



Briefing Note

Aquaculture

The background

Aquaculture throughout the world has experienced dynamic development. It is now the fastest-growing food sector in the world, maintaining an average annual growth rate of 8.8 per cent for the past 30 years. In 2008, world aquaculture production was worth nearly 100 billion US dollars – not including value addition.

The Food and Agriculture Organization of the United Nations (FAO) predicts that by 2028, annual global demand for fish products will increase to around 320 million tonnes – some 200 million tonnes (160%) more than today. Ninety per cent of this additional demand will be generated by economic growth and the associated rise in incomes and dietary diversification, mainly in developing countries. This additional demand can only be met by aquaculture.

Today, aquaculture supplies almost 50% of the global output of fish, crustaceans, shellfish and algae destined for human consumption. Freshwater aquaculture is the source of 60% of global production, with marine water aquaculture accounting for 33% and brackish-water production – mainly shrimp production – amounting to just 6%. Asia is the world's centre of aquaculture, accounting for 90% of global production, with China the leading producer. Asia is also the main consumer of aquaculture products. More than 80% of the fish and fishery products consumed in China is farmed, while aquaculture provides 50% of all fish consumed in Viet Nam and Bangladesh and almost a quarter of the fish destined for human consumption in Indonesia and the Philippines.

The production method most commonly found in Asia is fish farming in earth ponds, often as a component of agricultural production systems such as rice cultivation or in combination with animal husbandry systems, such as pig or poultry farming. Production in artificial reservoirs, natural lakes, rice fields and irrigation channels also plays an important role. Aquaculture – both commercial and small-scale – is gaining in significance in Africa as well, with annual growth of 13% now being achieved. In Latin America, shrimp production has developed and has been steadily expanding since the 1980s; the same now applies to pond farming of fish. In Brazil, for example, aquaculture production is growing at a rate of 21% per annum.

In most developing countries, aquaculture production mainly supplies the domestic markets. However, demand is outstripping supply, with the result that the price of farmed fish is now increasing more rapidly than the price of comparable foods of animal origin such as chicken. In some developing countries, aquaculture products such as shrimps, tilapia and pangasius are now major export goods, earning foreign exchange for the country concerned. In Viet Nam alone, production of pangasius, a freshwater fish belonging to the catfish family, increased to around 1.2 million tonnes in 2008 – a threefold increase since 2005. This was accompanied by a corresponding rise in exports. Imports of deep-frozen pangasius fillets by the European Union (EU) alone increased from 20,000 tonnes in 2004 to 215,000 tonnes in 2009 – a tenfold increase in just five years.

Intensive aquaculture has drawbacks, however. Depending on the species and age of the fish, it can involve the use of feedstuffs with a high percentage of fish meal and fish oil. Various species of pelagic fish, such as anchovy and sardine, are still being caught specifically to manufacture these feedstuffs; this is known as reduction fishery. Increasing efforts are now being made to replace the fish protein and fish oils in feed with plant protein and vegetable oils, derived, for example, from soybean. Waste fish is also to be utilised more efficiently in future. Indeed, the use of these alternative sources of protein and fatty acids is now a prerequisite for certification in accordance with some aquaculture standards such as *Naturland*. GlobalGAP and the Aquaculture Stewardship Council state that fish meal and oil used as feed must originate from reduction fisheries certified as sustainable.

The ongoing intensification of aquaculture results in higher stocking densities and feeding rates, causing nutrient overload in public water bodies and the environment when ponds are emptied. Non-native fish varieties sometimes escape from cages or pond farming facilities infiltrate wild fish populations and interbreed or compete with native species, putting biodiversity at risk. And not least, the construction of large aquaculture facilities in coastal zones has in some cases resulted in the clearance of ecologically highly valuable mangrove forests, depriving local communities of their traditional access to these areas.

International agreements contain guidelines for the development of aquaculture. Examples are the FAO Code of Conduct for Responsible Fisheries (CCRF), the Convention on Biological Diversity (CBD) and the FAO's ecosystem approach to aquaculture (EAA). Furthermore, in the industrialised countries, various aquaculture standards have been developed for specific market segments. Examples are GlobalGAP as a business-to-business standard, the Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP) standards, which enable consumers to identify sustainably farmed products, and organic labels such as *Naturland*. There is a noticeable trend at present for the major marketing chains to develop their own labels, however. Opting not to display the logos of the various certification schemes saves them money as they do not have to pay the relevant fees.

Our position

In this context, GIZ takes the following positions:

1. Environmental and social standards mitigate the adverse effects of aquaculture

Aquaculture production should be carried out sustainably and in compliance with ecological and social standards and principles, especially in view of the anticipated rapid expansion of the aquaculture industry. Otherwise, adverse ecological changes may result, causing economic and social problems. The development and introduction of environmental and social standards and relevant certification schemes for aquaculture are therefore a key priority.

