

# Fish for tomorrow ?



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CONVENTION ON WETLANDS  
CONVENTION SUR LES ZONES HUMIDES  
CONVENCIÓN SOBRE LOS HUMEDALES  
(Osaka, 1971)



## Fish and people - What's the issue?

*What's the issue? In a nutshell:*

- 👉 One billion people rely on fish – including both finfish and shellfish (molluscs and crustaceans) – as their main or sole source of protein;
- 👉 35 million people are directly engaged, either full- or part-time, in fishing and aquaculture; over 95% percent of them live in developing countries, and the majority are smallscale fishers;
- 👉 75% of commercially important marine and many inland fish stocks are currently being overfished or are being fished at their biological limit;
- 👉 Demand for seafood products (including “sea food” from inland waters) has nearly doubled over the past 40 years and is likely to continue alongside a growing global population.

You can imagine how much material would be needed to describe all this adequately. In this leaflet we will be selective – focusing on issues within these different scales that are particularly relevant to wetlands, both coastal and inland, from a Ramsar perspective. Issues to consider: inland and coastal aquaculture, the special difficulties faced by small-scale fishers, the role of international and national approaches to fisheries management, ornamental fish, recreational fishing, the relationship between fish and agriculture (e.g. rice growing), and finally the role of the conscientious consumer.

### Fish scales

*Fishing takes place at all these levels.*

*From **Industrial to Commercial to Small-scale/Artisanal to Subsistence to Recreational***

### Ramsar and fisheries

*And there are different ecosystems involved  
From **Offshore to Coastal to Inland***

*And two different fisheries sectors:  
From **Capture fisheries to Aquaculture***

Technically, the Ramsar Convention on Wetlands, an intergovernmental treaty with more than

150 member countries, or “Parties”, is directly concerned with inland waters and the near-shore coastal areas, but not deeper marine areas. Near-shore coastal areas are the nursery grounds of deeper ocean fish species and most of the coastal species that make up fish catches. So Ramsar rightly emphasizes that safeguarding the health of coastal ecosystems – such as estuaries, mangroves, seagrass beds and coral reefs – is critical for the maintenance of both coastal and offshore fishing stocks (quite apart from the many other services these wetlands provide). The Parties to the Convention are committed to ensuring the sustainable use in their countries of fisheries resources in both inland and coastal waters, and for both capture fisheries and aquaculture, through the fisheries Resolution adopted in November 2005 (read the details here: [http://www.ramsar.org/res/key\\_res\\_ix\\_04\\_e.htm](http://www.ramsar.org/res/key_res_ix_04_e.htm)).

The importance of fisheries to the Convention is also reflected in the criteria used for the designation of Ramsar sites (Wetlands of International Importance): one of the nine criteria for designations states “A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend”.

### Inland & Coastal & Open ocean

Here's the global perspective on fish catches – and it makes clear the critical importance of coastal ecosystems for fisheries.



Global catch from inland fisheries, as collated by the UN Food and Agriculture Organization (FAO) based on national submissions, was 9.2 million metric tons in 2004, but this is undoubtedly an underestimate since many countries (e.g., in Africa and Southeast Asia) experience great difficulty in getting accurate information from the millions of rural, part-time and small-scale inland fishers.

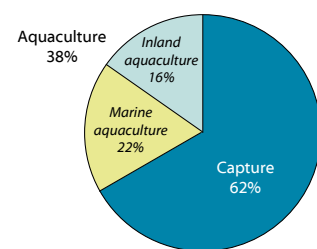
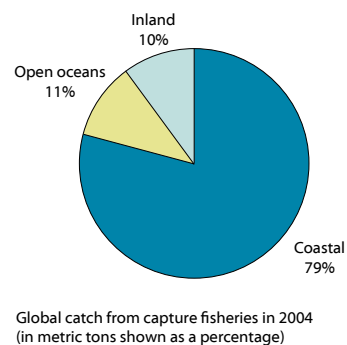
It's worth remembering too that global data do not always show the reality at the country and local level. Inland capture fisheries are a lifeline in many countries as a source of income and an immediate protein supply for local people – and the extent of this is seriously under-reported in fisheries statistics. Inland aquaculture not only provides protein, but also generates money for local people from the sale and export of inland fish to other areas, and it can be commercially important as well. Aquaculture and inland capture fisheries provide valuable nutrition to many of the 26 landlocked countries that are considered low-income-food-deficit countries according to the FAO.

For some parts of the world, inland fisheries are more important, in terms of the numbers of people involved and the economic value, for recreational rather than commercial or artisanal purposes – for example, in the 19 countries that make up central and eastern Europe, it is estimated that there are 10 million recreational fishers and only 18,000 full-time fishers: in these areas, recreational fishers are often considered the dominant driving force in the use of freshwater fisheries.

## To Catch or to Culture?

Aquaculture in freshwater and coastal ecosystems has increased dramatically in recent decades and capture fisheries are being fished to their limits and beyond – so while capture fisheries still outweigh aquaculture production, the gap has narrowed.

Aquaculture now supplies more than 30% of total production but almost 40% of the fish that we eat (because some of the fish we capture is used to feed cultured fish, livestock, and poultry). It's the fastest growing food sector in the world, and it often involves high value products: in 2004 aquaculture (including the culture of aquatic plants) was worth US\$70 billion, while capture fisheries were worth US\$85 billion.



