

Enabling adaptation: a Climate Agenda for European fish farming

Overview

Climate change is one of the defining challenges of our era, and its impacts are being felt across all sectors, including aquaculture. In Europe, fish farming is increasingly affected by rising water temperatures, shifting precipitation patterns, more frequent extreme weather events, and changing marine and freshwater conditions. These pressures are intensifying, putting the resilience and sustainability of the sector to the test.

In response, fish farmers are already taking steps to adapt, adjusting farming practices, implementing new technologies, and investing in more resilient systems. However, their ability to respond effectively remains constrained by persistent shortcomings in the legal and regulatory framework. These longstanding issues, which have long hindered innovation and flexibility, are now becoming critical obstacles to climate adaptation.

Unlocking European fish farming's full adaptive potential requires urgent action to modernise and align the legal framework with today's climate realities. Without it, the sector cannot face the challenges ahead with the speed and confidence that are now essential.

Ongoing adaptation measures

European fish farming is a forward-looking and innovative sector that is already taking concrete steps to address the impacts of climate change. Adaptation measures are being implemented across the sector, some tailored to specific sites or species, others with broader applicability. These measures range from simple adjustments to highly complex interventions, reflecting the diversity of environments and production systems in European fish farming.

Below is a list of tangible and practical climate change adaptation measures currently being adopted by undertakings in the European fish farming sector. It is important to note that these examples are not universally applicable to all fish farming operations; rather, they illustrate how specific ventures have addressed their particular challenges:

Farm management and operational adaptation

- Adjustment of fish management practices in sea farms to better cope with stormier weather by reducing the time fish spend in pens in the sea, stocking larger fish, or at lower densities. Examples occur in Atlantic salmon, seabass, and seabream farms.

Position Paper

- Relocation of marine farm sites to more sheltered areas, particularly for species like seabass and seabream, in response to increasingly violent sea conditions.
- Species diversification, or substitution, to adapt to changing water availability, such as replacing rainbow trout with more drought- and heat-tolerant species like sturgeon.
- Adjustment of production cycles in freshwater pond aquaculture, particularly in common carp farming, where the traditional three-year cycle is increasingly being shortened to 2–2.5 years.

Water management and temperature control

- Conversion from flow-through to recirculating aquaculture systems (RAS), either partial or total, to reduce water use and improve temperature control, particularly in land-based rainbow trout farms.
- Switching water sources from rivers to underground wells to achieve more stable and cooler water supplies in rainbow trout farms.
- Installation of shading systems over raceways, using covers or photovoltaic solar panels, to reduce heat exposure in trout farms.
- Deepening of fish ponds as a natural buffer to mitigate temperature fluctuations, notably for carp and trout production.
- Deployment of submersible sea pens, deeper nets, or upwelling systems to access cooler water layers during critical summer months, applied in species like Atlantic salmon and bluefin tuna.

Infrastructure and engineering solutions

- Reinforcing farming infrastructure, such as stronger sea pen moorings, nets, and structures, to withstand more frequent and intense storms.
- Mitigation of hydropower impacts where water oversaturation caused by energy generation compromises water quality and fish welfare.

Health, biosecurity, and monitoring

- Enhanced biosecurity protocols to ensure fish are in optimal health to resist climate-exacerbated disease pressures.
- Digitalisation and automated monitoring systems to track environmental parameters, for example, inflow water quality in rainbow trout farms, allowing quicker and more targeted responses to adverse in-flow water conditions.

Feed and nutrition innovations

- Development of improved feed formulations to enhance fish robustness and resilience under climate stressors, supporting better growth and health outcomes.
- Adjustment of winter feeding strategies by using high-energy feeds to support fish growth and health during milder winters, when fish remain active for longer periods.

Identification of persistent barriers that further hinder climate change adaptation

Persistent regulatory and administrative challenges continue to hinder the fish farming sector's capacity to adapt effectively to climate change. Addressing these long-standing issues is essential to unlocking the sector's full adaptation potential for resilience and sustainable growth in a changing climate. These bottlenecks include the following:

Regulatory and administrative bottlenecks

- Cumbersome administrative procedures that delay investments and the implementation of fit-for-purpose adaptation solutions.
- Inflexible regulatory frameworks that fail to accommodate innovation or timely adaptation to changing environmental conditions.
- Uncertainty in licensing frameworks, particularly where concession durations are too short, undefined, or not guaranteed, undermining business confidence and investment.
- Fragmented licensing and authorisation processes for veterinary medicines, limiting the availability of essential treatments for fish health and undermining the fight against antimicrobial resistance. A genuine EU Single Market for veterinary products is needed.
- Insufficient legal framework for the development, approval, and financing of fish vaccines, including the use of EMFAF to support their deployment against both established and emerging pathogens.
- Delays in the development, approval, and broad availability of new medications and vaccines, compounded by the sector's relatively small size and complex authorisation procedures.
- Lack of integrated licensing frameworks, such as single permits for fish farming operations that also cover the use of photovoltaic or alternative energy sources and avoid contradictory national legislation.
- Limited inclusion of fish farming in national Climate Adaptation Plans.

Spatial planning and resource access

- Incomplete or inadequate spatial planning, especially in coastal and inland areas, preventing the relocation or enlargement of farming sites in response to environmental change.
- Limited capacity of regional and local authorities to manage fish farming development, especially regarding fish health and environmental impact assessments.
- Lack of priority for aquaculture in freshwater allocation, even though it contributes to food production and ponds can serve as water reservoirs.
- Incoherent water management in river basins, requiring better coordination among sectors and more strategic optimisation of water use.
- Lack of flexibility in water use during droughts, including restrictions on pumping water back to source points, which could otherwise support resilience during scarcity.

Position Paper

Knowledge, skills, and policy coherence

- Limited aquaculture literacy among policymakers and inadequate training on fish farming of public administration staff, leading to poorly informed decisions and technically unfeasible proposals.
- Insufficient sharing of best practices between Member States on how to adapt aquaculture to climate change. The European Commission should support this.

Innovation, research, and technology gaps

- Insufficient sector's strategic influence over climate-related aquaculture research, with research initiatives needing better alignment with industry needs.
- Insufficient understanding of the role of the microbiome in fish health under changing environmental conditions.
- Limited research on adapting farming conditions (e.g., feeding, stocking density, oxygenation) to changing temperature and environmental conditions.
- Weak support for small-scale innovation projects, which are often more flexible and quicker to implement than large-scale EU research programmes.
- Limited research on the impacts of shortened production cycles in carp farming, particularly regarding the role of adapted winter feeding strategies in supporting immune function and fish health during milder winters.

FEAP, 30 June 2025

The Federation of European Aquaculture Producers is an organisation that represents the European fish farming profession and is based in Brussels. FEAP is composed of 24 national fish farming associations from 23 countries, both EU and non-EU. The combined yearly production of FEAP members surpasses 2,5 million tonnes of nutritious, safe, delicious and environmentally sustainable fish.

Follow us:

