



## Aquaculture – Sustainably farmed fish

Fish is healthy and it tastes good – and Germans eat more than a million tonnes of this protein-rich food each year. Salmon, wild Alaskan salmon and herring from marine fisheries are particularly popular. Yet seas and coastal waters around the world are overfished. In addition, large quantities of fish, seafood and other fish products travel a long way before they land on German plates. That is often not sustainable.

Fish farming in aquaculture systems can be a sustainable alternative, especially if its environmental impact is minimised. At present only about two per cent of the fish consumed in Germany comes from domestic aquaculture. And the present aquaculture systems have the potential to be more sustainable. What factors need to be considered if fish farming is to meet high regional, environmental and quality standards?

### Raising consumer awareness

Carp, trout and other native species are also tasty – and their environmental footprint is often significantly smaller than that of prawns from Thailand or salmon from Norway. Many environmental and consumer organisations regularly point this out, issue shopping advice and highlight the problems of worldwide overfishing.

However, there is still room for more to be done to draw consumers' attention to aquaculture as an environmentally friendly alternative. German fish farms already produce 20,000 tonnes of fish per year. Unlike in other areas of agriculture, exploiting the potential for growth in aquaculture is entirely justifiable in environmental terms, especially if the overall conditions are right.

### Encouraging domestic pond-farming

Freshwater fishing and the fishing industry have a long tradition in Germany. One has only to think of the classic carp pond or of trout farming in flow-through systems. Extensive pond-farming contributes to preservation of the countryside and to nature conservation and biodiversity, because it provides habitat not only for the farmed fish but also for many plants and aquatic animals.

Traditional aquaculture has to compete with low-cost sources in Asia and Africa, where fish is often produced under environmentally and socially problematic conditions. The sector also suffers from a

lack of skilled workers: in consequence, the number of aquaculture farms in Germany has been declining for some years, even though the quantity of fish produced remains stable. This trend needs to be slowed or completely halted, and ideally reversed.

## Expanding sustainable aquaculture

A number of factors are relevant to sustainable aquaculture. The most critical issue is the fish food, because feedstuffs often contain fish meal and fish oil from wild sources. Sustainable aquaculture requires fish food in which these constituents are replaced wherever possible by microalgae, oil seeds and insect protein.

Undigested feed and by-products of digestion, especially in flow-through systems, can result in undesirable discharge of nutrients into lakes and rivers (eutrophication). This problem could be addressed by using recirculating systems, in which the fish are kept in largely closed-loop conditions. Another advantage of recirculating systems is that they use significantly less water. A disadvantage is that they consume more energy. In this respect their environmental performance can be improved by using locally produced energy from renewable sources.

## Study “Policy for sustainable aquaculture 2050. Recommendations from the target perspective”

In a self-financed project, researchers at the Oeko-Institut generated a vision for sustainable aquaculture in Germany in 2050. They analysed the general conditions needed for the desired target state, investigated specific trajectories and produced recommendations for action for policy-makers.

The project’s core findings are that traditional aquaculture needs to be encouraged and that sustainable recirculatory systems should be more widely used. It is essential to pay attention to water and energy consumption and to environmentally sustainable feed. In general, fish consumption in Germany needs to fall from its current level of around fourteen kilos per person per year to around ten kilos. Even then it will not be possible to meet demand entirely from domestic production.

To better assess the environmental sustainability of aquaculture in Germany, the Oeko-Institut has also developed the “AMOUNT” simulation model (Aquakultur Monitoring Umwelt und Nachhaltigkeit – Aquaculture Monitoring Environment and Sustainability). The model uses statistical data to calculate the current resource consumption of German aquaculture production. Taking the status quo as a baseline, AMOUNT can also estimate future developments in the sector, fish production in various sub-sectors and the associated levels of future resource consumption.

[The Oeko-Institut’s study Politik für eine Nachhaltige Aquakultur 2050 \(Policy for Sustainable Aquaculture 2050\) and its AMOUNT model](#)

## Project: The Sustainable Aquaculture funding initiative of the German Federal Environmental Foundation

As part of its Sustainable Aquaculture funding initiative, the German Federal Environmental Foundation commissioned the Oeko-Institut to carry out an in-process sustainability assessment of ten research and development projects that were being funded. The most important evaluation tool

used was the established method of life cycle assessment. The researchers also included analysis of economic and social aspects in their comprehensive sustainability assessment.

This study, too, concludes that from a sustainability point of view it will be crucial to significantly increase the energy and resource productivity of aquaculture systems, to tap sources of feed other than fish meal and fish oil from fish caught in the wild, and to minimise the discharge of pollutants into lakes and rivers.

All the research and development projects that were considered represented useful methods of making aquaculture more sustainable. The study makes concrete recommendations for developing aquaculture in ways that meet the highest possible sustainability and animal welfare standards and it outlines further possible avenues for research.

[Synopse der Erkenntnisse zur Förderinitiative „Nachhaltige Aquakultur“ des Öko-Instituts im Auftrag der Deutschen Bundesstiftung Umwelt \(Synopsis of the Oeko-Institut's findings concerning the Sustainable Aquaculture funding initiative commissioned by the German Federal Environmental Foundation\)](#)

## Further information

[The project Politik für eine nachhaltige Aquakultur 2050 in Uganda \(Policy for sustainable aquaculture 2050 in Uganda\) by the Oeko-Institut on behalf of the Amber Foundation](#)

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Oeko-Institut is a leading independent European research and consultancy institute working for a sustainable future. Founded in 1977, the institute develops principles and strategies for realising the vision of sustainable development globally, nationally and locally. Oeko-Institut is represented at three locations in Germany – Freiburg, Darmstadt and Berlin.