Global Production in 2004  
(catch in metric tons shown as a percentage)

## Challenge for sustainable aquaculture

Aquaculture is an ancient practice with its beginnings in China, Mesopotamia and Egypt several thousand years ago, and some sites, such as the Czech Republic's 15th century Trebon Fishponds, have been designated for the Ramsar List of Wetlands of International Importance. While early practices focused mainly on carp species, modern aquaculture involves a much greater diversity of freshwater and marine species. It takes place in both inland wetlands, such as lakes and ponds, and in coastal wetlands. It's a diverse activity, carried out in pens, cages, rafts, and in inland ponds and rice fields, and it produces finfish, molluscs, echinoderms, crustaceans and aquatic plants. It may be carried out on a commercial scale for sale to lucrative international food markets, or it may be an activity to supplement the diet of a family or produce extra income from sales to local markets; it may even be a production system to stock lakes, rivers and coastal areas for capture fisheries (aquaculture-based fisheries), including recreational fisheries, a valuable market in some parts of the world.

The growth in aquaculture production in recent decades is making more fish available at a time when some capture fisheries are failing through over-exploitation and habitat degradation. Aquaculture can provide economic opportunities to areas that have few alternative options for development. For example, salmon farming in Chile provides over 30,000 jobs to rural people, and more than half a million people are employed in aquaculture in Vietnam, where it absorbs more labour than the capture fisheries. Aquaculture can contribute to decreasing rural emigration through providing new jobs and can contribute significantly to national economies: Vietnam forecasts that by 2010 the value of its aquaculture output could exceed US\$4 billion, including aquaculture exports worth US\$3 billion. Already, the contribution of aquaculture to economic activity in Vietnam is probably the highest in the world at more than 6% of GDP.

While aquaculture provides employment and a significant food source, some aquaculture practices bring environmental and social problems:

- ☛ destruction of mangroves to make way for marine aquaculture ponds;
- ☛ a heavy dependency on inputs such as energy and chemicals (antibiotics, pesticides, hormones, etc.);
- ☛ the use of wild fish as a food source, especially for farmed carnivores such as salmon and shrimps (where fishers are fishing for food to feed fish and livestock);
- ☛ pollution of local habitats through food-related wastes and chemicals;
- ☛ introduction of non-native species to the wetlands through escapes of cultured species;
- ☛ local communities deprived of the wild species they once depended upon for food security yet unable to afford the high cost of many aquaculture products; and
- ☛ displacement of local people to make way for aquaculture operations.

## Fish for fishers AND birds

*The Qingshan Polder, an 800-hectare area in China's West Dongting Lake Nature Reserve (a Ramsar site), was dyked and drained in the 1970s to make agricultural land. By the 1990s the polder was plagued with flooding problems and the government's solution in 1998 was to return the land to the lake – and to return the farmers to being fishers!*

*Through an innovative co-management system, developed with the help of WWF China, every fishing family is now co-owner of the fish along with the Nature Reserve. While the fish are prevented by dykes and nets from entering the open water, water is freely exchanged between the two areas. The fishers harvest the fish every year (over 40 species are involved): in 2005, 260,000 kg of fish were harvested and a further 50,000 kg of smaller fish were retained in the polder, thus replenishing stocks for subsequent years in both areas and contributing towards the maintenance of the capture fishery in the open water.*

*The polder is an important fish breeding area and a key feeding area for significant numbers and diversity of migratory wetland birds. The fish released from the polder provide a critical over-wintering food source for migratory birds – and keeping these birds in the polder is not only good for conservation, it brings additional income to some of the fishers who are involved in ecotourism, offering home-stays and tour boat trips to visitors.*



WWF China © Zhou Huaikuan

These problems have been recognized by many governments and development agencies, and by some members of the aquaculture industry, and progress is being made in reducing the negative impacts. Although aquaculture (and agriculture) use fish meal and fish oil, these uses provide motivation for maintaining productive fisheries of small pelagic fishes that are not strongly desired by people. Great progress has been made in reducing feed conversion factors for most aquaculture species, and fish meal is being replaced by vegetable protein, which creates positive integration between agriculture and aquaculture. The severity of environmental impacts depends to some extent on what is being farmed – in general, oyster and clam farms have fewer negative impacts than shrimp and salmon farms.

Aquaculture is the main reason for the deliberate introduction of alien species. Alien species have increased production and value from many areas. Chile is now the world's largest producer of several species of farmed salmon, all of them alien species. Tilapia (an African freshwater fish) is more widely farmed in Asia than in its home range in Africa and provides income and needed animal protein to rural households. Yet alien species are also a significant threat to native biodiversity – European crayfish were nearly destroyed by a pathogen introduced from North America; escaped tilapia have reduced native biodiversity in Latin America. The effects of alien fish species on wetland ecosystems remains an on-going area of concern for the Ramsar Convention.

To help maximize the benefits from alien species and minimize the risks, the international community is working to create guidelines and information on the responsible use and control of alien species in fisheries and aquaculture. The International Council for the Exploration of the Sea and FAO, among others, have developed codes of practice and databases on species introductions. The records in FAO's Database on

Introductions of Aquatic Species indicate that socio-

economic benefits of alien species outweigh the ecological damage they have caused. However, guidelines and codes of practice along with good farming practices are still needed to manage alien species.

Achieving sustainability in aquaculture is possible – the technology is available and better farming practices are becoming required in national and international legislation. Much more remains to be done, of course, but progress is being made.



