Blue foods in national climate strategies
Mexico

Mexico's rich marine and freshwater ecosystems support diverse and culturally significant blue food systems. In 2019, the fisheries and aquaculture sector supported nearly 297,000 direct jobs, mainly in capture fisheries. Mexico is a net exporter of blue foods, generating US$1.4 billion in export earnings. Mexicans consume nearly 13.8 kg of blue foods per person annually, below the 2022 global average of 20.2 kg per year.[1] Recognizing their broad contributions, the Mexican government has stated that fisheries and aquaculture are priorities, with efforts to strengthen regulations, increase seafood consumption to reduce malnutrition and obesity, and support ecosystem restoration.[2] Fully realizing the potential of blue foods will also require addressing overfishing and planning for climate threats such as warmer waters, deoxygenation, and stronger storms.

This brief is part of a series assessing how blue foods can support national climate goals by combining country-specific data on production, trade, consumption, greenhouse gas (GHG) emissions, and climate risks to identify opportunities for mitigation and adaptation. It is intended for decision-makers developing national climate strategies in Mexico and similar contexts, as well as funders and implementing partners targeting blue foods in climate initiatives.

Production and trade

Marine capture fisheries dominate Mexico's blue food production by volume, with small pelagic species driving much of this production. Pacific thread herring, Pacific sardine, Pacific anchoveta, and Pacific anchovy together account for nearly 30% of total production. Among the top species, all but one come from marine capture fisheries. The exception is whiteleg shrimp, a farmed species that ranks as the second most produced blue food in the country.

Production (MT)[3]	Inland	Marine
Capture	148,338	1,352,436
Aquaculture	75,028	203,655

Mexico exports 30% more blue food by volume than it imports. Exports total US$1.4 billion, compared to US$1.1 billion in imports. The largest exports by volume include fishmeal, fish oil, and small pelagic species, mainly to China (31%), the United States (26%), and South Korea (7%). The highest-value exports are fishmeal, fish oil, and shrimp, with key markets including the United States (44%), China (24%), and Norway (6%).[4]

Blue food consumption

Mexicans consume nearly 14 kg of blue foods per person per year, below the global average of 20.2 kg per capita in 2022.[5] Most consumption comes from marine species, particularly small pelagics such as Pacific thread herring, Pacific anchoveta, Pacific sardine, and California anchovy. Whiteleg shrimp is the second most consumed species (10%), behind Pacific thread herring (16%). Yellowfin tuna and species within the tilapia genus, both captured and farmed domestically, are also commonly eaten. Small pelagic fish are rich in DHA and EPA, protein, and vitamin B12. Yellowfin tuna provides high levels of vitamins B12 and B6, though it is lower in DHA and EPA. Tilapia is an excellent source of protein and selenium but contains lower levels of other key nutrients. Whiteleg shrimp are less rich in most nutrients but are a good source of selenium.

Greenhouse gas emissions

Across the four production sectors, marine capture fisheries generate the highest total emissions, nearly four times those of marine aquaculture. These estimates reflect production by Mexican-flagged vessels, regardless of where fishing occurs. Inland fisheries and aquaculture emit far less, reflecting their lower production volumes. At the species level, however, farmed whiteleg shrimp is the single largest emitter, accounting for more than 15% of all sector emissions, followed by yellowfin tuna and Pacific thread herring, each contributing just over 5%. Farmed tilapia, an inland species, also ranks among the top emitters, accounting for just under 5% of total emissions.

