Food and Agriculture Organization of the United Nations

BOBP

National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in China

National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in

China

Bay of Bengal Programme Inter-Governmental Organisation
91, St. Mary's Road, Abhiramapuram
Chennai 600 018, Tamil Nadu, INDIA

Preferred citation

BOBP IGO, 2025. National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in **China**.

Report Preparation

Dr. P. Krishnan, *Director, BOBP-IGO, Chennai*
Mr. Rajdeep Mukherjee, *Policy Analyst, BOBP-IGO, Chennai*
Dr Ahana Lakshmi, Senior Consultant, BOBP-IGO, Chennai

Background Research

Dr. T. Velumani, Project Scientist, *BOBP-IGO, Chennai*
Dr. K. Nirmala, Consultant, *BOBP-IGO, Chennai*
Dr. Anisha Shafni John, Research Associate, *BOBP-IGO, Chennai*
Ms Afifat Khanam Ritika, BIMReN Fellow, *BOBP-IGO, Chennai*
Ms Bhoomika Kosambi, Intern, *BOBP-IGO, Chennai*
Mr Nihal Kumar, Intern, *BOBP-IGO, Chennai*

Published by Dr. P. Krishnan, Director on behalf of the Bay of Bengal Programme Inter-Governmental Organisation, 91, St. Mary's Road, Abhiramapuram, Chennai 600 018, India.

National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in China

Table of Contents

List of Tables

List of Figures

1. Introduction and Context

1.1. Overview of the country's demographic and economic profile (fisheries)

China, with a population of 1.41 billion, is a leading global fisheries nation whose marine and inland water resources strongly support domestic food supply and international seafood trade. China has one of the world's largest marine shelf areas at 1,028,908 km² and a continental coastline exceeding 18,000 km, giving it substantial access to rich marine fisheries resources. The country's total fisheries and aquaculture production reached 62.85 million tonnes in 2020, of which aquaculture contributed 79% of output while capture fisheries accounted for 21%, highlighting China's dominance in farmed aquatic production. Fish availability for domestic consumption averaged 38.8 kg per capita, positioning aquatic foods as a major component of the national diet[Error! Bookmark not defined.]. In economic terms, China exported USD 18.48 billion worth of fish and fish products in 2020 while importing USD 14.88 billion, reflecting its dual role as both a global seafood supplier and a major processing and consumption hub. With a coastline of 30,017 km, rapid GDP growth averaging 8.33%, and a GDP per capita of USD 10,500, the fisheries sector functions as a critical contributor to food security, nutrition, employment and international trade within China's broader economic system[1]. Within this structure, fisheries contribute over 10.1% of the agricultural sector's economic value, amounting to ~2.64 trillion yuan in 2019, demonstrating its importance to rural income and employment[2]. China's 'Big Food' policy integrates aquatic products into national food-security strategy, emphasising that , alongside grain; meat, vegetables, fruit and aquatic products must all be guaranteed to meet people's needs for a better life[3].

China is the world's largest fisheries and aquaculture producer, contributing roughly 36% of global aquatic animal output in 2022, and close to 40% of total global aquatic production when algae are included[45]. Production has risen dramatically from 4.6 million tonnes in 1980 to 64.8 million tonnes in 2019, with aquaculture accounting for ~78% of total production by 2019[6]. While aquaculture continues to grow, marine capture has declined, from 14.4 million tonnes in 2015 to about 11.8 million tonnes in 2022[5], reflecting China's policy approach of controlling marine capture volumes and promoting sustainable, "green aquaculture." Fishing gear distribution exhibits a strong dominance of trawling at 47.7%, followed by gillnets (22.4%), stow nets (12.5%), purse seines (7.9%), hand-lines and hooks (3.0%) and other gears at 6.5%[1]. The East China Sea stands out as the most productive region, followed by the South China Sea, Yellow Sea and Bohai Sea. In the inland sub-sector, aquatic resources span 176,000 km², with lakes comprising 42.2%, rivers 39%, and reservoirs and other waters the remainder. Inland capture has stabilized at around 2.28 million tonnes, of which finfish represent 73%, crustaceans 14.5%, shellfish 11.4% and aquatic plants 0.01%. Inland aquaculture accounts for 60% of total national aquaculture output, with northern and western regions jointly contributing only 2.8%, underscoring sharp spatial disparities in aquaculture intensity[1].

China's fishery sector has also diversified socially and economically: recreational fisheries now play a rising role, supported by government establishment of 396 pilot sites by 2014 with a national target of 500 sites by 2016, reflecting a growth of 26% in pilot site expansion during the 12th Five-Year Plan. Post-harvest processing industries have evolved such that by 2014, up to 30% of aquatic products were processed rather than marketed directly as raw fish. Meanwhile, China's global emergence in aquatic trade saw exports rise from USD 260 million in 1978 to USD 30.8 billion in 2014, an increase of over 11,750%, making China the world's

largest exporter of fish products for more than a decade[1]. The fisheries sector supports a large employment base, with around 4.3 million workers employed directly in aquaculture[7] and more than 16 million people reliant on fisheries-linked livelihoods[8]. China is also the world's largest exporter of fishery products and has recently become a net importer of aquatic products by value, in response to increasing domestic demand for high-value seafood and its strong role in global seafood processing[5].

The largest proportion of the population, 63.35%, falls within the working-age group of 15–59 years, indicating a strong labour force with the potential to support economic productivity. The younger population aged 0–14 years accounts for 17.95%, which suggests a moderately sized upcoming generation, but not a high dependency burden from children. Meanwhile, the elderly population aged 60+ years constitutes 18.70%, and notably, 13.50% of the population is aged 65 or above, highlighting a visible demographic shift toward an aging society (Table 1).

Table 1. Population Distribution Structure

Category	%
0–14 years	17.95
15–59 years	63.35
60+ years	18.70
65+ years	13.50

Source: National Bureau of Statistics of China[9]

China has a total of 2,759 lakes, among which very large lakes (>1,000 km²) constitute only 0.5% of total lake numbers, but account for a disproportionately large 38% of total lake surface area. By contrast, the smallest lakes (1–10 km²) make up 75.6% of all lakes, yet represent only about 6.3% of total lake area. Lakes sized 10–100 km² form about 18.7% of lake numbers and contribute roughly 18.7% of total area. These percentages show a strong size asymmetry: a very small number of large lakes dominate total water surface coverage. In geographic terms, eastern freshwater lakes: such as Poyang, Dongting, Hongze, Taihu, and Chaohu, account for about 45% of China's total lake area, while the very large lake category: Qinghai, Poyang, Dongting, Taihu and others, constitutes only 1.1% of lake count but occupies an enormous 50.5% of the total lake area (Fig 1) (Table 2).

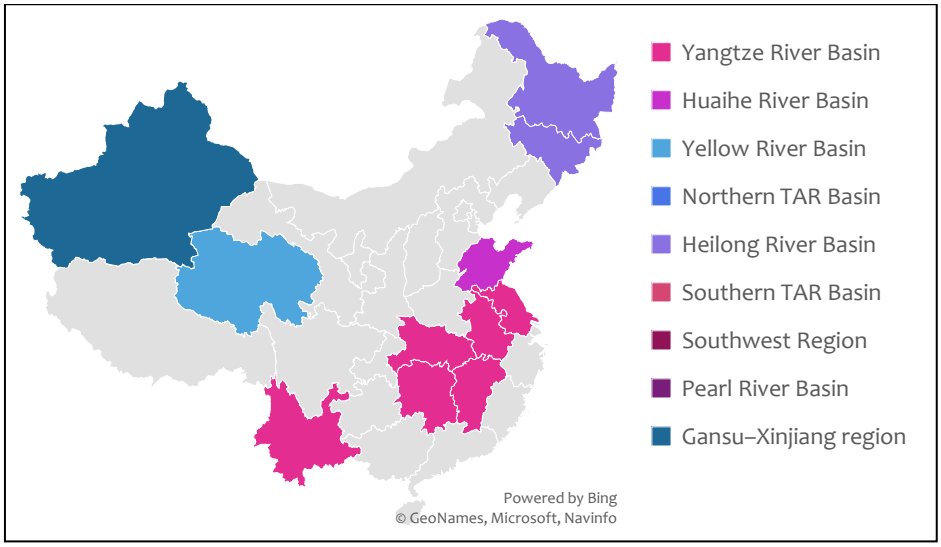

Figure 1. Freshwater Lakes in China
Source: FAO[10]

Table 2. Saline Lakes In China

Lake	Main location	River basin	Area (km²)
Ngagna Ringco Lake	China, TAR	Northern TAR Basin	513
Taro Co Lake	China, TAR	Northern TAR Basin	487
Sayram Lake	Xinjiang	Gansu–Xinjiang region	454
Aicke Lake	Xinjiang	Southern TAR Basin	345
Dali Nur Lake	Inner Mongolia	Inner Mongolia	210
Dalai Lake	Inner Mongolia	Inner Mongolia	140
Qinghai Lake	Qinghai	Qaidam	4,200
Hulun Lake	Inner Mongolia	Inner Mongolia	2,000
Namtso Lake	China, TAR	Northern TAR Basin	1,961
Siling Co Lake	China, TAR	Northern TAR Basin	1,628
Zhari Namco Lake	China, TAR	Northern TAR Basin	996
Bosten Lake	Xinjiang	Gansu–Xinjiang region	960
Dangra Yun Co Lake	China, TAR	Northern TAR Basin	959
Buluntuo Hai Lake	Xinjiang	Gansu–Xinjiang region	730
Yamdrok Tso Lake	China, TAR	Northern TAR Basin	638
Hoh Xil Lake	Qinghai	Qaidam	538
Ayakum Lake	Xinjiang	Northern TAR Basin	570
Aibi Lake	Xinjiang	Gansu–Xinjiang region	522

Source: FAO[10]

Three Asian countries (China, Indonesia and India) together possess more than 1.1 million vessels, which accounted for nearly 41 percent of the global fleet of motorized fishing vessels in 2018[11]. However, this number may be very conservative in view of the 36 233 fishing vessels of ≥ 24m LOA, as reported by the Government of China in the China Fishery Statistical Yearbook 2020 (China, 2020). The fishery fleet data from 1980 to 2019 shows a significant shift in fleet composition and usage patterns. By 2019, the total number of fishery vessels reached 4,68,312, reflecting a substantial growth in fleet size over time, even though the 1980 baseline is unavailable. The average engine horsepower per vessel increased only slightly, from 42.37 KW in 1980 to 42.50 KW in 2019, indicating that while the fleet expanded numerically, its technological power and engine capacity remained relatively stable. A major structural change is seen in the share of marine vs. inland vessels: marine fleets, which accounted for 80% of all vessels in 1980, dropped sharply to 48% by 2019, while inland fleets rose from 20% to 52% during the same period (Fig 3).

Table 3. Fishery Fleet Trend: 1980-2019

Parameter	1980	2019
Total number of fishery vessels	–	4,68,312
Average engine horsepower per vessel (KW)	42.37	42.50
Marine fleet share of total	80%	48%
Inland fleet share of total	20%	52%

Source: Transforming China's Fisheries, 2019[12]

The composition of fishing vessels shows a clear structural shift between 2015 and 2023. In 2015, motorised vessels made up 64.5% of the total fleet, rising slightly to 64.0% in 2019 and further to 68.2% by 2023, indicating an increasing reliance on powered craft. Conversely, non-motorised vessels accounted for 35.5% of the fleet in 2015, 36.0% in 2019, and declined to 31.8% in 2023. Overall, the total number of vessels has declined, with motorised vessels decreasing by roughly 49.6% and non-motorised vessels by about 57.4% since 2015, suggesting a gradual reduction in fleet size but with a relative strengthening of motorised dominance (Table 4).

Table 4. Composition of the Fishing Vessels in Capture Fisheries

	2015	2019	2020	2021	2022	2023
Motorised	6,72,416	4,68,312	3,74,757	3,56,994	3,42,418	3,38,817
Non-Motorised	3,70,073	2,62,857	1,88,505	1,63,851	1,68,628	1,57,713

Source: Fishery and Aquaculture Statistics Yearbook, 2023.

The vessel characteristics indicate substantial growth in capacity and technological power from 2000 to 2020. Single-boat bottom trawlers increased in average length by 11.5%, while their gross tonnage rose by 37.0% and engine power by 46.4%, reflecting greater fishing endurance and hauling strength. Pair trawlers show even more dramatic scaling, with length expanding by roughly 62%, gross tonnage by around 270%, and engine power by about 152%,

signaling a shift to much heavier and more powerful gear. Large purse seiners also intensified, with average length increasing by 31.4%, gross tonnage by about 105%, and engine power by nearly 147%, underscoring greater operational range and catching capability. By 2020, specialized vessels such as gill-netters and stownetters also appear in the fleet data with high gross tonnage and engine power (Table 5).

Table 5. Comparison of Average Vessel Characteristics

Fleet	Length Overall (Mts)		Gross Tonnage (GT)		Engine Power (kW)	
	2000	2020	2000	2020	2000	2020
Single Boat Bottom Trawlers	26	29	127	174	110	161
Pair Trawlers	25-28	43	114-158	504	185	467
Large Purse Seiners	28-42	46	158-474	648	280-440	889
Gill netter	34.02		168.6		236.8	
Stownetter	39.32		189.2		382.6	

Source: FAO Fishery and Aquaculture Statistical Yearbooks, 2020

Hairtail appears as a major target for 60% of the fleet categories (stow netters, single-boat bottom trawlers, pair trawlers), indicating its strong commercial importance. Anchovy is similarly targeted by 60% of fleets (single-boat bottom trawlers, pair trawlers, purse seiners), reflecting its significance in bulk catches and processing industries. Silvery pomfret is targeted by 40% of fleets (gill netters and pair trawlers), while Spanish mackerel is targeted by 40% (single-boat bottom trawlers and pair trawlers), showing moderate exploitation pressure. Squid is targeted by 40% of fleets as well (pair trawlers and purse seiners), pointing to a shared interest between trawling and pelagic-school-based fishing operations (Table 6).

Table 6. Main Species Targeted by Fishing Fleet[11]

Fleets/species targeted	1	2	3	4	5
Gill netters	Silvery pomfret (*Pampus argenteus*)	Swimming crab (*Portunus trituberculatus*)	Small yellow croaker (*Pseudosciaena polyactis* Bleeker)	–	–
Stow netters	Big yellow croaker (*Pseudosciaena amblyceps*)	Eel (*Anguilliformes*)	Hairtail (*Trichiurus haumela*)	Common Japanese mackerel (*Scomber japonicus*)	–

Fleets/species targeted	1	2	3	4	5
Single boat bottom trawlers	Hairtail	Mantis Shrimp (*Oratosquilla oratoria*)	Octopus (*Octopoda*)	Anchovy (*Engraulis japonicus*)	Spanish mackerel (*Scomberomorus nipholonius*)
Pair trawlers	Hairtail	Silvery pomfret	Anchovy (*Engraulis japonicus*)	Spanish mackerel	Squid
Purse seiners	Anchovy	Squid (*Ommastrephes bartrami*)	–	–	–

Source: ODI

1.2. Key nutrition challenges (e.g., undernutrition, micronutrient deficiencies, and overweight/obesity).

China faces a complex nutrition challenge characterized by a simultaneous persistence of micronutrient deficiencies and rising overweight/obesity, despite large fish availability. Per capita fish consumption has grown dramatically from about 4.2 kg in 1961 to ~40 kg in 2019[1], and FAO's National Aquaculture Sector Overview estimates a supply of ~36 kg per capita[8], but this access is uneven, coastal provinces frequently exceed 60–75 kg per person, while inland provinces consume <10 kg. Undernutrition and micronutrient deficiencies remain prevalent in vulnerable rural populations: for example, among infants aged 6–23 months in China's poorest counties, anaemia (18.3%), stunting (7.5%) and wasting (4.7%) coexist with early overweight (3.1%)[4], and among older adults 5.7% were underweight, 34.8% overweight, 12.4% obese, with ~12.5% anaemia and >75% showing inadequate intake of key micronutrients such as vitamins A, B_2, folate, selenium and calcium[5]. Meanwhile, rapid urbanization and dietary westernization have driven sharp rises in adult overweight and obesity over recent decades[6], creating a "double/triple burden of malnutrition" in which both nutrient deficiency and excess coexist within the same population[7,8].

1.3. Summary of the importance of aquatic foods in national diets and livelihoods

Aquatic foods from marine, aquaculture and inland sources are now embedded in both Chinese diets and livelihoods at a national scale: FAO's SOFIA 2024 indicates that China alone accounts for about 36% of global apparent consumption of aquatic animal foods, underlining their centrality in the national food basket[13]. A 2022 nationwide dietary survey found that Chinese residents consume on average 48 g of aquatic products per person per day, mainly fish and crustaceans, with intake spread across all age groups and aligning with Chinese dietary guidelines, confirming aquatic foods as a mainstream source of animal protein and micronutrients[14]. More detailed consumer research in 2024 showed that roughly one-third of surveyed Chinese consumers eat aquatic foods at least twice per week, with strong and growing preferences for diverse, higher-quality seafood, indicating sustained demand for both marine and farmed products[15]. On the supply side, China's total fish production reached

about 71 million tonnes in 2023, of which aquaculture contributed 81.6%, meaning that freshwater and coastal aquaculture now provide the bulk of affordable fish and shellfish that feed urban and rural populations[16]. FAO's aquaculture country profile already records millions of rural workers directly employed in aquaculture, and more recent social-survey analysis estimates that over 16 million people in China derive their livelihoods directly or indirectly from fisheries (marine capture, inland capture and aquaculture combined), showing the sector's importance for employment and income, particularly in coastal and riparian communities[17]. Marine capture fisheries (including distant-water fleets) and coastal mariculture supply high-value marine fish, crustaceans and molluscs for domestic markets and export, while extensive inland aquaculture and river–lake fisheries provide lower-cost carps and other freshwater species that are crucial for food security in interior provinces; case studies such as the Poyang Lake fishing ban demonstrate how dependent inland households have been on capture fisheries and how shifts in management rapidly reshape livelihood strategies[18]. Synthesizing these lines of evidence, Yang (2025) concludes that China's rapidly expanding and increasingly aquaculture-dominated aquatic food system is now a key pillar of national diets and a major livelihood base across marine, aquaculture and inland sub-sectors, with important implications for sustainable diet and environmental policy[19].

