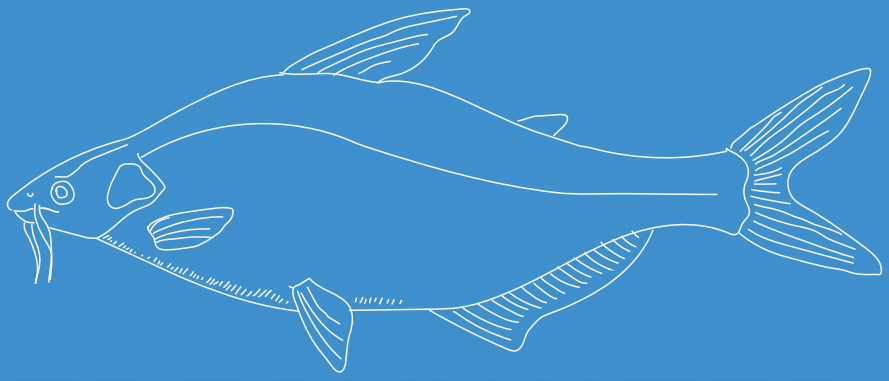

FRESHWATER AQUACULTURE & THE STATUS OF PANGASIUS IN INDONESIA

Global Context, Southeast Asia & Indonesia's Production Landscape

2025 REPORT

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Preface

Aquaculture has emerged as one of the most dynamic components of the global food system, contributing substantially to food and nutritional security, employment, rural livelihoods and economic development. With production from capture fisheries approaching its ecological limits, the sustainable expansion of aquaculture is no longer merely an option; it is essential to meet the growing global demand for affordable aquatic protein. Freshwater aquaculture has a particularly important role in this transformation because of its accessibility to small-scale farmers, efficient use of resources and capacity to support geographically dispersed value chains.

Among the species that exemplify the remarkable growth of freshwater aquaculture, Pangasius (Pangasianodon hypophthalmus) occupies a prominent position. Originating in the Mekong River basin, it has evolved from a regionally cultivated fish into an internationally traded commodity that reaches markets across the world. Its rapid growth, hardiness, efficient feed conversion, adaptability to diverse farming systems and suitability for processing have made it an economically attractive species for farmers, processors and consumers. The Pangasius sector also demonstrates how coordinated advances in breeding, hatchery production, feed technology, farming practices, processing, cold-chain infrastructure and market development can transform an aquaculture species into the foundation of a major industry.

This report, Freshwater Aquaculture and the Status of Pangasius in Indonesia: Global Context, Southeast Asia and Indonesia's Production Landscape, presents a timely and informative account of this transformation. It places the development of Pangasius farming within the wider transition from capture fisheries to aquaculture and examines Indonesia's emergence as an important producer. The report is particularly valuable because it combines a broad assessment of global and Southeast Asian aquaculture with observations from Indonesia's principal Pangasius-producing regions, including Sumatra, Kalimantan and Java.

The strength of this publication lies in its engagement with the entire value chain. Information gathered through field visits and interactions with farmers, hatchery operators, feed suppliers, traders, processors, fisheries officials and extension personnel provides a practical understanding of the sector beyond production statistics alone. The discussions on broodstock and seed systems, feed quality and cost, farm-gate prices, processing grades, market segmentation and the utilisation of by-products will be useful to farmers, entrepreneurs, researchers, policymakers and development agencies. The report also highlights the importance of evaluating production economics through parameters such as feed-conversion efficiency and the effective yield of processed products, rather than relying only on their nominal prices.

Indonesia's experience is especially instructive for other Asian countries, including India. Its combination of smallholder-based production, expanding hatchery networks, region-specific farming systems, domestic market orientation and growing processing capacity offers valuable lessons for developing inclusive and resilient freshwater aquaculture. At the same time, future expansion must be guided by environmental responsibility, aquatic animal health management, biosecurity, genetic quality, food safety, traceability, efficient resource use and fair returns to primary producers. Growth that is not supported by sound science and effective governance may create ecological and socioeconomic costs that undermine the long-term promise of the sector.

Kerala University of Fisheries and Ocean Studies is committed to advancing sustainable aquaculture through education, research, innovation, entrepreneurship and international cooperation. This report reflects that commitment by facilitating the exchange of knowledge and field-based experience between India and Indonesia—two major aquaculture nations with considerable opportunities for collaborative research, technology transfer, capacity building and responsible investment.

I congratulate Dr Dinesh Kaippilly and Mr Dilip Sathyanathan for compiling this informative report and acknowledge the many farmers, industry representatives, technical experts and Indonesian institutions whose cooperation made it possible. I trust that this publication will encourage informed discussion, comparative research and practical initiatives for developing a productive, inclusive and environmentally sustainable Pangasius value chain. May it also contribute to the broader objective of ensuring that aquaculture remains a dependable pillar of food security, livelihoods and the sustainable Blue Economy.

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Foreword

At a time when global food systems are being challenged to deliver more protein sustainably, freshwater aquaculture is proving to be one of the most promising pathways forward. Species such as Pangasius, with their rapid growth, hardiness, and efficient use of resources, demonstrate how a single freshwater fish can support smallholder livelihoods while also meeting large-scale market demand. As capture fisheries approach the limits of what oceans can sustainably provide, freshwater aquaculture offers a scalable, inclusive, and resource-efficient alternative that many developing economies are well placed to harness.

Indonesia's Pangasius sector illustrates this potential vividly. Over the past two decades, the country has built an extensive production base spanning Sumatra, Kalimantan, and Java, supported by an expanding network of hatcheries, feed suppliers, and processing units. Its journey from a modest freshwater fishery to a nationally significant aquaculture commodity offers valuable lessons for other Asian nations, including India, that are working to strengthen their own freshwater aquaculture value chains.

This report is the outcome of an effort to document that journey in detail. It draws on field visits across Indonesia's principal Pangasius-producing regions and on direct interactions with farmers, hatchery operators, feed suppliers, traders, processors and fisheries officials. Beyond production statistics, the report attempts to capture the practical realities of the sector — broodstock and seed availability, feed cost and conversion efficiency, farm-gate pricing, processing grades, market segmentation, and the utilisation of by-products. We believe this ground-level perspective is what makes the report genuinely useful to farmers, entrepreneurs, researchers and policymakers alike.

