time of contract renewal.

Overall hotels have average ESG disclosure. As hotels tend not to be among the largest companies by market capitalisation, only four are included in the 2011 ASR™, Responsible Research's proprietary benchmarking tool covering a universe of 750 listed Asian companies. However, these have fair overall disclosure, as befits high-end consumer brands, with an average of 45 percent compared to an Asian average of 32 percent.

The table below highlights disclosure at nine of the largest hotels in Asia. Of the companies, three have disclosure regarding their approach to suppliers. Two of these policies refer to the environment. Hong Kong and Shanghai Hotels' supplier code stands out for having specifically mentioned fish/marine products.

Those companies that have disclosure tend to focus on the operational efficiency of buildings. Significant supply considerations include building materials and timber sourcing, while linen sourcing and cleaning is also a major area of impact. Catering is, however, increasingly coming onto the radar.

Supplier policies tend to indicate a preference for local sourcing. This is an obvious step for hotels as they are rooted in their location and are frequently a major feature in the locality. Generally, environmental considerations are not considered within sourcing policies.

Many hotels, particularly resort hotels, are sited next to the ocean and have a vested interest in preserving marine health to attract their clientele. Two of the hotels covered have conservation initiatives that relate to the marine environment. For such hotels a drive to more sustainable and responsible sourcing is consistent with business sustainability.

## Company analysis

Company	Ticker	Listing	Is a supplier policy disclosed?	Does it cover environment?	Does it cover seafood?	Marine initiatives
EIH Ltd	EIH IN	India	No	-	-	-
Formosa Int	2707 TT	Taiwan	No	-	-	-
Hong Kong and Shanghai Hotels	45 HK	Hong Kong	Yes	Yes	Yes	-
Indian Hotels	IH IN	India	Yes	No	No	Yes
Mandarin Oriental International	MAND SP	Singapore	No	-	-	-
Overseas Union Enterprise	OUE SP	Singapore	No	-	-	-
Shangri-La Asia	69 HK	Hong Kong	Yes	Yes	No	Yes
Hotel Shilla	008770 KS	S Korea	No	-	-	-
Tokyu Corp	9005 JP	Japan	No	-	-	-

## Investor engagement notes

Most hotels will have a banqueting manager or equivalent at the hotel level under the general manager. For those companies with a supplier policy, particularly where it mentions the environment, there is a clear rationale to extend the policy to cover seafood sourcing. This is particularly the case at the luxury end and where

the marine environment is part of the draw to the hotels. Shangri-La is an example of such a company and has a very compelling marine initiative.

Hong Kong and Shanghai Hotels has strong policy as the extract from their sustainability report below shows. The caveat on sourcing is probably due to the cultural significance of shark's fin. They disclose proportions of key ingredients that are locally sourced and are aiming to improve this disclosure going forward.

Marriott International is the largest hotel to have introduced a systematic seafood sourcing policy with real bite.

It is worth sounding one note of caution in engaging hotels in Asia. Though many species of shark are now endangered, and the practice of 'finning' (hacking off only a shark's fin and throwing the rest of the animal back into the sea to die) is both barbaric and wasteful, it is traditional to serve shark's fin soup at Chinese weddings. Suggestions that such a practice is damaging may not be taken well and even if the management team agrees in principle, the risk to revenues will frequently be deemed too great to take action. Approaches based on improving traceability and sustainability across the board are more likely to gain traction in the short term, notwithstanding the need to address sustainability issues around the decline in top predators such as sharks.

#### SUGGESTED POLICY STEPS FOR HOTELS

- The company has a sustainable seafood policy in place
- The policy covers all seafood
- The company does not use IUCN-listed fish
- The company undertakes supply chain analysis to ensure sustainability of its fish products
- Suppliers with external certification, like ASC, GAA, or MSC, are favoured
- Suppliers are encouraged to seek sustainability certification
- Where appropriate, advice is given to customers on sustainable seafood choices
- Where appropriate, seafood is clearly labeled and sourced, in the same way other livestock (New Zealand lamb for e.g.) might be

- The company is a participatory member of relevant seafood sustainability initiatives
- The company works with trade and catering bodies to improve its policies on sustainable seafood sourcing
- The company outlines specific goals and targets to be achieved over set timelines

#### Best practice examples

##### CASE STUDY: HONG KONG AND SHANGHAI HOTELS

From the companies covered, Hong Kong and Shanghai Hotels has the strongest stance and is moving forward on the issue, as shown by these extracts from the company's Sustainability Report 2010:

"The guidelines require hotels and businesses to avoid procuring items that are deemed to be on an international, local or critically endangered species list, such as the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species or the World Wide Fund for Nature's (WWF) Sustainable Seafood Guides, whenever possible but recognise that given customer expectations, strict adherence to these guidelines may not always be achievable."

"Locally sourced items comprise 67% of eggs, 59% of vegetables, 51% of milk, yogurt and cream, 47% of meat, 38% of fish and seafood, 35% of fruit and 23% of cheese and butter."

"For fish and seafood items, some items are from sources that claim to be sustainable and/or certified as sustainable. Similarly, some of our egg and meat items are free range and some of our dairy and eggs are certified organic. Going forward, we aim to enhance the rigour of our sourcing and reporting on these issues where possible and when more reliable information is available."<sup>68</sup>



## RESTAURANTS

The consumption statistics show what's clear from the ground: Asians love their seafood. According to FAO statistics, most Asian populations derive over 20 percent of their total animal proteins from fish and seafood and are among only a handful of countries and regions to do so.<sup>71</sup> The restaurant trade derives the largest proportion of revenues from seafood of the consuming industries covered in this report. Some restaurants sell seafood exclusively, others have fish on the menu and others just as an ingredient in their dishes.

While fish has been a staple for many coast-dwelling Asians, the emergence of a new middle class has driven growth in higher protein diets. Much of this increase has come from meat, however, as the Asian consumer becomes increasingly health conscious, fish is seen as even more attractive. Restaurants will naturally move in lock-step with the changing demand patterns.

Food courts, hawker stands and street food comes in all shapes and sizes. Consolidation of food supply has not yet taken hold across the region in the same way as in developed markets. Consequently, there are few restaurant chains amongst the largest businesses in Asia and only one is covered in the 2011 ASR™, Responsible Research's proprietary ESG benchmarking tool covering a universe of 750 listed Asian companies. However, from the seven larger companies considered for this report it is clear that the overall standard of ESG disclosure is very low. None of the companies disclosed a supplier policy.

To some extent this reflects the immaturity of the market and the smaller size of the businesses compared to developed market counterparts. It may also be because it can be difficult for restaurants to know where to start in their journey to sustainability.

Most companies that embrace sustainability first consider their direct impacts. For restaurants this is primarily the energy and water used in cooking as well as furnishings for the outlets. Cooking is a precise art, but does not have the same sort of measurability and predictability of large manufacturing processes. It is not so clear how to invest to reduce resource intensity in the kitchen.

A further point is that the restaurants are usually tenants rather than owners of the buildings from which they operate and this prevents long-term investments in the resource efficiency of the buildings. One area that kitchens can focus on is waste reduction. Most do already as most wastage represents a cost, but there can usually be gains from looking at this area directly.

Overall this leaves restaurants without a clear starting point and so far very few have initiated sustainability programmes. This pattern contrasts with hotels, a number of which have advanced their thinking across a range of sustainability issues.

In many ways sustainable seafood sourcing is a good area for

### CASE STUDY: MARRIOTT'S FUTUREFISH PROGRAMME

Marriott International is the first large global hotel chain to launch a sustainable seafood policy. The following extract from the 2010 Sustainability Report Update shows what is possible. Most of their hotels have now removed bluefin tuna and Atlantic cod and moved to sustainable salmon. The current objective is that for each hotel 50 percent of seafood sourcing should be sustainable, though the target is expected to move to fully sustainable sourcing. In some places, such as the Marriott Park Lane Hotel in London, chefs are already striving for 100 percent.

"In mid-2010, Marriott launched the FutureFish global sustainable seafood program, designed to help our chefs around the world select, source and serve more sustainable seafood. Worldwide our hotels have received our FutureFish guide to assist in associate training and seafood selection. Working with vendors, global/local fisheries and small fishing communities, our chefs are sourcing an increasing amount of seafood that is caught in a sustainable manner. Marriott works with organizations like Cleanfish, Monterey Bay Aquarium, FishWatch and others to assist in this effort. The company currently sources 65 percent sustainable seafood and continues to look for new opportunities in our journey toward sustainability."<sup>69</sup>

### CASE STUDY: SHANGRI-LA HOTELS

Shangri-La has a programme in which conservation projects are run at all of its resorts. This includes a number of marine related initiatives. The following is a selection of some of the initiatives listed on their website.

At Mactan Resort and Spa there is a coral reef preservation initiative covering a five-hectare site and aiming to restore species such as seahorses, butterfly fish and various types of parrotfish.

The Barr Al Jissah Resort and Spa is home to various species of green and hawksbill turtles. A dedicated turtle ranger helps protect the turtles through the nesting period, maintaining temporary barriers to prevent people accidentally walking into the nest areas. Also, the Tanjung Aru Resort and Spa has partnered with WWF to help protect local Dugong.<sup>70</sup>



restaurants to prioritise as they turn to sustainability. While sustainability is not yet a common consideration in purchasing, most restaurants do think very carefully about their suppliers. Many chefs are fastidious about the quality of their ingredients, as it is a primary determinant of the quality of the final platter.

Moving to sustainable sourcing and associated branding may help with this process. Responsible sourcing can be described at each menu item, or through referring to a progressive policy at the bottom of the menu.

Fish offers particularly good prospects for improved branding as it can be associated with contamination, including heavy metals. While moving to certifiably sustainable sources does not offer guarantees of food safety, it does provide traceability, which enhances responsible seafood provision.

Other key raw materials would be unlikely to offer the same branding benefits. It might look odd to brag about the sustainability of the palm oil used, for example, even if the requirement for improved palm oil supply practices is no less urgent.

## Company analysis

### Investor engagement notes

There are a number of factors for investors to consider when engaging with the universe of listed Asian restaurants and fast food businesses. For those that are local versions of overseas brands, it is worth noting the standards of the parent brand. In McDonald's case, for example, the seafood policy is extremely progressive, and this has been highlighted as a case study below.

While restaurants are highly focussed on cost and product availability is a key consideration, these are not the only components of the offer. Moving to sustainably sourced seafood can sometimes broaden the offer as alternative fish species are brought onto the menu.

In general the higher-end brands are likely have a direct incentive to move to certified sources, as these provide an opportunity to enhance the brand through quality differentiation and also by appealing to the growing number of conscience consumers. It is worth noting that McDonald's and even KFC are aspirational brands in many parts of Asia.

There a number of ways of introducing sustainable seafood and while a policy and commitment to moving to 100 percent certified sustainably sourced is clearly the long-term goal, there are a number of steps along this path. For example, introducing certification on a few quality branded lines or giving preference to more sustainable suppliers where there is a minimal price differential.

Actual implementation will vary significantly by chain and according to the level of autonomy given to the chefs, managers or buyers at the restaurant level. For those organisations with a uniform brand where decisions are taken centrally, a policy will be required. In more localised chains there may be some instances of chefs that already have a preference for local or even sustainable sourcing as well as others that may resist any steps they view as challenging their bottom line.

Brand fit, implication of food safety and innovative offerings are strong arguments in favour of more progressive practices, notwithstanding the mantra of cost control. Given the way that fish stocks are moving there is a clear argument that restaurants will have to change practices and leaders will do so proactively.

A final note of caution, as with hotels, shark's fin may not be the best place for investors to start their engagement approach.

Name	Ticker	Listing	Seafood menu items	Is a supplier policy disclosed?
Ajisen China	538 HK	Hong Kong	Prawn, scallop, crab, squid, clam etc	No
Cafe de Coral	341 HK	Hong Kong	Café de Coral – fish, shrimp, squid Café de Royal – eel, fish Oliver's Super Sandwiches – salmon, tuna, prawn	No
Jollibee Foods	JFC PM	Philippines	Palobak Fiesta – tinapa flakes, shrimp Crispy Bangus – milk fish	No
Jubilant Foodworks	JUBI IN	India	None found	No
KFC Malaysia	KFC MK	Malaysia	Alaskan Fish Burger	No
McDonald's Japan	2702 JP	Japan	Fish Burgers	No
Zensho Co.	7550 JP	Japan	El Torrito – shrimp Hanaya Yohei – sushi Jolly-Pasta – fish roe, shellfish etc Carrows – scallop etc Coco – salmon, rockfish, pollock	No

## SUGGESTED POLICY STEPS FOR RESTAURANTS

- The company has a sustainable seafood policy in place
- The policy covers all seafood
- The company does not use IUCN-listed fish
- The company undertakes supply chain analysis to ensure sustainability of its fish products
- Suppliers with external certification, like ASC, GAA, or MSC, are favoured
- Suppliers are encouraged to seek sustainability certification
- Where appropriate, advice is given to customers on sustainable seafood choices
- Where appropriate, seafood is clearly labeled and sourced, in the same way other livestock might be
- The company is a participatory member of relevant seafood sustainability initiatives
- The company works with trade and catering bodies to improve their policies on sustainable seafood sourcing
- The company outlines specific goals and targets to be achieved over set timelines

## Best practice examples

### CASE STUDY: MCDONALDS

On 8 June 2011, World Oceans Day, McDonald's announced that by October all fish sold in European stores would be from MSC certified sustainable fisheries. It will be the first food service retailer in many of its 39 European countries of operation to sell any products carrying the MSC logo.<sup>72</sup>

## CASE STUDY: PRET A MANGER

Pret a Manger (Pret) is a privately owned chain of 265 sandwich shops. Pret's initial offer was based on additive free food of the highest standards. It invests a significant amount of time into sourcing natural ingredients and has now added the sustainable dimension across its range of ingredients. The following extract from Pret's website describes the chain's fish sourcing:

"Our tuna is pole and line caught skipjack tuna from the Maldives, which is the most sustainable fishing method that avoids the dreadful by-catch issue. We have never used bluefin tuna in our sushi and have recently dropped yellowfin tuna from sushi as well.

Our crayfish are caught wild and come from China. We insist that our supplier meets high standards, in line with those in the UK and Europe (all factories are BRC accredited). In fact we have just sent a team out to China to meet our fishermen.

Our smoked salmon is from low-density farms rather than wild. Fast flowing water is passed over the stocks in order to replenish oxygen and remove waste, and they are fed a GM-free diet. Our salmon supplier's farms are working towards the RSPCA Freedom Food accreditation."<sup>73</sup>



# PHARMACEUTICALS

The pharmaceutical industry in Asia splits into western medicine based pharmaceutical companies, many of which are located in India, and those selling herbal or traditional medicines, primarily the Chinese operators. A number of the western medicine companies sell products containing fish oil, while some of the Traditional Chinese Medicine (TCM) companies use marine sourced products.

The primary ESG issues for Asian pharmaceutical companies are product safety, corruption in the distribution channels and controversy around extended patent protection, especially where this relates to drugs targeting major diseases affecting the world's poorer regions. There are also significant environmental considerations in the manufacture of drugs. For the TCM players there are questions around efficacy, but an advantage that the chemicals involved are considered to have a lower pollution burden than many western medicines.