2. Country Snapshot Table

Indicator	Value	Year	Source
Population (billions)	1.41	2022	FAO[1]
GDP per capita (USD)	10,500	2020	FAO[22]
Marine Capture Production	1,29,85,097 tonnes	2022	FAO[20]
Aquaculture Production	5,28,83,662 tonnes	2022	FAO[20]
Inland Aquaculture Production	1,166 thousand tonnes	2022	FAO[69]
Top 3 Capture Species	Marine Fishes NEI: 26,61,523.42 Largehead hairtail: 9,10,275 Freshwater Fishes NEI: 9,08,467	2023	FAO[69]
Top 3 Aquaculture Species	Cupped Oysters NEI: 66,71,197 Grass Carp (=White amur): 59,41,315 Constricted tagelus: 4,49,106	2024	FAO[69]
Employment in Fisheries Aquaculture (thousands)	44,42,159	2023	FAO[69]
Employment in Fisheries Capture (thousands)	11,49,489	2023	FAO[69]
Export (USD Million)	18,48,17,38,200	2020	FAO[22]
Imports (USD million)	14,88,14,73,060	2020	FAO[22]

Per capita Fish Consumption (Kg/year)	38.8 Kg/capita	2020	FAO[22]
% of animal Protein from Fish	10-11%	2023	FAO[69]
Estimated Fish Loss and Waste			
Womens Participation in Post Harvest			
Key Compliance Measures			
Major Climate/Environment Risks			
Top Exporting item	Cuttlefish and squid, prepared and preserved: 18,15,588.98	2023	FAO
Women in SSF (number) (million)			

3. Aquatic Food Production and Utilization

3.1. Trends in capture fisheries (inland and marine) and aquaculture

The production data for 2020 shows that China's fisheries sector is overwhelmingly dominated by aquaculture, which accounts for 79% of the total 6,28,46,352 tonnes produced, while capture fisheries contribute only 21%. In 2024 aquaculture supplied **over 82%** of China's aquatic product output, reflecting a long-term structural shift from capture to culture-based production driven by policy and investment in aquaculture systems[21]. This indicates a strategic shift toward controlled, farm-based production rather than reliance on natural fish stocks (Table 7).

Table 7. Total Production in the Fisheries Sector, 2020

Total	**6,28,46,352 tonnes**
Fisheries	21%
Aquaculture	79%

Source: FAO[22]

The 2023 production composition clearly highlights China's global importance in fisheries, with aquaculture contributing 55,212 thousand tonnes, representing 63.1% of Asia's output and 56.0% of world production, demonstrating China's dominant position in global aquaculture. In contrast, capture fisheries produce 13,205 thousand tonnes, accounting for 27.5% of Asia's share and 14.6% of global capture output, reflecting a comparatively smaller role in wild harvests (Table 8).

Table 8. Composition of the Total Fisheries production and their Contribution, 2023

	Total Production	Asia's Total Share (%)	World's Share (%)
Capture Fisheries	13,205	27.5	14.6
Aquaculture Fisheries	55,212	63.1	56.0

Data: thousand tonnes- live weight
Source: FAO. 2025. FishStat. Global fisheries and aquaculture production 1950-2023

The trend shows a clear divergence between marine capture and marine culture production over the period. Marine capture declines by roughly 15–20% from its 2015 peak, whereas marine culture increases by approximately 25–30% over the same period, eventually surpassing capture fisheries. By 2020 onward, cultured production makes up an estimated 55–60% of total marine output, compared to 40–45% from capture, indicating a structural shift toward farming-based production (Fig 2).

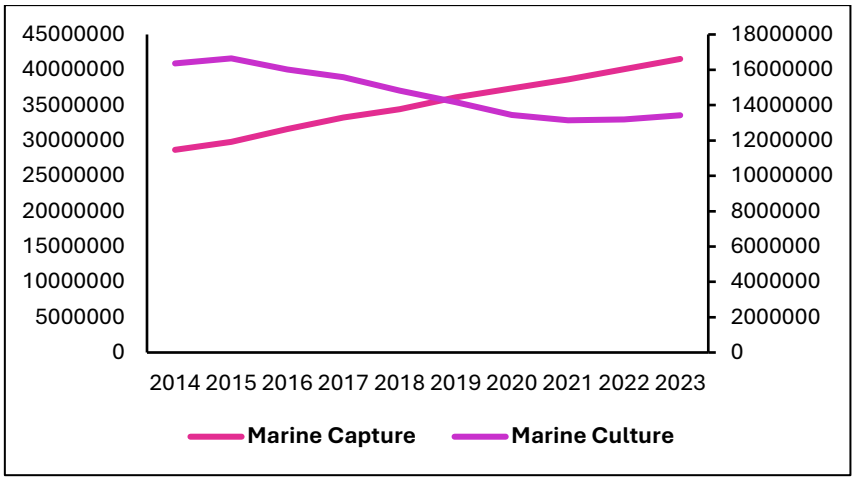

Figure 2. Trend in Marine Fisheries Production

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

The aquaculture production trend shows that freshwater aquaculture consistently dominates, accounting for approximately 59–60% of total aquaculture production from 2019 to 2021, gradually increasing to around 61–62% by 2024. Marine aquaculture, meanwhile, contributes about 40–41% in the earlier years and declines slightly in relative share to about 38–39% by 2024. Overall production increases for both sectors, but freshwater shows a stronger growth rate of around 20% over the period, compared to marine's more modest increase of roughly 12–14%, demonstrating China's sustained expansion and stronger reliance on freshwater aquaculture systems relative to marine-based farming (Fig 3).

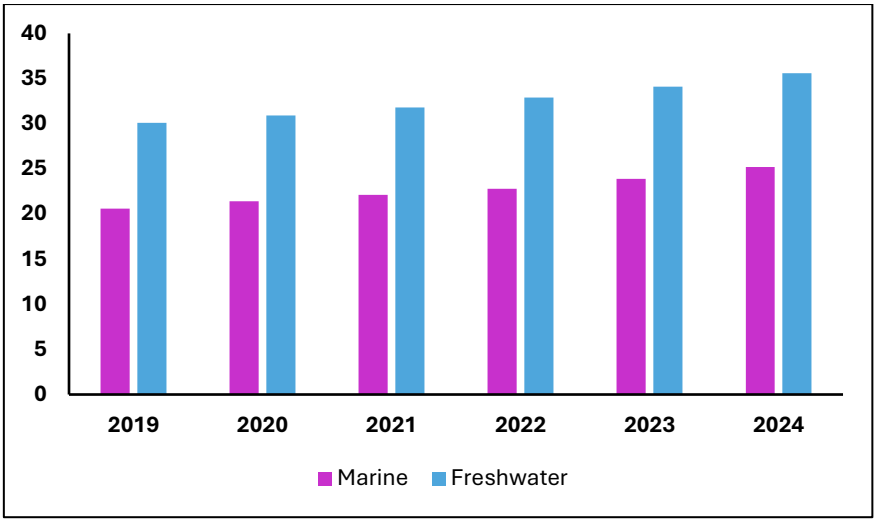

Figure 3. Trends in the Aquaculture Fisheries Production

Data: Metric Tonnes
Source: FAS. USDA, 2025[23]

The inland fisheries trend shows a decisive shift from capture to culture-based production. Inland culture steadily rises by approximately 20–25% from 2014 to 2023, while inland capture declines sharply, falling by nearly 50–55% from its 2017 peak to 2023. By the end of the period, inland culture represents roughly 70–75% of total inland output, compared to only 25–30% from inland capture (Fig 4).

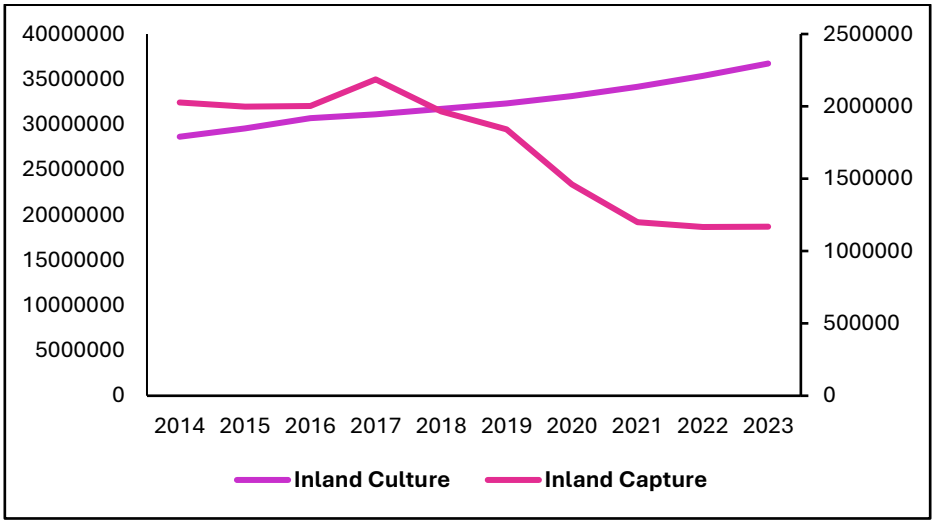

Figure 4. Trends in Inland Fisheries Production

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

3.2. Main species and product forms

The composition of fisheries products from 2020 to 2023 shows that aquaculture products consistently form the dominant share, accounting for approximately 75–78% each year, while marine products contribute the remaining 22–25%. Over this period, total production

increases by around 6–8%, with aquaculture experiencing stronger growth compared to marine-based output. China's high species diversity underpins its production: the country cultivates and harvests around 600 species across fish, shrimp, crabs, shellfish and algae, supporting a wide range of product forms from live fish to frozen, canned and ready-to-eat items[24]. This stable percentage dominance of aquaculture highlights China's continued dependence on farming-based fish production, while marine products remain supplementary (Fig 5).

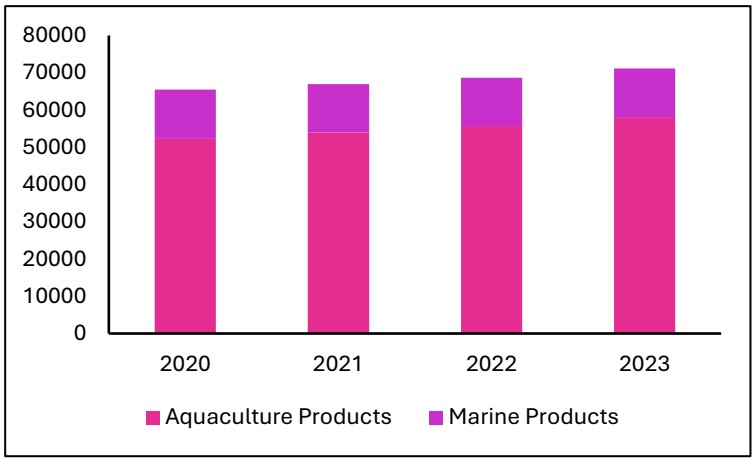

Figure 5. Overview of the Fisheries Products

Data: Thousand Metric Tonnes
Source: FAS. USDA, 2025

The aquaculture product composition shows that fish overwhelmingly dominates production, accounting for roughly 70–75% of total aquaculture output each year from 2020 to 2023, while shellfish contributes around 18–20%, and shrimp, prawn, and crab account for about 6–8%. Algae and other miscellaneous products together make up less than 2–3%, indicating their minor role in total volume. Over time, both fish and shellfish show steady growth of around 10–12%, whereas crustacean production increases more modestly by approximately 5–6%, reinforcing the pattern that China's aquaculture sector (Fig 6).

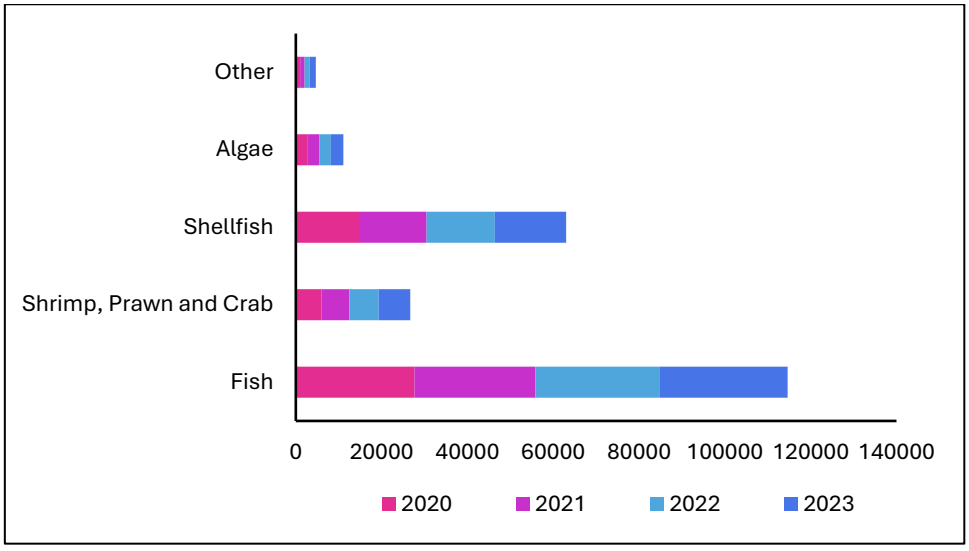

Figure 6. Composition of the Products in the Aquaculture

Data: Thousand Metric Tonnes
Source: FAS. USDA, 2025

The ranking of inland fisheries production shows that Portunus swimcrabs dominate at the top, contributing approximately 31–33% of total output among the listed species, followed by giant river prawn at around 17–18% and obscure pufferfish at about 15–16%. Nile tilapia accounts for roughly 14%, while frogs contribute close to 11%, and hybrid Blue-Nile tilapia add another 8–9%. Freshwater prawns and shrimps NEI along with Carassius spp. each represent about 7–8%, with yellow catfish and Wuchang bream forming the lower tier at roughly 5–6% and 3–4%, respectively (Fig 7).

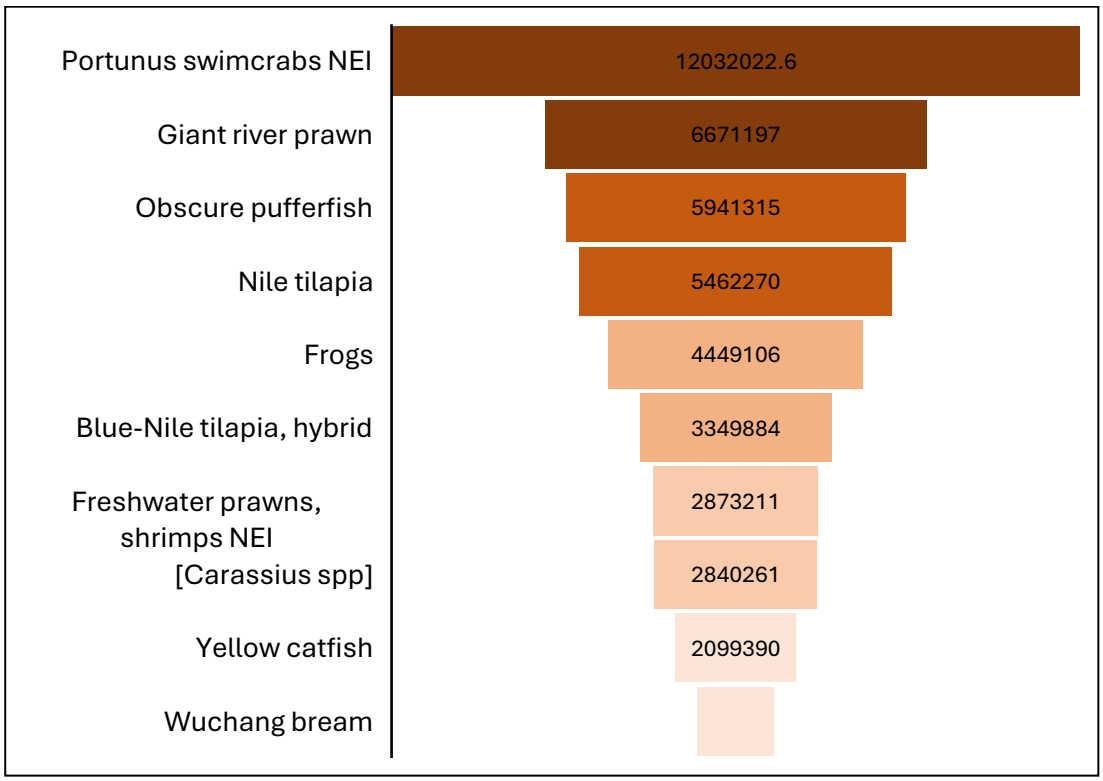

Figure 7. Top Fisheries Production in Inland Fisheries

Data: Metric Tonnes Source: FAO, 2025. Fishstat

The species-wise aquaculture production highlights a clear dominance of grass carp (White amur), which accounts for approximately 18–20% of total reported aquaculture output, followed by cupped oysters NEI at around 15–16% and Japanese carpet shell at 13–14%, reflecting the strong presence of molluscan aquaculture. Silver carp and marine fishes NEI each contribute about 10–11%, while bighead carp and common carp represent roughly 8–9% each. Carassius spp. and red swamp crawfish each account for around 6–7%, whereas whiteleg shrimp contributes the smallest among the listed categories at about 5–6%. Overall, this distribution confirms that carp species collectively make up well over 45–50% of China's aquaculture production (Fig 8).