We have also sought to place Indonesia's experience within the broader context of global and Southeast Asian aquaculture, so that readers can appreciate both the scale of opportunity and the challenges that accompany rapid sectoral growth — among them disease management, biosecurity, feed cost volatility, and the need for consistent quality and traceability standards.
It is our sincere hope that this compendium serves as a practical reference for students, farmers, entrepreneurs and policymakers, and that it encourages deeper collaboration between India and Indonesia in research, technology transfer and capacity building. We are grateful to the many farmers, hatchery operators, processors and institutions in Indonesia who generously shared their time and expertise, and to the Kerala University of Fisheries and Ocean Studies for its continued support in bringing this work to fruition.

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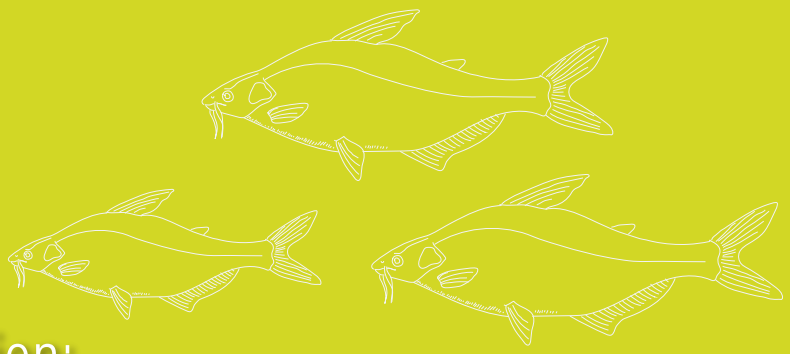


Introduction:

Fish as Protein in the Blue Economy

Fish occupies a central place in the blue economy because it is one of the few major protein sources that scales with ocean and freshwater productivity rather than land. As global population grows and pressure on arable land and freshwater intensifies, aquatic protein has moved from a regional dietary staple to a structural pillar of global food security and economic strategy.

Nutritional Weight

Aquatic foods already supply at least 20% of the animal protein intake for approximately 3.1 billion people worldwide. For many coastal and island nations, aquatic protein is the primary, and often the only, affordable source of animal protein. Fish also delivers a nutrient profile that land animals cannot always match as efficiently: highly digestible protein, essential omega-3 fatty acids and micronutrients such as vitamin B12, iodine, zinc and calcium, particularly when small fish are consumed whole. In many developing regions, fish consumption is the determining factor between adequate and inadequate micronutrient intake, especially for children and pregnant women.

Production Efficiency

Fish convert feed into body mass more efficiently than cattle, pigs or poultry and require substantially less land and freshwater per kilogram of protein produced. As global population climbs toward ten billion and arable land and freshwater resources become increasingly scarce, this efficiency is a structural reason why blue economy planners increasingly treat aquatic protein as a load-bearing pillar of future food security rather than a supplementary source.

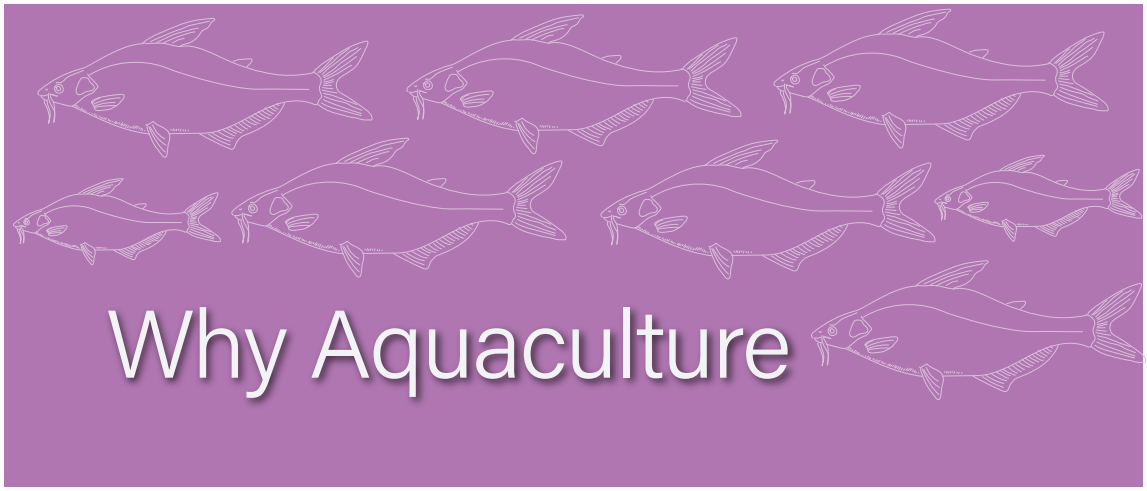
On a larger landscape, commercial capture fisheries sector is a relatively recent development, with their rapid expansion occurring mainly during the past two centuries. The sector evolved from small-scale artisanal operations into a highly organized global industry, driven by technological innovations, industrialization and increasing demand for seafood. Following the Second World War, advances in vessel design, engine technology, navigation systems and fishing equipment dramatically increased fishing capacity and efficiency. The development of large trawl nets, purse seines, gill nets and longlines enabled fishers to exploit offshore fishing grounds and harvest substantially larger quantities of fish than ever before. Consequently, commercially valuable species such as cod, herring, tuna and mackerel became major commodities in international markets.

Technological progress also transformed post-harvest handling and seafood distribution. Improvements in refrigeration, freezing, canning and cold-chain logistics, together with the growth of containerized shipping and modern transportation systems, greatly extended the shelf life of fish and facilitated the expansion of global seafood trade. These advancements allowed seafood products to reach distant markets while maintaining their quality, making fisheries an important contributor to food security, employment and national economies.

Despite these achievements, the rapid expansion and intensification of capture fisheries have placed considerable pressure on aquatic ecosystems. Continuous improvements in fishing efficiency have increased exploitation rates beyond the natural regenerative capacity of many fish populations. According to the Food and Agriculture Organization (FAO), global capture fisheries produced approximately 92.3 million tonnes in 2024, comprising 81.0 million tonnes from marine waters and 11.3 million tonnes from inland fisheries. At the same time, the proportion of marine fish stocks harvested within biologically sustainable levels declined to 62.3% in 2021, highlighting the growing challenge of maintaining healthy fish populations.