## International Principles for Sustainable Shrimp Farming

*Shrimp farming has been one of the fastest growing aquaculture sectors in Asia and Latin America, and recently Africa, but also one of the most controversial. Rapid expansion of shrimp farming has generated income for many developing, as well as developed countries, but has been accompanied by rising concerns over environmental and social impacts of development. Major issues raised include the ecological consequences of conversion of natural ecosystems, particularly mangroves, for construction of shrimp ponds, the effects such as salination of groundwater and agricultural land, use of fish meal in shrimp diets, pollution of coastal waters due to pond effluents, biodiversity issues arising from collection of wild brood and seed, and social conflicts in some coastal areas. The sustainability of shrimp aquaculture has been questioned by some in view of self-pollution in shrimp-growing areas, combined with the introduction of pathogens, leading to major shrimp disease outbreaks and significant economic losses in producing countries.*

*Due to the strong global interest in shrimp farming and the issues that have arisen from its development, a Consortium Program involving the Food and Agriculture Organization of the United Nations (FAO), the Network of Aquaculture Centres in Asia-Pacific (NACA), the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities of the United Nations Environmental Programme (UNEP/GPA), the World Bank (WB) and the Worldwide Fund for Nature (WWF), has developed **International Principles for Responsible Shrimp Farming**, to provide principles for management of shrimp aquaculture that provide guidance in implementation of the FAO Code of Conduct for Responsible Fisheries in the shrimp aquaculture sector. The Principles consider the technical, environmental, social and economic issues associated with shrimp farming and provide a basis for industry and government management to improve the overall sustainability of shrimp farming at all levels - national, regional and global. The principles and criteria may be used by the public and the private sector for development of locally specific Codes of Practice (COP) or better management practices (BMPs) for shrimp farming, suitable for local farming conditions, and social, economic and environmental contexts.*

*FAO/NACA/UNEP/WB/WWF. 2006. International Principles for Responsible Shrimp Farming. Network of Aquaculture Centres in Asia-Pacific (NACA). Bangkok, Thailand. 20 pp.*

The Ramsar Convention recognises that aquaculture in wetlands, both coastal and inland, has the capacity to improve human well-being locally and nationally when managed sustainably – but its potential environmental, economic and social impacts have to be assessed and included in the decision-making and management processes so that wetlands continue to provide a broad range of services.

## Mangroves and aquaculture - a special concern

It's estimated by some experts that the world's area of mangrove forests has been reduced by 35% in the past 20 years, with aquaculture implicated as one of the culprits. The threat is felt even in many of the nearly 200 mangrove areas that have been designated as Wetlands of International Importance, or "Ramsar sites." The culture of shrimps and fish together account for 42% of the mangrove loss, with shrimp culture taking the major role as the cause of 38% of the recorded loss (although the relative roles of shrimps and fish in the loss are still an area of dispute). To put this loss in context, the overall value of mangroves to people in terms of shoreline protection and extractive uses such as fish and timber is considerable – one recent estimate puts it at US\$200,000-900,000 per year, per km<sup>2</sup>.

While this coastal culture often provides significant financial rewards to a few people, it frequently destroys a natural resource that plays an important role in supporting local livelihoods. But it's not all bad news. The issue of clearing mangroves for fish and shrimp

© Sebastià Semene Guitart



ponds has abated in many countries over the years for several reasons. Greater awareness of the importance of mangroves has led many governments to impose either stricter regulations over their use or an outright ban on further clearing. It has also become increasingly clear that, technically, the mangrove is not the best area for semi-intensive or intensive aquaculture, and new farms are seeking areas behind the mangrove intertidal areas. Additionally, many countries are now attempting to implement Ramsar's Resolution VIII.32 on *Conservation, integrated management, and sustainable use of mangrove ecosystems and their resources* which effectively protects fragile mangrove ecosystems worldwide.

### Mangrove-friendly crab culture

*"Aquaculture needs to become more mangrove-friendly to be sustainable". So argues Jurgenne Primavera of the Philippines-based Aquaculture Department of the Southeast Asian Fisheries Development Centre (SEAFDEC), an 11-member intergovernmental treaty organisation. SEAFDEC has pioneered the development of aquaculture techniques that support the livelihoods of coastal communities AND conserve the natural resource base.*

*Tantanang is a scenic bay in a coastal municipality on Mindanao where 75% of residents in the bay's 16 villages rely on the bay for their livelihood. To find sustainable methods of raising mud crabs **Scylla serrata** in the bay's mangroves, a federation of 10 community-based organisations and cooperatives, in collaboration with the local government, has initiated a project in four of the villages, basing their approach on the SEAFDEC techniques.*

*With local government funding, the farmers have each built a 2,000 m<sup>2</sup> pen for crab culture. Through a community-based forest management agreement with the Philippine Department of Environment and Natural Resources, the farmers have renewable 25-year tenure over their pens. To maintain healthy mangroves, the pens are allowed to cover a maximum of 4-5 hectares, or up to a quarter of the total mangrove area of each village, and they are designed to allow tidal water to flow freely in and out.*

*SEAFDEC is still helping to fine-tune the feeding regimes - crabs are fed 'trash' or waste fish, which are valued and consumed by poor people since the Philippine capture fisheries are so degraded. Reducing the use of trash fish in the long run is vital.*

*This activity is now expanding to other countries, and one of the recent developments is in the Republic of Palau. Pilot culture of **Scylla serrata** in mangroves is now practiced as a demonstration of environmentally-friendly aquaculture.*



© Simon Funge-Smith / FAO



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## Thinking big for small-scale fishers

Of the estimated 35 million people directly engaged, either full- or part-time, in fishing and aquaculture, over 95% of them live in developing countries, and the majority are small-scale fishers. At least 5.8 million of them earn less than \$1 a day and thus rank amongst the world's poorest people. Small-scale fishers, despite their dependency on fisheries for livelihoods and food security, and the contribution of their activities to national income, are often still vulnerable to competition from industrial fleets, and their interests are usually marginal when decisions are taken on fisheries management. Sadly, many countries still consider first the needs of large-scale fishers, who are perceived as supplying more of the fish traded in international markets, consumed, or exported to developed countries, and fisheries management is still centralised and top-down in many countries.

### Inland waters – a multi-use habitat under threat

Inland waters have a variety of uses that include hydroelectric generation, irrigation, navigation, municipal water supplies, and industrial uses, as well as being a home for fish, so it is no surprise that there is tremendous competition for freshwater resources. Alteration of water flows for irrigation and hydro-electric development, road construction, livestock grazing, and the common practice of using the world's waterways as a garbage disposal all harm inland fishery resources and the people who depend upon them. These impacts have made inland fishes (and freshwater biodiversity in general) the most endangered group of species used by humans.