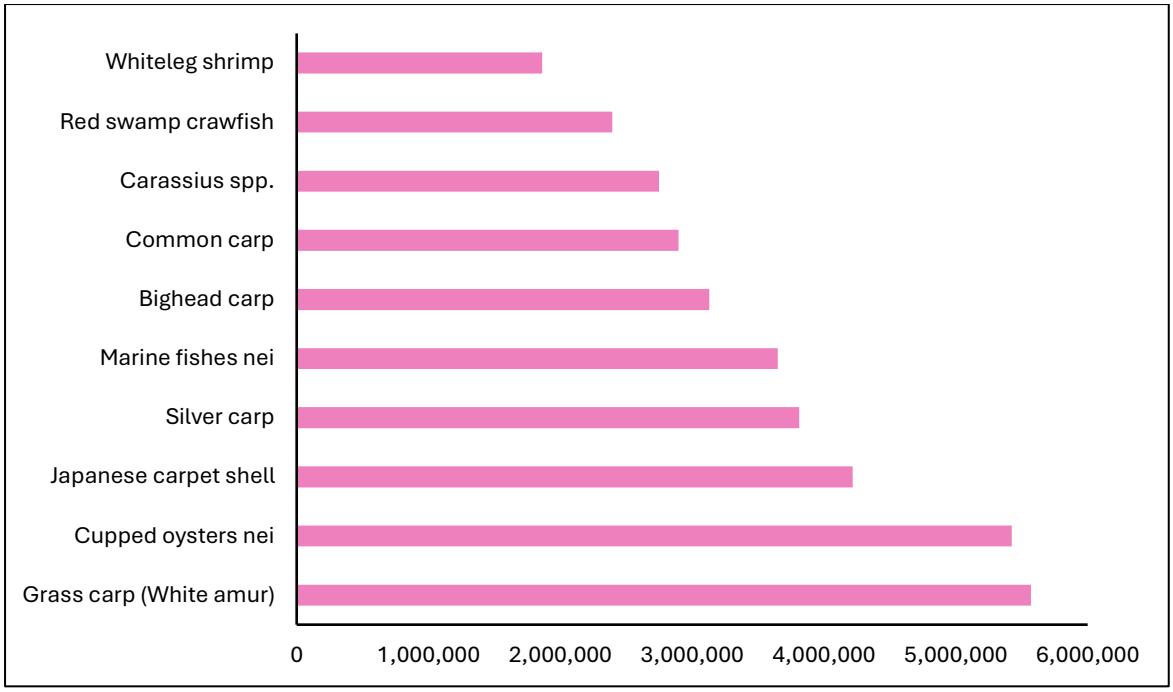

Figure 8. Top Species in Aquaculture Production

Data: tonnes
Source: FAO[22]

The marine fisheries production ranking shows that "Marine fishes NEI" overwhelmingly dominate, contributing roughly 55–60% of the total output among the listed species. Largehead hairtail and freshwater fishes NEI each account for around 18–19%, followed by Japanese anchovy at about 12–13%. Mid-range contributors such as jumbo flying squid and gazami crab contribute approximately 10–11% each, while Pacific chub mackerel and scads NEI form a slightly smaller share of around 8–9% each. The lowest-volume species, seerfishes NEI and various squids NEI, represent only about 7–8% of total reported tonnage (Fig 9).

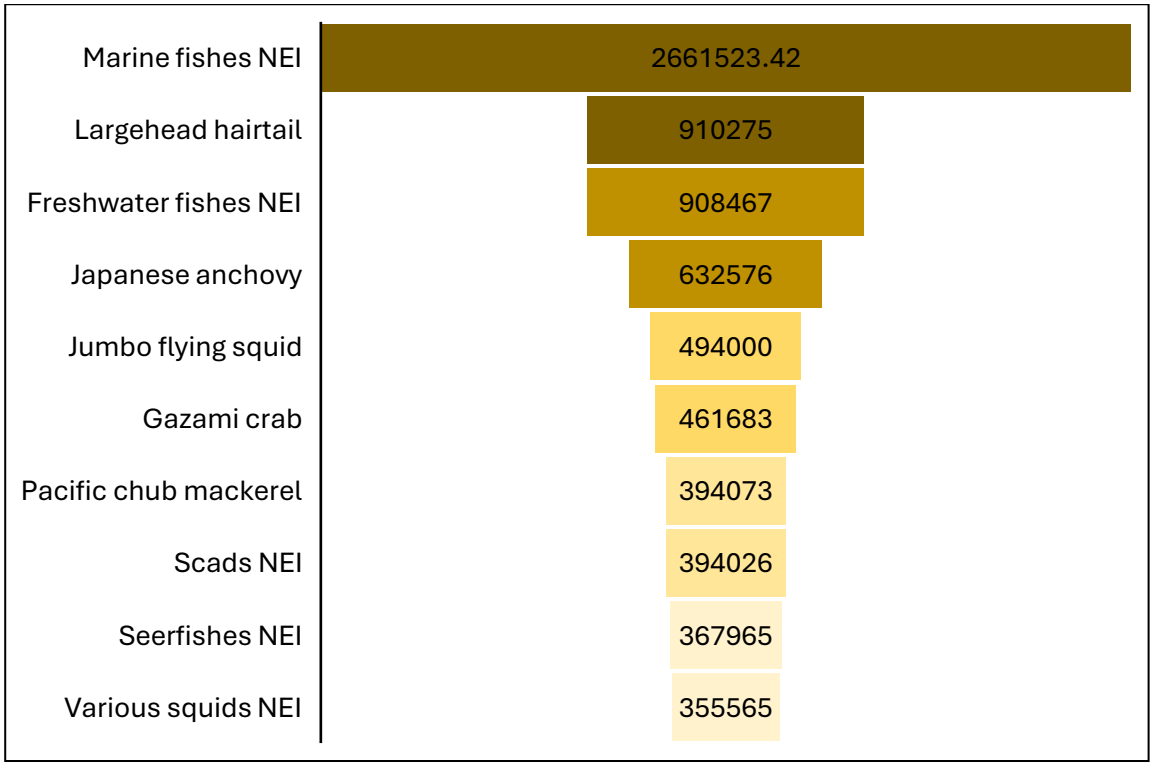

Figure 9. Top Fisheries in Marine Production

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

The algae production trend shows that China's contribution to global algae output is modest, accounting for only about 15–17% of total production in both 2010 and 2023, while the RoWcontributes roughly 83–85%. China's algae production slightly declined by around 17% from 2010 to 2022, before rebounding back to 220 thousand tonnes in 2023, representing a 13.4% recovery from the previous year. In contrast, RoW production increased by about 20% between 2010 and 2023, peaking in 2022 at 1,481 thousand tonnes and remaining significantly higher in absolute and relative terms (Table 9).

Table 9. Total Algae Production in 2023

	2010	2020	2021	2022	2023
China	236	220	204	194	220
RoW	1,128	1,211	1,175	1,481	1,354

Data: thousand tonnes
Source: Fishery and Aquaculture Statistics. Year Book 2023.

3.3. Major production zones and seasonal characteristics

China's major fisheries production zones are strongly structured by its four shelf seas and two great river basins. FAO's country review identifies the Bohai and Yellow seas (Liaoning, Hebei, Shandong and Tianjin), the East China Sea (Jiangsu, Zhejiang, Fujian and Shanghai) and the South China Sea (Guangdong, Guangxi and Hainan) as the core marine fishing areas; in 2005

the Bohai–Yellow Sea zone contributed about one-third of national marine capture, the East China Sea a little over one-third and the South China Sea about one-quarter, with fishing effort concentrated outside the regulated summer moratorium (typically June–September), so landings peak in spring and autum[25]. Inland capture fisheries are concentrated in the Yangtze and Pearl river systems and associated lakes and reservoirs in provinces such as Hubei, Jiangsu, Anhui, Jiangxi and Hunan; production follows a marked seasonal pattern, with spawning-season closures in spring–early summer and higher catches in the post-flood, receding-water period when fish are concentrated in floodplain lakes (e.g. Poyang and Dongting) and reservoirs[25],[26]. Aquaculture is now the dominant source of output: FAO and recent studies show that freshwater pond and reservoir culture is clustered along the Yangtze and Pearl basins and has expanded into the well-watered central provinces (notably Hubei, Hunan, Jiangxi and Jiangsu) where carp-based polyculture is practiced, generally with one production cycle per year in the north and up to two or more cycles in the subtropical south[27],[28]. Coastal and marine aquaculture (mariculture) is concentrated in Shandong, Liaoning, Jiangsu, Zhejiang, Fujian, Guangdong and Guangxi, producing mainly molluscs and seaweeds with high spatial density of ponds along the Bohai, Yellow, East China and Pearl River coasts; production is strongly seasonal, with seeding in late winter–spring and harvesting in autumn–winter, timed to monsoon-driven temperature and nutrient regimes[26,25,28]. China applies systematic aquaculture spatial planning under the Fisheries Law with multi-level plans (36 provincial, 351 regional and 1,572 county-level plans), organising aquaculture into designated zones, restricted zones and prohibited areas to manage environmental and production trade-offs[29].

The provincial production patterns show that in aquaculture, coastal and near-coastal provinces such as Guangdong, Fujian, Jiangsu, and Zhejiang collectively account for approximately 60–65% of total aquaculture output, with Guangdong alone contributing around 20–22%, demonstrating its strong dominance in freshwater and brackish farming. In comparison, marine fisheries production is even more coastal-concentrated, with Shandong, Zhejiang, Fujian, and Guangdong together contributing roughly 70–75% of total marine output, and Shandong alone providing close to 25–27%, reflecting its strong capture and marine culture industry (Fig 10&11).

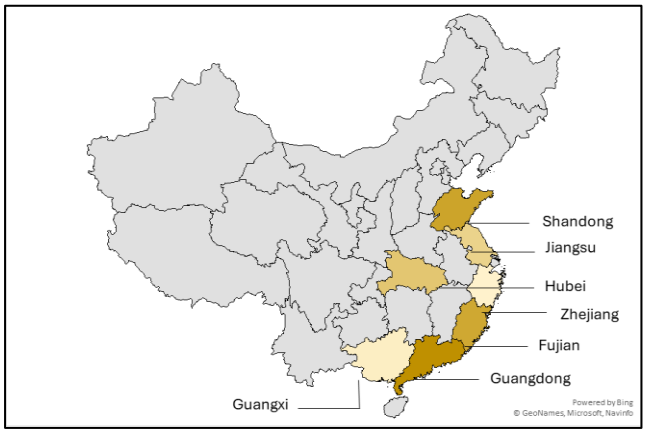

Figure 10. Aquaculture Producing Provinces

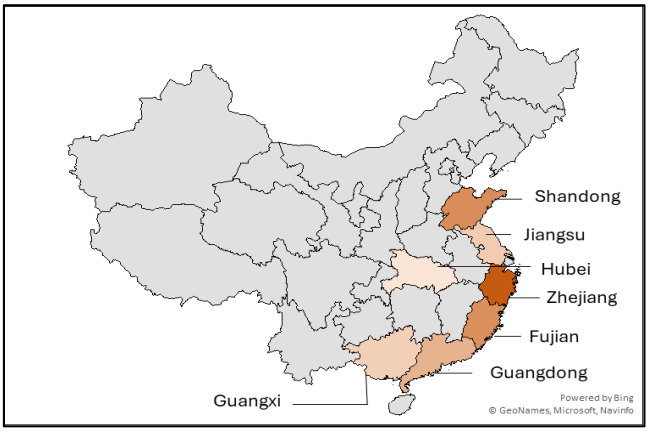

Figure 11. Marine Fisheries Producing Provinces

Data: thousand metric tonnes

Source: FAS. USDA, 2025

3.4. Processing, preservation and domestic consumption practices

Processing, preservation and domestic consumption practices in China's fisheries sector reflect both traditional preferences and rapid modernization across marine, aquaculture and inland value chains. China records very large volumes of frozen and preserved aquatic products and that national policy explicitly calls for the simultaneous development of aquaculture, fishing and processing, with special emphasis on aquaculture and associated cold-chain infrastructure[30],[31]. In the marine subsector, recent official data indicate that the bulk of the ~25.6 million tonnes of seafood entering processing plants in 2022 were ocean products, which in coastal hubs such as Shandong, Fujian and Liaoning are turned into frozen fillets, breaded products, canned fish, and prepared crustacean and mollusc items, while live marine fish and shellfish remain important for restaurant and wet-market channels[32]. A rapid modernisation of processing (vacuum packing, frozen fillets and ready-to-eat lines) and expanding refrigerated distribution, while noting that many inland supply chains still rely on traditional preservation (drying, salting, ice), producing uneven cold-chain coverage and quality loss[33]. In aquaculture and inland (freshwater) fisheries, industrial reviews and stakeholder surveys since 2021 report that freshwater fish from ponds, lakes and reservoirs are still widely transported live from farms to wholesale markets or processors, but that there is a fast shift toward factory processing, vacuum-packed chilled portions and ready-to-cook dishes for carps, tilapia, shrimp and crayfish as "industrialized aquaculture" expands[34],[35]. The demand for refrigerated storage and transport of aquatic products has risen steadily from 2012 to 2021 in step with urban seafood demand and e-commerce, yet cold-chain coverage remains patchy, especially for inland producers who still depend heavily on ice, drying, salting and pickling for preservation[36],[37]. The Chinese residents consume about 48 g of aquatic products per person per day, mainly as fresh fish eaten almost twice a week, with processed aquatic products (smoked, pickled or industrially prepared) consumed less frequently, even as online seafood platforms rapidly increase sales of frozen shrimp, ready-to-eat seafood and other value-added products sourced from both marine capture and aquaculture[38],[39].

The trend in processed aquatic commodities shows that processing output rose sharply between 2015 and 2017, by approximately 8–10%, before declining by about 7–8% between 2018 and 2020 and then rebounding again by around 4–5% by 2023, indicating fluctuations tied to market demand, export conditions, and processing capacity. The breakdown of processed commodity types reveals that frozen fish dominates the category, accounting for roughly 60–62% of total processed product volume, followed by dried/unsalted fish at around 15–17%, and frozen shrimp at about 10–11%, while all other processed categories, fishmeal, fillets, squid, mackerel, tilapia, each contribute less than 4–5% individually. Together, these percentages show that China's processing sector is heavily weighted toward mass-volume frozen product handling, with specialty and high-value processed forms contributing only a minor share of the overall processed aquatic commodity portfolio (Fig 12 &13).

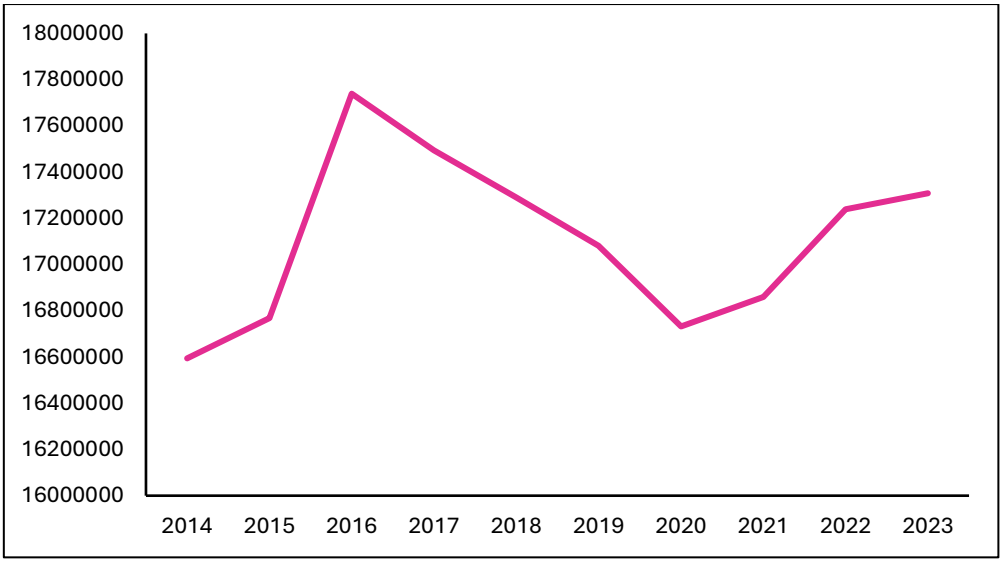

Figure 12. Trend in the Processed Aquatic Commodity

Data: tonnes-net production weight
Source: FAO, 2025. Fishstat

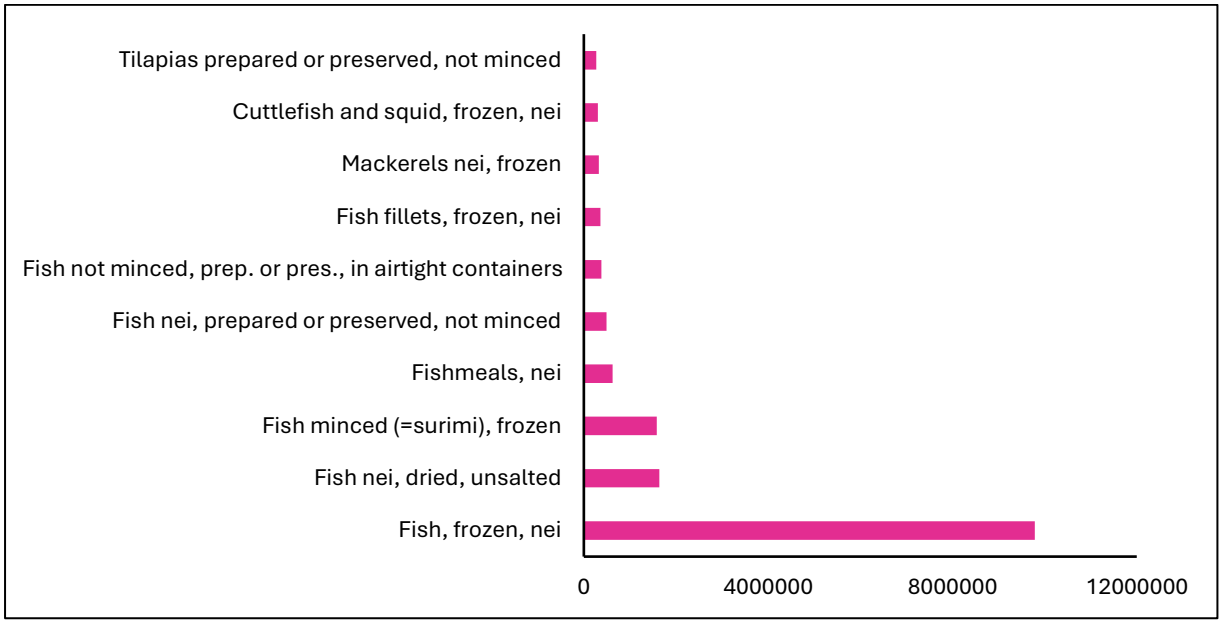

Figure 13. Top Processed Aquatic Commodities

Data: tonnes-net production weight
Source: FAO, 2025. Fishstat

4. Trade and Market Dynamics

4.1. Overview of fish exports (species, value, markets)

The trade dynamics show that exports consistently surpassed imports throughout the period, with exports accounting for around 60–65% of total trade volume on average, compared to 35–40% from imports. Exports grew significantly, rising by roughly 30–35% from 2014 to their peak around 2022, before dropping slightly by about 8–10% in 2023. an integrated industrial

chain for aquatic products that links processing, cold-chain logistics and branding—supporting both domestic refrigerated supply and significant exports, especially high-volume frozen products and prepared squid/cuttlefish lines[40]. In contrast, imports increased more gradually by about 15–20% over the same period, with mild fluctuations and steady upward movement (Fig 14).

