Irish Aid
Rialtas na hÉireann
Government of Ireland

Climate change and the blue economy

The role of fisheries and aquaculture

Key messages

- The small-scale fisheries and aquaculture sectors are a critically important source of livelihoods and nutrition for hundreds of millions of men and women. They are central to a sustainable and equitable blue economy and can make substantial contributions to sustainable development.
- Despite contributing relatively little to global emissions, fisheries and aquaculture face high levels of climate risk, particularly in the tropics and in areas facing compounding stressors, such as overfishing.
- To support resilient aquatic food systems, climate adaptation strategies must be multi-sectoral, multi-scale, and guided by the principles of equity and human rights. Transformative measures to reduce poverty and provide food and nutrition security will be instrumental.
- Policies and investments should work in partnership with small-scale fishing and fish-farming people and communities — including women and youth — to support their capacity to lead sustainable adaptive and transformative actions.

1. What are the fisheries and aquaculture sectors and why do they matter ?

Fisheries (harvesting of wild fish and invertebrates) and aquaculture (cultivation of aquatic animals and plants) are critically important components of the blue economy. While other sectors in the blue economy have greater direct economic value, fisheries, aquaculture and their value chains together employ more people than the rest of the blue economy combined.[1] At least 58.5 million people were estimated to be directly engaged in fisheries and aquaculture in 2020 (65% were employed in fisheries and 35% in aquaculture), with millions more employed in pre- and post-harvesting activities such as fish processing.[2] But these estimates do not fully account for small-scale activities (as opposed to large-scale industrial), which are often informal and spatially dispersed, and thus poorly documented in national statistics. New research indicates that up to 492 million people (7% of the world's population) depend at least partially on the small-scale fisheries (SSF) sector for employment or subsistence.[3] This accounts for 90% of people involved in fisheries, mostly living in the global South, and women make up nearly half of the total workforce (see Box 1).

Fisheries and aquaculture also play a huge role in food and nutrition security.[4] Aquatic foods offer essential omega-3 fatty acids and micronutrients that are critical for human health and development, particularly among vulnerable populations and for women and children.[3] Fish and other aquatic animals — which contribute more than 50% of total animal protein in some countries — are on average richer in these nutrients than meat from livestock and therefore have substantial potential to reduce malnutrition.[5] SSF provide around 40% of global fisheries catch, mostly landed in the global South and much of which is consumed locally.[3] Fisheries have long produced the majority of aquatic foods, but global growth in production is now coming from aquaculture.[2] Despite this, policies and investments in fisheries and aquaculture have long focused on economic and biodiversity conservation objectives and failed to recognise and nurture these sectors as crucial components of global food systems.

Moreover, while the blue economy agenda tends to focus on the ocean, inland fisheries and aquaculture — systems that are intrinsically connected to the ocean — also support livelihoods and nutrition. Nearly one third of global small-scale catch (and 50% in Africa) comes from inland fisheries, most of which are open access and therefore a lifeline for the landless poor.[3]

2. What are the impacts and challenges?

The fisheries and aquaculture sectors contribute relatively little to global emissions, yet climate change has caused

↘ Box 1. Gender in small-scale fisheries

SSF cannot be understood without considering gender, but data on gender has only recently started to emerge. Women make up around half of the people engaged in post-harvest labour such as processing, trading and marketing, and 15% of people engaged in pre-harvest labour such as net repair.[2,3] While fishing is typically associated with men, women also catch fish — particularly for subsistence and mostly from the shoreline on foot or from small, non-motorised vessels (often referred to as 'collecting' or 'gleaning').[2] Although these activities are critical to household economies and small enterprises, they are poorly understood and undervalued, resulting in gender disparities in pay and access to resources, financing, markets, social protection, technology, training, mobility and bargaining power, as well as poor representation of women in fisheries organisations and other decision-making bodies.[6] Ultimately, these inequities increase the vulnerability of women to shocks and contribute to climate injustice.