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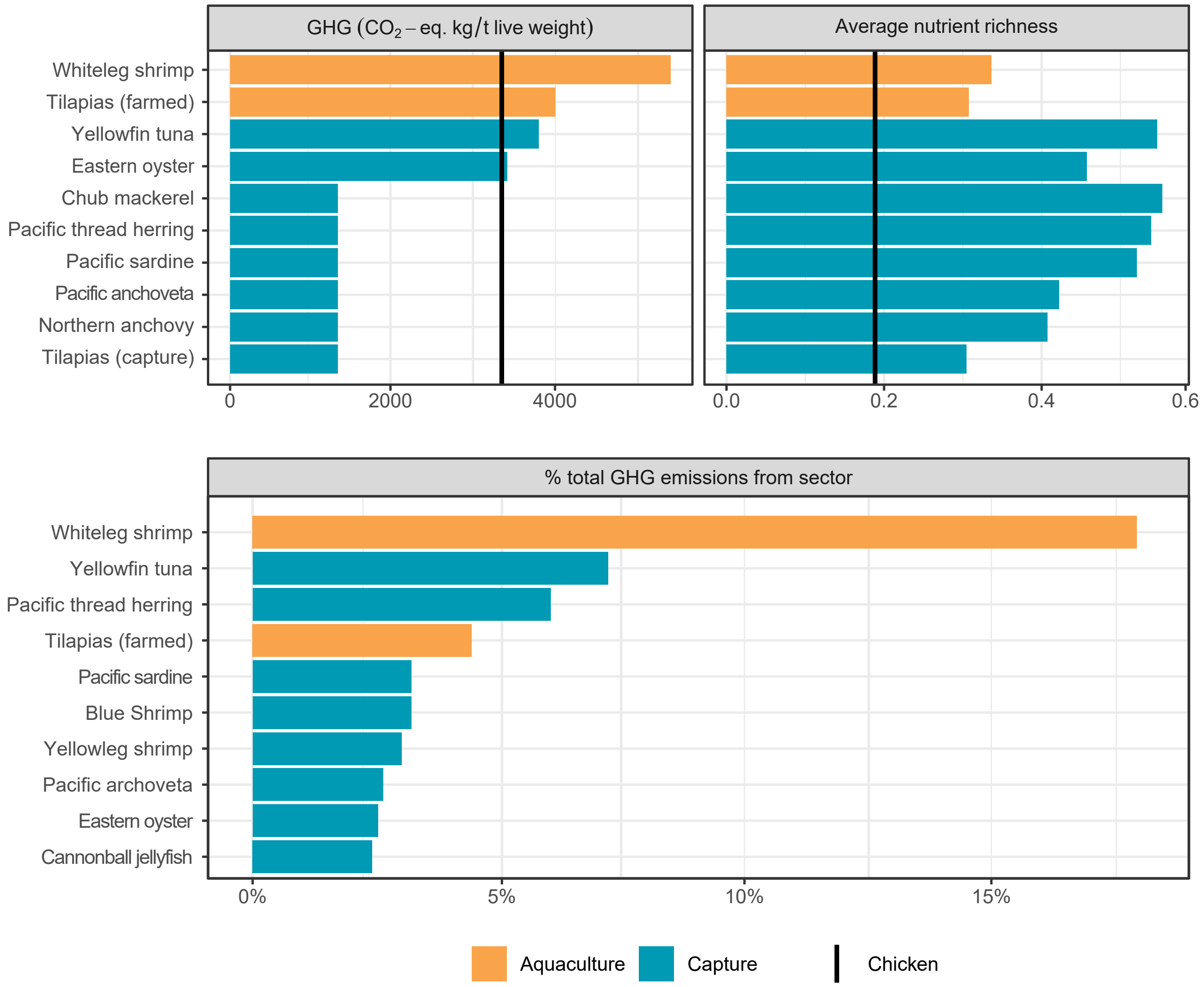
[1] *FAO, "Food balances (2010-)."* [2] *CONAPESCA, "Fishing and aquaculture."* [3] *Gephart et al., "Aquatic Resource Trade in Species." Note that the ARTIS production numbers exclude seaweed, mammals, reptiles, and co-products (e.g., caviar).* [4] *FAO, "FishStatJ: Global Aquatic Trade - By partner country 2019-2023."* [5] *FAO, "Food balances (2010-)." This consumption figure includes both domestically produced and imported species.*

When comparing emissions intensity per ton of live weight produced across the four production sectors, marine capture fisheries have the lowest emissions intensity, about 10% lower than chicken production. In contrast, marine aquaculture has the highest intensity, producing nearly 60% more emissions per ton than chicken production. At the species level, farmed whiteleg shrimp, primarily an export product, is particularly emissions-intensive, producing 60% more emissions per ton than chicken production. Farmed tilapia, consumed widely in Mexico, produces 20% more, while yellowfin tuna generates about 15% more. In contrast, small pelagic species such as Pacific thread herring are highly efficient, with emissions 60% lower than those of chicken.[6,7]



Emissions and average nutrient richness for top species produced in Mexico. In the top-left panel, GHG emissions are kilograms CO2-eq. per tonne live weight produced. Average nutrient richness is the average of the concentration of six nutrients relative to how much is needed to meet daily requirements for a woman aged 18-55. These six nutrients are vital for human health and include iron, selenium, vitamin B12, vitamin B6, protein, and the fatty acids DHA and EPA. The black lines indicate the GHG emissions (kg CO_2-eq. t^{-1} live weight produced) and average nutrient richness of chicken. The bottom panel shows the taxa as they contribute to total GHG emissions for the sector. Note that this figure excludes taxonomic groupings broader than family (e.g., Actinopterygii, Perciformes, Mollusca, Cephalopoda).

Climate hazards

Mexico's blue food systems are highly vulnerable to climate change. In marine ecosystems, rising temperatures, marine heatwaves, declining oxygen levels, increased salinity, and shifting nutrient dynamics are already altering species composition and reducing biomass and species richness. Ecosystem models project mixed outcomes for Mexico's Atlantic and Pacific fisheries. In the Pacific, total marine biomass could decline by 9% by 2050 under low-emission scenarios and by 12% under high-emission scenarios, while projected changes in the Atlantic are more limited.[8]

[6] Gephart et al., "Aquatic Resource Trade in Species." [7] Gephart et al., "Environmental performance of blue foods." [8] Blanchard J.L., and Novaglio, C. (Eds.), "Climate change risks."