Figure 14. Trade Dynamics

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

Three market supply chains are presented in the figure below[41].

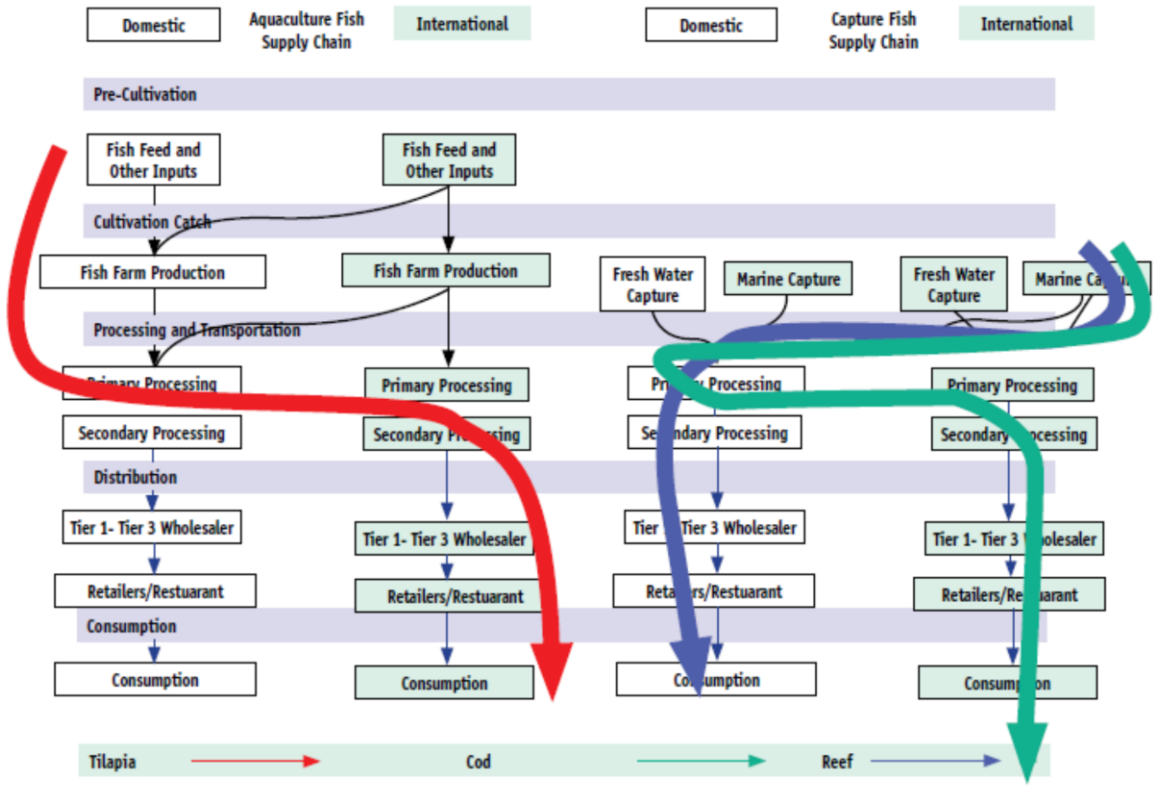

Figure 15: Three Market Supply Chains

The data shows that China's import value of aquatic animals is higher than its export value, with imports totaling USD 22,557 million, which accounts for 35.2% of Asia's total import share and 12.3% of the global import value, indicating its growing role as a major seafood-importing country. In comparison, exports are valued at USD 19,636 million, representing 31.8% of Asia's export share and 10.8% of global exports, demonstrating that although China remains a major exporter, its import share now exceeds its export share both regionally and globally (Table 10).

Table 10. Import and Export Value of Aquatic Animals

	Total Production	Asia's Total Share (%)	World's Share (%)
Import	22,557	35.2	12.3
Export	19,636	31.8	10.8

Data: USD millions
Source: FAO. 2025. FishStat. Global aquatic trade statistics 1976-2023.

The combined comparison between overall traded commodities (Figure 15) and exported commodities (Figure 16) shows a clear shift in product dominance and market orientation. In overall trade, shrimps and prawns (other than coldwater) dominate at around 33–35%, while in exports specifically, cuttlefish and squid, prepared or preserved, become the leading commodity, accounting for about 22–24% of export value, followed by frozen cuttlefish and squid at approximately 19–20%. Prepared shrimps and prawns in airtight containers constitute around 11–12%, while river eels represent 10% in exports, compared with only 3–4% in total trade

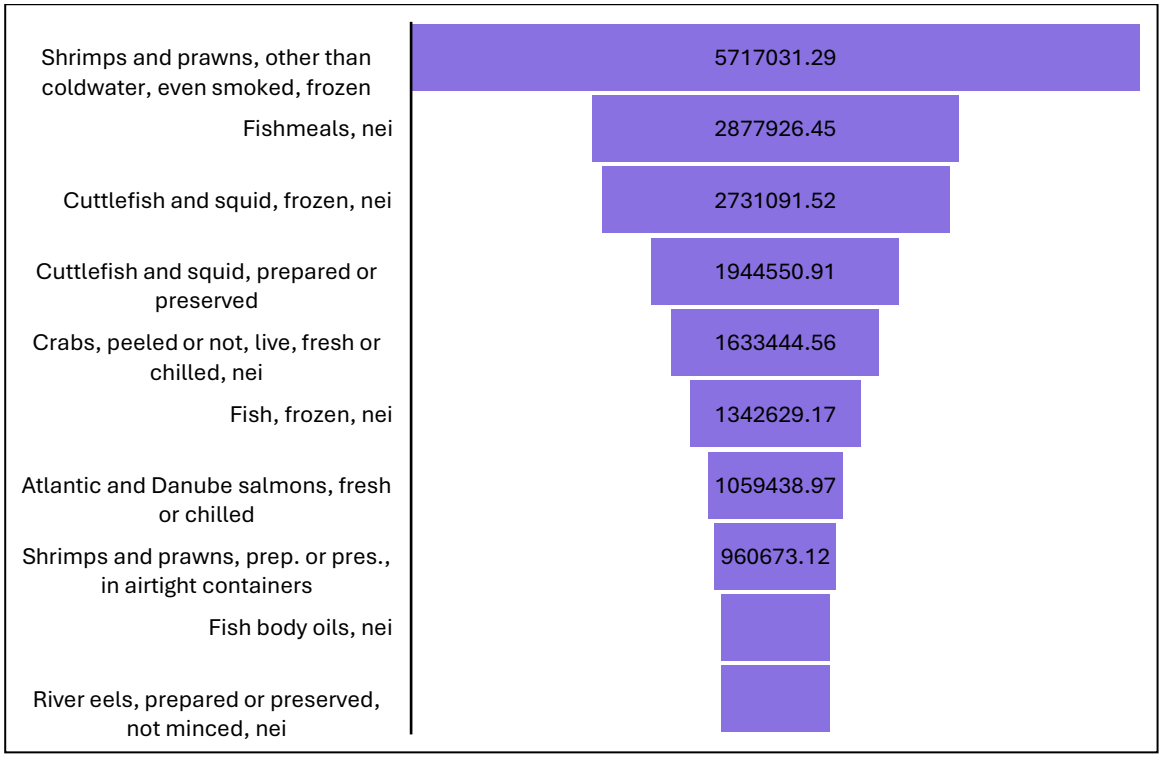

Figure 16. Top Commercial Commodities in Trade

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

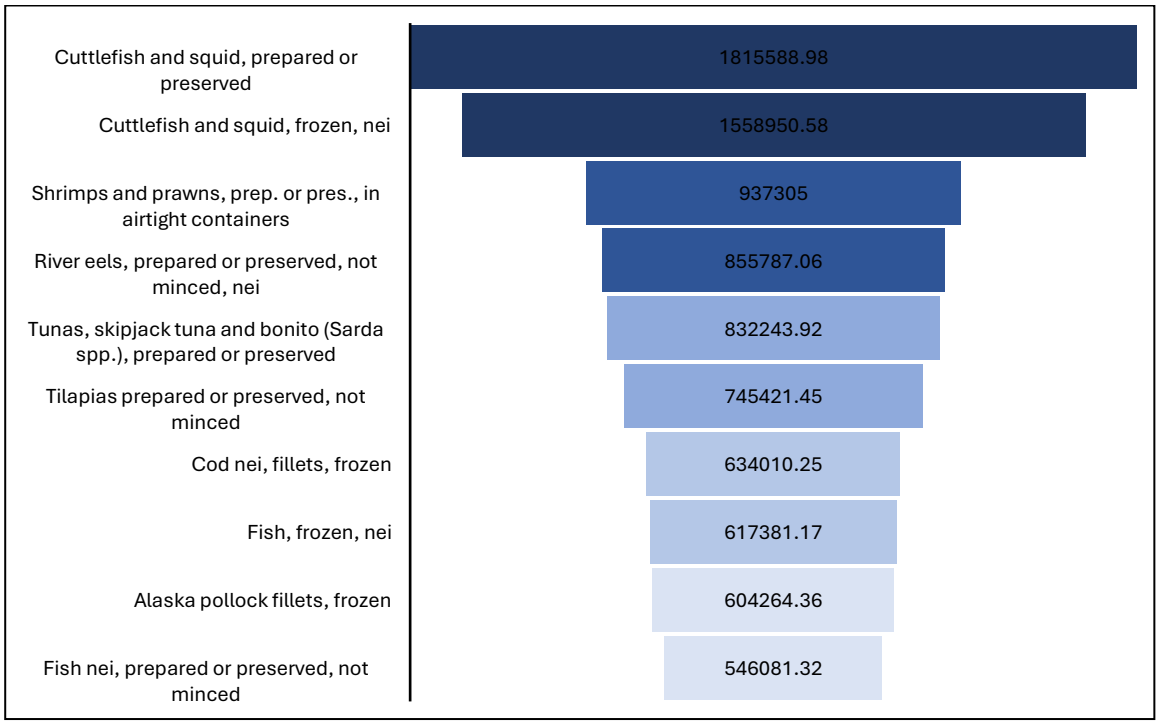

Figure 17. Top Commercial Commodities in Export

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

The import composition indicates that shrimps and prawns (other than coldwater) dominate China's import portfolio, accounting for roughly 32–34% of the total volume, reflecting strong domestic demand for premium crustaceans. Fishmeal forms the second-largest category at around 17–18%, supporting China's feed-dependent aquaculture sector. Crabs (peeled or not) and frozen cuttlefish and squid each contribute about 10–11%, while Atlantic/Danube salmon accounts for roughly 7–8%, showing China's increasing consumption of high-value imported species. American/European lobsters represent about 5%, followed by frozen fish and Alaska pollock at about 4–5% collectively. Rock lobsters and cold-water shrimps appear at the bottom tier with around 2–3%, indicating niche but expanding luxury seafood demand (Fig 17).

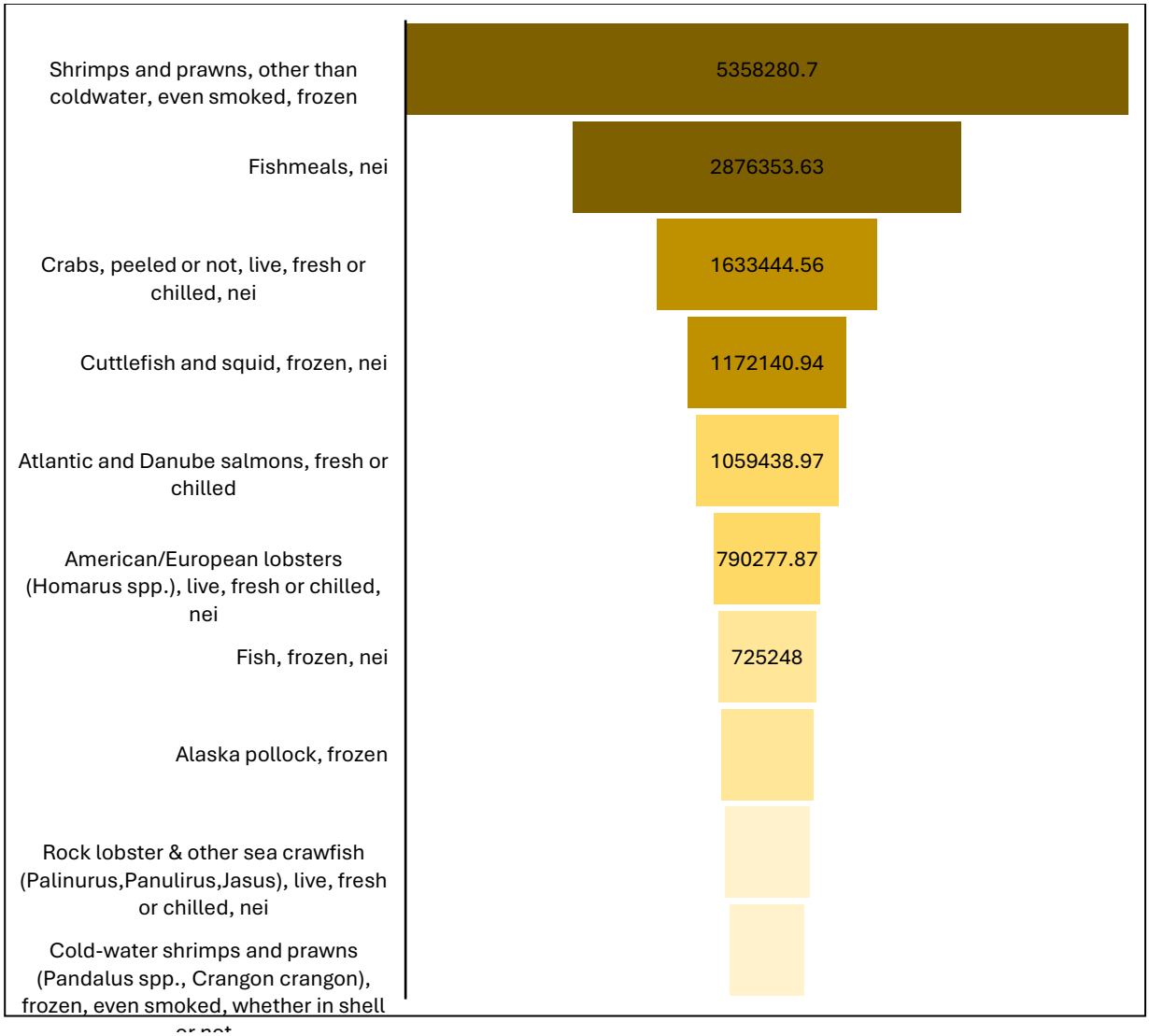

Figure 18. Top Commercial Commodities in Import

Data: Metric Tonnes
Source: FAO, 2025. Fishstat

4.2. Key import flows and their drivers

Key import flows of aquatic foods into China are increasingly shaped by a mix of marine supply constraints, fast-growing aquaculture and strong inland demand. China was the second-largest importer by value (USD 22.5 billion) and the top importer by volume, bringing in large quantities of species *not locally produced* both for domestic consumption and as raw material for its processing industry; shrimps, cods, lobsters and crabs together accounted for about half of import value, supplied mainly by Ecuador, Russia, Viet Nam and others[13,42]. For the marine segment, these flows are dominated by frozen marine fish (pollock, cod, mackerel, herring) and high-value crustaceans and molluscs that land in coastal hubs such as Shandong, Fujian and Liaoning, where they are processed and either re-exported or distributed to domestic markets; 2023 customs-based statistics report 4.6 million t of seafood imports, with frozen fish making up about 52 percent and crustaceans 1.24 million t, driven by post-COVID recovery of food service and processing demand[32]. For aquaculture, imports of fishmeal and fish oil are critical and about 52 percent of global fishmeal imports by 2034, reflecting feed needs for its rapidly expanding marine and freshwater farming, while high-value farmed species such as shrimp and Atlantic salmon are increasingly imported in premium product forms; a 2025 study estimates China imported around USD 22 billion of largely high-value aquatic foods in 2022, especially shrimp and salmon, influenced by perceptions of quality and food safety[43],[44],[45]. For inland and national consumption, FAO and recent Chinese analyses indicate that domestic aquatic production growth is slowing relative to rising demand, so imported frozen whitefish and crustaceans now play a stabilizing role in supplying inland cities via cold-chain and e-commerce channels, especially as marine catches are capped and inland capture (e.g. in the Yangtze basin) faces strict conservation measures[19,20]. Recent work on China's seafood imports from Southeast Asia after the Fukushima treated-water dispute also shows policy and food-safety concerns reshaping import origins (away from Japan and towards Indonesia, Myanmar, the Philippines and others), but overall import volumes remain high, underpinned by urban income growth, dietary upgrading and the need to secure diverse aquatic food supplies for both coastal and inland consumers[46].

4.3. The role of domestic markets in providing affordable fish to households

Around 92.6% is directed toward food consumption (apparent consumption of 59,396 thousand tonnes), while only about 3.9% is used for non-food purposes. Food imports contribute approximately 7.9% of domestic food supply, whereas food exports represent about 11.4% of total production, indicating that China exports a larger share of its output than it imports in this category. With a per capita consumption of 42 kg, the figures reflect a high incorporation of fish into the national diet (Table 11).