Overfishing has emerged as one of the most significant threats to the sustainability of global fisheries. When fish are harvested faster than they can reproduce, stock abundance declines, biodiversity is affected and the resilience of aquatic ecosystems is compromised. Unsustainable fishing practices also threaten the livelihoods of millions of people who depend directly or indirectly on fisheries for income and food security. Therefore, reducing excessive fishing pressure and adopting science-based fisheries management are essential to restoring depleted stocks, conserving marine biodiversity and ensuring the long-term productivity of aquatic resources.

In this context, sustainable fisheries management and the responsible development of aquaculture have become increasingly important. Measures such as regulating fishing effort, protecting critical habitats, enforcing catch limits, reducing bycatch and combating illegal, unreported and unregulated (IUU) fishing can contribute significantly to the conservation of fishery resources. Simultaneously, environmentally responsible aquaculture offers a viable alternative to meet the growing global demandfor aquatic food while reducing dependence on wild fish stocks. Together, sustainable capture fisheries and well-managed aquaculture provide a balanced approach to safeguarding aquatic ecosystems, supporting economic development, enhancing food and nutritional security and ensuring that fishery resources remain available for future generations.

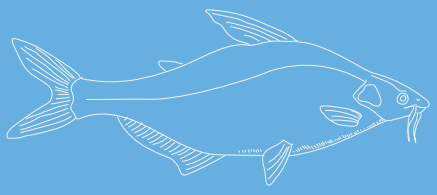


Why Aquaculture

Aquaculture has become the fastest-growing food production sector globally and forms the foundation of the Food and Agriculture Organization's (FAO) Blue Transformation strategy. According to the State of World Fisheries and Aquaculture (SOFIA) 2026, global fisheries and aquaculture production reached a historic 235 million tonnes recently, representing the highest level ever recorded. This included approx.195 million tonnes of aquatic animals and approx. 40 million tonnes of aquaculture production, including algae. For the first time, aquaculture produced more than 100 million tonnes of aquatic animals (103 million tonnes), accounting for 53% of total aquatic animal production and over 59% of aquatic animal food available for human consumption.

The fisheries and aquaculture value chain currently supports the livelihoods of more than 600 million people worldwide, while aquatic foods provide at least 20% of the animal protein intake for approximately 3.1 billion people. Despite these remarkable achievements, the proportion of marine fish stocks harvested within biologically sustainable levels declined slightly to 62.4% in 2023, emphasizing the continued need for effective fisheries management and the sustainable expansion of aquaculture.

Freshwater fisheries and aquaculture have grown into one of the world's most important sources of food, income and rural employment and within that sector, Pangasius (Pangasianodon hypophthalmus) stands out as one of the most successful commercialisation stories of the last four decades. This report traces that story at three levels: the global scale of freshwater aquaculture and why it matters for food security; the rise of Pangasius from a regional Mekong River fish into a globally traded commodity and the more domestically oriented but fast-growing Pangasius industry in Indonesia, where production is concentrated across Sumatra, Kalimantan and Java.



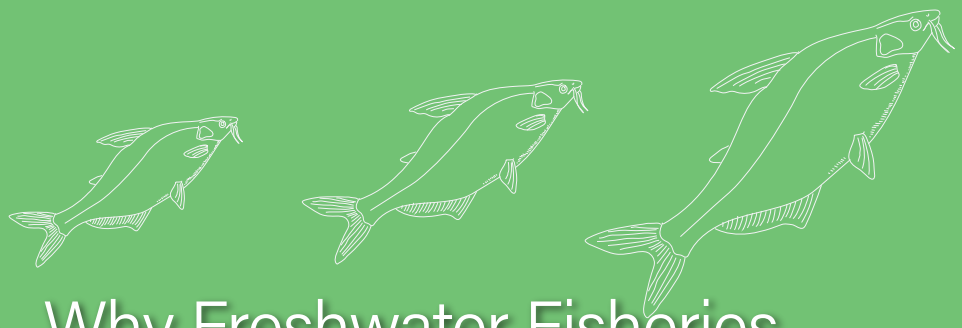
1 The Global Scale of Freshwater Fisheries and Aquaculture

As indicated above, the total global fisheries and aquaculture production reached a record 235 million tonnes in 2024, of which 195 million tonnes were aquatic animals (the remainder algae) a 5.2% increase over 2022. Aquaculture's share of that aquatic animal total crossed 100 million tonnes for the first time, reaching 103 million tonnes, valued at $371 billion at the farm gate. Aquaculture now accounts for 53% of total aquatic animal production and over 59% of aquatic animal food output. Of the aquatic animal total, 89% went to direct human consumption, supplying at least one-fifth of the animal protein intake for 3.1 billion people.

Aquatic foods matter nutritionally because they deliver highly digestible protein, essential fatty acids and micronutrients such as calcium, iron, zinc and vitamin B12 often at a lower environmental cost than land-based livestock, since fish typically convert feed into body mass more efficiently and require less land and water than cattle, pigs or poultry.

Freshwater systems remain the single largest source of farmed aquatic animals, producing 64 million tonnes in 2024 (63% of total aquaculture output) versus 38 million tonnes from marine and coastal aquaculture. 2022 was the turning point where aquaculture first overtook capture fisheries as the dominant source of aquatic animal food and that gap has kept widening since: capture fisheries held roughly flat at 92 million tonnes in 2024 (within the same 86-94 million tonne range the sector has occupied since the late 1980s), while aquaculture kept climbing.

Asia continues to drive most of this growth, producing the large majority of both aquaculture output and total fisheries and aquaculture production, led by China, Indonesia, India, Vietnam and Bangladesh. The sector's economic footprint keeps expanding too: FAO's newest framing describes the sector as supporting more than 600 million livelihoods worldwide a broader measure than the primary workforce alone, capturing the wider value chain of feed manufacturing, hatcheries, processing, logistics and retail. Trade in aquatic animal products climbed to a record $184 billion, now rivalling the value of the global terrestrial meat trade; export value has risen more than twenty-three-fold since 1976, reflecting decades of improved logistics, processing and trade liberalization.



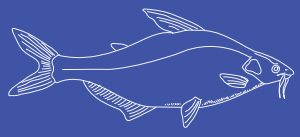
2 Why Freshwater Fisheries Matter for Food Security

Freshwater aquaculture holds a distinctive place in food security because it can be produced close to where people live in village ponds, irrigation canals, floodplains and small tanks rather than requiring the vessels, cold chains and long-distance logistics that much of marine capture fisheries depends on. That proximity keeps costs down, reduces post-harvest losses and puts fresh fish within reach of low-income households more reliably than most other animal protein sources.