Increasingly global pharmaceutical companies are seeking to improve understanding of their interaction with biodiversity and ecosystem services (BES). Pharmaceuticals have an impact on biodiversity directly when manufacturing and potentially releasing waste near sensitive sites and indirectly through their supply chain footprint. They also depend on BES in establishing new treatments and where nature provides compounds that can be hard to manufacture. The Economics of Ecosystem and Biodiversity (TEEB) study estimates that 25-50 percent of the pharmaceutical market is derived from genetic resources, including the marine environment as well as drugs from rainforests.<sup>74</sup>

Fish oil is a source of valuable proteins known as Omega 3 oils. DHA and EPA are amines contained in Omega 3 oils that are considered highly beneficial from health and nutrition perspectives. Pharmaceutical companies, health supplement manufacturers and some food manufacturers create pills and supplements or fortify food with the oils, the latter being known as nutraceuticals.

Fish oil is important within the seafood supply chain due to its high value. It uses a large volume of raw materials, primarily as the by-product of other processing operations.

As this excerpt from the FAO publication 'The state of world fisheries and aquaculture 2010' shows, a variety of seafood by-products find applications in pharmaceuticals:

"Chitin and chitosan obtained from shrimp and crab shells have a variety of uses, such as in water treatments, cosmetics and toiletries, food and beverages, agrochemicals and pharmaceuticals... Shark cartilage is used in many pharmaceutical preparations and reduced in powder, creams and capsules, as are other parts of sharks, e.g. ovaries, brain, skin and stomach. Fish collagen is used in the pharmaceutical industry, as are carotenoids and astaxanthins – pigments that can be extracted from crustacean wastes."<sup>75</sup>

Overall Asian pharmaceutical companies have extremely poor ESG disclosure. The 17 companies covered by the ASR™, Responsible Research's proprietary ESG benchmarking tool covering a universe of 750 listed Asian companies, had an average score of 26 percent compared to an Asian average of 32 percent. The following table looks at 20 of the larger Asian pharmaceuticals companies, identifying those with fish related products.

From the set of 20 companies, seven have a supplier code, of which three reference the environment. However, none of the companies have supplier codes that specifically mention fish or marine products.

From web searches, it was established that six of the companies sell products containing fish oil, while three contain other specific fish or marine ingredients. There appears to be a high degree of overlap between companies selling products with marine ingredients and the presence of supplier codes. Of the nine companies covered that sold products with marine ingredients, six have a supplier code, including the three with codes that reference the environment. There may be a reason for the correlation: those companies with a commitment to transparency make it easier to find their product ingredients and also disclose information relating to supplier codes.

In general the requirement to demonstrate product safety ensures that pharmaceutical companies have good traceability for key ingredients in addition to high manufacturing standards. Consequently pharmaceutical companies should be familiar with implementing supplier policy notwithstanding the low levels of disclosure of such policies. In China regulation around product standards is being tightened significantly, which is a major driver for change for the TCM industry.

Where there are supplier policies in place with environmental sections, the relevant coverage areas tend to be sustainable use of natural resources and legal compliance. Unsustainable fishing or irresponsible aquaculture practices may be deemed to breach the environmental component of some of the policies. The question of legal compliance may also be a consideration for the sourcing of some ingredients in seafood supply chains, for example in the case of IUU fishing.



## Company analysis

Company	Ticker	Listing	Relevant products found	Is the supplier policy disclosed?	Does it cover environment?
Astellas Pharma	4503 JP	Japan	Lipitor®	Yes	Yes
Celltrion	068270 KS	S Korea		No	-
Daiichi Sankyo	4568 JP	Japan	EPA-α	Yes	No
Dr Reddy's Labs	DRRD IN	India	Celadrin®	Yes	Yes
GlaxoSmithKline India	GLXO IN	India	Lovaza	No	-
Glenmark Pharma	GNP IN	India		No	-
IPCA Labs	IPCA IN	India		No	-
Jiangsu Hengru	600276 CH	China		No	-
Kalbe Farma	KLBF IJ	Indonesia	Osfit®, Entramax®	Yes	No
Lupin	LPC IN	Indonesia	Corcium (coral)	No	-
Piramal Healthcare	PIHC IN	India		No	-
Ranbaxy Labs	RBXY IN	India		No	-
Sun Pharma Industries	SUNP IN	India		No	-
Takeda Pharma	4502 JP	Japan	TAK-085	Yes	Yes
Guangxi Wuzhou	600252 CH	China	(TCM) Guiling jelly	Yes	No
Guangzhou Pharma	874 HK	China	(TCM) No	No	-
Jilin Aogong	000623 CH	China	(TCM) No	Yes	No
Kangmei Pharma	600518 CH	China	(TCM) Seahorse, isinglass	No	-
Shandong Dong	000423 CH	China	(TCM) No	No	-
Yunnan Baiyao	000538 CH	China	(TCM) No	No	-

## Investor engagement notes

Although in itself marine sourcing is not a primary issue for pharmaceutical companies – either for fish oils or for TCM ingredients – there is good potential for engagement. Fish oils are treated here, though similar arguments apply for TCM ingredients.

In general pharma companies are accustomed to working with high standards and are aware of the importance of high specification sourcing of ingredients. Traceability of fish oils is increasingly desirable due to the occasional concerns over PCBs and heavy metals found in them. Pharma companies frequently have consumer brands that can also benefit from responsible sourcing certification.

For pharma companies fish oil supply chains will tend to be separate from the rest of the supplier base so it is should be relatively easy for them to consider this sourcing issue independently. This is helped by the fact that this is an issue for the suppliers rather than the pharma companies themselves. In addition, fish oil is high value in itself and pharmaceutical margins tend to be high, both of which suggest that cost should not be a barrier to implementing changes.

However, there are some barriers. While pharma companies will typically be very large compared to their suppliers, they may only be purchasing a small proportion of a supplier's output, preventing them from exerting significant influence. It is also difficult for supply chains to re-orientate themselves and suppliers will take time to shift sourcing patterns even where they wish to. To account for this, certification standards are evolving to take into account improvers, particularly where local or regional standards make it very hard to ensure the fish are supplied sustainably.

Below are steps that companies can take to move to responsible fish oil sourcing. The Dr Reddy's case study shows the most evolved supplier policy publicly disclosed by the companies we looked at. This touches on the environmental impacts of sourcing as well as legal compliance, which can be a consideration for the fish used to make the oil in some areas. The wording appears to imply that marine sourcing is in the scope of the current policy, though it may not have been included explicitly.

The second case study relates to Croda, a specialty chemicals company based in the UK with a significant nutraceuticals business. Croda is looking to have its manufacturing site certified under IFFO RS.



## IFFO RS

The 'IFFO Global Standard for Responsible Supply' (IFFO RS) is a sustainability standard specific to fishmeal and fish oil production. The standard was developed by the UK-based International Fishmeal and Fish Oil Organisation (IFFO) in response to "a need for industry to demonstrate its commitment to the responsible sourcing of raw materials and the safe production of ingredients for aquaculture, agriculture and directly in the production of consumer products". According to a statement on IFFO's website, part of this need was derived from "concerns of the origins of 'trash fish' and also of the legality of catches used in the supply of fishmeal and fish oil".<sup>76</sup>

Like similar certification schemes, assessment for the IFFO RS is undertaken by an independent third party and successful certification allows the use of a logo.

## SUGGESTED POLICY STEPS FOR PHARMACEUTICALS

- Alternatives to fish oil as a source of Omega-3 fatty acids (EPA and DHA) for nutraceuticals and food additives are researched, and, where available, used
- The company undertakes supply chain analysis to ensure sustainability of fish stock used in production of fish oil
- Fish oil that carries the IFFO-RS certification of responsible sourcing is prioritized
- The company encourages fish oil suppliers to seek IFFO-RS certification
- The company makes time bound quantified commitments for the supply of certified responsibly sourced fish oil

## Best practice examples

### CASE STUDY: DR REDDY'S LABS & TAKEDA PHARMACEUTICALS

Among the pharmaceutical companies considered for this report, Dr Reddy's Labs and Takeda Pharmaceuticals had the strongest policies. Neither contains an explicit reference to marine sourcing. In Takeda's case marine sourcing would clearly fall within the scope of the policy. This is slightly less clear in the case of Dr Reddy's Labs on the environmental side; however, the requirement for compliance should mean that fish oil suppliers are not using ingredients sourced from IUU fishing.

*From the Basic Purchasing Policy on Takeda Pharmaceuticals website:*

"Response to Environmental Issues

Comply with relevant environmental laws and regulations and prioritize the purchase of materials with a reduced environmental load and ecologically friendly products."<sup>77</sup>

*From Dr Reddy's supplier code of conduct:*

"Resource Conservation and Climate Protection

Suppliers are expected to use natural resources (e.g. water, sources of energy, raw materials) in an economical way. Negative impacts on the environment and climate will be minimized or eliminated at their source or by practices such as the modification of production, maintenance and facility processes, material substitution, conservation, recycling and material reutilization. Suppliers will engage in the development of climate-friendly products and processes to reduce power consumption and greenhouse gas emissions.

Compliance with legal and regulatory requirements

The supplier ensures compliance with all country regulations and recommendations relating to environmental protection in force within the countries where it carries out its activities. The supplier has the appropriate certificates and/or permits allowing it to operate. Environmental reports are prepared in accordance with country regulations. They are available at the sites."<sup>78</sup>





## CASE STUDY: CRODA COMMITS TO CERTIFICATION

The following is taken from a press release on Croda's website. The company's business strategy revolves around supplying sustainable ingredients to clients downstream in the value chain. The company helps ensure that leading food producers, pharma companies and retailers are able to improve their sustainable offerings and achieve their commitments. Croda manufacturers concentrated fish oil as part of its nutraceuticals business.

In May 2011 Croda announced its "commitment to applying for Chain of Custody certification within the International Fishmeal and Fish Oil Organisation's Global Standard for Responsible Supply (IFFO-RS). Croda will become the first concentrated fish oil supplier to achieve this standard.

The IFFO RS Chain of Custody certification will recognise the strong emphasis Croda places on responsible marine sourcing, advanced production methods and raw material traceability and affirms confidence in Croda's industry-leading manufacturing site in Leek, UK, where all its Incrome<sup>™</sup> and Omelife<sup>™</sup> fish oil grades are produced.

The IFFO RS certification has three strict independently audited criteria that Croda feels confident it will gain approval against:

1. Responsible Sourcing
2. Responsible Production
3. Responsible Traceability<sup>79</sup>



ISSUES FOR  
RESPONSIBLE  
INVESTORS

# FINANCING



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## Investors and engagement

Many investors across a range of asset classes now have policies relating to environmental, social and governance issues as they relate to their investments. Few, however, have extended their policy to consider the sustainability of marine resources, despite the fact marine-based products are a key raw material for sectors as diverse as agriculture, retail, pharmaceuticals, pet food, and of course the fishing industry itself.

There are a number of stumbling blocks for investors. The first hurdle is the lack of clarity around the true extent of the marine value chain – few people would realize for example that shrimp shells are the base ingredient of chitosan, a key ingredient in many hair gels and sprays. A second more pertinent problem is the question of where the issues are material to the business. As the chitosan example shows, marine byproducts can pop up in the most unlikely of products, and therefore marine sustainability is likely to be relevant in some way to many companies within a typical investment portfolio. However, outside of those companies with direct links to the fishing and seafood industry, it is often challenging to justify the time required to develop and implement specific marine resource responsible investment policies for all sectors.

The retail sector is a case in point. A typical supermarket might derive only around 1 to 5 percent of its revenues from direct seafood-related sales. However, if that supermarket was to consider the complete role held by seafood in its supply chain, it would also need to factor in the fishmeal used as feed in its pork, poultry and farmed fish products; the fish in its pet food range; the fish oil in certain nutraceuticals and Omega-3 enhanced nutritional products; and potentially even the traces of fish in some household and personal care products. There are very few supermarkets willing to take such an in-depth look into their supply chains, and very few shareholders prepared to challenge them to do so.

However, the seriousness of the marine crisis and the realisation that we may be approaching the point of no return with our oceans has prompted some investors to act. Additionally, in Europe and the US, rising public awareness of the threats to marine sustainability – over-fishing, environmentally damaging fishing, by-catch, rapidly dwindling stocks – has introduced another compelling reason for investors and companies to engage on this issue: reputational risk. Direct attacks on specific brands within companies have been the tactic chosen by certain NGOs and campaigners to force change on this issue, with some success. One example is Greenpeace's annual ranking of US supermarkets according to the perceived virtues of their seafood sourcing policies, 'Carting Away the Oceans', which is now in its fifth year.<sup>80</sup> The success of shock campaigns addressing the palm oil issue (the gory 'orangutan finger in Kit-Kat' video, for example) will mean similar consumer campaigns will be planned

for other products and non-sustainable seafood brands are a likely target.

Another compelling motivation for some companies to consider issues of marine sustainability is food safety. Potentially dangerous levels of mercury have been found in fish at the top of the food chain, such as swordfish, shark and king mackerel, as a result of bioaccumulation of toxins and pollutants.<sup>81</sup> To mitigate risks of contamination, leading businesses will have to invest in the traceability of their products. Certification systems around sustainable sourcing offer ready-made solutions to such challenges, although they will not tackle the heavy metals pollution that is the root cause of the problem.

The following section presents case studies in the three most important categories of finance to the fishing industry: private equity, institutional investment and banks. These have all, in some way, incorporated consideration of marine sustainability into their investment remit. It also offers suggested actions for those wishing to incorporate marine sustainability into their due diligence, investment policy and engagement remits going forward.





# PRIVATE EQUITY

## CASE STUDY: THE CARLYLE GROUP AND CHINA FISHERY GROUP

Private equity investor The Carlyle Group invested USD190 million into SGX-listed China Fishery Group (CFG SP) in June 2010. The investment gave the US firm a holding of 13.62 percent in the company, whose biggest shareholder is Chinese fishing giant Pacific Andes Resources.

In a press release at the time, Carlyle stressed its intention to “reinforce China Fishery’s position as a reliable and responsible supplier of sustainable fish products to the global market and animal protein supply chain”.

According to Patrick Siewert, a Hong Kong-based senior director at The Carlyle Group and, following the investment, also a member of the CFG board of directors, “reinforce” is the key word in this statement.

As he explained in an interview, Carlyle had identified the fishing industry as an attractive investment target within the wider Asian investment story of rising economic levels, higher demand for food (and especially protein), and increased focus on food safety and security. However, when it began due diligence on the sector, it struggled to “get comfortable” with many fishing companies from a sustainability standpoint.

“We saw some interesting businesses, but they were working without visible quotas, strong government regulation, or even a strong understanding of the biomass and rejuvenation patterns. We could see how they could catch a proportion of dwindling stocks, but if the fishing stocks themselves are not sustainable we just don’t know how you’ll have a sustainable business,” he stated.

This realisation led Carlyle to automatically discount companies targeting several under threat species and approach the industry from a different starting point, by posing the question: where are the most plentiful species which are well managed? Once it had narrowed the field this way, it then asked: who are the responsible operators?