Table 11. Fish Contribution from the Aquatic Foods

Production	Non-Food Use	Food Imports	Food Exports	Apparent Consumption	Per Capita Consumption
64,159	2,511	5,073	7,325	59,396	42

Data: thousand tonnes (live weight)
Source: FAO. 2025. FishStat. Food balance sheets of aquatic products 1961-2021.

The data shows a steady increase in China's aquatic food consumption, rising from 51,187 thousand tonnes in 2010 to 59,396 thousand tonnes in 2021, reflecting a growth of about 16% over the period. In 2021, China accounted for 36.5% of global aquatic food consumption, while the RoW accounted for 87.7%, showing that although RoW consumes more in absolute terms, China individually represents a major share as a single country. This upward trend highlights China's increasing reliance on aquatic foods as a key dietary component, driven by growing population, rising incomes, and dietary transitions favoring seafood-based protein (Table 12).

Table 12. Annual Average Consumption of Aquatic Food, 2021

	2010	2018	2019	2020	2021
China	51,187	55,951	57,903	58,673	59,396
RoW	1,25,641	1,36,587	1,39,668	1,39,310	1,42,739

Data: thousand tonnes (live weight)
Source: FAO. 2025. FishStat and FAOSTAT. Food balance sheets 1961-2021.

The per capita aquatic food consumption data shows a consistent upward trend in China, increasing from 36.8 kg in 2010 to 41.6 kg in 2021, reflecting a growth of approximately 13% over the period. Although China's per-capita consumption remains slightly below the RoW which rose from 39.1 kg to 42.7 kg (an increase of about 9%), the narrowing gap indicates convergence toward global dietary patterns (Table 13).

Table 13. Annual Average Per Capita Consumption of Aquatic Foods

	2010	2018	2019	2020	2021
China	36.8	39.4	40.7	41.1	41.6
RoW	39.1	41.0	41.9	42.2	42.7

Data: Kg per person
Source: FAO. 2025. FishStat and FAOSTAT. Food balance sheets 1961-2021.

4.4. Barriers and opportunities (tariffs, non-tariff measures, certification, and traceability).

China's fisheries sector faces both market barriers and growth opportunities shaped by tariffs, non-tariff measures, certification, and traceability requirements. Although tariff levels have broadly decreased since WTO accession, tariff escalation in major markets (EU, US), especially on value-added products, constrains the margins of China's re-processing industry, particularly for marine species like tuna and whitefish[47]. Meanwhile, non-tariff measures, especially SPS restrictions, have a statistically significant negative impact on China's aquatic exports by increasing compliance costs and risk of entry rejection[48,49]. These requirements particularly burden small-scale inland and aquaculture producers (carp, tilapia, crustaceans), who struggle to meet strict bio-safety, residue, and temperature-control standards[47]. Certification (HACCP, ISO, MSC, ASC/BAP) remains a major barrier due to high audit and documentation costs, with documented cases of certificate withdrawal from Chinese

processors due to chain-of-custody failures[50], and label inconsistencies have been found in up to 83% of sampled products abroad[51]. However, these same instruments create opportunities: trade liberalization through FTAs, adoption of international certification standards, and digital traceability systems can increase China's access to premium markets while improving domestic governance of marine, inland and aquaculture supply chains[47,52]. Moreover, alignment with international IUU and catch-documentation frameworks (e.g., RFMO schemes, EU IUU Regulation) is increasingly prompting improvements in monitoring, vessel tracking, and origin verification, upgrading China's position in global seafood value chains[50].

5. Nutritional Contribution of Fish

5.1. Fish's share in total protein intake

The protein supply data shows that fish contributes 10.4 g/person/day, forming 20.6% of total animal protein intake (50.5 g/person/day**)** and 8.2% of overall daily protein intake **(**126 g/person/day**)**. This indicates that while fish is a significant source of animal-derived protein, providing about one-fifth of it, it represents less than one-tenth of total protein consumed, which includes plant-based sources as well. These percentages reflect a balanced dietary structure in China, where fish plays an important but not dominant role in protein nutrition, supplemented heavily by other animal and plant protein sources (Table 14).

Table 14. Protein Supply from the Aquatic Foods

Fish Proteins	Animal Proteins	Total Proteins	Share of Fish Proteins over Animal proteins %	Share of fish Protein over Total proteins %
10.4	50.5	126.0	20.6	8.2

Data: grams per person per day; Share in percentage
Source: FAO. 2025. FishStat. Food balance sheets of aquatic products 1961-2021

Pork is the dominant source of animal protein, contributing approximately 14% of total animal protein intake, followed by aquatic food (including fish) at around 10–11%, indicating its strong secondary role in the protein supply. Poultry and eggs each contribute roughly 7–8%, forming the next major tier of animal protein sources. Dairy products account for about 4–5%, bovine meat for around 3–4%, and ovine/caprine for about 2–3%, reflecting smaller but relevant dietary shares. Other animal proteins make up an additional 4–5%, indicating broader diversity in minor protein sources. Overall, these percentages demonstrate that while pork remains the predominant animal protein in China, aquatic foods have a significant and steadily increasing importance in dietary protein composition (Fig 18).

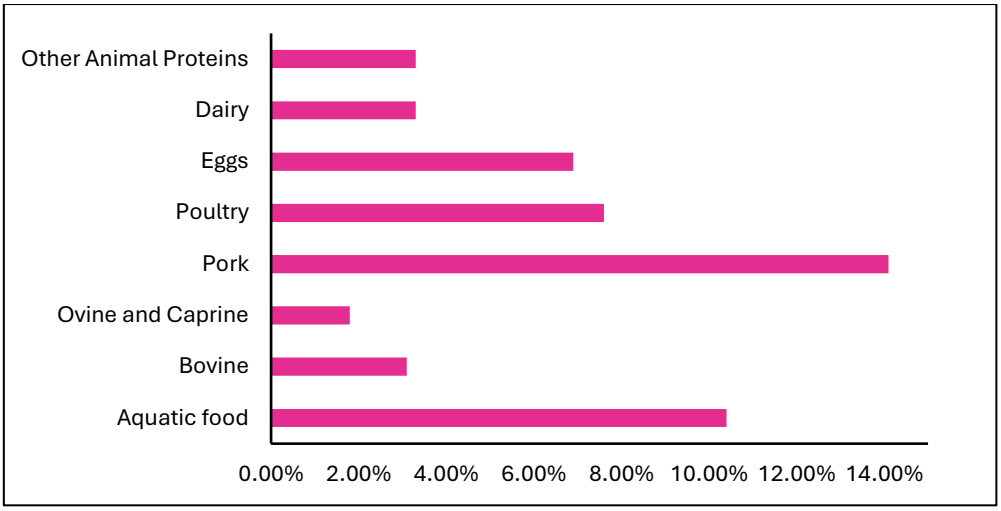

Figure 19. Consumption and Share of the Total Consumption of the Animal Protein

Data: grams per person per day; Share in percentage
Source: FAO. 2025. FishStat. Food balance sheets of aquatic products 1961-2021

5.2. Key micronutrients supplied (Ca, Fe, Zn, I, Se, Vitamin A, Vitamin B12, DHA/EPA)

The FAO/INFOODS Global Fish Composition Database and UN-Nutrition's aquatic foods review show that many of the marine species commonly consumed in China (small pelagic fish, demersal fish, shrimps, crabs, bivalves) are particularly dense in iodine, selenium, vitamin B12 and long-chain omega-3s (DHA/EPA), while also contributing bioavailable iron, zinc and calcium, especially when small fish are eaten with bones[53], [54]. Modelling of national nutrient supplies using the Aquatic Foods Composition Database and Chinese production and trade data indicates that aquatic foods can substantially reduce vitamin B12 inadequacy in China and make meaningful contributions to closing gaps in iron, zinc, calcium and vitamin A, with the largest effects in coastal and river-basin populations where fish intake is highest[55],[56]. Within this, marine capture and coastal mariculture (e.g. marine finfish, shellfish and seaweed) dominate the supply of iodine, selenium, B12 and DHA/EPA, reflected in recent Chinese and international risk–benefit assessments of seafood that highlight these nutrients as the primary health benefits of marine fish and shellfish consumption. Freshwater aquaculture of carps, tilapia and other species in ponds and reservoirs, along with inland capture fisheries in the Yangtze and other basins, provide large volumes of relatively affordable fish whose flesh and bones contribute calcium, iron and zinc, and in some cyprinids also vitamin A and DHA[54,55,56]. A fast-growing niche in China is selenium-enriched farmed aquatic products (fish, shrimp and invertebrates), which targeted reviews describe as an intentional strategy to raise dietary Se intake in line with Chinese DRIs, further strengthening the micronutrient profile of farmed seafood available on the market[57].

5.3. Role of small fish species consumed whole

FAO nutrient databases and post-2020 nutrition studies indicate that small fish species eaten whole (with bones, head and viscera) play a disproportionate nutritional role in Chinese fisheries across marine, aquaculture and inland systems. FAO's work show that whole, small fish are exceptionally rich in calcium, iron, zinc, vitamin A, vitamin B_{12} and DHA/EPA, because

minerals and fat-soluble vitamins are concentrated in bones, eyes and viscera rather than in muscle alone[54],[58] . In Chinese marine fisheries, small pelagic and "small miscellaneous marine fish" (including anchovies and other low-value species landed along the Bohai, Yellow and East China Sea coasts) are widely dried or processed and often consumed whole; dried marine small fish and fish powders shows that such products can supply very high densities of calcium, iron, zinc, selenium, iodine, vitamin B_{12} and DHA per 10–15 g serving, easily covering large shares of recommended intakes, which is directly relevant for these Chinese coastal small-fish resources[59],[60], [61]. The south inshore waters of Zhejiang and other Chinese coastal areas document abundant, seasonally variable stocks of key small-sized marine fish, confirming that these nutrient-dense species are a major component of marine catches available to local markets[62],[63].

5.4. Evidence from national nutrition surveys or literature

National dietary data from the China CDC show that Chinese residents consume about 48 g/day of aquatic products, with intake highest in coastal and aquaculture-intensive provinces, where fish and shellfish are promoted as "white meat" for their high-quality protein and lower saturated fat relative to red meat[14] (Table 14). Using the FAO/INFOODS Global Fish and Shellfish Database together with the Aquatic Foods Composition Database, Golden et al. (2021) and subsequent nutrient-density analyses demonstrate that marine finfish and shellfish commonly consumed in China (e.g. small pelagics, marine cods, mackerels, shrimps) are especially rich in vitamin B_{12}, iodine, selenium, vitamin D and long-chain omega-3s (EPA/DHA), and that these marine products are among the most efficient food sources of these nutrients globally[53,55]. In contrast, data on freshwater and aquaculture species, notably grass, silver and bighead carp, crucian carp and tilapia, which dominate China's inland ponds and reservoirs, show they provide substantial protein, iron, zinc and, when eaten with bones, very high calcium, while some species also contribute appreciable omega-3s, making them key everyday nutrient sources for inland and low-income households[56, 64]. Global modelling work using country-specific food balance data (including China) finds that where aquatic foods supply a large share of animal-source foods, as in China, they can provide most dietary vitamin B_{12} and heme iron, and 20–50% of niacin, vitamin A and total iron requirements, with both marine and freshwater species contributing[65],[55] (Table 15).

Table 15. Daily Aquatic Products Consumption by Gender and Age Groups

Aquatic products	Urban Male	Urban Female	Rural Male	Rural Female
Alga	0.210 (0.140, 0.281)	0.235 (0.139, 0.330)	0.189 (0.143, 0.235)	0.203 (0.158, 0.248)
Crustaceans	16.1 (15.0, 17.2)	13.9 (12.9, 14.8)	6.25 (5.78, 6.68)	5.34 (4.89, 5.79)
Fish	43.1 (41.4, 44.8)	35.4 (34.0, 36.8)	37.5 (36.4, 38.7)	32.2 (31.2, 33.4)

Aquatic products	Urban Male	Urban Female	Rural Male	Rural Female
Molluscs	2.95 (2.52, 3.38)	2.30 (2.00, 2.60)	2.04 (1.81, 2.26)	0.892 (0.745, 1.04)
The total 1	62.4 (60.0, 64.7)	51.8 (49.9, 53.7)	46.0 (44.5, 47.4)	39.5 (38.2, 40.9)
The total 2	56.8 (55.3, 58.3)		42.8 (41.8, 43.8)	

Source: Frontiers[14]

6. Fish Loss and Waste (FLW)

6.1. The main points along the chain where losses occur (landing, transport, processing, retail)

No public data are available about losses along the value chain.

6.2. Available estimates of quantity and value lost

An OECD report presenting estimates of food losses and food waste in China, based on literature data, informed estimates, and other publicly available information indicated that data in the literature are either out of date or fragmented[66]. The report did not talk about fish losses in the value chain.

6.3. Causes (infrastructure, handling, storage)

A report[67] stated that 'Of the output of capture fisheries, small fish and low-value fish constitute a considerable proportion. Owing to poor processing methods, post-harvest losses are high and some products deteriorate rapidly and thus nutritive value is lost'.

6.4. Mitigation practices or innovations

Key post-harvest loss reduction measures emphasised in the PPT include complete cold-chain upgrading (from landing to transport), low-temperature processing innovations (e.g., low-temp drying and ready-to-eat methods), and intelligent IoT monitoring for real-time storage-environment control[68].

7. Socio-economic and Gender Dimensions

7.1. Employment generated by the sector (fisheries, aquaculture, post-harvest)

The employment data reveals a continued decline in capture fisheries employment, falling from 15.3 million in 2019 to 11.49 million in 2023, reflecting a reduction of roughly 25% over five years, while aquaculture employment decreased more moderately by about 4.7% over the same period (from 46.6 million to 44.42 million), indicating a comparatively stable labor demand in farming-based production. By 2023, fishers in capture fisheries represent only about 20–21% of total employment among identified worker categories, while aquaculture farmers account for roughly 78–79%, emphasizing a structural labor shift from wild capture to aquaculture. The steady decline in fish processors by about 9.4% since 2019 suggests

increasing mechanization and downstream efficiency, while the large "unspecified" category, still making up nearly 45–47% of total workers, points to ongoing gaps in labor categorization and informal employment in the fisheries value chain (Table 16).

Table 16. Employment of Fishers by Capture Fisheries Producers

	2019	2020	2021	2022	2023
Fishers by Capture Fisheries Producers	15,30,996	12,98,588	12,12,667	11,88,736	11,49,489
Fish Farmers by Aquaculture Producers	46,63,678	45,75,402	43,53,995	43,16,700	44,42,159
Unspecified	58,95,862	57,30,966	55,05,064	55,05,046	54,22,036
Fish Processors: Unspecified	8,26,416	7,90,902	7,74,561	7,68,703	7,48,650

Source: Fishery and Aquaculture Statistics. Year Book 2023[69]

7.2. The role of women in processing, trading, and marketing

In China, women have long played a significant, but often under-recognized, role in inland fisheries. According to 1991 rural labour statistics, women made up about 26.3 % of the rural labour force in fisheries[70]. Across China's marine, aquaculture and inland fisheries, women are most visible not at sea but in processing, trading and marketing, where they form a large share of the post-harvest workforce yet remain under-recognized. FAO's global gender reviews note that in major producing countries such as China, women constitute roughly one-fifth of all fishers and fish farmers, but their share rises sharply in processing and marketing, where in developing-country marine and inland fisheries women often make up more than half of workers in filleting, peeling, drying, packaging and retailing[70]. For marine fisheries, case material from China shows women concentrated in shore-based activities in coastal provinces (e.g. Shandong, Zhejiang, Fujian), where they grade, clean, dry, salt and pack marine fish and shellfish, and operate stalls in wet markets; they contribute substantially to value addition and quality control but are typically employed as low-wage, casual labour with limited social protection[71],[72]. In aquaculture, FAO's Asia aquaculture review reports that women in China are involved in "practically all aspects" of farm operations, from pond preparation to harvesting, but their comparative advantage and numbers are greatest in hatchery work, on-farm post-harvest handling, small-scale processing and local marketing of carp, tilapia and other farmed species, often as family labour or small traders[73].

8. Sustainability and Resilience

8.1. Summary of stock status where available (overfishing, recovery, habitat pressures)

For marine capture fisheries, a national carrying-capacity assessment found that China's marine fishery resources were generally within sustainable limits before 2017 but have since shifted into overexploitation, with declining CPUE-based indicators across all sea areas; scenario modelling suggests that if current fishing pressure (~1.5 F_{msy}) continues, national

marine biomass could fall to ~10% of B_{msy} by 2030, whereas reducing effort to 0.8–1.0 F_{msy} could allow stock recovery[74]. while aquaculture has expanded, marine and some inland capture indicators show declining CPUE and biomass, prompting policy actions (seasonal moratoria, caps on capture intensity and targeted restoration) to address overexploitation[75]. In response, China has expanded summer marine fishing moratoria and gear restrictions, and new analyses of the Yellow–Bohai and other shelf seas indicate that these closures can improve size structure and abundance of key species where enforcement is strong, even though habitat degradation and climate change still constrain full recovery (Table 17)[76]. In inland systems, FAO's 2024 inland fisheries review and recent ecological studies underline long-term declines in wild stocks from overfishing, dams, pollution and eutrophication, around 30% of monitored Chinese lakes and reservoirs are now eutrophic, prompting China's unprecedented 10-year fishing ban on the Yangtze River and major lakes[10] (Table 17).