The capital barrier to entry is also comparatively low. Farmers can start productive systems with modest earthen ponds or tanks built from locally available materials and managed with family labour, which is a major reason freshwater aquaculture has become such an effective tool for rural poverty alleviation and livelihood diversification, particularly across Asia, Africa and Latin America. Species such as carp, tilapia, catfish and Pangasius are prized specifically for their efficient feed conversion and rapid growth, which keeps production costs and consumer prices low.

Freshwater aquaculture also lends itself to integration with other farming systems. Rice–fish culture, in which fish are raised directly in flooded paddies, is one of the oldest and most successful examples: fish consume insect pests and weeds while their waste fertilises the rice, letting farmers harvest two food products from the same land. Similar integration is possible with livestock, where manure stimulates the plankton growth that feeds fish ponds. These systems also make productive use of land unsuited to conventional cropping flood-prone areas, seasonal water bodies and reclaimed irrigation reservoirs without displacing staple crop production.

On top of this, freshwater aquaculture's short, local supply chains proved more resilient than import-dependent food systems during disruptions like the COVID-19 pandemic, reinforcing its value as a stabilising piece of national food security strategy, alongside its direct contributions to the UN's Zero Hunger, Decent Work and Climate Action sustainability goals.



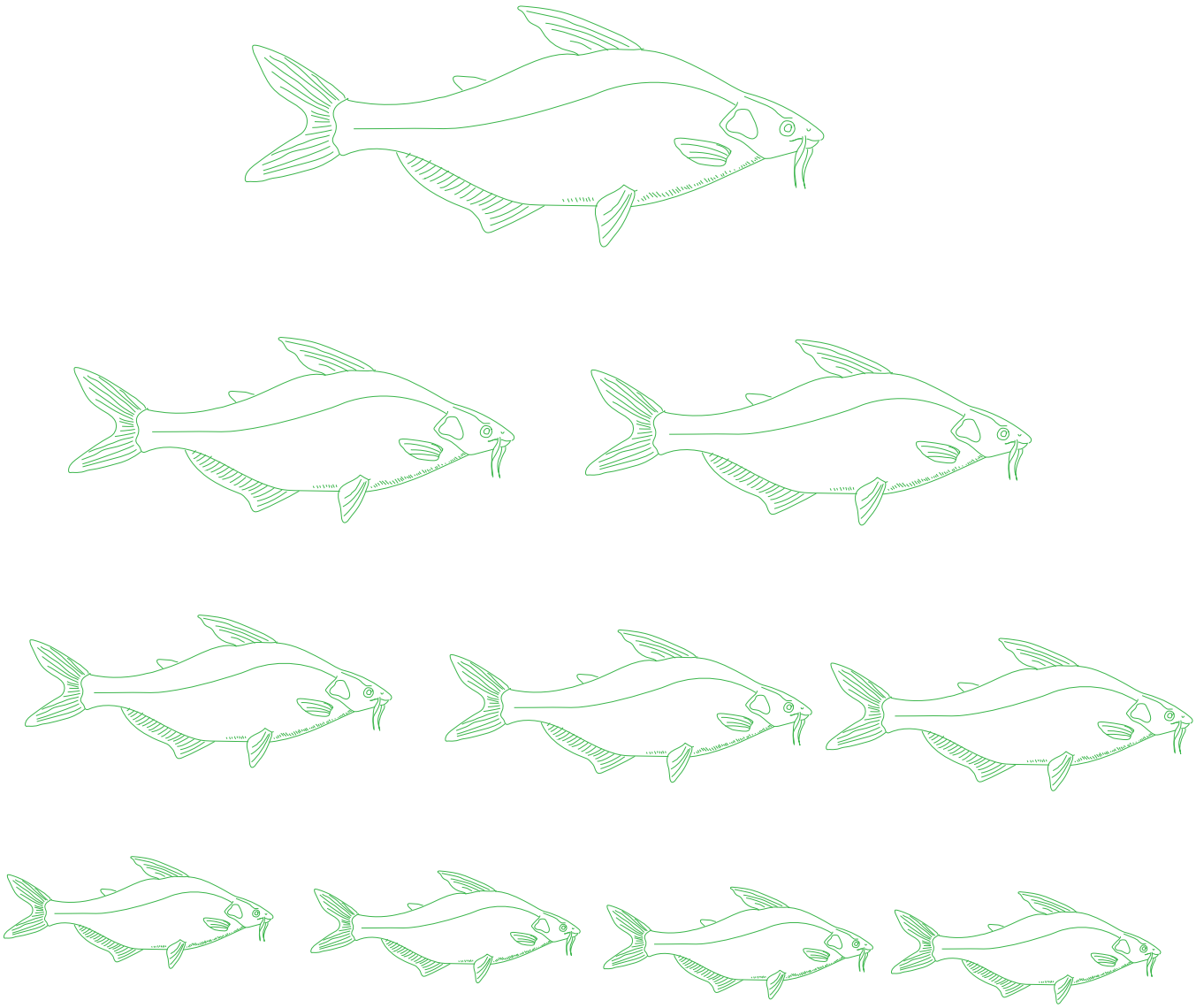
3 Freshwater Aquaculture Across Southeast Asia

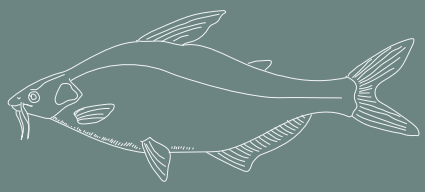
Freshwater culture is the backbone of Southeast Asia's aquaculture sector, even though marine shrimp farming tends to draw more international attention. As per the Southeast Asian Fisheries Development Center's (SEAFDEC) 2023 regional statistics, freshwater aquaculture accounts for about 37% of the region's aquaculture production by volume slightly behind mariculture's 40% and ahead of brackish-water farming's 23% but for 41% of total aquaculture value, more than four times mariculture's 9% value share. That gap reflects how much of the region's freshwater output feeds high-value domestic and export markets rather than lower-value bulk commodities.

Indonesia and Vietnam together account for nearly 75% of the region's freshwater aquaculture production, with Myanmar a distant but meaningful third producer and Thailand, Cambodia, the Philippines, Laos and Malaysia rounding out the remainder.