## Taking control - Argentinian fishing communities

The wetland corridor along the Paraná and Paraguay rivers, the largest freshwater reserve in Argentina, supports the main inland fishery of the country. Approximately 3 million people are supplied with freshwater from this corridor and around 100,000 small-scale, commercial and subsistence fishermen depend on the sustainable management of its fisheries resources. Local communities largely depend on the fishery for food security and employment.

With the help of the NGO Fundación PROTEGER, fishing communities around the Paraná and Paraguay rivers are now able to play a role in managing the wetlands upon which they depend, through a number of recent developments:

- ✎ the creation of REDEPESCA (Fluvial Litoral Network of Artisanal Fisherfolks), bringing together fisherfolk associations with more than 3,000 members;
- ✎ the designation of the 508,000-hectare Ramsar site Humedales Chaco and direct involvement of local communities in management planning and implementation for the site;
- ✎ the promotion of the 100,000-hectare Humedales Entrerrianos del Paraná as a Ramsar site;
- ✎ the new Sustainable Fishing Law, championed by PROTEGER, which came into effect in 2003, and the Regional Treaty on Fisheries in the Argentinian Northeast, together giving a stronger legal basis for sustainable management and supporting civil involvement in management.



Artisanal fishers in the Paraná River play a role in managing this wetland, helping to sustain their livelihoods and maintain their culture.



© Fundación PROTEGER

© Fundación PROTEGER

## US\$240 million Fishing Fund supports Africa's small-scale fishers

With US\$240 million over the next 10 years, Africa's coastal communities can look forward to financial support to help them manage their fisheries through the Sustainable Fishing Investment Fund launched in May 2006. The result of a partnership of the African Union, World Bank, United Nations Food and Agriculture Organization, and WWF, the Global Environment Facility has committed US\$60 million, to be matched 3-1 by funds from other donors.

The Fund will support on-the-ground projects such as community-driven management programmes that monitor and control fisheries – which have been shown to work reasonably well in several African countries – as well as programmes that develop alternative livelihoods to fishing for coastal communities.

Fish make a vital contribution to the food and nutritional security of 200 million people in Africa and provide income for over 10 million, most of them small-scale fishers and entrepreneurs engaged in fish production, processing and trade. The Sustainable Fishing Fund will directly assist some of these fishers to secure their livelihoods through achieving sustainable management – and show the way forward for many others.



IUCN Photo Library © Philippe Tous

Progress can be made in mitigating or reducing many of these impacts through habitat protection and rehabilitation. And techniques exist to help fish pass around dams, to treat pollution, and to re-engineer wetlands to benefit fish and other biodiversity. The most successful techniques are those that restore ecological process and ecosystem services, such as re-connecting floodplains to the main river, removing dams, or replanting riparian vegetation. These practices help a variety of biodiversity rather than just a single species. Sadly, these rehabilitation techniques are usually practiced only in developed countries, but efforts are underway to promote them elsewhere. Protection is far cheaper than rehabilitation, however, and the cost of development projects should include habitat protection at the outset.

### Solutions?

Some countries are recognising that the value of co-management, which directly involves small-scale fishers in the management process along with government fishery managers, can be pivotal in safeguarding the livelihoods of small-scale fishers, both inland and marine. In Lake Victoria, Eastern Africa, for example, co-management involves the establishment of beach management units (BMUs) that form a local administrative structure and a focal point for government contact. The BMUs are now being used to inform community members about business management, nutrition, human health, especially HIV-AIDS, and habitat protection. In these ways, co-management can lead to the development of sustainable management practices. Such a participatory approach to fisheries management is strongly encouraged by the Ramsar Convention.

It must be remembered that most of the hazards to inland fishery resources come from outside the fisheries sector, so solutions need to be sought outside the sector as well.

## Managing for ecosystems - The Code of Conduct for Responsible Fisheries

An ecosystem approach to sustainable management of fisheries, rather than management of individual fisheries or species, is now the favoured way forward – but many governments still work with the latter in their management practices.