Table 17. Carrying Capacity of Marine Fishing Resources in China

Year	Catch yield (tonne)	Fishing effort (h)	CPUE	B	Assessment results
2013	12,643,822	5107	2475.782651	1.28800209	Sustainable Capacity
2014	12,808,371	5425	2360.990046	1.22828342	Sustainable Capacity
2015	13,147,811	6576	1999.362897	1.040149346	Critically Overloaded
2016	11,872,029	5688	2087.206224	1.058548944	Critically Overloaded
2017	11,124,203	6719	1655.633275	0.861327507	Overloaded
2018	10,444,647	9650	1082.346839	0.563808523	Overloaded
2019	10,001,515	8157	1226.12664	0.637870858	Overloaded
2020	9,474,104	7977	1187.677573	0.617878723	Overloaded

Source: Frontiers in Marine Science[76]

8.2. Environmental risks (pollution, waste, carbon intensity)

Environmental risks associated with China's marine, aquaculture and inland fisheries are now framed around three linked issues: pollution, waste and carbon intensity. FAO's National Aquaculture Sector Overview for China and recent syntheses highlight that coastal and freshwater aquaculture are widely exposed to, and also generate, pollution from agricultural and industrial effluents, nutrients, antibiotics and other chemicals, raising fish-safety and ecosystem concerns[17,77,78]. In the marine sector, multiple reviews show very high loads of plastic litter and microplastics in the Bohai, Yellow, East China and South China seas, with the East China and Yellow seas already at or beyond ecological plastic-pollution thresholds and

much of the litter made up of discarded or lost fishing and aquaculture gear; this adds to chronic nearshore eutrophication from land-based nutrients and farm effluent[79, 80,81.] For inland fisheries, FAO's 2024 review notes water pollution, eutrophication and habitat loss as major threats, while a national analysis of inland fishery waters finds that concentrations of heavy metals and petroleum hydrocarbons declined between 2003 and 2017 but many lakes and reservoirs still face eutrophication risk, meaning that capture and culture-based fisheries remain vulnerable to water-quality shocks[82],[10]. On carbon intensity, lifecycle accounting shows that China's aquaculture and mariculture together emit on the order of ~112 Mt CO_2-eq per year, with feed production the dominant source and greenhouse-gas emission intensity around 2.7 kg CO_2-eq per kg liveweight, lower than the global aquaculture average but large in absolute terms given China's scale; newer work on freshwater aquaculture finds a quasi "N-shaped" trend in emissions from 2013–2023 and strong spatial clustering in high-emitting provinces[83] (Fig 19&20).

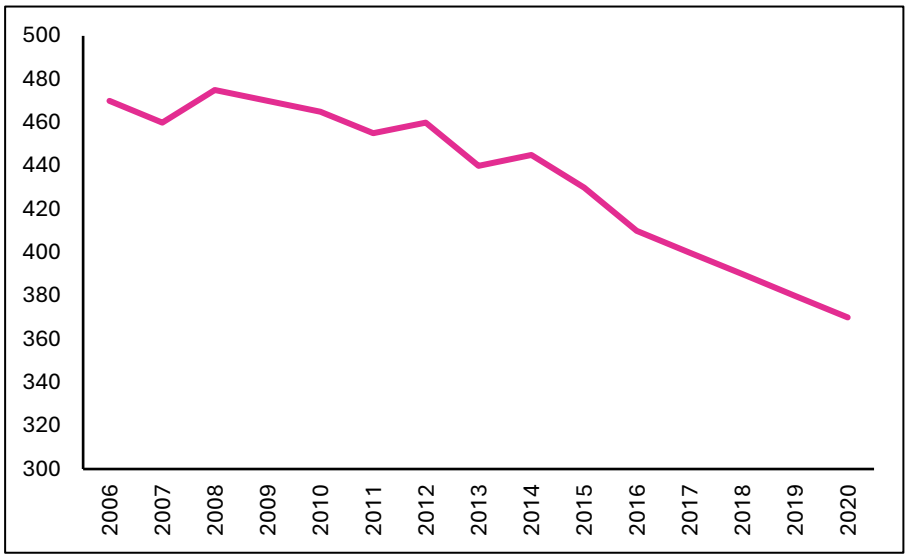

Figure 20. Carbon Emissions from Marine Fisheries

Data: Carbon Emissions (ten thousand tons)
Source: Ye. S., 2024[83]

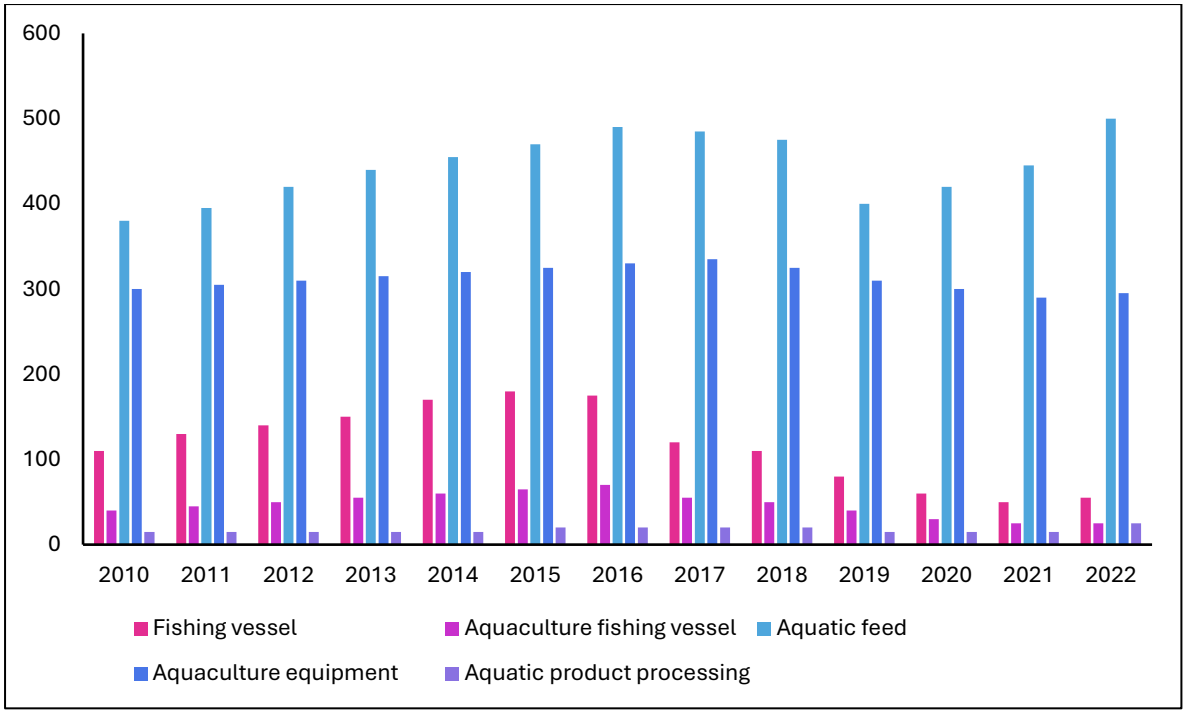

Figure 21. Carbon Emission Structure of Fishery in Inland Area

Data: Carbon Emissions (ten thousand tons)
Source: Ye. S., 2024[83]

8.3. Climate risks and adaptation measures

Climate change presents substantial risks to China's fisheries across marine, coastal aquaculture, and inland/freshwater systems, largely by altering ocean and freshwater conditions, disrupting habitats, and destabilizing supply-chains. In the marine sector, rising sea-surface temperatures, ocean acidification, and shifting oceanographic conditions are already altering species distributions and reducing productivity of many fish stocks in Chinese seas; one recent study finds that such changes are "remarkably altering fishery patterns" in China's marine waters[84] (Table 21)[85]. Moreover, coastal and marine-dependent communities are increasingly vulnerable to sea-level rise, coastal erosion, and more intense storms, risks acknowledged in China's evolving marine and coastal adaptation policies[86] (Fig 21). China is implementing ecological and climate-focused actions—such as the Yangtze 10-year fishing ban, AI-enabled hazard forecasting and national early-warning systems (e.g., MAZU) —to reduce climate and anthropogenic pressure on fisheries and support fisher transition[87].

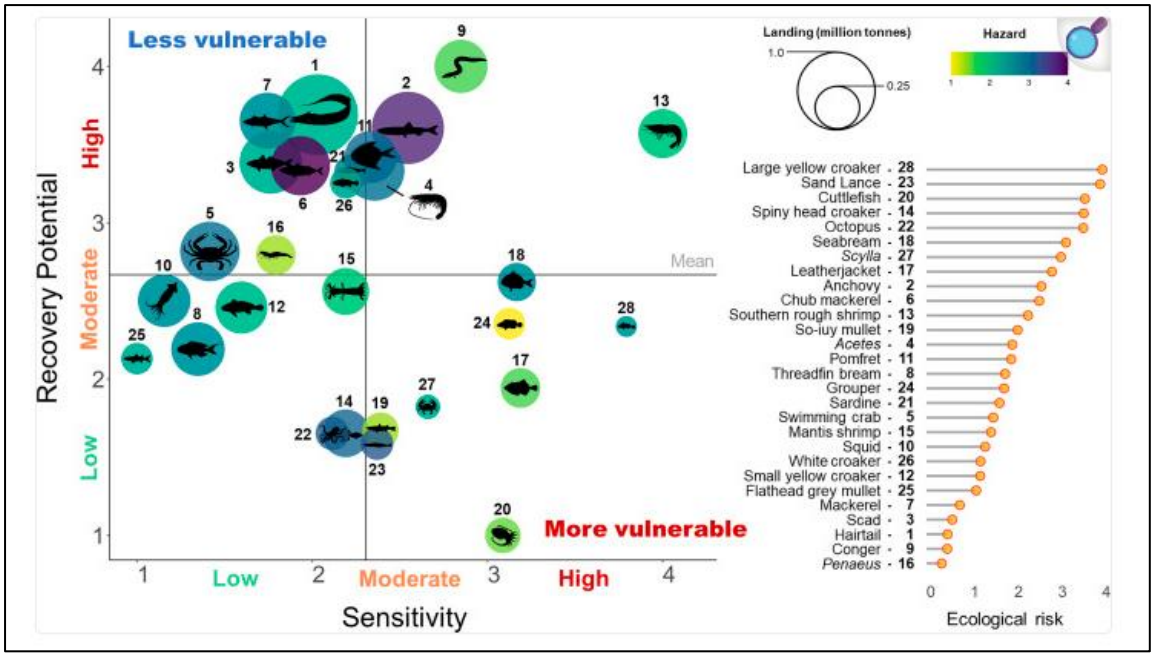

Figure 22. Ecological risk of the Fishery Taxa

Source: Li et al., 2024[85]

In the aquaculture sector (both coastal mariculture and inland pond/lake aquaculture), climate change affects water temperature, salinity and water-quality regimes, which in turn influence growth rates, disease outbreaks, and mortality[86]. Freshwater aquaculture (ponds, reservoirs) also faces risks: altered rainfall patterns, increased droughts or floods, and changing water availability can disrupt stocking cycles, seed supply, and pond water management, challenging the resilience of small-scale inland aquaculture producers[88]. For inland capture fisheries and freshwater systems, climate-driven shifts in precipitation, hydrology and river/lake water levels, along with increasing frequency of extreme weather events, threaten fish habitat, migration routes, spawning grounds, and water-quality, thereby undermining long-term sustainability of inland stocks and making fishing livelihoods more precarious[89].

Given these risks, adaptation measures in China are gaining policy traction. For marine and coastal fisheries, national adaptation planning has been updated: the country has adopted a comprehensive marine and coastal climate-adaptation framework under its broader climate strategy, including measures such as ecosystem protection and restoration (e.g., coastal wetlands, mangroves), coastal-zone monitoring and early warning systems for disasters, and coastal engineering standards to handle sea-level rise[90] (Table 18)[91].

Table 18. Synergism among Environments, Climate, Marine and Biodiversity Policies in the Period 2016-2023

Participants	Areas	Perspectives	Base Values	Strategies
Central Committee of the Communist Party of China,	General Provisions on	① Protection of the ecological	① Innovative, coordinated,	Goal-based solution and

State Council *(Central Committee of the Communist Party of China and the State Council of the People's Republic of China, 2018)*; Ministry of Ecology and Environment *(Ministry of Ecology and Environment of the People's Republic of China, 2021)*	Environmental Protection	environment ② The Uphill Battle for Prevention and Control of Pollution	green, open, and shared development ② The community with the shared future for humankind	construction of ecological civilization
State Council *(State Council of the People's Republic of China, 2021)*; Ministry of Ecology and Environment, National Development and Reform Commission, et al. *(Ministry of Ecology and Environment of the People's Republic of China et al., 2022)*	Climate Change	① The adaptation of natural ecosystems to climate change ② The adaptation of economic and social systems to climate change	① Climate resilience ② Comprehensive capacity in climate change adaptation	Nature-based solution in climate change adaptation
Ministry of Ecology and Environment, Ministry of Natural Resources, et al. *(Ministry of Ecology and Environment of the People's Republic of China et al., 2022)*	Marine Environment	① The quality and stability of marine ecosystems ② Response to marine environmental emergencies and ecological disasters ③ Response to climate change	Center on the improvement of marine environmental quality	Synergistic strategy on pollution prevention and carbon reduction
Central Committee of the Communist Party of China, State Council *(General Office of the Central Committee of the Communist Party of China et al., 2021)*	Biodiversity Conservation	① Optimization of in-situ conservation and improvement of ex-situ conservation ② Improvement of biosecurity governance ③ Ecosystems stabilization	The harmonious co-existence of human and nature	Integrated protection and restoration of ecosystems

Source: Bai et al., 2023[91]

8.4. Resilience factors (diversification, community practices, and early warning systems).

Resilience in China's marine, aquaculture and inland fisheries is increasingly built around diversification, community-based practices and expanding early warning systems. In aquaculture, China now farms over 800 species and 240 improved varieties, with wide use of carp polyculture, mixed-species pond systems and spatial diversification across at least five major aquaculture regions (Bohai Bay, Yangtze Delta, Pearl River Delta and key inland clusters), which spreads biological and market risk and underpins sectoral resilience[92,93,94]. For inland fisheries, the Yangtze River Protection Law and the 10-year fishing ban are coupled with compensation, retraining and promotion of "ecological farming" and aquaculture-based livelihoods, so that many former capture fishers are diversifying into farming, services and non-fishing work, strengthening household resilience even as wild fishing pressure is reduced[95,96,97.] Along the coast, policy reforms for small-scale coastal fisheries and recent analyses of "fishery economic resilience" in coastal provinces show a shift toward co-management, cooperatives and more "refined" scientific management, which enhance social organization, access to support schemes and collective capacity to absorb shocks[98,99.] At the same time, China has built a multi-layer marine disaster risk and early warning system, including an ecosystem early warning and monitoring network, a four-part national mechanism covering prevention, warning, emergency response and recovery, and specialized tools such as sea-ice hazard forecasts for fisheries and AI-enabled coastal early warning under the MAZU initiative, supporting safer marine operations and coastal adaptation[100, 101].

9. Governance and Policy Framework

9.1. Overview of national fisheries and aquaculture policies

China's fisheries and aquaculture governance operates under a centralized–decentralized administrative framework, with core authority vested in the Ministry of Agriculture and Rural Affairs (MARA), supported by provincial and municipal fisheries bureaus for localized implementation. The overarching policy direction is guided by China's Five-Year Plans, which articulate national priorities for resource management, ecological restoration, aquaculture development, and international fisheries positioning. Governance is strongly aligned with China's broader Ecological Civilization agenda, emphasizing sustainability, stock recovery, and ecosystem-based management.

Key governance instruments include the Fisheries Law of the People's Republic of China (1986, amended 2000, 2013, 2015 and 2020), which provides the legal foundation for licensing, fishing effort control, stock protection, and conservation measures, including seasonal moratoriums and species protection. The Regulations on the Management of Fishing Permits, Regulations on the Administration of Aquaculture, and the 2017 Marine Ecological Redline Policy operationalize these national mandates through a permitting regime, area-based management, and aquaculture zoning. The state also directs aquaculture modernization through the National Plan for Aquaculture Development and promotes

technological upgrading, biosecurity, and genetic breeding programs. In governance of distant-water fishing, China's Regulation on Management of Distant-Water Fisheries (2017) and related IUU control measures institutionalize vessel monitoring (VMS), observer systems, and international compliance with RFMO obligations.

Governance enforcement relies on multiple instruments: vessel registration control, seasonal fishing bans, gear restrictions, coastal conservation areas, and integrated coastal management. Policy implementation is further strengthened by scientific institutions such as the Chinese Academy of Fisheries Sciences, which support stock assessments and ecosystem monitoring. Recent reforms emphasize de-capacity programs, fisher workforce restructuring, targeted subsidies for sustainable gears, and transition of fishers into aquaculture or marine-related livelihoods.

9.2. Food safety and quality assurance systems

China maintains a highly regulated seafood safety and quality control framework, primarily enforced through the Food Safety Law (amended 2015) and regulatory oversight by the State Administration for Market Regulation (SAMR), the National Health Commission, and MARA, integrating risk-based monitoring from production to market. Quality and hygiene standards in aquaculture are maintained through mandated HACCP compliance, residue monitoring, and testing protocols for chemical contaminants, antibiotics, and heavy metals, supported by the National Standards for Maximum Residue Limits. China has strengthened traceability mechanisms through the Aquatic Product Quality and Safety Traceability System, which ensures tracking from farm or capture site to consumer; research shows substantial improvements in safety compliance in aquaculture farms under these systems[102] [103]. FAO analyses confirm that China has adopted multi-level safety inspection systems and microbiological risk controls, particularly for export-oriented seafood[104]. Furthermore, the proliferation of Green, Organic and eco-certification labels for aquaculture products has encouraged compliance with environmental and safety standards[105].

9.3. Participation in international agreements (e.g., WTO fisheries subsidies, PSMA, CITES)

China participates in an extensive array of international agreements relevant to fisheries governance, reflecting its role as a major global fishing nation and seafood producer. China is a Party to foundational international marine legal instruments such as UNCLOS, the UN Fish Stocks Agreement, the FAO Port State Measures Agreement (PSMA), and the FAO Compliance Agreement, reinforcing obligations for sustainable fishing, monitoring, and enforcement. China is also a long-standing Party to environmental and biodiversity treaties affecting marine resources, including CITES, CBD, the Nagoya Protocol, the Cartagena Protocol, MARPOL, the London Convention, UNFCCC, and the Paris Agreement, ensuring regulation on trade of endangered species, pollution control, and climate impacts on fisheries. In addition, China is an active Member or Cooperating Party of several Regional Fisheries Management Organizations (RFMOs) such as the IOTC, WCPFC, CCAMLR, NPFC, NAFO, and participates in ICCAT and SPRFMO, contributing to stock assessments and quota governance of transboundary and highly migratory species. China's position in international trade governance is further reinforced through its membership in the WTO, with engagement in

the 2022 WTO Fisheries Subsidies Agreement, aiming to curb subsidies linked to overcapacity and IUU fishing. Beyond binding treaties, China also adheres to the FAO Code of Conduct for Responsible Fisheries and implements relevant International Plans of Action (IPOAs) on IUU fishing, sharks, capacity reduction, and seabirds, aligning its domestic policies with global best practices.