The search ultimately led to China Fishery Group, after extensive due diligence that included input from marine-focused NGOs like Environmental Defence Fund in the US and WWF in several countries. CFG deploys its fishing fleet in the North and South Pacific and counts Pollock, Anchovy and Jack Mackerel among its key species. Crucially, says Siewert, the company had already

taken some initial steps towards formulating a stance on sustainability, which meant it fit with Carlyle’s own outlook.

Post-investment, one of Carlyle’s first acts was to instigate the formation of a Corporate Social Responsibility (CSR) Committee of the Board of Directors. The CSR committee, broadly, is charged with developing CFG’s sustainability policy and then working with management to insure there is a meaningful and well thought out action plan. To help it do that, it has recruited industry expertise in the form of Dr Keith Sainsbury, an Australian marine biologist and professor of Marine System Management at the Institute of Marine and Antarctic Studies, University of Tasmania. Sainsbury also sits on the board of the Australian Fisheries Management Authority and the Marine Stewardship Council (MSC), and in 2004 was awarded the Japan Prize for his work to increase awareness of ocean shelf ecosystems and their sustainable use.

Siewert is transparent about the fact that neither Carlyle nor CFG has all the answers yet as to how the company will become a 100 percent sustainable fishery.

“We look at this as a journey. It’s not about being 100 percent right from the outset, but about being on the journey to get to being 100 percent right. It takes pragmatism and conviction,” he said.

The pragmatic approach has seen CFG move forward with several initiatives, some of which were underway before the Carlyle investment, while the bigger picture around its future sustainability plans and targets takes shape.

One of these is to press ahead with the assessment of key CFG fisheries for MSC certification. Of these, the company is currently working with auditors to prepare the North Pacific Pollock Fishery for assessment. Preparation to get the Peruvian Anchovy fishing grounds into assessment is underway.

Though the certification process carries a financial burden for the fishery, Siewert believes it could “drive an enormous amount of value” in the market.

“To behave responsibly does have higher costs associated with it, but if you can give consumers assurance of the sustainability of the product, they will pay more – we are chasing a price premium in this regard,” he stated.

Other initiatives underway include a plan to organise acoustic sounding expeditions with CFG vessels in the South Pacific to



properly assess the biomass of the fishing grounds, which are currently much less defined than those of the North Pacific. An inaugural CFG Sustainability Report is also slated for mid-2012.

Ultimately, though Carlyle believes the investment story behind the fishing industry remains solid because of the consumption trends supporting it, Siewert's view is that the sector is at a crossroads and only those companies which take the road to sustainability will survive.

"We think well-managed fisheries will be successful and poorly managed ones will fail. They will either have quotas taken away, or there won't be any quotas – they will be chasing that ever-diminishing last dollar," he summarised.



#### CASE STUDY: SEA CHANGE MANAGEMENT<sup>82</sup>

San Francisco-based Sea Change Management is an impact investment firm investing a mix of private equity capital and philanthropic capital into companies in the "middle of the seafood supply chain". It launched the Sea Change Investment Fund in 2005.

According to the firm's website, the fund invests "in seafood companies which help to expand the market for environmentally-preferable seafood by demonstrating that sustainable seafood is good business for the seafood industry and for investors. An integral part of Sea Change's investment strategy is driving incremental environmental improvement in the sourcing and business practices of our portfolio companies."

Portfolio companies include Advanced BioNutrition, which produces poly-unsaturated long-chain fatty acids from algae to be used as a substitute for fish oil in aquaculture feed; and Wild Planet, a producer of seafood from "environmentally-preferable fisheries".

#### SUGGESTED STEPS FOR PRIVATE EQUITY FIRMS

- For all companies directly or indirectly linked to the fishing and/or aquaculture industries, due diligence process should include consideration of the related sustainability issues
- Formulate a policy on sustainable fishing, or incorporate consideration of such issues into existing investment policies
- Policy to encompass a broad spectrum of sectors, such as those contained within this report
- Ultimate goal of policy is to ensure sustainability of fish stocks any portfolio company has exposure to whilst simultaneously ensuring methods of obtaining any marine based product cause minimal damage
- Post-investment management goals for any company where the issue of fish sustainability is material should include targets related to improvement on sustainability issues and accountability and oversight at board level of progress
- For companies where the business is directly related to the fishing and/or aquaculture industries, a significant portion of the investment should be directed to achieving improvement on sustainability issues (for example, to acquire external certification of sustainability within an ambitious but achievable timeframe)
- For companies where the business is directly related to the fishing and/or aquaculture industries, decline to invest in companies which have no hope/intention of working towards sustainability on fishing related issues
- Any exit plan should reflect the value of sustainability programmes in the exit price to try to safeguard its continuation as a central function

# INSTITUTIONAL INVESTORS

## UN PRI COLLABORATIVE ENGAGEMENT ON SUSTAINABLE FISHERIES

Earlier this year, a collaborative engagement was launched by signatories to the UN-backed Principles for Responsible Investment (PRI) to “investigate sustainable fishery sourcing practices in international retailers, distributors and producers”.

The motivation for the engagement was described by the group of investors as it follows: “There is increasing evidence of overfishing affecting a significant amount of global fish populations and rising awareness among regulators and the public of this issue. The investors involved in this initiative are concerned about the possibility that unsustainable fishing practices could cause an irreversible decline in fish populations and eventually lead to disruptions in company supply chains. The investors also believe that the growing public sensitivity regarding biodiversity in general and overfishing in particular may expose companies to reputational risks if not appropriately managed.”

At the end of July 2011, a group of 20 investors, led by UK-based Threadneedle Asset Management and Hermes Fund Managers, who had initiated the engagement, sent letters to 40 listed companies in the retail, food producers and processors sectors. Thirty-one companies received a standard letter, while nine companies that had disclosed significant policies or information related to fisheries received a modified version of the letter, which acknowledged the steps that they had already taken.

The letter asked the companies for information about:

- “Revenue exposure to raw materials and/or finished products derived from fish, the split between wild and farmed fish, and their view on the materiality of their exposure
- Sourcing policies for fish and fish products, and scope of policies (e.g. group level vs business level)
- Percentage of wild catch sourced sustainably, their view on constraints to further sustainable sourcing, and certifications used
- Guidelines or standards used for farmed fish, and whether companies have evaluated sources against Aquaculture Stewardship or equivalent guidelines.”

Companies were asked to respond by the end of September, after which point the group of investors will consider follow-up engagement.

## CASE STUDY: TCAM AND MAKRO SELF SERVICE WHOLESALERS<sup>84</sup>

One example of successful engagement by an asset management firm with a seafood retailer is that between UK-based firm The Cooperative Asset Management (TCAM) and Metro, Europe’s largest retailer of fish.

Metro is the parent company of Makro Self Service Wholesalers, which until recently was the UK’s only multiple retailer selling shark meat.

TCAM’s concerns about Metro’s sale of shark meat centred on environmental as well as consumer safety issues linked to the high levels of mercury found in fish products from apex predators including shark.

In its ‘Responsible Investments Quarterly Review’ of Summer 2011, TCAM described the meeting with Metro’s management: “We discussed the reputational risk posed by the perception that Metro’s products are linked to shark extinction which may cause significant damage to the company’s intangible assets, and the stance of their peer group who have withdrawn the aforementioned fish from their stores (Asda in 2005 and Tesco in 2009, for instance). In addition, we explored the financial and other implications of withdrawing from the market in shark, marlin and swordfish. In our view, this could protect or enhance Metro’s reputation and reduce the prospects of potentially costly future litigation stemming from the high levels of methyl mercury.”

The report continues: “We were delighted that Metro’s UK subsidiary, Makro, has now de-listed fresh marlin with immediate effect and will cease selling shark products throughout its 30 UK stores. We remain in dialogue with Metro about its purchasing policy and the entire range of exposure to fish.”

## CHARITABLE ENGAGEMENT AND OUTREACH PROGRAMMES

Another way in which banks and investment firms have addressed marine sustainability is through conservation initiatives by their charitable and philanthropic outreach programmes.

One example is Hong Kong-based ADM Capital which, via its venture philanthropy arm, ADM Capital Foundation, makes marine ecology a core focus. Examples of related projects sponsored include



one to support marine conservation in Vietnam by enabling local fishermen on the South coast to participate in the protection of endangered species, and another focused on building awareness of declining shark populations in Hong Kong by tackling shark's fin consumption.<sup>85</sup>

In 2008, Standard Chartered Bank (Taiwan) donated USD350,000 to the WWF's coral reef conservation project, the Coral Triangle Initiative. The money was raised via the bank's marathon fundraising programme 'Race for a Living Planet'.<sup>86</sup>

Meanwhile, one of the projects currently being undertaken by the HSBC Climate Partnership is to "increase the income of 56,000 fish farmers in China through the adoption of sustainable aquaculture techniques".<sup>87</sup> The HSBC Climate Partnership is a five-year collaboration between HSBC, The Climate Group, Earthwatch Institute, Smithsonian Tropical Research Institute and WWF.

#### **SUGGESTED STEPS FOR INSTITUTIONAL INVESTORS**

- For all companies directly or indirectly linked to the fishing and/or aquaculture industries, due diligence process should include consideration of the related sustainability issues
- Formulate a policy on sustainable fishing, or incorporate consideration of such issues into existing investment policies
- Policy to encompass a broad spectrum of sectors, such as those contained within this report
- Ultimate goal of policy is to ensure sustainability of fish stocks any portfolio company has exposure to, whilst simultaneously ensuring methods of obtaining any marine-based product cause minimal damage
- Engage with portfolio companies to draw their attention to investment policy and encourage best practice according to the sector (see relevant notes in this report)
- Encourage other shareholders to engage on this issue and join collaborative efforts

- Depending on materiality of the issue to the company, consider sale/exclusion of stock of companies that consistently refuse to address their performance on this issue. Post any engagement, evaluate the receptiveness of the company to making necessary changes and consider divestment if unsatisfactory
- Engage with regulators to encourage simplification of distribution networks with the aim of improving traceability of sustainably caught fish. This will mean that the marginal benefits are not 'lost in the system' and will incentivise those involved in best practice fisheries management to expand and achieve market growth



# BANKS

## CASE STUDY: NORDEA BANK, NORWAY

The fishing industry is the second largest export sector in Norway after oil and gas. The Norwegian business of the Nordea Bank Group has around NOK20 billion (USD3.7 billion) in seafood-related credit on its books, out of a total of around USD480bn in lending across the wider Group. The NOK20 billion is split more or less evenly between capture-fishing and fish farming, with a small portion of lending to the value-added processing sector. The lending to the capture-fishing segment typically consists of financing for new vessels as well as licenses.

With capture fishing and fish-farming such important sectors within Norway, the bank has a separate lending policy in place for each industry. This on top of the policy addressing environmental waste and social responsibility it is required to have across all industries.

Odd Kristian Stavaas, head of credit, Nordic Banking, Norway explained in an interview that the most important part of the credit assessment for this sector was industry analysis, as both fishing and fish-farming have high start-up costs. The typical cost of a fishing vessel was, said Stavaas, in the region of NOK100 – 150 million. In addition come investments in licenses, which for a fully equipped purse seiner could amount to some NOK250 – 300 million. With repayment periods of between 10 and 15 years, the onus is on the bank to accurately assess the long-term sustainability of the business plan and industry in question.

One start-up cost shared by both industries is licence acquisition. Approximately 1000 licences have been issued to fish farms in Norway to-date and the terms and conditions around them are crucial to the success of the business. Within the wild capture fishing industry, clarity on the number of licences issued and the transferability of these licences between vessels is essential for the assessment of credit risk.

Most Norwegian fishing vessels financed by Nordea are deployed in Norwegian waters and target pelagic fish such as herring and mackerel. Quotas for these fisheries are set and monitored by the Norwegian authorities, which have a reputation for being both accurate and conservative in their assessment and management of fishing stocks, says Stavaas. Regulation around types of fishing gear and allowable by-catch are other sustainability-related issues controlled by the authorities and the bank is comfortable they are managed competently. However, an example of an area where the bank must use its own judgement, said Stavaas, is for instance on

issues like the threat of market competition from cheaper white flesh farmed fish, like Pangasius and Tilapia, to Norwegian wild caught fish stocks.

For fish farms, which in Norway focus mostly on the rearing of Salmon, the sustainability issues are completely different and there is a clear correlation between more sustainable and environmentally friendly business practices and reduced credit risk at the individual farm level, says Stavaas. Questions around proposed inputs (feed, antibiotics), crowding levels, mortality rate and fish health and production levels are all relevant – especially as the industry is potentially sensitive to regulatory changes at a later date.

At the industry level, however, credit risk is tied more to fluctuations in the price of salmon as a commodity, which in turn depends on supply and demand dynamics. Earlier this summer, for instance, the price of salmon dropped from around NOK40/kilo to NOK25/kilo in the space of a few weeks, against market predictions. Meanwhile, the salmon farming industry in Chile, Norway's main competitor, has suffered for the past few years from the outbreak of a deadly virus linked to overuse of antibiotics and crowding.

## CASE STUDY: TRIODOS AND FISH 4 EVER

Netherlands-headquartered sustainable financial services group, Triodos Bank, is involved in several lending initiatives supporting the sustainability of marine resources.

One UK-based initiative, announced in March this year, is the ring-fencing of £5 million to lend at a 1 percent discount to caterers and restaurants awarded the UK Soil Association's gold or silver Food for Life Catering Mark. In a press release, the bank said the awards "encourage caterers to use more fresh, seasonal, local and organic ingredients, high welfare meat and fish from sustainable sources".<sup>88</sup>

In a second initiative, Triodos client Organico Realfoods used a Triodos loan to launch a sustainably sourced fish brand, Fish 4 Ever. Fish 4 Ever supplies sustainably sourced tinned fish such as mackerel, sardines, herrings and salmon to retailers, largely across the UK.<sup>89</sup>





## CASE STUDY: IFC'S EXCLUSION LIST<sup>90</sup>

The International Finance Corporation is the largest multilateral source of loan and equity financing for private sector projects in emerging markets and promotes sustainable private sector development. Although it has not yet been active in the sector, with a portfolio of only USD7 million in aquaculture, primarily in shrimp production<sup>91</sup>, it does have a limited reference to marine sustainability in its exclusion policy, as follows:

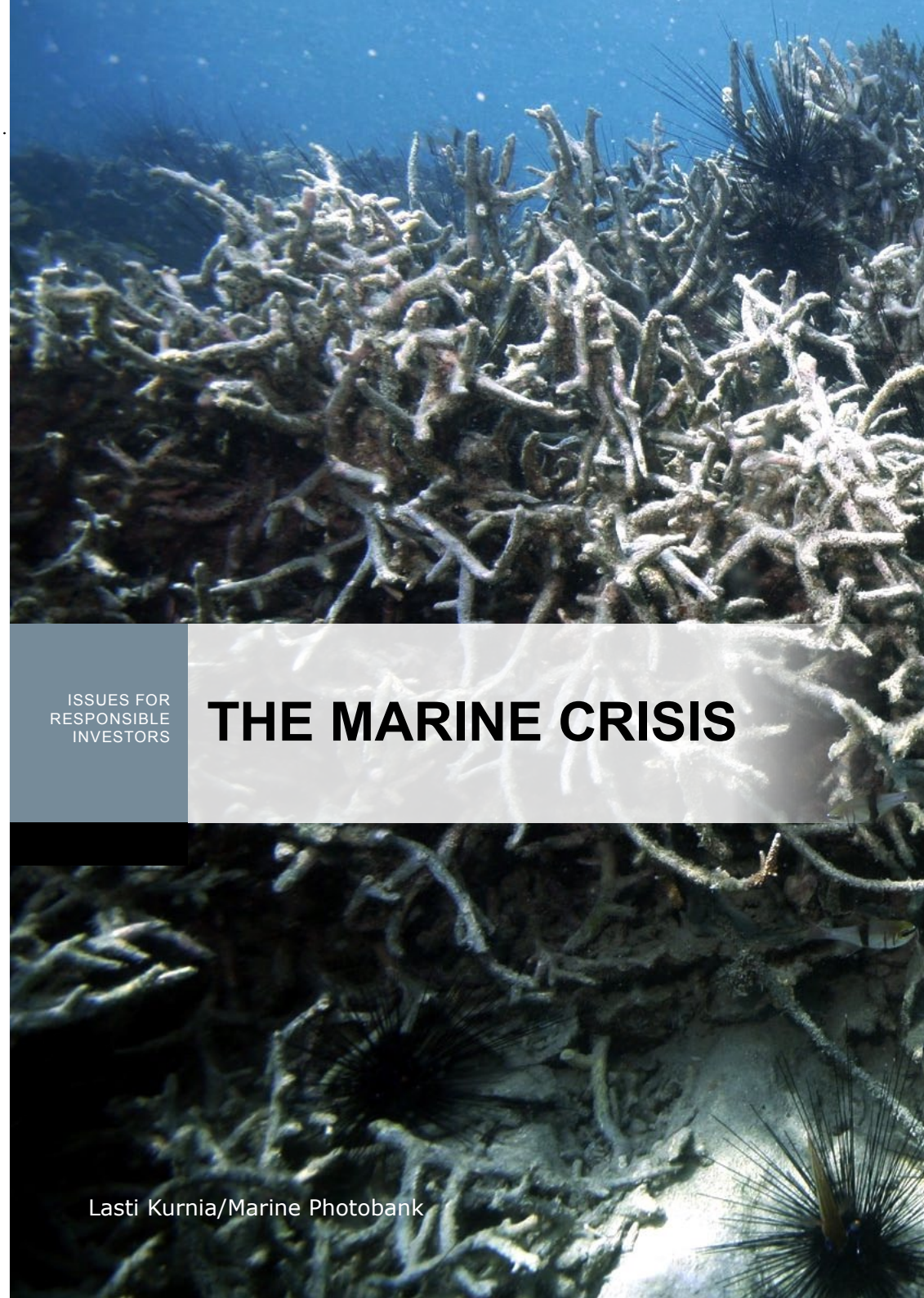
"IFC does not finance the following projects:

\* Production or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements, or subject to international bans, such as pharmaceuticals, pesticides/herbicides, ozone depleting substances, PCBs, wildlife or products regulated under CITES.

\* Drift net fishing in the marine environment using nets in excess of 2.5 km. in length."

## SUGGESTED STEPS FOR BANKS AND OTHER LENDERS

- For all companies directly or indirectly linked to the fishing and/ or aquaculture industries, due diligence process should include consideration of the related sustainability issues
- Formulate a policy on sustainable fishing, or incorporate consideration of such issues into existing lending policies
- Policy to encompass a broad spectrum of sectors
- Ultimate goal of policy is that bank only lends to those companies committed to improving performance on fish sustainability, where that is a material issue



ISSUES FOR  
RESPONSIBLE  
INVESTORS

# THE MARINE CRISIS

Lasti Kurnia/Marine Photobank



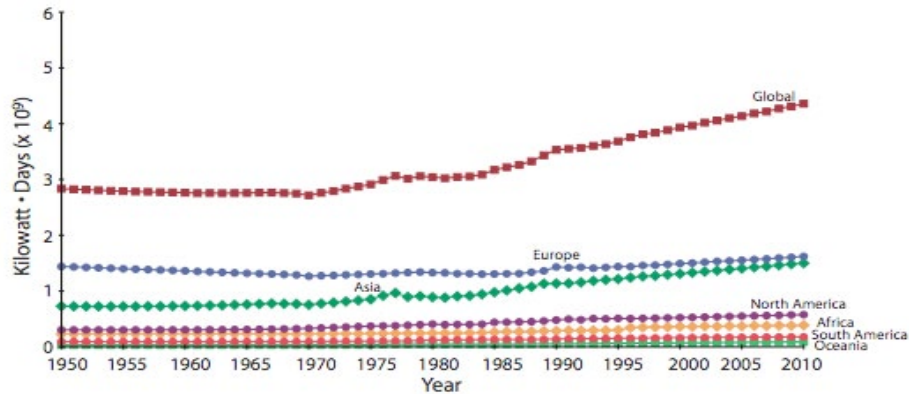
# THREATS TO MARINE RESOURCES

Marine resources are impacted by a number of issues and although they are not all directly attributed to fishing, these issues have compounded one another to create extreme pressure on fish stocks.

## Overexploitation

Marine stocks are being exploited at an alarming rate, too fast for natural processes to keep pace with. Fifteen years ago, around 85 million tonnes of marine stocks (as opposed to those fished from inland waters) were produced from capture fisheries annually. Since then, production from marine waters has declined to around 80 million tonnes in 2008, despite increases in fishing effort.<sup>92</sup>

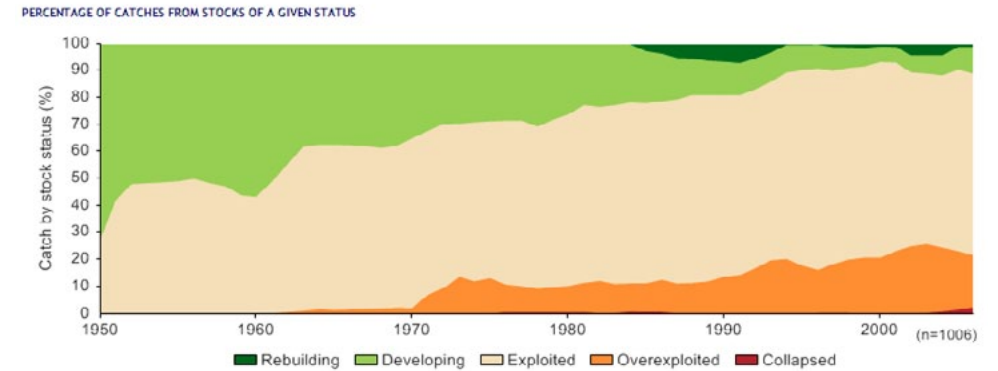
Figure 17: Time-series of annual estimates of total fishing effort exerted by all countries globally, and by continent (1950–2010).



Source: Anticamaraa, J. A, R. Watsona, A. Gelchu, D. Pauly. Global fishing effort (1950–2010): Trends, gaps, and implications. 2011. Fisheries Research 107.<sup>93</sup>

This decline has increased conviction among the marine biology community that we have passed the point of 'peak fish' – the year in which harvests of wild fish peak, before going into decline. In the mid-1970s, the percentage of stocks that were moderately or under-exploited was still 40 percent, but this decreased to just 15 percent by 2008.<sup>94</sup> The number of marine stocks that were over-exploited, depleted or recovering in the mid-1970s was 10 percent; a figure that has since risen startlingly to 32 percent, taking the number of stocks that are fully- or over-exploited to 85 percent.<sup>95</sup> This means that an alarming 85 percent of world fish stocks cannot be expanded to keep pace with population growth and increased demand for fish as a food source.

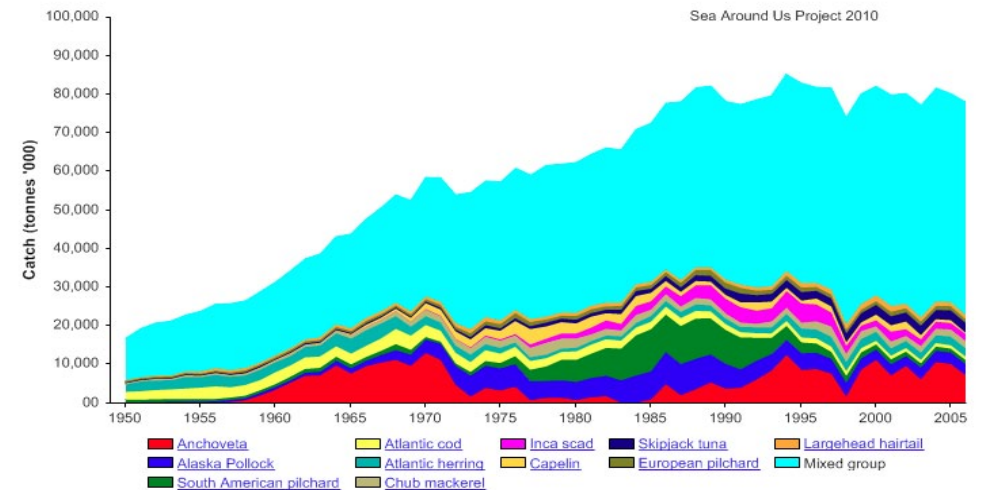
Figure 18: Percentage of total catch from stocks at different stages of exploitation



Source: Sea Around Us Project<sup>96</sup>

The relentless harvesting pressure on marine stocks is putting more and more marine species on the International Union for Conservation of Nature (IUCN) list of threatened species, or 'Red List'. This list includes commercially popular fish such as Atlantic cod, three species of marlin, five species of tuna, 17 species of grouper and over 35 species of shark.

Figure 19: Landings of ocean species globally



Source: Sea Around Us Pproject<sup>97</sup>



Not only does this mean that we are in serious danger of losing one of the world's most important sources of protein, but the historic concentration of fishing efforts on apex predator species, like cod, tuna and shark, means we are also causing 'trophic cascades'. This is when a significant change in population number of one species effects a change in a different species population number due to their inter-dependence in the food chain.

### Predator-prey dynamics: the effects of disequilibrium in fragile marine ecosystems

Marine ecosystem dynamics are complex and not yet fully understood. However, as with terrestrial ecology, it is known that the removal of large numbers of a particular species can lead to the disruption of food chains and destabilisation of the ecosystem in question. This can happen through over-exploitation, loss of habitat, changes in environmental conditions, disease or introduction of non-native species.

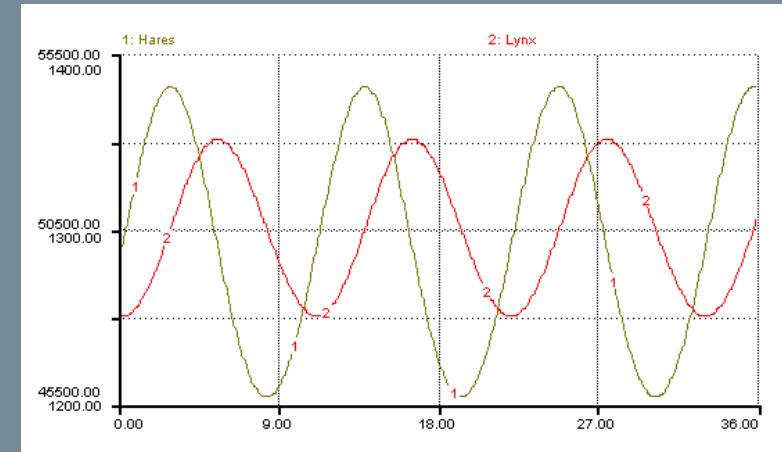
There have been many examples of trophic cascades in terrestrial ecology, and we are starting to witness them in marine ecology too. Theoretically, removal of apex predators, such as shark, tuna and billfish, leads to an increase in numbers of their prey, usually smaller predatory fish. These enlarged secondary predator communities in turn increase feeding pressure on their prey, which tend to be herbivorous fish and invertebrates.

One example where this has happened is on the Atlantic coast of the US, where scientists have shown<sup>98</sup> that over-fishing or accidental by-catch of large sharks, such as the bull, great white, dusky and hammerhead, has led to a decline in numbers in the order of up to 99 percent. This has led to an explosion in the population of cow-nosed rays, a species normally kept in check by these sharks, which are their natural predator. In turn, cow-nose rays have devastated populations of bay scallops, wiping out a once thriving and lucrative industry for local fishermen.

Further unchecked decimation of the food chain can have even more catastrophic effects. Significantly reduced numbers of herbivorous fish and invertebrates allow algae to grow almost unrestricted, outcompeting coral for space on the ocean floor. A shift from a coral-dominated community to an algal dominated one may then occur. Coral reefs support, directly and indirectly, 90 percent of marine life and without them marine life could theoretically cease to exist.

It is important to note that it is not just the removal of apex predators that can cause trophic cascades. Disruption at any level of the food chain will echo up and down, meaning over-fishing of any species could trigger disastrous consequences.

Figure 20: Results of Lotka-Volterra predation model for Lynx and Hare with respective initial populations of 1250 and 50,000. The chart is the classic illustration used by ecologists to show how population numbers of predators and prey naturally cycle and echo each other. Interfering with population numbers can disturb this natural cycle



Source: Wilensky, U. & Reisman, K. (2006). Thinking Like a Wolf, a Sheep or a Firefly: Learning Biology through Constructing and Testing Computational Theories -- an Embodied Modeling Approach (PDF). *Cognition & Instruction*, 24(2), pp. 171-209.<sup>99</sup>

Trophic cascades are one consequence of our relentless targeting of apex predators, but another is the practice of "fishing down the food web". This phenomenon was first presented in 1998, using research from the University of British Columbia Fisheries Center. As fishing depletes the top predators, such as tuna and cod, their numbers decline, so fishermen move onto the next level in the food chain, the middle predators. As those stocks become exhausted, fish even lower in the food chain, herbivorous fish, are targeted – and so on until fisheries are depleted. Both theories demonstrate serious threats to marine populations.

### By-catch

By-catch is the capture of aquatic species other than the main target. Depending on the method used, by-catch can range from a tiny percent of the total catch to 40 percent and more. By-catch may be non-target fish or juveniles of the target species that are smaller than regulations allow the fishing company to land. They are often

ecologically important or endangered species such as sharks, rays, turtles, dolphins, whales, seals, sea lions and even sea birds.

Some by-catch is used, noticeably as feed for aquaculture, but the majority is thrown back into the sea, normally dead. By-catch is such a problem that it has contributed to the placing of the one hundred plus species of sharks and rays, six species of marine turtles and ten species of dolphins and porpoises on the IUCN Red List.<sup>100</sup>

### By-catch from a shrimp trawl net



Source: Elliott Norse, Marine Conservation Biology Institute/Marine Photobank

### Illegal, Unregulated and Unreported (IUU) Fishing

IUU fishing is a vast problem, which contributes to overfishing and undermines conservation and management efforts. The practice threatens coastal livelihoods and it is thought to occur in virtually all capture fisheries.