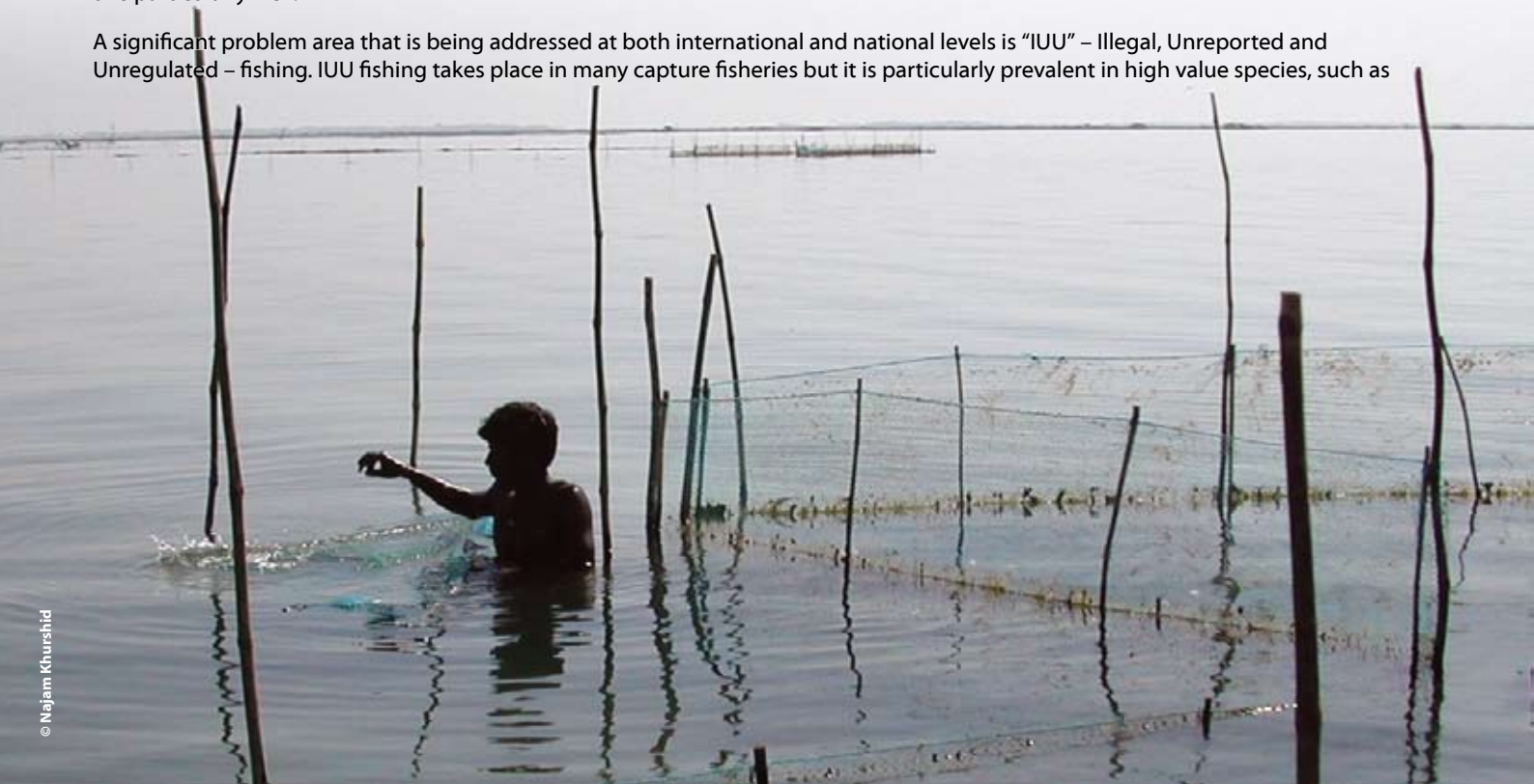
Through the UN Convention on the Law of the Sea (UNCLOS), by 1994 coastal nations had exclusive rights for exploitation for 200 nautical miles out to sea – exclusive economic zones or EEZs – an area where about 90% of the marine catch is realised. This agreement significantly reduced the 'open access' area of the marine environment where there is no agreed control over exploitation (now only about 5% of the global catch comes from this 'open access' area), so it was generally seen as 'a good thing'. But it leads to management challenges:

**International challenge:** Unfortunately, fish don't take much notice of EEZs so, for certain exploited species that readily cross these areas (or worse, for those species such as tuna and swordfish that are known to range thousands of kilometers) there is often a need for formal collaboration between neighboring nations, and this is usually very challenging – a recent assessment reckons that effective bilateral or multilateral agreements are the exception rather than the rule.

To assist countries to take a more responsible, ecosystem-based approach to fisheries management, FAO introduced a Code of Conduct for Responsible Fisheries in 1995.

**National challenge:** Even at a national level, having, implementing and enforcing effective fisheries management plans, and putting the necessary laws in place to control exploitation in their exclusive fishing zones, is not easy, and only a few countries are managing this particularly well.

A significant problem area that is being addressed at both international and national levels is "IUU" – Illegal, Unreported and Unregulated – fishing. IUU fishing takes place in many capture fisheries but it is particularly prevalent in high value species, such as





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tuna. Often conducted by fleets that carry a “flag of convenience” – vessels that are officially registered in one nation, but are owned and operated by persons of another nation – it is considered an important and damaging feature of international trade. FAO has overseen the development of an International Plan of Action to help nations deal with this – that nations place a high priority on IUU is evidenced by the fact that 70 countries have developed or are in the process of developing a national plan to address IUU.

### Managing at the national level – focus on New Zealand

*The national approach to marine fisheries management in New Zealand underlines the complexity and challenges of managing fisheries at the national level.*

*New Zealand’s 200-mile Exclusive Economic Zone comprises 4.4 million km<sup>2</sup> of ocean and 15,000 kilometres of coastline. It is home to an estimated 8,000 species of aquatic life, around 130 of which are fished commercially. Capture fisheries and aquaculture produce 600,000 metric tonnes annually from New Zealand’s seas with a value of around \$1 billion; over 90% of the catch is exported and it ranks as New Zealand’s fourth or fifth largest export earner.*

*The job of managing exploitation by the three main groups – commercial, customary Maori, and recreational fishers – falls to the Ministry of Fisheries. Employing around 400 staff, 40% of the Ministry’s costs are recovered from the fishing industry. The Ministry uses a three-pronged approach:*

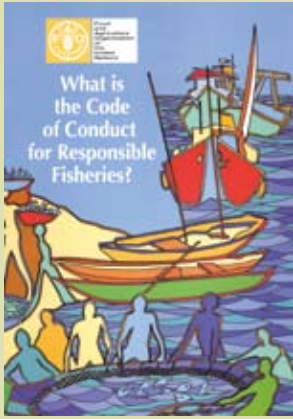
- 🔍 research and monitoring to ensure that the rules and regulations are based on scientific evidence of the state of each fishery;*
- 🔍 access, gear, and quota controls that are regularly updated;*
- 🔍 ensuring compliance with the rules and regulations.*

*Of the commercially exploited fish, 92 are subject to a Quota Management System (QMS), an approach to stock management practiced by only a few countries. The allocation of quota to individual fishers encourages a long-term perspective, allowing fishers to plan and invest appropriately in equipment and staff to sustainably harvest, process and market the catch. The system sets a Total Allowable Catch (TAC) for each QMS fishery with an allowance made for recreational and customary Maori uses.*