List of key international Conventions that China is a party to:

- Convention on Biological Diversity (CBD)
- Nagoya Protocol on Access to Genetic Resources and their Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Paris Agreement
- United Nations Convention on the Law of the Sea (UNCLOS)

9.4. Institutional arrangements for managing value chains

China's value chain governance in fisheries and aquaculture is organized through a multi-tiered institutional structure, spearheaded by the Ministry of Agriculture and Rural Affairs (MARA), which oversees capture fisheries, aquaculture production, market regulation, and quality standards. Under MARA, specialized departments manage fisheries licensing, traceability, processing standards, and domestic distribution, while local provincial and municipal fisheries bureaus implement these regulations at the operational level, including farm supervision and landing site controls. The State Administration for Market Regulation (SAMR) ensures quality assurance, laboratory testing, and certification compliance throughout the seafood chain, including processing plants, cold storage units, and distribution networks. Customs and port authorities such as the General Administration of Customs (GACC) supervise international seafood trade through catch documentation verification and CITES export/import enforcement. Additionally, China employs digitalized value chain monitoring through the National Aquatic Product Traceability Platform, while state-owned enterprises, fishery cooperatives, and private seafood corporations integrate vertically across harvesting, processing, and retail distribution. Scientific institutions such as the Chinese Academy of Fisheries Sciences contribute by supporting technology adoption, post-harvest quality innovation, and cold-chain efficiency. A coordinated institutional actions across

ministries, pilot national 'Healthy Aquaculture and Ecological Aquaculture Demonstration Zones', licensed veterinary oversight, and strengthened quarantine/prescription systems to support healthy, traceable production chains[106].

10. Key Challenges and Opportunities

10.1 Most pressing constraints (production, markets, nutrition, gender, governance)

a) Production

- Overexploitation of marine capture fisheries, with CPUE and biomass indicators showing sustained decline and several stocks assessed as overloaded or critically overloaded.
- Environmental pressures on aquaculture, including water pollution, eutrophication, disease outbreaks, and rising feed dependence (fishmeal/fish oil).
- Spatial and regional imbalances, with aquaculture heavily concentrated in coastal and central provinces while northern and western regions lag behind.
- Climate risks, such as rising temperatures, extreme weather, and changing hydrology, affecting productivity and stability of marine, coastal, and inland systems.

b) Markets

- High compliance costs related to SPS measures, certification (HACCP, ASC, MSC), and traceability, especially for small-scale and inland producers.
- Tariff escalation and non-tariff barriers in key export markets (EU, US), limiting value addition and margins for processed products.
- Uneven cold-chain and logistics infrastructure, particularly in inland areas, leading to quality loss and reduced market access.
- Growing import dependence for high-value species and fishmeal, exposing the sector to global price volatility and supply risks.

c) Nutrition

- Unequal access to aquatic foods, with very high consumption in coastal areas but low intake in inland and poorer provinces.
- Persistent micronutrient deficiencies (e.g., iron, calcium, selenium, vitamin A and B_{12}) among vulnerable groups despite high national fish availability.
- Double and triple burden of malnutrition, where undernutrition and micronutrient deficiencies coexist with rising overweight and obesity.
- Underutilization of nutrient-dense small fish, especially in inland and urban diets, despite their high micronutrient value.

d) Gender

- Under-recognition of women's roles, particularly in processing, trading, and marketing where women form a large share of the workforce.
- Concentration of women in low-paid, informal, and insecure jobs, with limited social protection and decision-making power.
- Limited gender-disaggregated data, making women's economic contributions and constraints poorly visible in policy and planning.
- Restricted access for women to finance, training, certification, and upgrading opportunities in value chains

e) Governance

- Fragmented institutional coordination across fisheries, aquaculture, environment, trade, and food safety agencies.
- Enforcement challenges in managing fishing effort, IUU fishing, and compliance with seasonal bans and capacity controls.
- Data gaps, especially on inland fisheries, fish loss and waste, informal labor, and gender participation.
- Balancing conservation and livelihoods, particularly in inland systems affected by fishing bans (e.g., Yangtze River) and restructuring policies.

10.2 Promising opportunities or best practices that could be scaled up

a) Production

- Expansion of sustainable and "green" aquaculture, supported by strong policy backing, spatial zoning, and technological upgrading.
- Stock recovery potential in marine fisheries, through effort reduction, seasonal moratoria, gear restrictions, and science-based management.
- Diversification of species and systems, including polyculture, mariculture, algae farming, and low-trophic species with lower environmental footprints.
- Adoption of climate-smart practices, such as resilient breeds, improved pond and water management, and early-warning systems for extreme events.

b) Markets

- Large and growing domestic demand for aquatic foods, driven by urbanization, income growth, and dietary transitions toward "white meat."
- Upgrading value addition, with scope to expand ready-to-eat, chilled, frozen, and high-quality processed products.
- Digital traceability and e-commerce platforms, improving market access, transparency, and price realization for producers.
- Leveraging international certification and FTAs, enabling access to premium export markets and strengthening competitiveness

c) Nutrition

- Strong nutrient density of aquatic foods, particularly for vitamin B_{12}, iodine, selenium, calcium, iron, and DHA/EPA.
- Promotion of small fish and diverse species, offering cost-effective solutions to address micronutrient deficiencies.
- Alignment with national dietary guidelines, which increasingly encourage aquatic food consumption as part of healthy diets.
- Potential for nutrition-sensitive aquaculture, including fortified and selenium-enriched farmed fish products

d) Gender

- High participation of women in post-harvest segments, creating opportunities for targeted upgrading, skill development, and entrepreneurship.
- Scope to formalize and professionalize women's roles in processing, marketing, and retail through cooperatives and MSMEs.

- Potential for gender-responsive value-chain interventions, improving incomes, working conditions, and recognition.
- Growing policy attention to rural livelihoods, which can be leveraged to strengthen women's economic empowerment in fisheries.

e) Governance

- Strong national policy framework, including the Fisheries Law, Big Food policy, and long-term conservation measures (e.g., Yangtze fishing ban).
- Integration of environment, climate, and biodiversity policies, enabling ecosystem-based and climate-resilient fisheries governance.
- Improved monitoring and compliance systems, including vessel tracking, catch documentation, and IUU controls.
- Opportunities for data and institutional strengthening, particularly in inland fisheries, fish loss and waste, and labour statistics.

11. Priority Policy Recommendations

10.3 Key actionable policy recommendations linking aquatic foods, value chains and Food Security and Nutrition (FSN - six dimensions)

S. No	FSN Dimension	Policy Recommendation	Rationale	Supporting evidence
1	**Fish Loss & Waste (FLW)**			
2	**Gender Inclusion**	Formalise and upgrade women's roles in processing, retail and MSMEs through targeted training, finance and enterprise support.	Women perform extensive but often informal roles in processing and market retail and need targeted support to capture more value.	Provide business, HACCP and digital training targeted to women processors. Create MSME finance windows and grant support for women-led enterprises. Integrate sex-disaggregated indicators into monitoring and reporting systems.
		Create micro-finance and enterprise schemes for women-led fish handling & retail initiatives.	Enables upward mobility and income autonomy among women workers.	Women often work as unpaid family labour or low-paid casual workers with limited access to capital or social protection
		Promote formal recognition and labour protections	Women lack legal identity within	"Unspecified" labour category remains nearly 45–47% of total workers,

S. No	FSN Dimension	Policy Recommendation	Rationale	Supporting evidence
		for informal women workers.	workforce statistics.	indicating significant informal participation
3	**Compliance & Trade Readiness**	Scale national certification, traceability and accredited testing to meet export and domestic safety standards.	High-value domestic and export markets require HACCP, traceability and reliable laboratory services to maintain access.	Expand HACCP/GMP coaching and accredited labs countrywide. Roll out interoperable digital traceability (QR/chain-of-custody) for aquaculture and processed lines. Strengthen quarantine, veterinary oversight and supply-chain inspections.
		Provide financial and technical support for international certification adoption (MSC, ASC, ISO).	Certification is cost-burdening for small producers.	Certification challenges create barriers due to cost of audit and documentation for smaller operations
		Strengthen catch documentation and IUU compliance, especially for distant-water fleets.	Ensures access to EU, US and RFMO-regulated markets.	China participates in PSMA, UNCLOS, UNFSA and multiple RFMOs with formal commitments to anti-IUU enforcement
4	**Environmental Sustainability**	Enforce stock recovery measures (seasonal moratoria, reduced fishing effort).	Marine stocks have crossed into overexploitation status since 2015.	CPUE and biomass dropped to critically overloaded and overloaded stock levels post-2015
		Strengthen ecosystem-based aquaculture zoning and effluent regulations.	Controls pollution, eutrophication and antibiotic discharge risk.	Document notes aquaculture faces risks from excess nutrients, chemicals, and farm effluents in coastal and inland waters
		Expand mangrove, wetland and	Restores ecological	China's ecological civilisation plan includes coastal ecosystem

S. No	FSN Dimension	Policy Recommendation	Rationale	Supporting evidence
		estuarine habitat restoration.	resilience and breeding grounds.	protection and nature-based restoration strategies
5	**Nutrition Contribution**	Encourage consumption of micronutrient-rich small fish species eaten whole.	Whole small fish provide Ca, Fe, Zn, B12, DHA/EPA.	Document shows small fish have high micronutrient density due to bones, viscera and head being consumed
		Link aquaculture production and value-added processing to nutrition programmes to improve affordability and micronutrient delivery.	Large aquaculture output can be leveraged to improve diets and reach vulnerable groups if nutrient-dense products are made affordable and available.	Promote small-species products and fortified/ready-to-use fish powders for school and maternal programmes. Support small processors to produce low-cost, nutrient-dense product lines.
		Promote selenium-enriched aquaculture species.	Supports public nutrition and counters selenium deficiencies.	Document highlights selenium-enriched farmed aquatic foods as an emerging targeted nutrition strategy
6	**Climate Resilience & Readiness**	Expand climate-adaptive aquaculture (species tolerance, thermal resistance).	Changing temperatures & salinity affect freshwater and marine culture.	Climate change is altering water conditions and disease patterns across marine and inland aquaculture
		Strengthen China's marine-hazard early warning and AI-assisted monitoring systems.	Reduces risk of operational hazards and supply disruptions.	China has developed national early-warning systems and AI-enabled monitoring under MAZU initiative
		Facilitate transitions of capture fishers into aquaculture & non-fishing livelihoods.	Reduces pressure on wild stocks and builds economic stability.	Yangtze fishing ban programs include compensation, retraining and livelihood diversification

10.4 Recommendations (specific, feasible, and linked to national priorities)

Dimension	Policy Action(s)	Linked National Policy / Strategy
1. Fish Loss & Waste (FLW)		
2. Gender Inclusion	1. Support women-led processing & retailing enterprises	National gender inclusion labour frameworks; local fisheries employment directives
	2. Integrate women into cooperatives, registries & credit channels	Fisheries workforce statistics reforms; cooperative restructuring strategies
	3. Provide skill training for women in packaging, hatchery-work & value-added processing	MARA capacity building initiatives; FAO-supported training programmes
3. Compliance & Trade Readiness	1. Strengthen HACCP & ISO enforcement for domestic & export markets	Food Safety Law (2015); SAMR enforcement inspections; GACC export regulatory compliance
	2. Expand traceability and product origin authentication	Aquatic Product Quality and Safety Traceability System; national digital monitoring systems
	3. Align fishing activities with PSMA, RFMO & WTO seafood protocols	China's participation in UNCLOS, PSMA, UNFSA, WTO Fisheries Subsidies & multiple RFMOs
4. Environmental Sustainability	1. Expand marine seasonal bans & stock recovery initiatives	Marine summer fishing moratorium; national fisheries enforcement measures
	2. Enforce aquaculture zoning & water-quality regulations	Marine Ecological Redline Policy; aquaculture regulatory framework and enforcement
	3. Restore wetlands, estuaries & coastal habitats	Ecological Civilization policy; National marine biodiversity stewardship actions

5. Nutrition Contribution	1. Promote nutrient-rich small fish consumption (whole-body eating)	National dietary policies and nutrition promotion campaigns
	2. Improve fish supply distribution to inland provinces	Aquaculture expansion under National Plan for Aquaculture Development
	3. Expand selenium-enriched aquaculture production	Bio-fortification initiatives under national nutrition strategies
6. Climate Resilience & Readiness	1. Promote climate-tolerant aquaculture species & adaptive culture methods	National climate adaptation policies; Ministry of Ecology & Environment climate action
	2. Expand AI-enabled early warning & hazard-forecast systems (e.g., MAZU)	National marine disaster early-warning framework; MAZU system deployment
	3. Support fisher livelihood transition (post-capture fishing restrictions)	Yangtze 10-year fishing-ban compensation & reskilling programmes

12. Provide the traffic-light scoring for the six key dimensions

Dimension	Score (1–5)	Colour	Key Notes
Fish Loss & Waste	3		China's processing sector is rapidly modernizing, with increasing use of factory processing, vacuum packaging, frozen handling, and expanded refrigerated distribution; however, inland supply chains still rely heavily on traditional drying, salting and ice preservation, with patchy cold-chain coverage, leading to quality loss and reduced market value. Explanation: Score reflects meaningful advances in industrial processing and cold-chain expansion, but uneven infrastructure between coastal and inland regions.
Gender Inclusion	2		Women represent a substantial portion of post-harvest labour in processing, sorting, drying and market retail, yet remain informal, low-paid and without social or financial protections; many are unregistered within the "unspecified workforce", which remains 45–47% of total labour.

			Explanation: Score shows high participation but low formal recognition and empowerment.
Compliance & Trade Readiness	4		China applies Food Safety Law (2015), SAMR quality inspection, HACCP standards, and strong export surveillance; operates advanced nationwide traceability monitoring; and participates in PSMA, UNCLOS, FAO Compliance Agreement, UN Fish Stocks, WTO Fisheries Subsidies, providing strong international alignment. Explanation: Score reflects high regulatory maturity and international compliance, though small producers still face certification cost barriers.
Environmental Sustainability	2		Marine CPUE and biomass indicators show critical overload since 2015, with stock conditions shifting from sustainable to overloaded; eutrophication and aquaculture effluent risks threaten both coastal and inland ecosystems. Explanation: Score reflects severe stock pressure and environmental risks, despite strong policy commitments.
Nutrition Contribution	4		China has high per-capita aquatic consumption (41.6 kg); aquatic foods provide >20% of total animal-protein intake; small fish consumed whole supply key micronutrients; selenium-enriched aquaculture is emerging as intentional nutrition strategy; fish now integrated into dietary norms across demographic groups. Explanation: Score reflects strong contribution to nutrition, especially coastal areas, though inland disparities persist.
Climate Resilience & Readiness	4		China operates a multi-layer marine hazard early-warning system, AI-enabled monitoring (MAZU), climate-adapted aquaculture, and structured fisher transition support (e.g., Yangtze 10-year ban compensation). Explanation: Score reflects strong state-led climate-resilience mechanisms, forecasting systems and livelihood transition frameworks.

13. References

[1] FAO, SOFIA 2022: https://openknowledge.fao.org/items/11a4abd8-4e09-4bef-9c12-900fb4605a02

[2] Agriculture and Agri-Food Canada (AAFC), 2024: https://agriculture.canada.ca/en/international-trade/reports-and-guides/sector-trend-analysis-fish-and-seafood-trends-china

[3] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[4] Huo, J. et al., (2024). Malnutrition in infants aged 6-23 months in China's poorest rural counties from 2016 to 2021: cross sectional study. *BMJ*, *387*.

[5] Zhang, J., et al. (2021). Malnutrition in relation with dietary, geographical, and socioeconomic factors among older Chinese. *Biomedical and Environmental Sciences*, *34*(5), 337-347.

[6] Huang, L., et al. (2021). Nutrition transition and related health challenges over decades in China. *European journal of clinical nutrition*, *75*(2), 247-252.

[7] HLPE, 2017. Nutrition and food systems. A report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome. https://openknowledge.fao.org/server/api/core/bitstreams/4ac1286e-eef3-4f1d-b5bd-d92f5d1ce738/content

[8] FAO & WHO. 2024. FAO/WHO background document on the risks and benefits of fish consumption. Food Safety and Quality Series, No. 27. Rome. https://doi.org/10.4060/cd1548en

[9] National Bureau of Statistics of China: https://www.stats.gov.cn/english/PressRelease/202105/t20210510_1817190.html

[10] FAO. 2023. A review of the inland fisheries of the People's Republic of China and the strengthening of capacity in the collection and analysis of inland fisheries statistics. FAO Fisheries and Aquaculture Circular, No. 1264. Rome. https://doi.org/10.4060/cc9258en

[11] Van Anrooy, R., Carvalho, N., Kitts, A., Mukherjee, R., Van Eijs, S., Japp, D. and Ndao, S. 2021. Review of the technoeconomic performance of the main global fishing fleets. FAO Fisheries and Aquaculture Technical Paper No. 654. Rome, FAO. https://doi.org/10.4060/cb4900en

[12] Liu, X., Geng, R., Do, T. N., Lv, X., & Du, X. (2024). Transforming China's Fisheries: A 40-Year Journey toward Sustainable Management (1980–2019). *Fishes*, *9*(9), 343.