unprecedented physical changes to the ocean and other aquatic systems, with increasingly severe impacts on the nature that underpins fisheries and aquaculture.[7] These changes interact with and exacerbate the impacts of other stressors on aquatic ecosystems, which include fishing itself, changes in land and sea use (such as clearance of mangroves for aquaculture), pollution and invasive species.[1]

A dramatic increase in fishing effort and geographic coverage of fishing during the last half of the 20th century, driven in part by subsidies that incentivise mostly industrial overfishing, has had devastating impacts on aquatic species and ecosystems — particularly in the ocean.[2] More than 35% of assessed fish stocks are overfished, and another 57% are fished at their maximum, but the majority of global fish catch by volume comes from stocks without reliable scientific assessments, which are hence even more likely to be overexploited.[2]

2.1 Impacts on aquatic food systems

Climate-related changes — for example, changes in species distribution, growth and reproduction — are affecting the production capacity of aquatic food systems, with impacts already being seen on the availability and stability of supply.[7] Fishing and farming operations are also expected to be affected by increasingly frequent and extreme weather events, which will lead to loss and damage of infrastructure and equipment throughout value chains and jeopardise safety and working conditions; and increased levels of toxins, pathogens and parasites are expected in farmed and wild stocks, threatening food safety.[7]

Fisheries and freshwater aquaculture are projected to experience the most severe climate hazards by the end of the century.[8] Fisheries are already particularly vulnerable to natural climate variability, and anthropogenic climate change is altering and exacerbating this variability and uncertainty.[7] The sector is facing shifts in the distribution of stocks and reduced or more variable yields, with the largest declines expected in the tropics and particularly where stocks are already overexploited.[9]

Aquaculture operations (for example, shrimp farming) are generally less directly exposed to climate-induced changes in ecosystem productivity than are wild stocks, but inland ecosystems — where the majority of global aquaculture is concentrated — are very sensitive to warming.[8] Fed aquaculture operations, which usually rely on feeds produced by agriculture and fisheries, also face uncertainty in the availability and higher costs of these inputs.[10] Research suggests that marine aquaculture (mariculture) — which currently supplies only a small portion of aquatic foods, particularly in the global South — has potential for growth even under climate change, although these operations would still be high risk in areas likely to face sea-level rise and more extreme weather events.[9] Overall, climate impacts on aquaculture are expected to be negative.[10]

2.2 Who is most at risk?

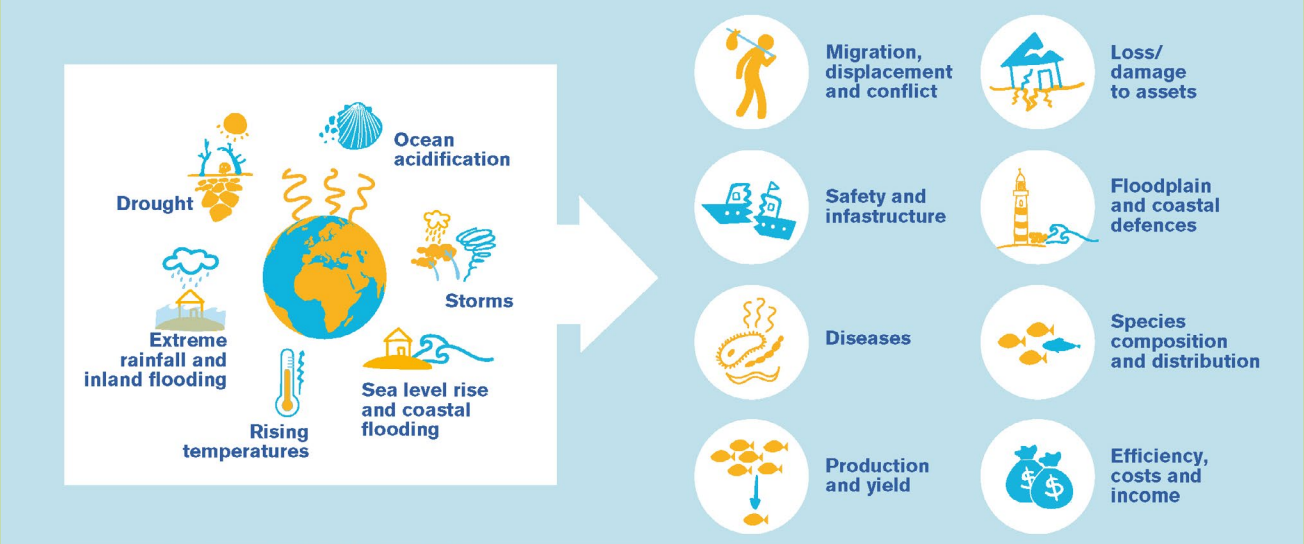
Climate-related change in fisheries and aquaculture will have far-reaching consequences throughout value chains and on wider society via effects on employment and income, trade, food and nutrition security, health and conflict.[7] On a national level, small island developing states (SIDS) and countries in Africa, South Asia and Southeast Asia are projected to face particularly high risks, given their relatively high dependence on aquatic foods for nutrition, income and livelihoods, and low capacity to adapt to the loss of these benefits.[8]