*An annual review of management measures for selected New Zealand fisheries is carried out and consultation documents made available to the public for their input.*

*More information on New Zealand’s fisheries management is available at: <http://www.fish.govt.nz/>.*

## Code of Conduct for Responsible Fisheries



FAO's Code of Conduct for Responsible Fisheries is an important set of recommendations and guidelines to assist countries in managing their fisheries and aquaculture sustainably. Aimed at national policy-makers and fisheries managers, it covers a wide range of topics, from how nations should register and monitor their fleets, to how they should conduct fishing operations and develop aquaculture sectors. Ramsar has recommended to its Parties that the Code should be taken as the guiding principles in regulating marine and freshwater fisheries and aquaculture in Ramsar sites and other wetlands.

Key principles of the Code include:

- ▣ Manage stocks using the best available science;
- ▣ Use conservative management approaches when the effects of fishing practices are uncertain (the "precautionary principle");
- ▣ Avoid overfishing; prevent or eliminate excess fishing capacity;
- ▣ Minimize discarded fish and bycatch;
- ▣ Prohibit destructive fishing methods;
- ▣ Restore depleted fish stocks;
- ▣ Implement appropriate national laws, management plans, and means of enforcement;
- ▣ Monitor the effects of fishing on all species in the ecosystem, not just the target fish stock;
- ▣ Work cooperatively with other states to coordinate management policies and enforcement actions;
- ▣ Recognize the importance of artisanal and small-scale fisheries, and the value of traditional management practices;
- ▣ Develop aquaculture in an environmentally and socially responsible manner.

To augment the Code, FAO has issued a number of "technical guidelines for responsible fisheries" that look in much greater detail at certain subject areas. For example, there are FAO guidelines on integrating fisheries management into coastal area management, inland fisheries, developing aquaculture responsibly, and applying an "ecosystem approach" to fisheries.

The Southeast Asian Fisheries Development Centre has usefully produced Regional Guidelines in several areas of fisheries management covered by the Code.

Read more about the Code of Conduct and associated guidelines at:  
[http://www.fao.org/figis/servlet/static?dom=org&xml=CCRF\\_prog.xml](http://www.fao.org/figis/servlet/static?dom=org&xml=CCRF_prog.xml)



## Focus on coral reefs

An estimated 30 million small-scale fishers in the developing world depend, at least to some extent, on coral reefs for food and livelihood. In developing countries coral reefs contribute about a quarter of the annual fish catch – providing food for about one billion people in Asia alone. Coral reefs also support important recreational fisheries and play a key role in the supply of fish to the highly lucrative aquarium trade.

The rewards from reef fisheries are considerable – depending on the value of the catch, reef fisheries can be worth US\$15,000 – 150,000 per km<sup>2</sup>, an important consideration for the 78 countries worldwide that have tropical coral reefs. Reef-based recreational fisheries alone are estimated to generate annually over US\$100 million. More than 50 coral reef areas have been judged to be internationally important and added to the Ramsar List, with more to follow.

But the world's reefs are in a sorry state. Recent reports predict that 24% of the world's reefs are under imminent risk of collapse through human pressures, and a further 26% are under a longer-term threat of collapse. And this follows as great as 20% losses in recent years.

Overfishing and destructive fishing practices are key problems, and so too is pollution from land-based sources, collectively exacerbating the impacts of a warming climate. Unfortunately poor practices can bring short-term benefits for the fishers but long-term losses for society: it has been estimated that in southeast Asian coral reefs, blast fishers may earn US\$15,000 per km<sup>2</sup> but they generate losses to society over a 20-year period of US\$91,000 to 700,000 per km<sup>2</sup>. Similar estimates have been made for the financial effects of overfishing.

### Managing Australia's Great Barrier Reef

*Extending 2,300 km along the Queensland coast, the Park includes more than just coral reefs, embracing mangroves, seagrass beds, sandy and coral cays, continental islands and deep ocean areas, with a total area encompassing a staggering 345,000 km<sup>2</sup>.*

*Australia's Great Barrier Reef, the world's largest coral reef ecosystem, is protected under the Great Barrier Reef Protection Act of 1975, which established the Park and the Great Barrier Reef Marine Park Authority (GBRMPA) to manage it.*

*With the overall goal of maintaining the rich diversity within the Park, it is managed as a multi-use area with an effective zoning policy and management plan that have been tested and adapted over the past 30 years. This permits a number of sustainable activities within the Park, including tourism, diving, and commercial and recreational fisheries. The Park's annual contribution to the Australian economy? A total of US\$4.5 billion, with US\$3.9 billion from tourism, US\$469 million from recreation, and US\$115 million from commercial fishing, collectively generating 63,000 jobs.*

*While the Queensland Government is responsible for fisheries management in the Park, the GBRMPA negotiates with the state government and key stakeholders to minimise the impact of fisheries on the ecosystem. A set of regulations allows effective management of catch and effort by commercial, recreational and charter boat fishers, including a well-controlled licensing system, site closures during spawning periods of key species, and special measures to protect specific reef fishes, as well as special regulations to reduce by-catch and turtle losses. Dive-based fisheries for marine aquarium fish, coral, lobster, trochus and sea cucumber collecting are given special attention, requiring licenses from both the Park and the state government.*



## The Tanga Tale

*The three coastal districts of the Tanga Region in Tanzania, in collaboration with the District and Regional governments and the technical help of IUCN, have set up six Collaborative Management Areas (CMAs) that cover the entire length of the Tanga coastline – an area of 1,604 km<sup>2</sup> of coastal waters richly endowed with coral reefs, mangroves, seagrass meadows and estuaries that provide the 49 local communities (around 200,000 people) with numerous direct and indirect benefits. The CMAs include from 3-14 villages and cover 100-400 km<sup>2</sup>. Their overall aim? To enhance the well-being of their coastal communities by improving the health of the coastal environment they depend on.*