Country	Freshwater Production (approx.)	Regional Share	Dominant Species / Notes
Indonesia	3.71 million tonnes	38.3%	Tilapia, common carp, catfish, Pangasius; almost entirely domestic-market oriented
Vietnam	3.54 million tonnes	36.6%	Pangasius-dominated, export powerhouse; Mekong Delta and Red River Delta
Myanmar	1.15 million tonnes	11.9%	Carp polyculture, concentrated in the Ayeyarwady Delta; mostly domestic
Thailand	460,000 tonnes	4.7%	Tilapia-dominant; historic role in global tilapia breeding development
Cambodia	302,520 tonnes	3.1%	Tied to the Mekong River and Tonle Sap Lake; smallholder-dominated
Philippines	266,845 tonnes	2.8%	Tilapia-dominant freshwater sector; milkfish remains the top species overall but is brackish-water
Laos	140,000 tonnes	1.4%	Landlocked, Mekong-dependent; small family-farm production for local markets
Malaysia	113,076 tonnes	1.2%	Smallest major producer; tilapia, catfish, Pangasius, mostly for domestic consumption

Across the region, the same handful of species recur tilapia, carp, catfish (including Pangasius), snakehead and giant freshwater prawn chosen for their fast growth, consumer acceptance and tolerance of tropical pond conditions. Earthen ponds remain the dominant system because of their low cost, though floating cages are increasingly common in Indonesia, Vietnam, the Philippines and Cambodia, and integrated rice–fish and livestock–fish systems remain important for smallholder livelihoods. Smallholders still form the backbone of the sector.





4 Pangasius: A Global Aquaculture Success Story

From the Mekong to the World

Pangasius - known variously as striped catfish, basa, swai, or (in Indonesia) patin- is native to the Mekong and Chao Phraya river basins of Vietnam, Cambodia, Thailand and Laos. For most of the twentieth century, it was a fish of local river fisheries and small-scale cage culture. That changed with breakthroughs in induced breeding, hatchery production and feed formulation in the late 1980s and early 1990s, which made commercial-scale farming possible for the first time. Today, Pangasius is produced industrially and exported to more than 140 countries, making it one of the most important species in the global whitefish trade.

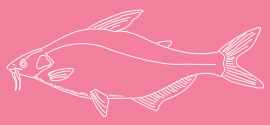
Why It Sells: The Commercial Case

The commercial success of Pangasius rests on a few compounding advantages. Because it is farmed rather than wild-caught, supply is predictable and largely insulated from the fishing quotas, seasonal closures and stock declines that make marine whitefish supply and price volatile; that price stability is valuable to retailers, food-service operators and processors alike and it keeps Pangasius accessible to budget-conscious consumers even as premium whitefish prices climb.

Its mild flavour, firm white flesh and near-absence of small bones make it unusually versatile in the kitchen. It takes on marinades and seasonings well, earning it a reputation as a "blank canvas" protein used everywhere from fish and chips to curries to breaded convenience meals and its uniform fillet size and excellent freezing characteristics make it well suited to industrial-scale processing into individually frozen portions, breaded products and ready-to-cook meals.

On the farm side, Pangasius grows to market size in six to eight months, converts feed into body weight efficiently, tolerates low dissolved oxygen and fluctuating water quality better than many species and thrives at high stocking densities in relatively simple pond systems all of which keeps production costs and therefore consumer prices, low. Unlike shrimp farming, which typically demands expensive biosecurity infrastructure and salinity control, Pangasius can be farmed successfully in modest earthen ponds, which has made it accessible to smallholder farmers throughout Asia, including the communities in Indonesia's Riau Province and India's West Bengal, Andhra Pradesh, and Odisha.

Nutritionally, Pangasius delivers complete, highly digestible protein along with vitamin B12, phosphorus, selenium and potassium, and while it is lower in omega-3 fatty acids than oily marine fish like salmon, it remains a genuinely lean source of animal protein, which has made it popular in school feeding programmes and institutional catering across the developing world.