Because they depend on coastlines and floodplains for food and livelihoods, fishing and fish-farming communities are particularly exposed and sensitive to hazards such as rising sea levels and storms. The most vulnerable populations — SSF communities, Indigenous Peoples, women, children and migrant fishers — also face structural constraints that limit their capacities to adapt to sudden shocks or to more gradual changes in catch and income.[7,10] These constraints — often related to the informality of labour — include low financial inclusion, limited access to public services such as basic healthcare, education or social protection, and marginalisation from decision-making processes that affect them and their livelihoods.[6]

3. What are the solutions and opportunities for change?

Meeting the Paris Agreement mitigation targets will reduce climate hazards in aquatic food systems.[8] There are several climate mitigation opportunities within the fisheries and aquaculture sectors — for example, switching to low-carbon fuels and feeds,[7] community-led protection and restoration of blue carbon ecosystems[1] and shifting demand towards low-carbon aquatic foods, such as unfed aquaculture and small fish.[11] However, mitigation benefits can be slow

↘ Box 2. Impacts of climate change on fisheries and aquaculture



Source: Pita, C and Bladon, A (2021) Climate change and aquatic food systems. IIED, London. iied.org/20811iied

to emerge, and the future of fisheries and aquaculture ultimately depends on their capacity to adapt to change, some of which is already unavoidable.[8]

There are a range of adaptation options available for fisheries and aquaculture, including institutional adaptations, livelihood adaptations and actions to manage risks and increase resilience.[12] Given the economic constraints and inequities facing the most vulnerable individuals and communities, and the multi-scale nature of climate change, adaptation strategies must take a multi-dimensional, system-wide approach and address the underlying causes of vulnerability. Research suggests that in countries facing high compound risks, actions to reduce societal vulnerability in aquatic food systems can lower risks by margins similar to those of mitigation targets.[8]

3.1 Priorities for adaptation in fisheries and aquaculture

FAO has flagged the following climate adaptation actions as priorities that can support this approach by maximising the contribution of fisheries and aquaculture to the Sustainable Development Goals (SDGs).[2]

Mainstream climate change in management and planning: fisheries and aquaculture management requires more explicit consideration of climate hazards and better coordination with adaptation plans.[2] To enable adaptation to unpredictable changes, management also needs to be more participatory, flexible and responsive.[2] This management is best implemented in the context of integrated, climate-informed spatial planning and management.[1]

Develop and implement transformative adaptation plans: aquatic food systems are diverse and dynamic, and it is common for actors to adapt their livelihoods in response to change — for example, by switching their target species, fishing gear, processing technique or markets; and by diversifying to activities outside their sector, such as agriculture and tourism.[7] Institutional support, such as enabling policies and stronger governance, can help to facilitate locally-led adaptation and avoid maladaptation.[10,12,13] Transformative adaptation plans are needed at the national, subnational and local levels, formulated through an inclusive and participatory approach,[2] as emphasised by the Principles for Locally Led Adaptation.