*Through the six CMAs, community-led resource management plans are developed and implemented, with the direct involvement of village-level committees and the District government. Within their plans, the CMAs have addressed the key problems facing the participating villages: destructive fishing practices, control of 'visiting' fishers (mostly from Zanzibar), and the creation and management of closed fishing areas to allow reef recovery and fish stock replenishment. The plan also defines a system for the collection and analysis of fisheries data by the communities. The successes so far – an improvement in reef condition in the closed areas; the mutual trust between villagers and the local government that has developed; and an effective CMA system – make this experience promising for the entire coastline of Tanzania and beyond.*

## Rice and fish – a powerful mix

Rice is grown in 113 countries, and 90% of it is grown in flooded conditions – as irrigated human-made wetlands, rice fields can qualify as Ramsar sites. The cultivation of most rice crops in rainfed, irrigated and deeper water systems presents a great wetland environment for fish, crustaceans, molluscs, amphibians, and aquatic plants, and the harvesting of these organisms has supplemented rural diets for as long as rice has been cultivated. More than 80 species of animals that are used for food, medicine and cultural practices have been found in rice fields.

The rice environment also offers opportunities for the culture of fish, often with introduced herbivorous species. Rice-fish culture has been practiced in China since AD100, and the practice has been widespread throughout southeast Asia for many hundreds of years.



Cultivating fish results in a source of protein and potential source of income but also brings many practical advantages to rice growing: fish can eradicate weeds, eat potential rice pests, and reduce fertilizer requirements through their contribution to the nutrient cycle. But because the harvesting of these additional food sources frequently goes unrecorded, they are often undervalued when making management decisions. While there are highly productive varieties of rice available which increase crop value, they demand high inputs of fertilizers and pesticides and use less water, which affect the harvesting of important additional aquatic food sources. With such intensification of rice production, communities are losing local knowledge of traditional farming practices and traditional foods and medicines. The rice farmer and his family are the primary losers, and sometimes the local community, too, when excess fish and other aquatic products are no longer sold or exchanged.

### Rice fields and fish in Ban Khoum Village, Lao PDR

*Ban Khoum village has 50 households with a total population of 333, farming 42 hectares of rice fields. Most fields are owned by the community, and the village chief allocates areas to households. A limited number of fields are privately owned, and these are allocated by the district authorities, with owners paying a tax to the district authority and to the village.*

*To deal with a perceived decline in fish catches, community-developed management plans and rules on the exploitation of aquatic resources allow every villager to catch fish in any of the communal rice fields provided there is no active fish culture taking place. There are agreed rules on the exploitation of resources in streams and irrigation canals for the rice fields, with control of specific fishing sites, fishing gear, target species and seasonal restrictions. Fines, fish confiscation and eventual imprisonment can result from violations. These controls have become possible through the government's decision in recent years to decentralize power to provincial, district and village authorities.*

*Fish are the main source of protein and thus play a key role in village livelihoods. Of the 26 species caught, at least 17 occur in rice fields and six breed there. In terms of other aquatic species exploited, villagers consume five amphibian, at least three reptile, two prawn, four mollusc, nine insect, and 10 aquatic plant species. In addition, another three crustacean and five plant species are fed to ducks, pigs and chickens.*



### Organic rice – good for consumers, farmers AND wildlife

*The Ebro delta, home to 50,000 people, occupies some 320 km<sup>2</sup> in northeast Spain. Much of the delta is farmed, with rice fields occupying 65% of the area and producing one fifth of Spain's rice production. It's a haven for water birds – 40,000 pairs of 50 different water birds all year round, with much higher concentrations in winter and during autumn migration periods. The delta is home to the world's biggest colony of Audouin's gulls, an endangered species.*

*While rice-growing is generally good for water birds, modern techniques, with their intensive use of pesticides, fertilizers, and artificial drainage systems, have significant negative effects. Rice farmers in Spain can be subsidised, through the European Union, to practice less damaging techniques – such as mechanical weeding, reducing the use of dangerous herbicides and pesticides, prolongation of the flooding period, etc. While this agri-environmental farming is environmentally beneficial, it does not go as far as the organic methods developed in the Ebro delta that prohibit the use of artificial fertilisers, phytosanitary products, or treated seeds.*

*An EU-Life funded project begun in 1997 in the delta by SEO/BirdLife has identified how rice-growing techniques can be modified so that they are good for farmers, consumers AND wildlife. On their experimental farm they've looked at organic rice farming, comparing it with agri-environmental and conventional methods.*

*The SEO/BirdLife project has found that densities of fish and invertebrates in the organic fields are double those in the agri-environmental and conventional fields – and as a result have more birds, particularly from August to October and especially after harvesting the rice, when the fish and invertebrates can be easily caught by waterbirds. So organic rice is better for wildlife – but it is also better for farmers, fetching a higher price in the growing market for organic foods.*

## Fishing for Fun

Recreational fisheries can be important in terms of volume of fish caught and economic value in some countries – such as Australia, Canada, Chile, many European countries, New Zealand and the USA. In Germany it is estimated that there are 3.3 million recreational fishers spending US\$8.2 billion per year, their activities sustaining 52,000 jobs, many of them in rural areas; and in England and Wales, recreational fishing is worth around US\$ 6.4 billion, in the USA US\$24 billion, and in Canada US\$5 billion. If not sustainably managed, this can have significant negative effects on fish stocks and lead to conflicts between recreational and small-scale fishers. Many countries have introduced regulations to control the 'take' of recreational fishers to protect fish stocks in both inland and marine ecosystems. Additionally, greater efforts must be made to increase the social and conservation impact of recreational fisheries in local, rural communities. Such activity is taking place in large areas such as in many sub-basins of the Amazon River and in larger rivers in Argentina and Chile. In most of these cases recreational fisheries are foreign businesses, which often interfere with local fisheries; including these communities could have important positive impacts on the conservation of many fisheries and on improving communities' livelihoods.