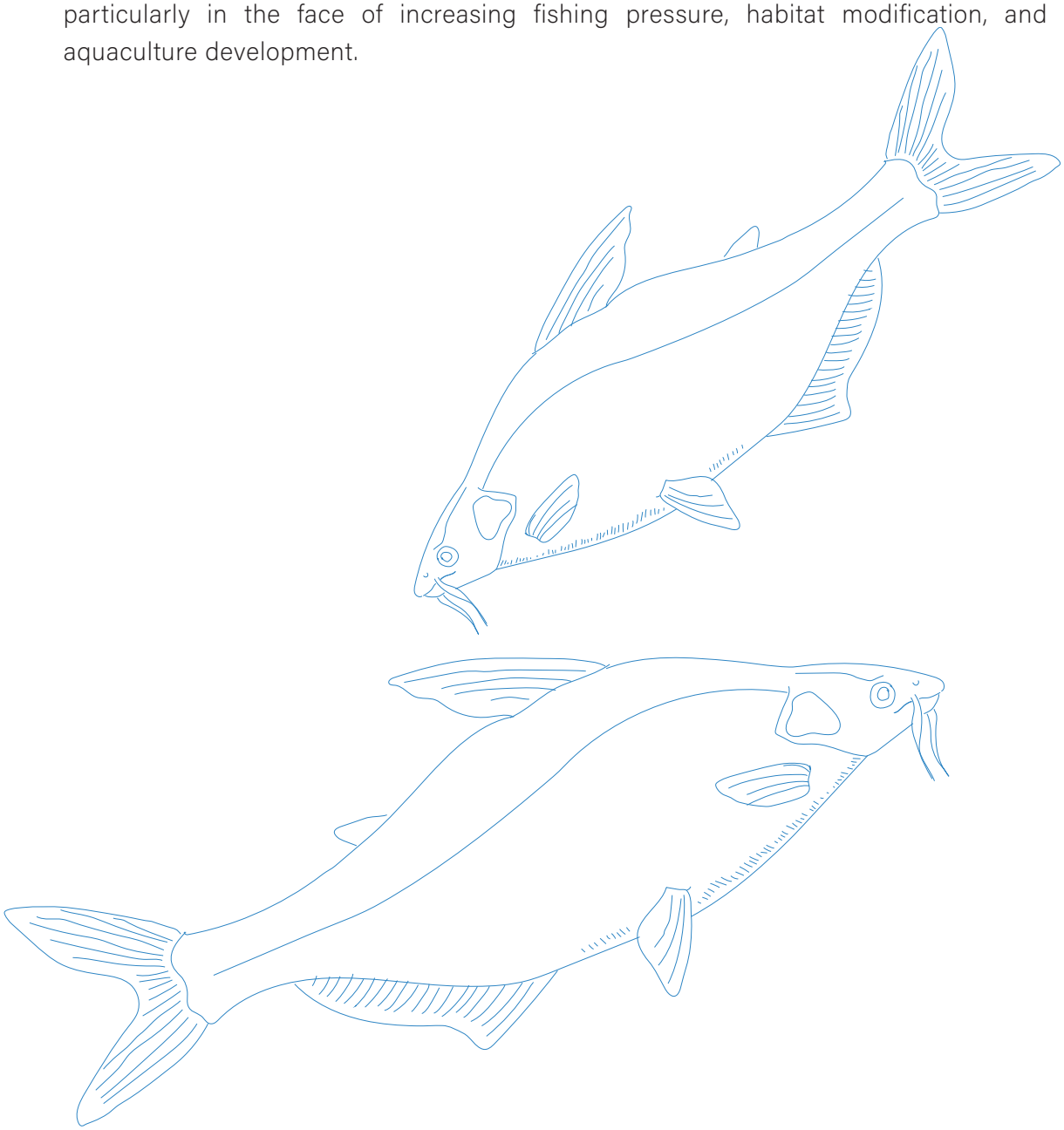
5 Pangasius Distribution in Indonesia

Distribution of Pangasius Species Across Major River Basins in Indonesia

Indonesia is one of the primary centres of diversity for the family Pangasiidae, with numerous indigenous Pangasius species distributed across its major river systems. These freshwater catfishes inhabit large rivers and associated floodplains throughout Sumatra, Java and Kalimantan, where they play an important ecological and economic role. The distribution of different Pangasius species varies among river basins due to differences in hydrology, habitat characteristics, and biogeographical history.

River Basin	Location	Pangasiidae Species Recorded
Way Rarem	South Sumatra	*Pteropangasius micronemus, Pangasius polyuranodon*
Musi River	South Sumatra	*Pangasius djambal, Pangasius hypophthalmus, Pteropangasius micronemus, Pangasius nasutus, Pangasius polyuranodon, Pangasius kunyit, Helicophagus waandersii, Helicophagus typus*
Batang Hari–Indragiri River Basin	Central and North Sumatra	*Pangasius djambal, Pangasius hypophthalmus Pteropangasius micronemus, Pangasius nasutus, Pangasius polyuranodon, Pangasius kunyit, Helicophagus waandersii, Helicophagus typus*
Brantas and Bengawan Solo Rivers	Central and East Java	*Pangasius djambal, PteroPangasius micronemus*
Barito and Kahayan Rivers	Central Kalimantan	*Pangasius kunyit, Pteropangas iusmicronemus, Pangasius nasutus, Pangasius polyuranodon, Pangasius lithostoma, Pangasius humeralis, Helicophagus typus*
Kapuas River	West Kalimantan	*Pangasius kunyit, Pteropangasius micronemus, Pangasius nieuwenhuisii, Pangasius mahakamensis*
Mahakam River	East Kalimantan	*Pangasius kunyit, Pteropangasius micronemus, Pangasius nieuwenhuisii, Pangasius mahakamensis*
Kayan and Berau Rivers	East Kalimantan	*Pangasius rheophilus*

Indonesia possesses one of the richest diversities of Pangasiid catfishes in the world. Species such as Pangasius djambal, Pangasius hypophthalmus Pangasius kunyit, Pteropangasiusmicronemus and Helicophagus typus are widely distributed across several major river systems, whereas species such as Pangasius rheophilus and Pangasius lithostoma exhibit more restricted distributions. This diversity highlights the ecological significance of Indonesia's freshwater ecosystems and emphasizes the need for conservation and sustainable management of native Pangasiid genetic resources, particularly in the face of increasing fishing pressure, habitat modification, and aquaculture development.



6 Indonesia's Pangasius hypophthalmus Industry

Indonesia is one of the world's largest producers of Pangasius (locally, patin siam), a position built since the species was first introduced from Thailand's Chao Phraya and Mekong stocks in the early 1980s. Where Vietnam's industry is built around export, Indonesia's is overwhelmingly domestic-market driven, feeding a population of more than 280 million people for whom fish is a nutritional staple and supported by a growing processed-food sector. National output of patin catfish exceeded 400,000 metric tonnes in 2024, and Pangasius has become one of the country's most important freshwater aquaculture commodities. Production is heavily concentrated on three islands: Sumatra contributes roughly 68% of national output, Kalimantan about 20%, and Java around 8.5%, with the remainder spread across Sulawesi, Bali and smaller islands where the industry is still emerging.

Sumatra: The Traditional Heartland

Sumatra's dominance rests on extensive rivers, floodplains, and peat-swamp ecosystems, and on a long tradition of smallholder-driven freshwater farming that developed organically rather than through top-down planning.

Jambi Province

Centred on East Tanjung Jabung Regency along the Gelam River, Jambi's extensive wetlands support a largely smallholder Pangasius sector often integrated with rice cultivation. Jambi's particular significance is institutional rather than purely production-based: it hosts BBAT Jambi, one of Indonesia's key national centres for Pangasius broodstock management and breeding research, giving the province an outsized role in the national seed-supply chain relative to its own grow-out volume.

Riau Province - Kampar Regency

("Kampung Patin")

Kampar Regency and specifically Koto Mesjid village within XIII Koto Kampar District, is Indonesia's best-known Pangasius farming community nationally branded as "Kampung Patin" (Pangasius Village). The community's shift to fish farming followed 1990s-era resettlement for a hydroelectric project, after cash compensation and rubber plantations proved insufficient; one resident, Suhaimi, left a government job to farm fish full-time and the rest of the village gradually followed, giving rise to the local saying "Tiada rumahtanpakolam" ("no home without a fish pond"). Today, more than 160 hectares are under Pangasius culture, producing roughly 15 tonnes of fresh fish daily, with around 600 of the village's 700 households involved somewhere in the value chain.