[13] The State of World Fisheries and Aquaculture, 2024: https://www.developmentaid.org/api/frontend/cms/file/2024/06/cd0690en.pdf

[14] Wang Q, Liu S, Wang H, Su C, Liu A, Jiang L. Consumption of aquatic products and meats in Chinese residents: A nationwide survey. Front Nutr. 2022 Jul 22; 9:927417. doi: 10.3389/fnut.2022.927417.

[15] Xu, H., Wu, T., Budhathoki, M., Fang, D. S., Zhang, W., & Wang, X. (2024). Consumption patterns and willingness to pay for sustainable aquatic food in China. *Foods*, *13*(15), 2435.

[16] Dong, Y., Liu, W., & Li, J. (2025). Chinese policy on fisheries subsidies: Evolution, challenges, and new prospects. *Marine Policy*, *181*, 106826.

[17] FAO: https://www.fao.org/fishery/en/countrysector/naso_china

[18] Ma, H., Zhong, Y., Ou, M., Wang, W., & Feng, X. (2022). The Transformation of Fishermen's Livelihoods in the Context of a Comprehensive Fishing Ban: A Case Study of Datang Village at the Poyang Lake Region, China. *Land*, *11*(12), 2262.

[19] Yang, W. (2025). Dynamic trends in aquatic product supply and consumption in china: implications for sustainable diets and environmental impact reduction. *Foods*, *14*(2), 191.

[20] Fishery and Aquaculture Statistics. Year Book 2022. https://openknowledge.fao.org/server/api/core/bitstreams/8ceadc57-dab4-4546-a7f9-066d8f428b21/content

[21] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[22] FAO: https://openknowledge.fao.org/server/api/core/bitstreams/0bbb0c60-38cf-452b-a510-fd34822917d8/content

[23] FAS.USDA, 2025: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=2025%20China%20Fishery%20Products%20Report_Beijing_China%20-%20People%27s%20Republic%20of_CH2025-0057.pdf

[24] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[25] FAO (2009). *Review of fishery information and data for China*. FAO Fisheries and Aquaculture Circular 1029.

[26] Chang, T. et al. (2025). Studies on Yangtze flood-pulse lakes and fish assemblages, illustrating seasonal hydrology–fishery linkages.

[27] Newton, R. et al. (2021). "The changing face of inland aquaculture in China." *Reviews in Aquaculture*.

[28] Tian, P. et al. (2022). "Mapping China's coastal aquaculture ponds expansion with Sentinel-1 images." *Remote Sensing*.

[29] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[30] FAO: https://www.fao.org/fishery/en/legalframework/nalo_china

[31] FAO: https://www.fao.org/fishery/en/collection/global_pp

[32] FAS. USDA: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=2024+China+Fishery+Products+Report_Beijing_China+-+People%27s+Republic+of_CH2024-0044.pdf

[33] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[34] Yang, Y., Phillips, C., Narayan, E., Shao, Q., & Descovich, K. (2025). Attitudes of Chinese aquaculture stakeholders towards live transport and farmed fish welfare, with a focus on the Hunan region. *Aquaculture International*, *33*(4), 300.

[35] Chen, W., & Gao, S. (2023). Current status of industrialized aquaculture in China: a review. *Environmental Science and Pollution Research*, *30*(12), 32278-32287.

[36] Liu, S., Chang, L., & Wang, L. (2023). Demand forecasting of cold-chain logistics of aquatic products in China under the background of the Covid-19 post-epidemic era. *Plos one*, *18*(11), e0287030.

[37] Research on the Safety of Aquatic Products Transportation under the Background of the New Crown Epidemic. 2022. Yuchen Ren, Xiang Wang, Macheng Pan, Xuan Yang and Weilin Zhang. Frontiers in Humanities and Social Studies. Vol 2. Issue 11.

[38] Budhathoki, M., Li, L., Xu, H., Zhang, W., Ma, X., Pandey, S., & Thomsen, M. (2026). Market dynamics and E-commerce satisfaction in China's aquatic food sector: Machine learning and data insights. *Aquaculture*, *610*, 742904.

[39] Wang, Q., Liu, S., Wang, H., Su, C., Liu, A., & Jiang, L. (2022). Consumption of aquatic products and meats in Chinese residents: A nationwide survey. *Frontiers in Nutrition*, *9*, 927417.

[40] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[41] Arthur Hanson, He Cui, Linlin Zou, Shelley Clarke, Geoffrey Muldoon, Jason Potts, Huihui Zhang, 2011. Greening China's Fish and Fish Products Market Supply Chains. at www.iisd.org/publications/pub.aspx?id=1474

[42] FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. https://doi.org/10.4060/cc0461en

[43] OECD-FAO Agricultural outlook 2025-2034. https://www.oecd.org/en/publications/2025/07/oecd-fao-agricultural-outlook-2025-2034_3eb15914/full-report/fish-and-other-aquatic-products_ed13346f.html

[44] Budhathoki, M., Xu, H., Song, Y., Ma, Z., Benter, A., Zhang, W., ... & Little, D. (2025). Perceptions fuelling the demand for high value imported aquatic food in China. *Sustainable Futures*, *9*, 100569.

[45] FAO: https://www.fao.org/in-action/globefish/news-events/news/news-detail/china%27s-atlantic-salmon-imports-hit-record-high-in-2023/en

[46] Qi, X., & Gao, L. (2025). Analysis of the development trend of Chinese seafood imports from Southeast Asia after the Fukushima-Daiichi radioactive treated water discharge from Japan. *PLoS One*, *20*(10), e0334879.20

[47] FAO: https://openknowledge.fao.org/server/api/core/bitstreams/9df19f53-b931-4d04-acd3-58a71c6b1a5b/content/sofia/2022/trade-of-aquatic-products.html

[48] Zuanbin, M. (2024). The Role of Non-Tariff Measures (NTMs) on Aquatic Trade: Evidence from China's Aquatic Exports. *Available at SSRN 4813707*.

[49] Mustafa, A., Akhtar, Z. M., & Sohail, M. (2022). The impact of sanitary and phytosanitary measures and technical barriers to trade on imports of China with partner countries. *Journal of Development and Social Sciences*, *3*(2), 819-831.

[50] The Fish Site: https://thefishsite.com/articles/understanding-chinas-fish-trade-and-traceability-systems

[51] D'Amico, P., Armani, A., Castigliego, L., Sheng, G., Gianfaldoni, D., & Guidi, A. (2014). Seafood traceability issues in Chinese food business activities in the light of the European provisions. *Food Control*, *35*(1), 7-13.

[52] IISD: https://www.iisd.org/system/files/publications/greening_china_fish_sum_en.pdf

[53] Food and Agriculture Organization of the United Nations (2016). FAO/INFOODS Global Food Composition Database for Fish and Shellfish Version 1.0- uFiSh1.0. Rome, Italy.

[54] The role of aquatic foods in sustainable healthy diet. https://www.unnutrition.org/wp-content/uploads/FINAL-UN-Nutrition-Aquatic-foods-Paper_EN_.pdf

[55] Golden, C. D., Koehn, J. Z., Shepon, A., Passarelli, S., Free, C. M., Viana, D. F., & Thilsted, S. H. (2021). Aquatic foods to nourish nations. *Nature*, *598*(7880), 315-320.

[56] Byrd, K. A., Thilsted, S. H., & Fiorella, K. J. (2021). Fish nutrient composition: a review of global data from poorly assessed inland and marine species. *Public health nutrition*, *24*(3), 476-486.

[57] Qiu, H., Ren, H., Wang, W., Huang, J., Wang, L., & Jin, X. (2025). Dietary Selenium-Enriched Aquatic Products for Human Health. *Nutrients*, *17*(23), 3640.

[58] Bavinck, M., Ahern, M., Hapke, H.M., Johnson, D.S., Kjellevold, M., Kolding, J., Overå, R., Schut, T. & Franz, N., eds. 2023. Small fish for food security and nutrition. FAO Fisheries and Aquaculture Technical Paper No. 694. Rome, FAO. https://doi.org/10.4060/cc6229en

[59] Sun, H., Johnson, D. S., & Aluko, R. E. (2025). Nutrient and heavy metals composition of dried fish varieties from Bangladesh. *LWT*, *215*, 117233.

[60] Mamun, A. A., Bhowmik, S., Sarwar, M. S., Akter, S., Pias, T., Zakaria, M. A., & Little, D. C. (2022). Preparation and quality characterization of marine small pelagic fish powder: A novel ready-to-use nutritious food product for vulnerable populations. *Measurement: Food*, *8*, 100067.

[61] Mamun, A. A., Rifat, M. A., Wahab, M. A., Rahman, M. A., Nahiduzzaman, M., Thilsted, S. H., & Kjellevold, M. (2024). Nutrient composition of dried marine small fish in Bangladesh and their potential to address hidden hunger. *Journal of Food Composition and Analysis*, *131*, 106241.

[62] Zhao, J., Chen, S., Li, C., Wang, T., Du, F., Sun, D., & Liu, Y. (2024). Thirty years of change: Assessing the dynamics of fish communities in Daya Bay, a semi-enclosed coastal ecosystem of the South China sea. *Water Biology and Security*, *3*(3), 100268.

[63] Xu, M., Gao, X., Liu, W., & Wang, J. (2024). Seasonal Distribution of Key Small-Sized Fish in the South Inshore of Zhejiang, China. *Fishes*, *9*(10), 412.

[64] Newton, R., Zhang, W., Xian, Z., McAdam, B., & Little, D. C. (2021). Intensification, regulation and diversification: The changing face of inland aquaculture in China. *Ambio*, *50*(9), 1739.

[65] Zamborain-Mason, J., Eurich, J. G., Friedman, W. R., Gephart, J. A., Kelahan, H. M., Seto, K. L., & Golden, C. D. (2025). The contribution of aquatic foods to human nutrient intake and adequacy in a small Island developing state. *Scientific Reports*, *15*(1), 26220.55

[66] Liu, G. (2014-04-03), "Food Losses and Food Waste in China: A First Estimate", OECD Food, Agriculture and Fisheries Papers, No. 66, OECD Publishing, Paris. http://dx.doi.org/10.1787/5jz5sq5173lq-en

[67] Song Zhiwen, 2000. The Sustainable Contribution of Fisheries to Food Security in China. In 'Sustainable Contribution of Fisheries to Food Security'. Asia-Pacific Fishery Commission, Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific, December 2000. https://www.fao.org/4/x6956e/x6956e06.htm#P0_0

[68] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[69] Fishery and Aquaculture Statistics. Yearbook 2023: https://openknowledge.fao.org/server/api/core/bitstreams/140be7f8-74b2-4b8a-9ca7-285719c31e53/content

[70] FAO: https://www.fao.org/4/ad070e/ad070e08.htm

[71] Wang, Q., & Zhou, Y. (2008). Contributing significantly: Women make major contributions to the fisheries sector in China but more needs to be done to promote equal rights in fisheries and accelerate women's development. *Yemaya*, (28), 5-7.

[72] Megbowon, I., Adewolu, M. A., Ozor, P. O., Ayo-Olalusi, C. I., Okunade, O. A., Mojekwu, T. O., & Kolade, O. Y. (2010). Role of women in fisheries and fish processing: A global view.

[73] FAO: https://www.fao.org/4/s4863e/s4863e06.htm

[74] Kang, B., Wang, L., & Liu, M. (2022). Species traits determined different responses to "zero-growth" policy in China's marine fisheries. *Scientific Reports*, *12*(1), 20410.

[75] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[76] Liu, Z., Lu, W., Wang, T., Zhang, Y., He, L., Yang, L., & Deng, L. (2025). The assessment of carrying capacity of marine fishery resources in China. *Frontiers in Marine Science*, *11*, 1518235.

[77] Liu, X., Shao, Z., Cheng, G., Lu, S., Gu, Z., Zhu, H., ... & Chen, X. (2021). Ecological engineering in pond aquaculture: a review from the whole-process perspective in China. *Reviews in Aquaculture*, *13*(2), 1060-1076.

[78] Li, G., Dong, M., Liu, H., Lu, L., Hou, P., & Pan, X. (2025). Occurrence, Distribution, and Ecological Risk Assessment of Antibiotics in Aqueous, Sediment, and Solid Waste of a Typical Island Province in China. *Water*, *17*(19), 2846.

[79] Hao, H., & Jiang, C. (2023). The path of transboundary marine plastic waste management in China, Japan, and South Korea from the perspective of the blue economy. *Frontiers in Marine Science*, *9*, 1075667.

[80] Tekman, M. B., Walther, B., Peter, C., Gutow, L., & Bergmann, M. (2022). *Impacts of plastic pollution in the oceans on marine species, biodiversity and ecosystems*. WWW Germany.

[81] Wu, Z., Wang, J., Yu, S., Sun, Q., & Han, Y. (2025). Microplastic Pollution in China's Aquatic Systems: Spatial Distribution, Transport Pathways, and Controlling Strategies. *Microplastics*, *4*(3), 41.

[82] Mu, X., Yuan, L., Meng, S., Huang, Y., Chen, J., & Li, Y. (2023). Significant decline of water pollution associated with inland fishery across China. *Eco-Environment & Health*, *2*(2), 79-87.

[83] Ye, S. (2024). Analysis of influencing factors of carbon emissions from China's marine fishery energy consumption under different development scenarios. *Frontiers in Marine Science*, *11*, 1377215.

[84] Ma, S., Kang, B., Li, J., Sun, P., Liu, Y., Ye, Z., & Tian, Y. (2023). Climate risks to fishing species and fisheries in the China Seas. *Science of the Total Environment*, *857*, 159325.

[85] Li, Y., Sun, M., Yang, X., Yang, M., Kleisner, K. M., Mills, K. E., & Chen, Y. (2024). Social–ecological vulnerability and risk of China's marine capture fisheries to climate change. *Proceedings of the National Academy of Sciences*, *121*(1), e2313773120.

[86] Yuan, B., Tu, J., & Li, Z. (2025). Impacts of climate change on mariculture in coastal China: Spatial reconfiguration and structural adaptation. *Aquaculture*, 742874.

[87] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

[88] Williams, M. (2024). Impact of climate change on inland and ocean fisheries and aquaculture. In *Climate change and sustainable agro-ecology in global drylands* (pp. 128-148). GB: CABI.

[89] Daw, T., Adger, W. N., Brown, K., & Badjeck, M. C. (2009). Climate change and capture fisheries: potential impacts, adaptation and mitigation.

[90] China Council for International Cooperation on Environment and Development (CCICED) Secretariat. (2023). Global Ocean Governance and Ecological Civilization. In *Green Recovery with Resilience and High Quality Development: CCICED Annual Policy Report 2021* (pp. 125-180). Singapore: Springer Nature Singapore.

[91] Bai, J., & Li, X. (2023). The evolution of China's policies on marine and coastal ecosystems in climate change adaptation. *Frontiers in Marine Science*, *10*, 1190132.

[92] Yue, G. H., Tay, Y. X., Wong, J., Shen, Y., & Xia, J. (2024). Aquaculture species diversification in China. *Aquaculture and fisheries*, *9*(2), 206-217.

[93] Newton, R., Zhang, W., Xian, Z., McAdam, B., & Little, D. C. (2021). Intensification, regulation and diversification: The changing face of inland aquaculture in China. *Ambio*, *50*(9), 1739.

[94] Chen, J., Lin, C., Xue, K., Song, K., Cao, Z., Ma, R., ... & Tong, Y. (2025). Mapping China aquaculture ponds: Integrating a new aquaculture index with machine learning. *Earth's Future*, *13*(6), e2024EF005637.

[95] Xiong, S. (2024, January). The Unintended Consequences of the Yangtze River Fishing Ban: A Deep Dive into the Economy and Culture of Hongze Lake. In *2023 2nd International Conference on Public Service, Economic Management and Sustainable Development (PESD 2023)* (pp. 201-210). Atlantis Press.

[96] He, Y., & Chen, T. (2022). Does the 10-year fishing ban compensation policy in the Yangtze River basin improve the livelihoods of fishing households? Evidence from Ma'anshan City, China. *Agriculture*, *12*(12), 2088.

[97] Wang, X., Zheng, J., Yang, Y., & Chen, T. (2025). Resilience and intentions of fishermen transitioning to ecological farming: insights from China's Yangtze River basin. *Frontiers in Environmental Economics*, *4*, 1518032.

[98] Xiong, M., Wu, Z., Qi, G., Jiang, K., Zhao, N., & Jiang, W. (2024). Exploring Policy of Small-Scale Coastal Fisheries in China: Evolution, Challenges and Prospects. *Fishes*, *9*(11), 451.

[99] Chen, Y., Ma, T., Xu, S., Zhao, Y., & Deng, Z. (2025). Research on the resilience level of fishery economy in coastal areas of China.

[100] Yao, L., He, P., Xia, Z., Li, J., & Liu, J. (2024). Typical marine ecological disasters in China attributed to marine organisms and their significant insights. *Biology*, *13*(9), 678.

[101] Wang, Y., Ding, Y., Geng, R., & Chen, C. (2023). Risk characteristics of China's marine disasters and trends since 2000. *Frontiers in Marine Science*, *10*, 1152880.

[102] Li, W., Pires, S. M., Liu, Z., Ma, X., Liang, J., Jiang, Y., ... & Guo, Y. (2020). Surveillance of foodborne disease outbreaks in China, 2003–2017. *Food Control*, *118*, 107359.

[103] Wang, H., Yao, Y., Dai, X., Chen, Z., Wu, J., Qiu, G., & Feng, T. (2022). How do ecological protection policies affect the restriction of coastal development rights? Analysis of choice preference based on choice experiment. *Marine Policy*, *136*, 104905.

[104] FAO, 2022, FAO Fisheries and Aquaculture Country Profiles – China

[105] Wang, J., Liu, M., & Zhou, H. 2023. "Certification and ecological labelling impacts on China's aquaculture sector." *Aquaculture Reports*, 29: 101527.

[106] Regional Workshop on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Asia held in Chennai from 2-4 December, 2025. Presentation for China by Dr. Jian Yang and Dr. Wenbo Zhang

Bay of Bengal Programme
Inter-Governmental Organisation
91 St. Mary's Road, Chennai - 600 018, India.
Tel: +91 44 42040024
Email: info@bobpigo.org | www.bobpigo.org