In developing countries, many small-scale producers and individual households are engaged in aquaculture, and it is important to ensure that the standards and associated procedures can be applied in an economically efficient manner by these producers as well. Group certification is an option here. However, this requires an internal management system which coordinates and documents compliance with the standards and traceability on behalf of the group. The groups also undergo annual inspections. The group approach has proved its worth in the introduction and dissemination of new and complex technologies such as aquaculture, particularly for microenterprises.

2. Small-scale producers need safeguards

Inclusive business models such as contract fish farming as well as the formation of farmer groups and cooperatives, with the safeguards that this offers, have proved their worth in the aquaculture industry. Examples are tilapia and shrimp production in Thailand and pangasius and shrimp production in Viet Nam. The teaming up of small-scale farmers usually delivers economies of scale in production and strengthens negotiation leverage with regard to the selling prices achieved. Cooperatives and contract-based production schemes can also provide a basis for the establishment of microinsurance schemes, as it requires producers to comply with specific criteria and production standards, thus creating additional safeguards. These microinsurance schemes cover losses caused, for example, by environmental events, which are beyond the control of the standards.

3. The sustainable development of aquaculture requires enabling legislation

The introduction of local minimum quality standards for national or regional operators in developing countries helps to improve quality and minimise losses. It thus contributes to economic development. In Asia and Africa alike, this has led to improvements along the local value chain for aquatic products. For example, supermarket chains in the developing countries require their suppliers to comply with defined production and delivery criteria, such as specific quality features, size and quantity criteria, and transportation conditions, such as the requirement that fishery products from pond fishing are immediately packed in ice. This must be supported, along with the sharing of experience and the further development and dissemination of successful approaches.

International cooperation can build the capacities of governments, business and civil society to ensure that aquaculture is conducted in a sustainable and responsible manner. This must include the establishment of legal frameworks which facilitate the sustainable development of aquaculture. At present, national legislation in many developing countries poses obstacles to the development and expansion of an aquaculture industry.

4. Well-qualified service providers are a must

There are no ready-made solutions or technology packages for the successful establishment of aquaculture systems. These are always dependent on the local situation, which also determines value chains. Nonetheless, appropriate and targeted principles and rules are important in every case. Raising awareness of these principles and rules and supporting their practical application can be tasks for international cooperation, which can also support partner countries in sustainably developing local aquaculture industries. Here, well-qualified local service providers – such as extension agents, fish hatcheries, feed manufacturers and credit institutions – have a key role to play along the value chain. Public authorities and local research institutions must be involved as well.

Our recommended actions

International cooperation can assist the partner countries in various ways to develop a sustainable aquaculture sector. By providing advice on ways of implementing international agreements, introducing standards and improving environmental compatibility, major new opportunities can be created.

GIZ considers the following the most important recommendations for action:

1. Implement international agreements

International cooperation can assist the partner countries to implement international codes and agreements which focus on the responsible use of aquatic resources and the introduction of integrated ecosystem approaches.

2. Introduce standards

Improved wealth creation along the entire value chain benefits the sustainable development of aquaculture. The introduction of quality standards, environmental and social standards and guidelines for product certification are key elements here. These standards can also be applied by small-scale enterprises producing for local markets. This also makes it easier to introduce inclusive business models based on certification schemes.

3. Provide advice for decision-makers and producers

The provision of advice to policy-makers and the private sector in the partner countries and industrialised countries alike is a key task for international cooperation and must focus on the joint development and implementation of long-term strategies and policies for ecologically, socially and economically responsible and sustainable aquaculture.

Technical support and capacity building for commercial aquaculture are other areas of activity for international cooperation. It can provide training for producers and support the establishment and operation of fish hatcheries, fish food production and the management of aquaculture enterprises. The provision of advice to credit institutions and insurers is also important to encourage their engagement in the aquaculture sector.



4. Improve the environmental compatibility of aquaculture

The provision of support to partner countries for the establishment of mechanisms and procedures to undertake appropriate environmental impact assessment and monitoring of aquaculture is another possible task for international cooperation. This builds their capacities to identify adverse ecological changes and related socio-economic effects.

5. Promote research

Research on key technical, socio-economic and political issues is of relevance to aquaculture as well and must be supported, along with the sector's integration into the partner countries' existing agricultural systems. This helps to promote sustainable rural development.

6. Adapt aquaculture to climate change impacts

In future, aquaculture will be increasingly exposed to the impacts of climate change. In particular, higher temperatures and reduced precipitation may make it more difficult to meet freshwater requirements. Shorter rainy seasons will adversely affect the operation of seasonal ponds, while heavier storms could pose a risk to net cages and enclosures that are secured with mooring and anchor lines. Insurance schemes potentially have a role to play here, as does adaptation. On the other hand, temperature changes and increased precipitation could create new opportunities for aquaculture development.

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