IUU fishing is any fishing that contravenes the national or management law of the related fishing zone. It includes fishing by unregistered boats and boats fishing outside of zones in which they are registered. It also includes the landing of catch over the volume quota, individual target fish under the minimum size quota or illegal species.

Up to USD24 billion of revenue is lost to IUU fishing annually.<sup>101</sup> Even at the lower end of the spectrum, this is thought to be around 10 percent of the value of the entire capture industry. In the Pacific Ocean, illegal fishing steals fish worth four times more than the region earns in license fees.<sup>102</sup>

Greed and poverty both drive IUU fishing and the vastness of the ocean makes policing the industry a daunting task. Patrolling the oceans is expensive and labour- and time-intensive, so any policing and enforcement is usually conducted at the landing ports. Corruption, a lack of political will, and numerous legal loopholes often undermine these enforcement efforts, especially in remote locations. Because boats can cross national boundaries, even competently managed ports can be fooled as fishers simply lie about where their catch was caught. Ineffectual enforcement does not just affect the country of landing but also the country in whose Exclusive Economic Zone (EEZ) the product was illegally caught. IUU is, therefore, an international problem.

The challenge for eliminating IUU fishing is tougher in developing countries that lack strong administrative procedures or the funds to police their fishing grounds. They are likely to be disadvantaged when it comes to certifying legal catch for these reasons, making the introduction of global trade certification and reduction of IUU fishing more difficult.

### Ocean Acidification

The oceans maintain a natural pH of 8.2, which is slightly alkaline. This alkalinity dictates the saturation of carbonate ions, which are used by shell, plate and skeleton building marine creatures such as urchins, sea stars, molluscs, cephalopods, some algae and, most importantly, corals.

When Carbon Dioxide (CO<sup>2</sup>) dissolves in seawater a carbonic acid is produced, and ocean acidity levels rise. This action increases both the number of hydrogen ions and decreases carbonate ions. The reduced availability of the latter means those organisms that need them will not be able to sustain their shells or will be forced to



attempt survival with weaker support. Elevated CO<sup>2</sup> levels are seen to be 'dissolving' the shells of these animals, and could lead to their eventual extinction. The loss of these economically and ecologically valuable species would impact food chains and change the ecology of the oceans completely.<sup>103</sup>

Other effects of increased acidity are reduced sound absorption, which affects marine mammals' ability to communicate, and increased growth rates of turf algae that compete with corals and kelp forests for space.

### **Climate Change and Ocean Warming**

A number of scientists have confirmed that the oceans are getting warmer.<sup>104</sup> Marine species are adapted to living at a specific water temperature. A change in temperature means they need to alter their range and geographic distribution. Many fish are likely to move towards polar or deeper waters and migratory patterns will also be disrupted. Marine life that is unable to relocate may not be able to survive in increased temperatures.

Another ill-effect of temperature change is the reduced nutrient availability within surface waters. Most 'primary production', the production of organic compounds that are the basis of all marine life, is carried out via photosynthesis. Photosynthesis is a process that needs light, so marine organisms that are primary producers, such as phytoplankton, are found in surface waters. This surface Phytoplankton also needs inorganic material (such as carbon dioxide) to fuel primary production, which, due to gravity, drops to deeper sea over time. Natural upwellings of deeper, colder water are therefore needed to bring these materials from the ocean depths back to the surface where the phytoplankton live. Unfortunately, with ocean warming, surface waters tend to warm faster than deeper waters and freshwater from melting ice caps reduces surface salinity. This, in turn, reduces the density of surface water. This means that less dense, warmer, fresher water is often floating on denser, colder, sea water which may lessen the likelihood of the upwellings that are so vital for primary production. Without this primary production, life in the ocean cannot exist.

Coral bleaching is also a possibility in warmer waters. Increased temperatures stress corals and cause them to shed the symbiotic algae which, through photosynthesis, normally provides them with around 80 percent of their energy needs. This loss of algae is called 'bleaching' because it literally leaves the coral colourless. If water remains warm for an extended period of time, corals remain bleached and will eventually starve and die. Bleaching currently happens on a regular and sometimes cyclical basis. Corals seem to be able to recover between events if the water has the opportunity to cool again. If sea temperatures increase incrementally, coral may bleach more often and, without the respite of a cooling period, may not recover at all. Coral reefs are the basis for much of marine life and the loss of reefs will impact other marketable marine resources.

Storms and extreme weather patterns are expected to increase due to global warming and could affect fishing activities and threaten fishing crew safety more frequently. Rising sea levels, flooding and droughts, another by-product of climate change, could damage aquaculture, especially that based in mangroves and low lying areas, as well as coastal fishing villages.

### **Pollution**

According to the UN, over 80 percent of marine pollution occurs as a result of land-based activities.<sup>105</sup> Pollution of the oceans damages marine stocks by causing a number of adverse conditions. Typical causes and forms of marine pollution are:

#### *Oil*

Oil, in crude form or refined, can coat sea creatures' fur, feathers and skin, preventing insulation, impeding self-cleaning and choking respiration. When ingested it can be poisonous. Animals, which are exposed to oil pollution can develop diseases and growth impediments. Oil pollution comes from a number of sources, mostly from drainage from industrial processes, transportation maintenance, and air pollution.

#### *Nutrient run-off*

Fertilizer encourages the growth of plants on land and also in coastal regions, as well as lakes and rivers. Rainfall on land washes fertilizer into the coastal water, causing eutrophication, which is the rapid growth of photosynthetic algae. Photosynthetic algae depletes sources of oxygen in the ocean, suffocating oxygen-dependent marine life.

### **Dead coral overgrown with algae in Indonesia**



Source: (c) Wolcott Henry 2005/Marine Photobank

### Sewage and Toxic Chemical Pollution

Untreated sewage can also cause eutrophication and disease. Man-made chemicals, such as pesticides and cleaning chemicals, permeate nearly all aspects of marine life. Once introduced, these chemicals, such as PCBs (polychlorinated biphenyls) or DDT (dichlorodiphenyltrichloroethane), which are contained in run-off from many industrial processes, are nearly impossible to remove. Due to biomagnification, the process by which concentrations of a poisonous substance increase the higher up the food chain they travel, chemicals and heavy metals can reach levels in animals high in the food chain that are lethal either to them or the humans that feed upon them. Examples of commonly detected toxins include mercury and ciguatoxin. In fact, the US Food and Drink Administration has advised certain vulnerable members of the population, such as pregnant women, to avoid eating shark, swordfish and some types of mackerel due to the concentrations of mercury found.<sup>106</sup> They are also thought to cause cancer, damage to the immune system, behavioural problems, and reduced fertility.<sup>107</sup>

### Marine Debris

Rubbish from land, if not correctly contained and disposed of, also makes its way into the ocean. Marine life becomes entangled in plastic and other waste and either drowns or is inhibited from eating, cleaning or escaping predators. Marine debris can also be mistaken for food and ingested, killing the creature by choking or blocking its digestive tract. It is thought that over 100,000 animals a year are killed by marine debris.<sup>108</sup>

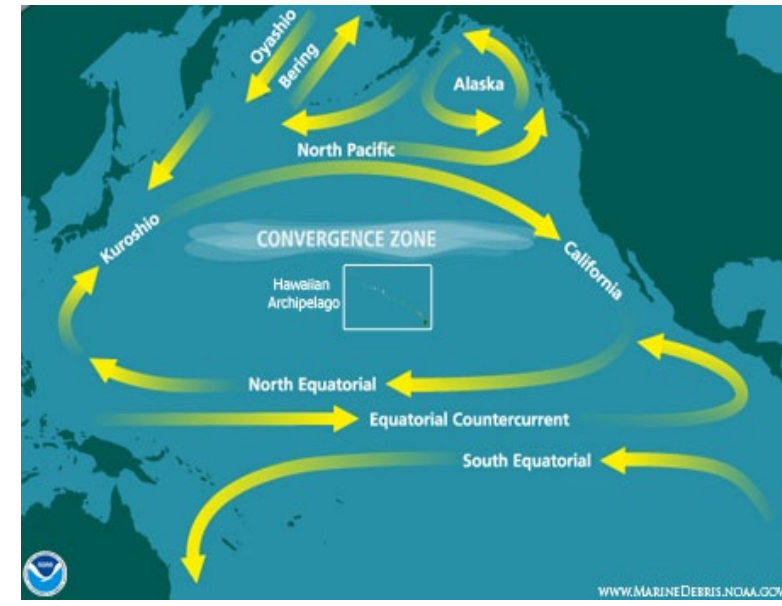
### A manta ray unable to feed due to entanglement



Source: Dale Galvin/Marine Photobank

The North Pacific 'Gyre' is an area of the ocean located between the equator and latitude 50°N. The gyre is formed by four ocean currents that cause a confluence from which little water flows in or out.

### The North Pacific Gyre



Source: National Oceanic and Atmospheric Administration, United States Department of Commerce<sup>109</sup>

Due to this natural phenomenon it has become the final resting place for an unusually high concentration of man-made rubbish, much of it plastics, and is nicknamed the Great Pacific Garbage Patch. The water here contains rubbish of all kinds from tiny broken up pieces of plastic to huge polystyrene containers and extends up to 3 meters underwater. Most of this debris, particularly plastic, does not break down so this plastic trash vortex, along with the rest of the plastic debris floating elsewhere in the ocean, will persist and remain lethally dangerous for hundreds of years to come unless multilateral action is taken.

### Lanternfish amid microplastic debris from the North Pacific Gyre



Source: James Leichter/Marine Photobank

#### Destruction of Habitats

In order for marine life and commercially valuable stock to survive in the wild, shelter, food and a place to reproduce are required. Each species is adapted to occupy certain niches in its natural marine habitat. If changes occur in that habitat, creatures may not be able to adapt quickly enough to their new environment, or may not be able to move quickly enough to one better suited to them, and so will die out.

#### Damage from overfishing, destructive fishing, ocean acidification, climate change and pollution

Marine habitats are sensitive and are damaged by a number of processes, many of which have already been detailed in this section. Overfishing leads to trophic disturbances and often impacts the primary production layer of the food web, altering the whole habitat. Destructive fishing methods, such as bottom trawling, and cyanide and dynamite fishing, cause physical damage to bottom environments, sometimes permanently. Ocean acidification, climate change and pollution can all alter environmental conditions in the habitat.

#### Onshore development – Tourism and Aquaculture

Land development is another process putting pressure on aquatic habitats. More than half of the world's population lives on the coast. Development has accelerated in many areas due to increasing prosperity, population density, more land use required for agriculture and aquaculture and increased tourism.

Coastal habitats such as wetlands, mudflats and mangroves are breeding and nursery grounds for marine and aquatic species and habitats for prey species. Development onto or close to these habitats will physically damage or wipe out these important parts of the ecosystem.

Clearing of land for development is not just damaging to terrestrial ecosystems, but to marine ones too. Without trees, shrubs and roots, soil is left exposed to the erosion caused by rainfall and water. Rain washes soil into rivers and eventually into seas. This mixing of land-based nutrients and chemicals is polluting to the marine ecosystem, but worse still is sedimentation. Soils and silt flushed out into waterways decrease oxygen content, smother aquatic life including coral reefs, increase turbidity and even fill in shallower habitats.

Aggregates are materials used in nearly all construction and building development for reinforcement and foundations. Aggregates include sand, much of which is dredged from the ocean floor. Dredging itself is physically damaging as it crushes and destroys all marine structures in the path of the dredger, damaging the marine habitat beyond repair. It also stirs up sediment that can choke and suffocate life on the seabed. Removal of the sand also has a huge effect on the ecosystem, as sand is a habitat for many marine creatures. It also acts as a filter by cleaning any water running down beaches, protecting the coast from erosion and regulating channel formation. Much of the coastal areas surrounding Hong Kong, Singapore, southern China and Taiwan have been heavily dredged to supply aggregates for the massive building boom of the past decade.



# CASE STUDY: THE CORAL TRIANGLE

Figure 21: The Coral Triangle



Source: The Coral Triangle Center<sup>110</sup>

The Coral Triangle spans the coastal and marine areas of Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands and Timor Leste. Scientists consider this to be the most ecologically significant area of marine diversity in the world and a major centre of coral evolution. Some 76 percent of known coral species are found here and 37 percent of reef fish species.<sup>111</sup>

## Healthy coral reef, Indonesia



Source: Colin Zylka/Marine Photobank

Habitats include coral reefs, mangrove forests, rocky intertidal zones, beaches, cliffs and wetlands. These habitats all provide nurseries, shelter and food for a large proportion of marine animals. The high diversity of habitats in turn leads to a high diversity of marine animal life and ensures adaptation of natural populations to changing environmental conditions, such as climate change. The 500 species of coral and 3,000 species of fish found in The Coral Triangle include endemic (native) species as well as globally distributed but rare ones, such as the Whale Shark, the Ceolocanth, the Ocean Sun Fish, six species of marine turtle and several hundred species of shark.

The marine animals in The Coral Triangle are either exploited directly or form part of the food chain that feeds the exploitable resources. For example, the area provides a nursery ground for several commercially valuable tuna species.

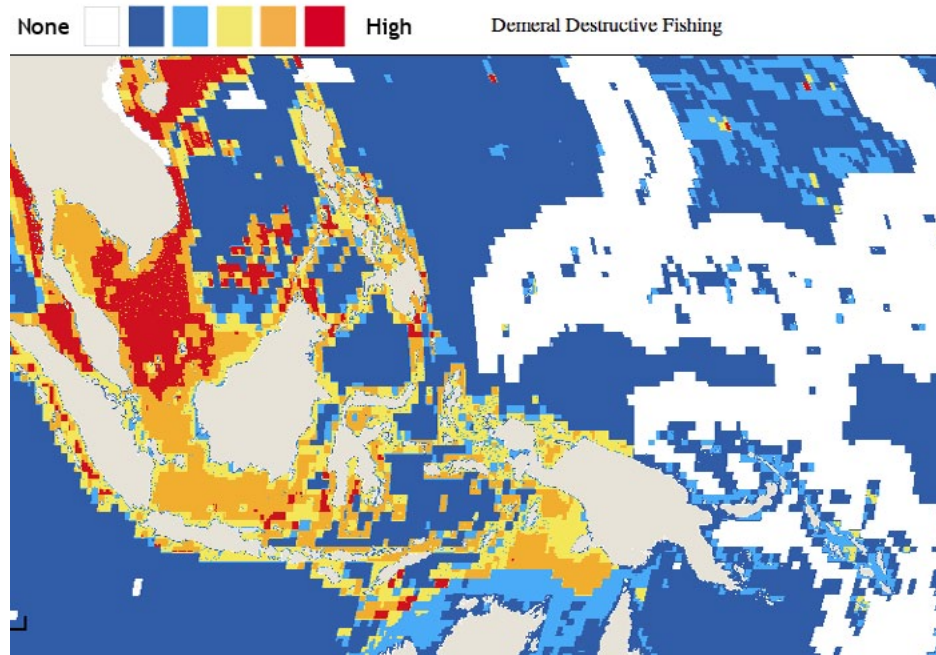
The high concentration of islands in the area means that many people living within the Coral Triangle are sea-faring islanders that rely on these marine resources as a source of protein and income, and have done so for thousands of years. The fisheries in the area provide food security for more than 126 million people directly within the area and an additional 240 million people further inland.<sup>112</sup> The Coral Triangle's marine resources are also exported across the globe, bringing in valuable income. It is one of the most productive fishing areas in the world.