South Sumatra - Palembang and the Musi River Basin

South Sumatra is Indonesia's other historically significant Pangasius region, anchored by the Musi River and the provincial capital, Palembang. The area combines a natural pangasiid habitat with a long-established pond-culture industry and is also home to a strong local processing tradition smoked fish, fish cakes (pempek) and dried products sold into southern Sumatra's urban markets. It is also more mature than Kampar in a less flattering sense: research has flagged real operational constraints, including declining water quality from pollution and inconsistent adoption of standard farming practices, and it was the site of an FAO-supported pilot project on low-cost local feed production aimed at improving affordability for farmers.

Java: The Emerging Technology Hub

Java produces a comparatively small share of national Pangasius output (around 8.5%), but its role is disproportionately important because it hosts most of Indonesia's fisheries universities, research institutes, hatcheries and feed manufacturers. Where Sumatra's industry grew organically from smallholder initiative, Java's growth is increasingly driven by deliberate government investment in modern hatcheries, improved broodstock, digital monitoring and precision aquaculture, and recirculating aquaculture systems (RAS) positioning the island as the technological centre for the industry's future rather than its current production base. West Java is the island's leading Pangasius province, often integrating the species with tilapia and African catfish farming and supplying fingerlings produced at its research-linked hatcheries to farmers nationwide.

Lampung Province

At Sumatra's southern tip, Lampung is one of Indonesia's officially designated freshwater aquaculture development zones, with strong transport links to Java that support distribution of fresh and processed product. Within Lampung, Central Lampung Regency is the standout: Pangasius was the single largest species in the regency's freshwater output in 2014.Lampung also supports commercial hatcheries supplying fingerlings to farmers across southern Sumatra.

Kalimantan: The Expanding Frontier

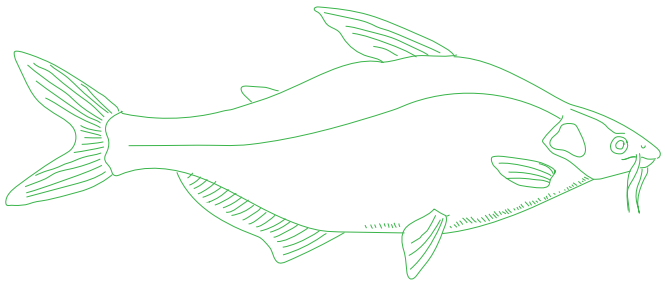
Kalimantan's roughly 20% share of national production makes it Indonesia's second production pillar, built on vast freshwater wetlands and peat-swamp ecosystems. Pangasius's defining advantage here is biological: it tolerates the acidic water conditions typical of peatland far better than most cultured fish, letting farmers use land that would otherwise be unproductive for aquaculture.

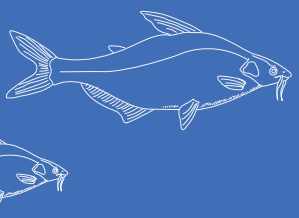
In South Kalimantan, Barito Kuala Regency has emerged as one of the country's most significant Pangasius Districts, dominated by family-owned earthen-pond operations supplying domestic and regional markets, with research confirming its meaningful contribution to household income. Central Kalimantan, meanwhile, has been officially designated a strategic development area its extensive, relatively underused peatland and low population density give it substantial room for expansion as hatchery access and farmer training improve.

Why Pangasius Spread So Widely?

The common thread across all three islands is biological adaptability. Pangasius tolerates acidic water, low dissolved oxygen, fluctuating temperatures, seasonal flooding and high stocking densities better than most freshwater species letting it succeed everywhere from Sumatra's peat swamps to Kalimantan's wetlands to Java's intensively managed ponds. Combined with fast growth and efficient feed conversion, this adaptability keeps production costs low and explains why the species has become the default choice for expanding freshwater aquaculture into marginal land across the archipelago.

Economically, the industry supports employment well beyond the pond itself to hatcheries, feed manufacturing, transportation, processing, cold storage and retail and in regions like Kampar has it has become the organising force behind local rural development. Looking ahead, Indonesia's growth priorities include expanding certified hatcheries and genetically improved seed, wider adoption of precision and recirculating aquaculture, stronger farmer cooperatives, better biosecurity and continued growth in value-added processing. Vietnam is likely to remain the world's dominant Pangasius exporter, but Indonesia's scale, biological advantages and growing domestic demand give it real room to strengthen its own position, particularly if it builds out processing and branding to capture more value domestically rather than exporting primarily raw or frozen product.





7 Pangasius Hatchery Development in Indonesia

Indonesia has established a well-developed hatchery sector to support the rapid expansion of Pangasius aquaculture. At present, the country is estimated to have more than 150 Pangasius hatcheries, primarily located across the islands of Sumatra, Java and Kalimantan. These hatcheries collectively produce approximately 600 million fry annually, maintaining high survival rates throughout the various stages of seed production. The availability of quality seed has been one of the major factors contributing to the sustained growth of the Indonesian Pangasius farming industry.

Role of Pangasius Hatcheries

Hatcheries serve as the foundation of the Pangasius production chain by ensuring a continuous supply of healthy, genetically superior fingerlings for grow-out farms. They are responsible for maintaining broodstock, inducing spawning, incubating fertilized eggs and rearing larvae until they reach the fingerling stage suitable for stocking. The production of uniform, disease-free seed is essential for achieving high survival, rapid growth and improved productivity in commercial aquaculture operations. Modern hatcheries also undertake broodstock management, selective breeding, larval nutrition, water quality management, and health monitoring to maximize seed quality. These practices contribute significantly to enhancing the biological performance and economic efficiency of Pangasius culture.

Major Seed Production Regions

Pangasius seed production in Indonesia is concentrated in three principal regions, each contributing significantly to the country's aquaculture industry.

Sumatra is one of the oldest and most important centres for Pangasius hatchery production. Provinces such as North Sumatra possess well-established hatchery infrastructure supported by experienced farmers, research institutions and government agencies. The region supplies a substantial proportion of fingerlings to farms within Sumatra as well as other parts of Indonesia.

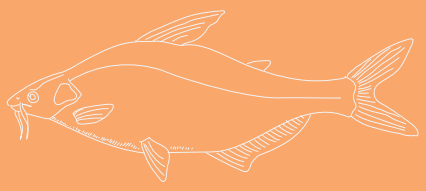
Java, particularly West Java and Central Java, is another major hub of hatchery activity. The island supports an intensive aquaculture sector with numerous commercial hatcheries that cater to the high demand for quality seed from grow-out farms. Advanced hatchery technologies and improved broodstock management practices have contributed to consistent seed production in this region.