Although aquaculture currently plays a smaller role than capture fisheries, its future expansion may be constrained by growing coastal and hydrological hazards. Previous analyses from the Blue Food Assessment project medium-high levels of climate hazards for coastal aquaculture under a high-emission scenario.[9] Together, these trends pose risks to the stability and productivity of Mexico's blue food systems, with implications for export earnings, domestic consumption, and livelihoods.

Fishermen dragging fishing nets in Veracruz, Mexico
Image credit: Oleg Shuldiakov/ iStock.com

Blue foods in nationally determined contributions

A global analysis of blue food inclusion in the most recent nationally determined contributions (NDCs) for all countries that submitted during the NDC 2.0 cycle scored each country as "No mention," "Low," or "High" based on the presence and specificity of blue food-related keywords. In this analysis, Mexico had low inclusion, compared to 76 countries with high inclusion, 36 with low inclusion, and 82 with no mention of blue foods at all.

Mexico's latest NDC, submitted in 2022, includes broad commitments to protect marine and coastal ecosystems and recognizes their role in climate mitigation and adaptation. It identifies the fisheries sector as a target for climate action and references consultation with the Fisheries Information Service. The NDC also commits to developing a National Blue Carbon Strategy, primarily focused on mangrove conservation and restoration. However, it does not explicitly reference blue foods in the context of climate mitigation, adaptation, or food systems. Strengthening these linkages, particularly around the role of blue food production in supporting food and nutrition security, livelihoods, and emissions reduction, could help align Mexico's NDC with its broader environmental and food system goals.

[9] *Tigchelaar et al., "Compound climate risks."*

Recommendations for action

Invest in climate-adaptive fisheries management and resilient coastal communities. Mexico's marine fisheries, crucial for livelihoods, nutrition, and the economy, face mounting pressure from warming waters, deoxygenation, and more intense and frequent storms. Strengthening management by incorporating climate variables into stock assessments and planning new multispecies co-management systems at the regional level can build sustainability and resilience. Tailoring strategies to regional and community contexts, such as developing regional territorial use agreements, can also help address local climate impacts. As coastal fishers grow more exposed to climate-related hazards, investing in a regionalized early warning system for natural disasters, including developing a national atlas of climate risks and vulnerabilities, and developing financial instruments and social security mechanisms to protect fishers from climate impacts can improve safety and adaptive capacity. Updating the General Sustainable Fisheries and Aquaculture Act to reflect these measures could further align the sector with social, environmental, and climate goals.

Reduce emissions from tuna fisheries. Within Mexico's marine capture sector, tuna fisheries account for a large share of emissions, while small pelagics such as Pacific thread herring are comparatively low-emission and highly efficient. Emissions reductions could therefore focus on higher-impact fleets, especially tuna. Opportunities include improving fuel efficiency across fleets, upgrading vessel engines, transitioning to low- or zero-emission technologies, and incentivizing gear improvements, but primarily better managing stocks. Supporting efficient cold storage at landing sites can also reduce fuel use and post-harvest loss. Given the distinct characteristics between industrial and small-scale vessels, strategies should be tailored to vessel type and target species.

Improve aquaculture feed and farm management to reduce GHG emissions. Improving feed and farm practices in aquaculture can reduce emissions, particularly from species such as whiteleg shrimp and tilapia, which are among Mexico's most emissions-intensive farmed blue foods. Strategies such as optimizing feed conversion ratios, improving biosecurity, and sourcing lower-emission feed ingredients can lower both costs and environmental impacts. Supporting research, training, and technology adoption, especially for small- and medium-scale producers, can help with the uptake of best practices. More data on GHG emissions from different types of aquaculture production, and systems for measuring those emissions over time, are also needed to more effectively set targets and monitor progress.

A variety of fish on display at a fish market in San Cristóbal de Las Casas, Mexico *Image credit: Edgar Machado/ iStock.com*

Reduce loss and waste and enhance circularity in blue food supply chains, which can lower emissions while increasing profitability and improving food availability. Investments in cold storage, transport, and processing infrastructure, especially in coastal and rural areas, can help preserve product quality and reduce spoilage. Repurposing fish waste into fishmeal, fertilizers, or other products can further reduce environmental impacts and create new income streams. Policies that support innovation and traceability can help support these solutions while advancing climate goals.

Integrate sustainable blue foods into public food programs while supporting consumer shifts toward healthy, low-footprint choices. A national system of regional, direct-to-producer purchases of sustainable, traceable, and legally documented blue foods could regularly supply healthy products to school breakfast programs, disaster relief, and food assistance programs, improving nutrition while building climate resilience. Labeling initiatives and public awareness campaigns, such as those led by COMEPESCA, can help shift consumer demand toward sustainable options while highlighting the role of blue foods in preventing inflammatory and chronic diseases. These efforts could expand markets for responsible local producers and reinforce the role of blue foods in meeting national health and climate goals.

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Suggested citation: Koehn, J.Z., Anderson, L.C., Henriksson, P.J.G, Tigchelaar, M. 2025. Blue foods in national climate strategies: Mexico. Stanford Center for Ocean Solutions. https://doi.org/10.25740/qr738mf9192

Header image: Fishing boats moored in the port of Tuxpan, Mexico
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