## Threats

The Coral Triangle has not escaped the pressures and threats that are impacting other coastal and ocean environments. Industrial fishing companies are increasingly plundering the rich seas, damaging habitats and draining resources.



Figure 22: Coral Triangle and surrounding area showing destructive demersal (lower level) fishing (purse seining and bottom trawling)



Source: National Center for Ecological Analysis and Synthesis<sup>113</sup>

Rising local populations in the developing countries of the Coral Triangle are also placing unprecedented pressure on local ocean products. Social issues, including poverty and poor education, also contribute to the acceleration of degradation of the area. The practice of dynamite and cyanide fishing is widespread due to lack of awareness of its damaging effects as it provides an easy, quick and cheap method of extracting fish. Demand also comes from better external communications, which open up previously inaccessible foreign markets for local produce. Aquariums, as well as low cost trinket and jewellery markets increase demand for small salt-water fish, sea anemones, urchins, shells and coral from this coral rich area.

### Red coral jewellery for sale in Beijing Pearl Market



Source: Devin Harvey/Marine Photobank

Land development in the region is rapid, with industry and tourism infrastructure increasing to meet short-term demand from global markets, with little thought to longer-term environmental and social effects. Long-term problems include lack of water, electricity, building materials and food as well as an increase in traffic, sewage and waste. Most islands are ill prepared to deal with these issues and poor governance, inefficient financial management and corruption in the Coral Triangle means that sustainability and social priorities are often ignored in the race to make a fast buck.

Added to these pressures are climate change, ocean acidification and rising sea levels. Man-made damage will inhibit the ecosystem's natural ability to adapt to and tolerate these phenomena.

### Protection

The ecological importance of The Coral Triangle has been recognised for a number of years by scientists, NGOs and governments. As a result, there are many NGOs and initiatives supporting the area, most of them feeding into the Coral Triangle Initiative.

The Coral Triangle Initiative (CTI) was set up in 2007 by the leaders of the six nations in the region during the APEC Leaders Declaration on Climate Change, Energy Security and Clean Development in Bali.<sup>114</sup> In further meetings, most recently in Papua New Guinea in 2009, multilateral support was given to the initiative. Partners involved in the initiative include: the governments of all six nations, the US CTI, the Global Environment Facility (GEF), World

# REGULATORY OVERSIGHT

Wildlife Fund (WWF), Conservation International and The Nature Conservancy.<sup>115</sup> The Regional Plan of Action (also referred to as the Bali Plan of Action) was developed by these partners to push forward conservation issues in the region. The plan captures the joint priorities and commitments of all of six governments, and reflects extensive inputs from many partners. According to the Interim Regional CTI Secretariat, as stated in the Regional Plan of Action text, the action plan "is intended to serve as a rallying point for collective and parallel action at regional, national, and sub-national levels".<sup>116</sup>

Funding for the initiative comes from the GEF Council, which approved a USD72 million, five-year CTI Support Program, with over USD300 million in joint financing from various other sources in April 2008. Further funding came from USAID and the US Department of State, which pledged a USD40 million, five-year programme implemented through a consortium of NGOs.

As stated by the Interim Regional CTI Secretariat in the Regional Plan of Action, the CTI's specific over-arching commitments are to:

- "Designate the sustainable management of marine and coastal resources as a high and urgent ongoing priority on their national agendas;
- Mobilise high-level public and private sector leadership;
- Achieve enhanced regional collaboration to address important regional problems;
- Implement needed economic, policy and legal reforms;
- Establish a system of sustainable funding and orient these financial resources toward achievement of the CTI Plan of Action;
- Achieve a rapid improvement in institutional and human capacity;
- Lead effective, highly participatory multi-stakeholder alliances;
- Integrate conservation, management and development;
- Promote public / private partnerships."<sup>117</sup>

It aims to meet these commitments by designating and effectively managing priority seascapes, using an ecosystems approach to management of fisheries, establishing and effectively managing a network of Marine Protected Areas, putting in place climate change adaptation measures and improving the status of threatened species.

The implementation of sustainable fishing practices in the region, for example through Fisheries Improvement Programmes, complements these goals and should serve as an example to other threatened fishing grounds.

Regulatory oversight of the oceans has historically been poor. Before modern regulations were introduced in the 1950s, rights to control over the oceans were limited to national waters that were within range of a cannon shot, three nautical miles. The rest of the ocean was free for all to exploit however they wanted. Unrest and conflict over the oceans' natural resources began at the beginning of the 20<sup>th</sup> century until finally the United Nations held its first Conference on the Law of the Sea (UNCLOS) in 1956.

## Law of the Sea

After a number of conferences the UNCLOS, as it is today, came into force in 1994. UNCLOS set a number of regulations in place, including a legally binding international standard which aims to protect the marine wildlife and environment and a peaceful way to resolve territorial and natural resource disputes through the International Tribunal for the Law of the Sea (ITLOS). It also put in place zonal boundaries, as follows:

*Internal waters* – These are the inland rivers and lakes of which the country has free rule.

*Territorial waters* – As far as 12 nautical miles out from the coast is the area in which a country is free to set its own rules of exploitation. Foreign vessels are free to move in and out as long as it is for 'innocent passage'.

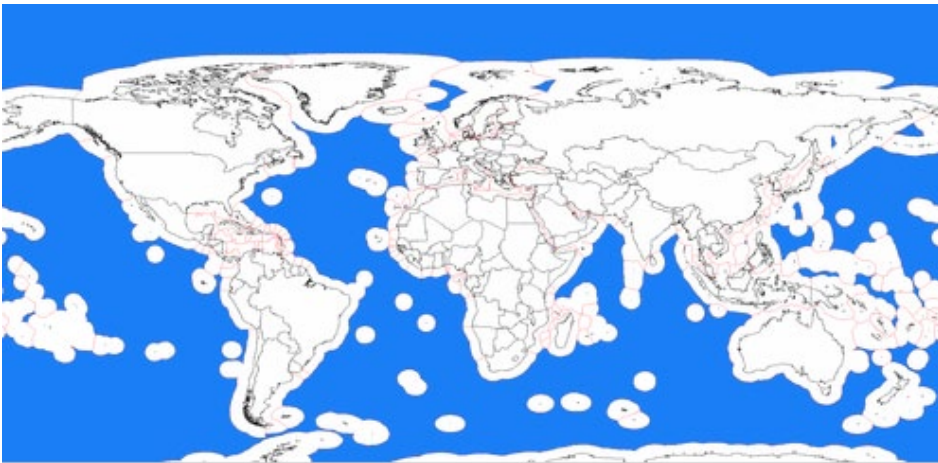
*Exclusive Economic Zones (EEZ)* – These zones were a new addition in the 1982 UNCLOS III that came into force in 1994 and extend from the edge of the coast out to 200 nautical miles. Within this area, the coastal nation has sole exploitation rights over all natural resources, although it can choose to sell access rights to other nations or companies. EEZs that overlap are generally revised to delineate equally between the two states. This means that only they, or whoever they sell their rights to, may fish in the zone, but they are subject to some other international rules and regulations, such as quotas. There is often controversy over the rights to fish 'transboundary' and 'straddling' fish stocks. Transboundary stocks are those which move between the EEZs of two or more countries, while straddling stocks move between an EEZ and the high seas.

Waters outside of these defined zones are international waters and are covered only by the Convention on the High Seas that came into force in 1962. This treaty asks only that ships sail the high seas under a flag state and agrees to comply to rules of that state. However, how the flag state chooses to regulate and enforce its responsibilities towards that ship is up to them. Some states have 'open registers' into which a ship of any nationality can register for a fee and many of these are notorious for turning a blind eye to illegal activity, with regard to both fishing and crew welfare. The flags of these countries are termed flags of convenience (FoC) and are sought by companies intending to avoid controls and regulations, especially around fishing. Several Asian states are considered 'Flags

of Convenience' including Myanmar and Cambodia. The Marshall Islands in Micronesia now registers about 2,300 vessels, the third-largest fleet in the world, and receives an income of approximately USD4 million annually from the practice.<sup>118</sup>

If a ship is involved in criminal activity, such as piracy, any nation can exercise jurisdiction and any passerby that sees a ship without a flag can report the ship. In addition the International Maritime Organisation (IMO) has some authority over ships sailing the high seas. However, in reality, the high seas are only very loosely regulated with no centralised authority responsible for monitoring activities.

Figure 23: Map of high seas area of the world - shaded blue. These areas are only loosely covered by voluntary international treaties.



Source: Wikipedia

### Regional Fisheries Management Organisations

Further regulation on global fishing comes in the form of Regional Fisheries Management Organisations (RFMO). They are international organisations that aim to steer sustainable management of fishery resources in a particular region of international waters, or of highly migratory species. There are a number of RFMOs around the world and their role is particularly pertinent when there are shared stocks and management issues within regions.<sup>119</sup> RFMOs only have jurisdiction over member countries and countries must sign up voluntarily.

There are three main types of RMFOs:

1. RMFOs that have a mandate for fisheries management and are empowered to establish management measures;
2. RMFOs that have an advisory role and provide members with scientific and management advice; and
3. RMFOs that provide scientific advice and information.<sup>120</sup>

In Asia there are six RMFO that fall into the first category. These are:

- IATTC - Inter-American Tropical Tuna Commission
- IOTC - Indian Ocean Tuna Commission
- IPHC - International Pacific Halibut Commission
- NPAFC - North Pacific Anadromous Fish Commission
- WCPFC - Western and Central Pacific Fisheries Commission
- PSC - Pacific Salmon Commission

These commissions agree on a management plan for the species and area under their jurisdiction. Often, this means a quota system, which is then divided out amongst the member states. It is then up to member states to regulate fishing within their own country.

The RMFOs in the next category were formed with a mandate to harmonise fisheries management policies or focus on more specific sub-sectors. There are six of these in Asia. They are:

- APFIC - Asia-Pacific Fishery Commission
- BOBP-IGO - Bay of Bengal Programme Inter-Governmental Organization
- FFA - South Pacific Forum Fisheries Agency
- MRC - Mekong River Commission
- RECOFI - Regional Commission for Fisheries
- SEAFDECA - Southeast Asian Fisheries Development Center







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Sadly, despite increased awareness of the fragility of many marine stocks and the governance offered by RMFOs and UN laws, a very large proportion of the high seas remains stuck in this “commons” situation.

#### *Enforcement issues*

Even where there are quotas and regulations in place, enforcement is challenging for a number of reasons. Patrolling the oceans is expensive and labour and time intensive – more often than not it is left to land based authorities to regulate the fishing industry and they can only regulate the catch they see landed.

Penalties for IUU fishing range from a few hundred to a few thousand dollars and can be imposed by the state whose EEZ was violated or by RMFOs whose regulations were flouted. The fine is rarely large enough, compared to the potential gains from IUU fishing, to serve as a deterrent. Occasionally, the IMO gets involved in illegal fishing situations and has been known to confiscate ships. However, the loopholes in the law and the vastness of the unregulated high seas means that many incidents go unnoticed.

The introduction of satellite imagery has allowed regulatory authorities to police the seas remotely rather than attempting to catch boats ‘red-handed’, but identifying, locating and approaching those boats is still difficult. Another method of oversight common in some of the better-managed fisheries is the placing of official inspectors on fishing vessels. Even if the presence of the official means the vessel in question plays by the rules only as long as he or she is on board, comparison of catch data from these “policed” fishing expeditions against those of un-policed vessels can often highlight discrepancies in catch numbers.

Once at port, corruption and bribery are not uncommon and it is disturbingly easy for IUU fish to be mixed with legal catch and enter the seafood value chain. In general there is little oversight and transparency in the convoluted chain of custody involved in getting a fish from the sea to a plate, and this contributes to the deception. Oftentimes the end consumer, whether that is a fishmeal producer, a restaurant customer or a supermarket shopper, is none the wiser about the origins of their fish, or even what species it is. It is for this reason that sustainability certification schemes, such as that of the Marine Stewardship Council (MSC), insist on auditing every link in the chain of custody (fishery, processor, logistics, retailer) before a consumer-facing label can be placed on a product

#### **Rights-based fishing using Individual Fishing Quotas**

There are a number of methods for distributing shares in a country’s rights to exploit fish stocks. Some countries limit ‘days at sea’, some use varied fishing seasons and some limit boat numbers or sizes. All these methods have their own problems. For example, fishing seasons, especially if reduced to just a few days, introduce

potential safety hazards, as boats need to go out fishing on those days, regardless of weather conditions. In addition, the produce is all landed at roughly the same time, meaning that the market is flooded and prices drop. With limits to days at sea or boat numbers, a race to build the biggest boat with the best technology ensues, to ensure exploitation is maximized within the limitations. In addition, none of these options allow species to be treated differently even if the state of the stocks is indeed different.

Individual fishing quotas (IFQ) are one of the most popular choices for dividing up fishing rights. Boats apply for a share of the total allowable catch quota and are then able to catch their share whenever they chose. This eliminates most of the issues above and gives much of the decision-making and ownership back to the fishers. They get more leverage in the market, more control over their own business and managing authorities are better able to monitor what is happening with the stock.

IFQs have been used in New Zealand, Australia and Iceland with much success. Hoki stocks off the coast of New Zealand, for example, looked close to collapse, but the introduction of IFQs has been credited with their recent recovery. Catches and individual fish sizes are still far from 1980s levels, but have bounced back enough for the MSC to certify these two fisheries.

IFQs are not, however, free from problems. For example, in the European Union the combination of quotas and indiscriminate fishing gear has seen a large proportion of good seafood dumped back into the ocean. EU fishermen have quotas for species and, once their quota for that species has been reached, they are liable to penalty if they land more of that species. However, they may have quota of a different species left and will continue to fish targeting that species. If, when fishing for species of which they still have quota, they catch species for which their quota has been reached, they must dump the filled quota species back overboard, already dead. In the North Sea this by-catch has been estimated to be up to 50 percent of the catch.<sup>121</sup> This wastes a huge amount of fishing effort and completely undermines the conservation aim of the quota system.

# SOCIAL ISSUES AND FORCED FISHING

Unsustainable fishing practices have parallel long-term social impacts, particularly, but not exclusively, in third-world coastal communities.

## Depletion of a traditional resource

For many coastal communities, the sea provides them with their only source of protein. Villages have congregated along coasts purely for easy access to the sea and communities have relied on its resources for hundreds of years. Community activities, cultures and politics as well as income, have been based around the ocean. In both developed and developing communities, fishing is a way of life, not just a job.