Integrate equity and human rights considerations: the processes and outcomes of adaptation must be equitable and protect the rights of all actors — including women, youth and other vulnerable and marginalised groups — to tenure, food, a healthy environment, decent work and culture. This requires fair processes of decision making, transparency, accountability and dispute resolution, and fair distribution of costs and benefits. Implementation of the FAO-endorsed Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)[6] can support equitable adaptation.

Invest in innovation: transformative adaptation to climate change requires innovations in technology, policy and markets.[2] Examples include innovations that enhance the anticipation of climate hazards, such as measures to improve early warning systems for weather or food safety.[7] Innovative financial mechanisms can ensure that local people can access finance for adaptation, and innovative programmes and market mechanisms may be required to incentivise behaviour change.

4. What to address in your work?

Fisheries and aquaculture should be a key area of intervention within Irish Aid's work on climate action and the blue economy. It is critical that climate action and development interventions in the blue economy prioritise people involved in small-scale fisheries and aquaculture, and this approach can also drive progress towards other priority areas of work, including food and nutrition, gender

equality and governance. The below actions will also support Irish Aid to take a people-centred approach to blue economy and climate work and to implement the Principles for Locally Led Adaptation which were endorsed in 2021.

4.1 Senior policy/leadership level

• Prioritise blue economy development assistance that aims to reduce poverty and inequality and provide food and nutrition for men and women in small-scale fishing and fish-farming communities.

• Promote a shift in the framing of fish as a natural resource towards fish as food. A food systems perspective can lead to innovative policies and investments that promote nutrition-sensitive and socially equitable fisheries and aquaculture.

• Identify opportunities to support sustainable locally-led adaptation in the fisheries and aquaculture sectors when programming climate action and blue economy development. These will have substantial co-benefits for meeting the SDGs.

4.2 Programme/technical staff

• Invest in interventions that build the capacity of fishers, fish farmers and fish workers to adapt to change while promoting sustainability — for example, through enhancing the flexibility of their livelihoods or through strengthening governance institutions for collective action.

• Support efforts to strengthen fisheries and aquaculture governance and to build climate change into fisheries and aquaculture management, for example, through adaptive co-management.

• Support governments to place a stronger emphasis on the contribution of fisheries and aquaculture to poverty reduction and food security in countries' Nationally Determined Contributions, and to integrate measures for poverty eradication and food security for fishers, fish workers and fish farmers in the formulation and implementation of National Adaptation Plans.

• Work with delivery partners to support institutional and cross-sectoral cooperation and coordination, including between relevant government ministries and between countries. Support capacity to connect the fisheries and aquaculture, climate adaptation and poverty reduction agendas such that national and international policy coherence can improve.

• Promote a human rights-based approach to fisheries management and climate action in fisheries by supporting the implementation of the FAO-endorsed SSF Guidelines.[6]

• Identify opportunities to support partners' knowledge development and capacity to design and implement gender-transformative climate adaptation that creates equal opportunity for women in fisheries and aquaculture.

4.3 Delivery partners

• Develop climate action that empowers small-scale fishing and fish-farming communities to lead the transformation of aquatic food systems towards resilience and sustainability and which safeguards their human rights.

• Refer to the FAO toolbox for climate change adaptation in fisheries and aquaculture for guidance on developing and implementing action, limiting maladaptation and navigating trade-offs.[12]

• When designing climate interventions in the blue economy, recognise that they can have negative or unintended consequences for fishers and fish workers, and build in measures to avoid or compensate for these. Ensure that climate action does not make local people worse off in the short to medium term.

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