## Aranyponty – a multi-functional fish farm approach in Hungary

A fishpond system established in the early 1900s forms the core of the Retszilas-ponds Nature Reserve, a Ramsar site in Hungary. The Aranyponty fishponds within the Nature Reserve are privately owned and managed as an organic fish farm – one of only three such certified fish farms in the country.

Using 49 ponds varying in size from 1 to 70 hectares, the 760-hectare farm produces pike, perch and tench as well as three carp species for recreational fishers and for sale at national and international levels; it also produces and markets ornamental fish.

Through innovative management, Aranyponty offers much more than just a fishing experience. With fishers' families in mind, the farm offers accommodation, a camp site, a restaurant offering traditional Hungarian cuisine, and bike rentals. And the innovative approach does not stop there. A former stable has been converted into the country's only fishing museum, including an open-air exhibition of the lifestyle of Hungarian fishers from earlier times.

Finally, Aranyponty's multi-functional approach has taken it into the world of research. Working with the Hungarian Institute for Fisheries, Aquaculture and Irrigation, an on-site laboratory monitors the wetland environment within the territory, developing innovative aquaculture techniques and studying various technical aspects of multi-function fish farms. Aranyponty has also played a key role alongside universities and research institutes in Hungary in setting up and testing the Hungarian Standards on Organic Fish Farming which set technical standards for the whole process from pond to dinner plate.



## The Conscientious Consumer

If you live in a developed country, no doubt your local supermarket or favourite fish shop provides a fine display to tempt your taste buds and your wallet – fresh fish, prawns, squid, crab, mussels, lobster are in abundance and the freezers are filled with more of the same. Yet this picture of plenty belies the unsustainable practices that so often provide the fish you eat. So what can you do? The **Marine Stewardship Council** gives many consumers around the world the chance to make choices. And there are also a number of national certification initiatives on 'ecolabelling' that ensure that products come from sustainably managed sources - these too assist consumers in making the right choices. FAO has developed guidelines on ecolabelling of marine and inland fishery products; work is beginning to develop environmental certification for aquaculture products as well.

There's still another area where the consumer can make an informed choice – the marine aquarium trade. This is a particular threat to Asian reefs which dominate the global supply and where trade is growing apace. Worldwide, import value has grown from US\$24-40 million in the 1980s to an estimated at US\$200-300 million today. Around 1,000 species of marine organisms (fish and invertebrates, including coral) are traded internationally – key importers are the USA, Europe and Japan. The major problems include over-collection and destructive fishing practices, such as cyanide fishing and dynamiting and breaking coral to obtain stunned fish. This may threaten the biodiversity of fish on a local level and can result in local extinctions of rare or endemic species. Here again, progress is being made.

The **Marine Aquarium Council** has devised a certification process to manage the trade from collection in the field to retail sale to the final consumer. A monitoring programme has been established in collection areas to assess the local management programme and to act as an early warning system to detect impacts on the ecosystem resulting from the trade. In the mid-1990s, the National Research Council of Brazil started Project Piaba, a community development project to promote conservation of the rainforest and floodplain through export of wild-caught cardinal tetras (a popular ornamental fish). Piaba's slogan, "buy a fish, save a tree", indicates how closely inland waters are tied to the surrounding environment.



In 1997, WWF and Unilever co-founded the **Marine Stewardship Council (MSC)**. This international NGO, independent since 1999, works with retailers, governments, NGOs, conservationists, the fishing industry and other stakeholders to promote sustainable fisheries. Products from fisheries meeting its rigorous environmental standard, can carry the MSC eco-label – giving consumers the opportunity to make an informed choice in the supermarket. To date, over 20 fisheries, both small- and large-scale, and including two inland fisheries in Sweden, have been certified and a further 18 are undergoing the rigorous assessment to determine if they meet the MSC standard. Over 100 major seafood buyers have pledged to purchase MSC-certified products and more than 400 MSC-certified seafood products are in the global marketplace today.

Make your decision count!  
<http://www.msc.org/>



Langoustines (aka Norway lobsters, Dublin Bay lobsters, or Scottish prawns) caught by the MSC certified Loch Torridon Nephrops Creel Fishery, Scotland. (© WWF-Canon / Edward Parker)

## Will there be fish for tomorrow ?

The future of the world's fisheries is a matter of vital importance for all of us. The issues are frequently complex and the competing special interests can sometimes seem irreconcilable. The Ramsar Convention on Wetlands takes a strong line in promoting effective participatory and collaborative management practices for both habitats and their resources, and, as we have seen, great strides are being made in many parts of the world to rationalize our use of our fisheries and the wetlands that support them, and ensure that they remain productive, and sustainable, for our children and grandchildren.

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Wetlands support fisheries  
 keep them healthy



estuaries, swamps, lakes, coral reefs, tidal flats, rivers, mangroves, ponds... etc.



CONVENTION ON WETLANDS  
CONVENTION SUR LES ZONES HUMIDES  
CONVENCIÓN SOBRE LOS HUMEDALES  
(Ramsar, Iran, 1971)

Ramsar's mission is  
“the conservation and wise use of all wetlands through local,  
regional and national actions and international cooperation, as a contribution  
towards achieving sustainable development throughout the world”

To find out more about the Ramsar Convention and its work,  
visit the Ramsar website, managed by the Ramsar Secretariat and updated daily:

**[www.ramsar.org](http://www.ramsar.org)**

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