But changes have been occurring in the industry. In developed countries, stock depletion has led to limits to allowable catch through quotas, increased efforts with decreased results and dropping prices at markets. This has inversely affected their ability to survive on fishing alone and the number of fishers in some developed countries is decreasing.<sup>122</sup>

Depleted stocks in western waters has led fishing companies to move into previously unexploited areas surrounding developing countries. Previously artisanal fishers have been introduced to commercial fishing opportunities that have encouraged them to sell all that they catch, leaving them with little or low quality food for themselves and their families. Profitable markets have also encouraged them to fish more, leading to over-fishing. Once their stocks are gone, the collection company moves on to the next village and the subsistence fishers are left with severely damaged resources and no income.

## Sale of fishing rights

Poverty and lack of education adds to developing countries' problems. Without realising the value of what they are giving away, governments in developing countries often jump at the chance to earn quick money by selling access rights to their EEZ. Unfortunately, they often settle for a fraction of the value of the fish within it. Once the rights are sold, foreign companies take over traditional fishing grounds with large boats and industrial sized fishing nets. Artisanal fishers are forced out of their living as foreign companies exploit the resource as far as possible, safe in the knowledge that they do not have to deal with the consequences. Again, once the stocks become depleted, foreign ships will move on, leaving the developing nation with degraded stocks and no income.

## Forced Labour in Fishing

Forced labour in the fishing industry is a practice that is being slowly exposed as modern day slavery. There are 27 million men, women and children working in forced labour around the world today.<sup>123</sup> The fishing industry has been highlighted as one of the

main culprits. Unscrupulous fishing companies have just one aim, to maximise catch and minimise cost. Using migrant workers is one way of achieving this. Migrant workers that struggle to find lucrative work in their own countries or are fleeing oppressive home rule are a vulnerable, cheap and captive source of labour. Often they are unaware of laws protecting their human rights.

Migrants are lured from developing countries into the fishing industry in countries such as Thailand, which has an estimated 250,000 Burmese fishermen but just 70,000 of them legally registered.<sup>124</sup> They are promised modern ships and regular wages to take home to their families, but many find that the reality is horrific brutality, worse than their situation back home. In the best cases, workers deal with long hours, cramped conditions, basic or no sanitation, storms and wages well below the national minimum. In the worst reported cases, they are beaten, tortured and even killed by the captains of lawless ships.

Enslaved migrants out on the distant high seas have nowhere to run and no contact with the outside world. To further lower costs, companies fail to register ships, and crew and workers are smuggled into the country and onto ships without the correct documentation. These unregistered ships remain hidden and unregulated for years at a time, refueling and transporting catch whilst at sea and allowing captains to escape the consequences of flouting not just the laws of fishing but those of human rights too.

When ships finally return to port, workers' passports are frequently withheld, and are in any case useless without work permits, forcing them to either return to the ship or make their way home. Abandoned or runaway fishermen generally have no paperwork, no money and no knowledge of the local language and find themselves eking out a living or being absorbed into the underworld of various port towns around the world.

The Environmental Justice Foundation (EJF)<sup>125</sup> and the International Transport Workers Federation (ITF)<sup>126</sup> have both documented and reported cases of forced labour in West Africa, Southeast Asia, the Indian and Pacific Oceans, all regions with high incidences of illegal fishing. The EJF's most recent report, 'All at Sea'<sup>127</sup> calls for an end to Flag of Convenience (FoC) states and has named and shamed a number of countries that they and the FAO consider to be the worst offenders. In addition, the International Labour Organisation is due to release a report on Forced Fishing in early 2012.

Fishing is widely considered to be one of the world's most dangerous occupations with around 24,000 fatalities and 24 million non-fatal accidents a year. It is an industry with some very major social problems and improved regulation and management of the industry is desperately needed to protect the rights of its workers as well the natural resources that it depends upon.

# PREVENTING CATASTROPHE

## The Importance of Aquatic Resources

Aquatic resources are exceptionally important in a number of different ways.

*Food* - 1.5 billion people take at least 20 percent of their animal protein from marine resources and 3 billion people take 15 percent.<sup>128</sup> 500 million people rely on coral reefs alone for food and livelihood security and for many it is their only source of food.

*Revenue* - Marine resources are worth billions of dollars in international trade for food, fishmeal and fish oils with producers, retailers, pharmaceutical and medical industries all involved. It is important to note the socio-economic benefit to developing countries too. More than 95 percent of small-scale fishers and related workers in post-harvest sectors live in developing countries.<sup>129</sup> Small-scale fisheries are more precarious than larger industrial ones, so collapse of fish stocks for those people will have more of an impact than for more affluent countries.

*Tourism and Recreation* - Much of the global tourism industry is based around marine and freshwater life. Beaches, coral reefs, waves, mangroves, rivers and lakes attract tourists for leisure and recreation. Activities such as snorkeling, diving, kayaking and sailing are based on the marine fauna that can be seen, making this wildlife incredibly valuable. Coral reefs have been estimated to be worth USD375 billion in goods and services, whale watching is worth over USD2.1 billion and whale and shark tourism, USD47.5 million.<sup>130</sup> This type of tourism often provides important revenues to developing countries in South America, sub-Saharan Africa and South-east Asia.

*Jobs* - There are 180 million jobs in the fishing industry and on average, the people holding those jobs have three dependant family members. This results in the support of 540 million people, which is 8 percent of the world's population, by the fish extraction industry alone. Hundreds of thousands more jobs are created by the global marine tourism industry and more again in medical and other related fields.

*Medical research and advances* - Marine resources are the source for some medical treatments for conditions such as cancer, HIV, cardio-vascular diseases and many more. There is still much potential for further medical research into fish proteins and fish oils in the fields of molecular biology, pharmacology, nano and biochemistry and neuroscience.

*Ecology* - The world's population is reliant on nature for food, income, medical advances and nearly all other aspects of daily life. Nature is connected across the biosphere, national borders and social classes. Changes in one geographic area echo across the world's oceans and lands. Disturbing the delicate balance of nature will be detrimental to the human population.

The threats to these resources are significant. No one really knows what would happen if anthropogenic impacts on marine life are not eased, however, there is a very real possibility that continued or increased pressure on these resources could lead to the loss of them. UN models predict that with current practices, there could be just a third of the number of fish in the oceans in 2050 as there was in the 1970s<sup>131</sup>, numbers low enough to make fishing commercially non-viable<sup>132</sup> and a decline from which marine populations may never recover. What is known is that without marine resources, the world would lose hundreds of billions of dollars of revenue and a vital food source, not to mention the recreational, medical and pharmaceutical values of marine life. The social effects would be devastating, with poorer coastal communities being the most vulnerable to impact.

There is no doubt that the loss of aquatic stores would lead to wide-scale food insecurity, poverty, ill health and social disaster, escalating to civil unrest and political crisis. It is also clear that oceans are not the infinite reserve that they were once thought to be, although, just as with the issue of climate change, there will be those with vested interests who will continue to deny this.

Crucially, oceans are a carbon sink and absorb around a third of all carbon dioxide in the atmosphere. Deserted oceans may release that CO<sup>2</sup> back into the atmosphere, accelerating greenhouse gas accumulation. Furthermore, coral reefs protect around 25 percent of the world's coastline from land erosion. The loss of this buffer would contribute to rising sea levels.

In short, the loss of marine life would be catastrophic.

## Conservation and Protection

As with any other natural resource, sustainable management of marine stocks is desperately needed to prevent a global marine crisis. Current regulations and fishing quotas are not going far enough to mitigate all the effects of wild-catch fishing and aquaculture is virtually unregulated thus far. Stricter quotas, a clampdown on IUU fishing and adoption of more responsible fishing methods such as pole and line or trolling will go a long way towards conserving precious stocks. There are also a number of other management methods that are being suggested to increase the protection of marine resources.

### Marine Protected Areas

Marine Protected Areas (MPAs) operate much like land-based national parks. They are geographic areas of the ocean that are under the management of an authority, such as a government department, an international body or an NGO. Within the MPA, there are various rules that restrict certain activities and different MPAs have different rules. For example, an MPA may allow fishing of a certain type for a certain species, but not for another. Or it

may state that there is no fishing allowed at all, but recreational activities are. Some MPAs even prevent any human activity within the zone. The theory behind an MPA is that fish or habitat within the zone are protected from over-exploitation or damage, therefore the MPA shelters healthy marine life that is able to grow and reproduce. The excess of fish, cephalopods, crustaceans and other creatures produced within the MPA will migrate out of the area and are then able to be harvested. This means that the MPA will provide a constant source of products for fishers outside of the zone.

The locating, zoning and sizing of MPAs is very important. Relevant habitats must be chosen and be of a big enough size to allow the protected species to reproduce properly. For this reason, rich spawning and nursery grounds are often chosen for protection.

#### CASE STUDY: PROPOSED (SOUTH) PACIFIC COMMONS MPA

There are many islands scattered across the vast South Pacific Ocean, each with their own surrounding EEZ.

The ocean also contains important tuna fishing grounds which many ships from Japan, China, the Philippines, Taiwan, Korea, the US and the EU now target, having depleted stocks in their own waters. In particular, there are four 'patches' of ocean between the network of EEZs that are international waters and these waters are a favorite 'hiding place' for illegal fishing boats. Ships will fish the abundant Pacific Ocean and return to port claiming to have collected their catch from these unregulated waters, when in fact they have been plundering the island EEZs. If they do buy licenses, they pay such small access fees that Pacific island countries only get around 5-6 percent of the market value of the live fish caught in their waters.<sup>133</sup> The islands of the Pacific are small and do not have the economic and political power to patrol the area and stop the illegal boats. In addition, with little access to global markets and scarce agricultural land, they rely heavily on fish to feed themselves. Residents would not be able to survive without their traditional fishing grounds, which are in danger of being depleted by visiting, affluent nations.

Greenpeace International has been campaigning for these four areas of international waters to be closed off to fishing and made MPAs, with the dual aim of giving tuna a 'safe haven' from fishers and Pacific Islanders more control over their EEZs. The Western and Central Pacific Fisheries Commission, the RFMO managing fishing in the area, closed two of these areas to purse seining for tuna in 2009 and for other methods of tuna fishing in 2010.<sup>134</sup> In time, Greenpeace hopes all four areas will have full MPA status.

Figure 25: Pacific Ocean 'patches' of international waters that Greenpeace International proposes are designated as MPAs. Areas 1 and 2 have already been designated as Tuna MPAs.



Source: Greenpeace<sup>135</sup>

#### Ecosystems Approach to Management (EAM)

An 'ecosystems approach' to fisheries management is being called for by a number of stakeholders, including the FAO, due to the complexity of the marine ecosystem. Still an idea in its infancy, EAM attempts to combine the needs of the fishers, the local communities, the habitat, the target species and the other species affected into an integrated management plan. The proposal is to address the wider interactions between fisheries and the whole ecosystem, not just from a one-sided perspective. This is in contrast to current fisheries management methods, which are approached from the fishers' perspective and focus on the sustainability of the target species alone.

The practical application of EAM is currently on trial as openly taking the needs of more stakeholders into consideration will lead



to a number of conflicts of interest and sacrifices will need to be made on all sides. Hopes are high, however, that results will be a more effective, better considered, decentralised management plan.

#### *Greater Education*

Better understanding of the ecological and economic processes is needed among virtually all stakeholder groups in the fishing industry.

Consumers need to be better informed about where their seafood comes from and the environmental and social impacts that the collecting, processing and shipping of it has on the environment and local communities. Better education at this level will allow consumers to make sustainable choices and lead to a shift in customer demand that retailers will have to listen to. Ignorance is not an excuse and a plethora of concerned bodies, such as NGOs, government bodies, TV chefs and movie personalities are producing or backing campaigns that raise awareness for sustainable seafood.

Retailers and processors need to equip themselves with knowledge about their suppliers, products and transportation methods and understand that prolonged supply of their products and fair prices relies on the sustainable management of the source. They need to be aware of the effects of maintaining a market for unethical or irresponsible products and they need to accept responsibility for changing people's habits. For example, many restaurant owners are aware of the damaging effects of serving shark's fin soup, but are scared of losing customers if they stop doing so. Instead of a barrier, making responsible decisions should be seen as an opportunity. Retailers are in a unique position to impress the importance of sustainability upon both their suppliers and their customers.

Fishing companies and aquaculture farmers must ensure that they are fully informed of the effects of their exploitation, if for no other reason than to secure their own jobs and future employment for their community. Sustainable choices are not just a sensible for ecology, but for the individual and business too.

#### **RAISING CONSUMER SEAFOOD SUSTAINABILITY AWARENESS**

A number of organisations have run campaigns over the last few years to raise awareness of sustainable seafood choices. These include Monterey Bay Aquarium,<sup>136</sup> Greenpeace,<sup>137</sup> Blue Ocean Institute<sup>138</sup> and the Environmental Defense Fund,<sup>139</sup> to name just a few. There are also web pages dedicated to the cause, such as [sustainablesushi.com](http://sustainablesushi.com),<sup>140</sup> [sustainableseafood.org.au](http://sustainableseafood.org.au)<sup>141</sup> and [seachoice.org](http://seachoice.org).<sup>142</sup> However, few of these campaigns seem to have caught momentum with the general public.

One can only speculate as to why they have been less successful than hoped, when other similar 'commons' environmental issues, notably palm oil, have gained traction quickly. Perhaps the campaigns have not been aimed at the right audience. Perhaps they haven't been given the exposure that they need. One possibility is that the guides are relatively complicated, as is the industry; many guides advocate certain species from certain places, and often specify fisheries or regions rather than a clear 'Country of Origin'. A further reason could be that seafood labeling is not clear enough to allow consumers to choose. Or it could simply be that people don't care.

The World Wildlife Fund (WWF) is one organisation that has produced several sustainable seafood guides aimed at specific consumer countries. In an interview, Andy Cornish from WWF Hong Kong said he feels the guides were necessary as much of the food available in Hong Kong was likely to be from unsustainable sources and the public and restaurateurs lack knowledge about sustainable seafood. WWF found that 70 percent of people in Hong Kong were unclear about the origins of the seafood they bought, and 97 percent of people surveyed claimed that they would use a guide if one were available. The guides were also aimed at retailers and some were accompanied by workshops, to increase the impact.

Different types of seafood were classified as red, amber or green after being rigorously assessed using a proprietary scoring system. Allen To, also of WWF Hong Kong, advises that the system is based on biological vulnerability, destructiveness of method used to catch or farm the fish, associated by-catch, effectiveness of management of the stock and traceability. IUCN Red List status was also considered.

Consumer research in *Seafood Business Magazine* and *SeafoodSource.com* (carried out by WWF Hong Kong) has shown that the average Hong Kong seafood consumer does consider the environmental impacts of their choice, but does not make it a priority. Not surprisingly, freshness and cleanliness are most important, followed by family preference, nutritional value and price. Environmental credentials come next, but these are more important than the specific type of fish, whether it was recommended or the preference of that species for a particular dish.

The WWF sustainable seafood guides have been available since 2007 and can be found in selected shops, restaurants and a Hong Kong theme park as well as online. They have been slow to make an impact, but the uptake is growing. In Hong Kong, there are around 25 restaurants that claim to restrict menus to the recommended fish in the WWF guide and there are plans to campaign for change in buying habits for events and dinners, especially traditional Chinese occasion banquets. Due to wide press coverage, a quarter of survey respondents had heard of the program in Hong Kong.

Feedback has taught WWF that Western-style restaurants are more receptive to the idea than Chinese counterparts, presumably because of differences in culture and traditional reasons for choices. Unsurprisingly, younger consumers in higher-income brackets are more willing to consider sustainable choices.

Asia, being an increasingly important consumer and producer of seafood, is an important market to tackle. However, as illustrated by WWF's observations on differing restaurant attitudes, its consumers could be more of a challenge than western ones, mainly due to lower baseline levels of awareness. The outlook is positive though and WWF feel that its guide is making headway when it comes to changing consumer's minds about seafood. Attitudes are slow to change but, if younger generations are getting onboard, there is no doubt that they will. The only question that remains is will they change quickly enough?

### **Alternative livelihoods**

The best way to preserve marine life would be to leave it exactly as it is. Marine life is more valuable alive than dead. The Australian Institute of Marine Science has calculated that in the waters around Palau, an island in the Pacific Ocean, a single shark caught and served up in soup is worth, on average, USD108. However, due to the economic significance of the shark diving industry, the estimated lifetime value that same reef shark to the tourist industry was USD1.9 million, or approximately USD179,000 per year.<sup>143</sup> Another study showed that whale watching tourism in 119 countries involved approximately 13 million participants and generated an income to operators and supporting businesses of over US\$2.1 billion.<sup>144</sup>

However, considering the value of the fishing industry and its importance in food security, it would be fantasy to believe that extraction of marine resources could be halted completely. Reducing economic reliance on extraction by developing alternative sources of income from aquatic resources would relieve the pressure on wild stocks. In time, this would also prove positive for the extraction industry, as stocks that are not under as much pressure will be able to produce more yield with less effort.

Tourism is one alternative source of income. Fishermen can often transfer their skills to guiding or operating smaller boats and their families are usually capable of setting up small-scale hotels and restaurants. Aquaculture is another alternative that coastal communities will be well adapted to, especially culture of seaweed, bivalves, sea cucumbers, and a number of other options. However, developing alternative livelihoods involves changing lifelong habits and customs. Many fishermen have been fishermen for generations and whole communities are based around the practice. Another

challenge involves the retraining of fishermen, both in developed and developing countries. Equipping them with the skills to do something else and giving them access to different markets is a long and often expensive process. But the challenges are not insurmountable and the need for alternative livelihoods is fully accepted. In most fisheries, coastal and tourism management plans developed by governments and NGOs, funds and resources are already dedicated to this matter.



# APPENDIX

## SPECIES OF CONCERN

Responsible Research has compiled a list of commonly known marine species of various genera which are considered to be under threat by one or more of the following organisations: International Union for the Conservation of Nature (IUCN), Greenpeace, WWF, and the Global Marine Species Assessment project at the Department of Biological Sciences at Old Dominion University.

This list is too long to be included in the printed version of this report, but is available on the Responsible Research website: [www.responsible-research.com](http://www.responsible-research.com)

## KEY NGOS AND ASSOCIATIONS IN MARINE CONSERVATION

### WWF

Global Marine Programme:

[http://wwf.panda.org/what\\_we\\_do/how\\_we\\_work/conservation/marine/](http://wwf.panda.org/what_we_do/how_we_work/conservation/marine/)

Coral Triangle:

[http://wwf.panda.org/what\\_we\\_do/where\\_we\\_work/coraltriangle/](http://wwf.panda.org/what_we_do/where_we_work/coraltriangle/)

### Greenpeace

Oceans campaign:

<http://www.greenpeace.org/international/en/campaigns/oceans/>

### Conservation International

The Ocean:

<http://www.conservation.org/where/oceans/Pages/overview.aspx>

### Seaweb

<http://www.seaweb.org/home.php>

Asia-Pacific program:

<http://www.seaweb.org/initiatives/asiapacific.php>

Ecosystems-Based Management Communications Project:

<http://www.seaweb.org/resources/ebm.php>

Seafood Choices:

<http://www.seafoodchoices.org/home.php>

### Sustainable Fisheries Partnership (SFP)

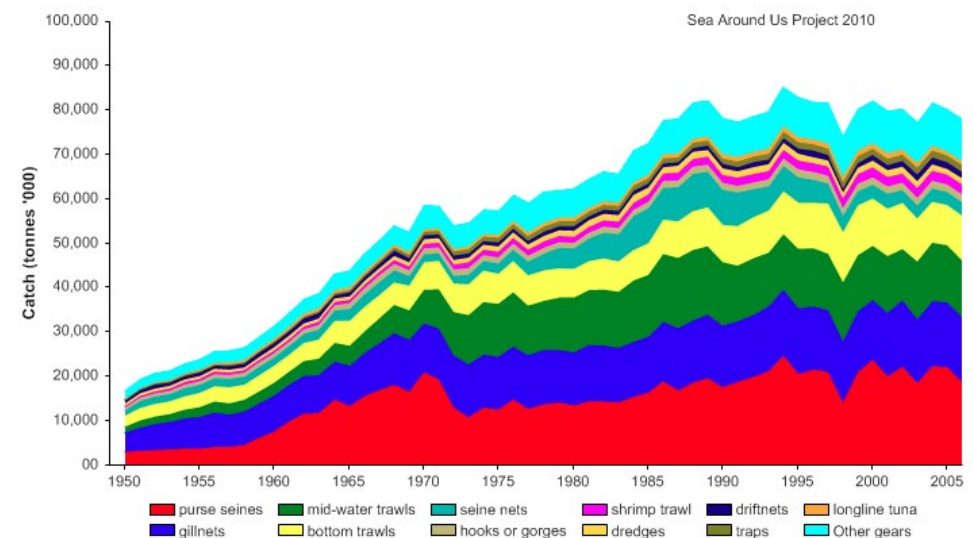
<http://www.sustainablefish.org/about-us>

## FISHING METHODS AND THEIR IMPACT

### Prevalence of certain fishing methods

Purse seining is one of the most widely used methods of fishing followed by gill-netting, and mid water trawling. Bottom trawling is also commonly used.


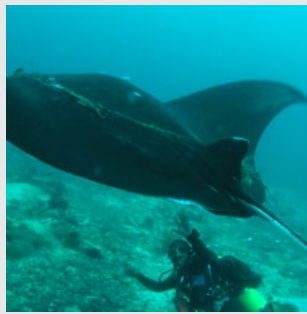

Figure 26: Global landings by gear type.



Source: <http://www.searoundus.org/>



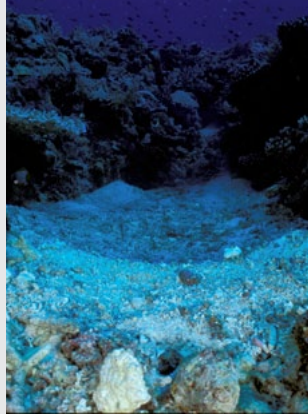
## Description of common fishing methods



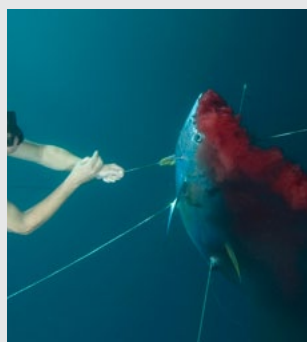
Figure 27: Fishing methods, their targets and their environmental impact

METHOD	IMAGE	TARGET SPECIES
<p><b>Seining and surrounding netting</b> (purse-seining, beach seining, Lampara etc.)</p> <p>Image – Purse seine nets</p> <p>Source: (c) Wolcott Henry 2005/Marine Photobank</p>		<p>Large, surface nets (such as purse seines) are used for schooling fish, such as tuna and sardines</p> <p>Midwater, smaller nets are used for snapper, John Dory</p> <p>Beach nets can be used for mullet, flat fish, crabs</p>
<p><b>Long lining</b></p> <p>Image - Manta ray entangled in a long line</p> <p>Source: Konstantin Tkachenko/Marine Photobank</p>		<p>Long lining is used for pelagic or demersal fin fish such as tuna, swordfish, cod, and halibut</p>
<p><b>Trolling/Pole and line</b></p> <p>Image - Pole and line fishing in the Maldives</p> <p>Source: Greenpeace</p>		<p>Tuna and mackerel</p>

DESCRIPTION	USAGE	ENVIRONMENTAL IMPACTS AND SUSTAINABILITY CONSIDERATIONS
<p>Close large nets around schools of fish</p> <p>Nets for purse seining can be several kilometres long and catch hundreds of tonnes of fish in one go. Commercially lucrative due to high volumes caught with low effort</p>	<p>World-wide. A considerable share of the tuna fishing industry uses purse seining.</p>	<p>Very high.</p> <p>An indiscriminate method which catches potentially unsustainable volumes of target fish, in addition to significant by-catch including sharks, rays, seals, turtles, whales and juvenile fish.</p> <p>Purse seining is often combined with the use of Fish Aggregating Devices (FADs), floating man-made objects which attract juvenile fish and their predators. This practice is considered to be particularly unsustainable.</p>
<p>Long lines of baited hooks are set still or pulled behind fishing vessels. Fish are caught by the mouth and held until they the lines are collected in. Lines can be on the surface, mid-water or along the bottom and can be up to 50km long.</p>	<p>World-wide. A considerable share of the tuna fishing industry uses long-lining.</p>	<p>Very high.</p> <p>Long-lining can be an indiscriminate method which catches significant by-catch including sharks, rays, seals, turtles, whales and juvenile fish. However, different hooks and baits can be used to more precisely target select species and reduce by-catch. Streamers, pingers and circle hooks are frequently used to mitigate by-catch in commercial fishing.</p>
<p>A number of lines with baited hooks, that can be hauled individually, are trailed behind a vessel at a variety of depths. The lines are hauled mechanically or manually (attached to poles).</p>	<p>A growing industry with growing commercial use, especially in tuna industry where it is seen as the most sustainable catch method</p>	<p>Low.</p> <p>Very discriminate method of fishing, with hooks and bait designed to catch only target species. If a non-target species is caught, because lines can be hauled in separately, fish can be freed alive</p>



<p><b>Trawling and dredging</b></p> <p>Image – Bottom trawling seen from space</p> <p>Source: © DigitalGlobe/Marine</p>		<p>Trawling is used for species such as pollock, cod, flounder, and prawns</p> <p>Dredging is used for species such as scallops, clams, and oysters</p>	<p>Cone-shaped nets are pulled behind boats to filter the water. Trawler nets can be placed mid-water or along the bottom and can be up to 100m long.</p> <p>Dredgers are large frames dragged along the sea bottom. They scrape up bottom dwelling fish, shell fish and other invertebrate.</p>	<p>World-wide. Most common method of shellfish capture.</p>	<p>High (less so with mid-water trawling)</p> <p>Significant by-catch of juveniles, non-target species and endangered species.</p> <p>Bottom trawling and dredging cause considerable damage to the bottom environment by stirring up sediment plumes, crushing corals and dragging boulders.</p> <p>Mesh size can be increased to reduce by-catch.</p>
<p><b>Gill/Drift netting</b></p> <p>Image - Fish entangled in drift net</p> <p>Source: Elaine Blum 2009/Marine Photobank</p>		<p>Used for sardines, salmon, cod, grouper</p>	<p>Nets are deployed with weights and floats and left to entangle fish. Nets are set at different depths ensnare different species.</p> <p>Nets can be up to 2.5 km long (longer nets were banned by the UN in 1991).</p>	<p>Used world-wide by commercial fishers as well as artisanal.</p>	<p>Medium to high.</p> <p>Nets can also entangle non-target species, such as sharks, turtles, seals and sea birds.</p> <p>Nets that get lost or abandoned, termed ghost nets, go on to kill marine life, smother reefs and get tangled in boat propellers.</p> <p>However, mesh sizes can be adjusted to select larger, adult individuals and reduce by-catch.</p> <p>Also, if hauled in soon after setting, unwanted by-catch can be set free whilst still alive.</p>
<p><b>Cyanide and Dynamite fishing</b></p> <p>Image - Crater from blast fishing</p> <p>Source: (c) Wolcott Henry 2005/Marine Photobank</p>		<p>Indiscriminate. Often used for the aquarium trade</p>	<p>Small bombs are exploded underwater or sodium cyanide is mixed with salt water and squirted into the reef. The blast or poison, stuns or kills the fish which are then easily picked up by hand</p>	<p>Not common world-wide, but very common in The Coral Triangle countries of Indonesia and the Philippines</p>	<p>Very high.</p> <p>The poison or blast kills almost all the other living organisms on the reef, bleaching the coral or reducing it to rubble. Usually, reefs cannot recover from this destruction.</p>

<p><b>Pots/traps</b></p> <p>Image - Reef shark trapped in fish trap</p> <p>Source: (c) 2009 David Vize/Marine Photobank</p>		<p>Used to trap lobsters, crabs, shrimp, octopus, eels and cod</p>
<p><b>Hand gathering</b></p> <p>Image - Mollusc gathering in the Philippines</p> <p>Source: Howard Peters 2008/Marine Photobank</p>		<p>Slow moving or immobile marine species including many shellfish, sea cucumbers, urchin, octopus, lobster and abalone</p>
<p><b>Spear-fishing/ Harpooning</b></p> <p>Image - Tuna spearfishing</p> <p>Source: Fiona Ayerst/ Marine Photobank</p>		<p>Many different species of fin fish</p>

<p>Mesh cages with an opening into which target species can enter, but not exit. These traps are placed on the ocean floor for a number of hours or days. Catch is hauled up, usually alive.</p> <p>Can be placed from 10 to several hundred meters deep.</p>	<p>Very commonly used for lobster and crab, but not commonly for fish.</p>	<p>Medium.</p> <p>Little by-catch as mesh size can be adjusted for target catch. Entrances can also be adjusted to exclude by-catch such as turtles.</p> <p>Unwanted catch can usually be released alive</p> <p>Some damage can be done when dropping and retrieving traps, especially when dropped onto coral reefs.</p> <p>Lost pots may continue to catch fish indefinitely.</p>
<p>Fishers move along reefs, intertidal zones, mudflats, river sides and lakes either by walking, snorkeling or free diving, collecting slow moving marine animals and plants by hand. Little specialized equipment is needed. SCUBA is sometimes used for deeper dwelling species.</p>	<p>Often in third world countries by artisanal, traditional or subsistence fishers.</p> <p>International fishing companies will buy catch from local fishermen.</p>	<p>Low.</p> <p>Very selective method - no by-catch.</p> <p>Can be damaging if reefs or rocks are smashed to reach target species.</p> <p>Labour intensive, requires large groups of fishers to collect commercial volumes.</p>
<p>Fishers spear the target species from boats or while free diving or SCUBA diving. A variety of harpooning equipment is available, such as spear guns, bow and arrow.</p>	<p>Not used often for commercial fishing.</p>	<p>Low .</p> <p>No by-catch, suitable fish size can be selected, spears do not damage coral if fired accurately.</p> <p>Labour intensive, need large groups of fishers to collect commercial volumes.</p>

Source: Responsible Research, FAO, Wikipedia, Sustainable Waters, Shark Trust, WWF, Greenpeace, Monterey Bay Aquarium

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