Kalimantan has emerged as an important centre for Pangasius hatchery development in recent years. The expansion of freshwater aquaculture in the region has stimulated investments in hatchery infrastructure, enabling local production of fingerlings and reducing dependence on seed transported from other islands.

Production Trends

` The Indonesian Pangasius hatchery sector has experienced continuous growth over the past two decades in response to increasing demand from both domestic and export-oriented aquaculture industries. Expansion has been accompanied by improvements in artificial breeding techniques, broodstock selection, larval rearing protocols and hatchery management practices. These technological advancements have resulted in higher spawning success, improved fry survival, and enhanced overall production efficiency.

Increasing attention is also being given to the production of high-quality fingerlings with superior growth characteristics and disease resistance. Sustainable hatchery management practices, including efficient water use, responsible waste disposal and improved biosecurity measures, are being adopted to minimize environmental impacts while maintaining productivity.



8 Overview of the Feed Industry

There are close to 100 feed mills operating in the country, most of which are located in Java, producing nearly half a dozen brands of freshwater fish feeds with varying protein content and nutritional efficiency. Imported feed brands are slightly more expensive in the market but have proven more effective in terms of feed conversion ratio (FCR) and product quality. Most Pangasius farmers obtain their pellet feed from these feed mills through wholesalers and retailers. It may be noted there is no exclusive commercial feed for Pangasius and most feeds are produced as 'general' suitable for all freshwater fishes.

Significance

The Pangasius feed industry is a crucial component of Indonesia's aquaculture sector, providing the nutritional foundation for healthy growth and optimal production of Pangasius fish. The sector supports farmers in maintaining productivity and profitability, ensuring the financial sustainability of the industry.

Feed Types

Feed for Pangasius includes various formulations, such as pellet feeds, designed to meet the specific nutritional needs of different growth stages from fry to adults. A few successful farmers even make use of feeds manufactured for other finfish species with higher protein percentages than optimally required for Pangasius.

Cruble 40/6 | 0.8mm 32/4 | 1.4mm 32/4 | 2mm 32/4 | 3mm 28/4 | 4mm 28/4 | 4mm 24/4 | 4mm 20/4

Major Production Areas

Sumatra:
Significant feed production facilities are located in North Sumatra and other regions, supporting local Pangasius farms with specialized feed formulations.

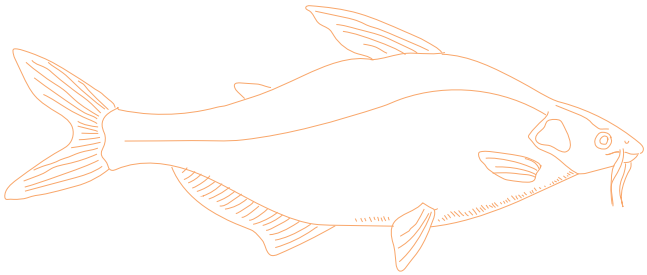
Java:
Includes West Java and Central Java, where both feed production and Pangasius farming are concentrated

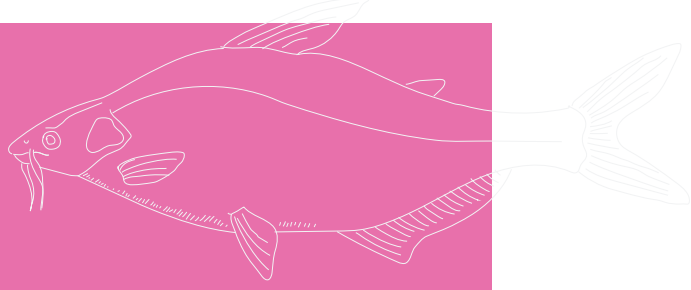
Kalimantan and Sulawesi:
Emerging areas with increasing feed production to support local aquaculture growth.

Production Trends

Growth and demand: The feed industry has been expanding in response to rising demand for Pangasius both domestically and internationally, driven by the increasing number of Pangasius farms and the need for high-quality feed.

Technological advances: Innovations in feed technology, including the use of advanced ingredients and formulations, have enhanced feed efficiency and fish health.

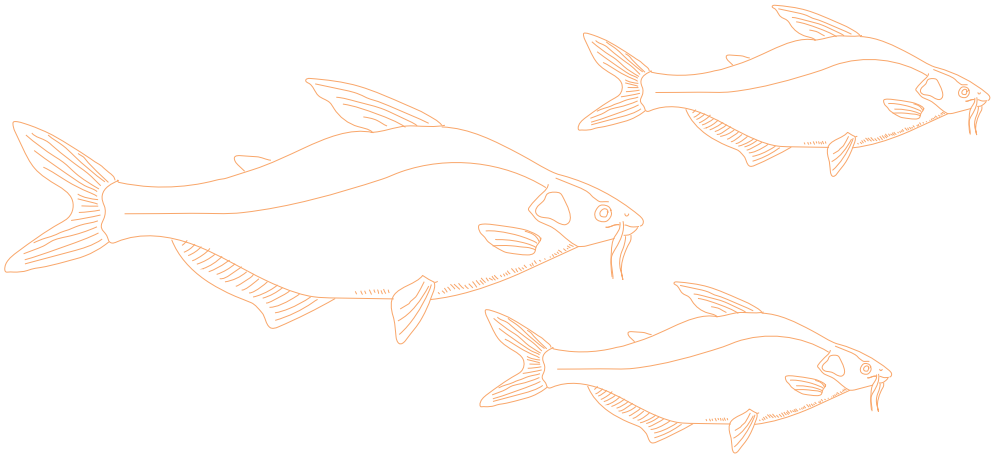




9 Pangasius Processing Industry in Indonesia

Indonesia has developed a modern and expanding Pangasius processing industry that plays a vital role in enhancing the value of aquaculture production and strengthening the country's seafood export sector. The processing industry serves as the link between aquaculture farms and domestic as well as international markets by converting fresh Pangasius into a wide range of high-value products that meet stringent food safety and quality standards. With the continuous growth of Pangasius farming, investments in processing infrastructure, cold-chain logistics and quality assurance systems have also increased significantly.

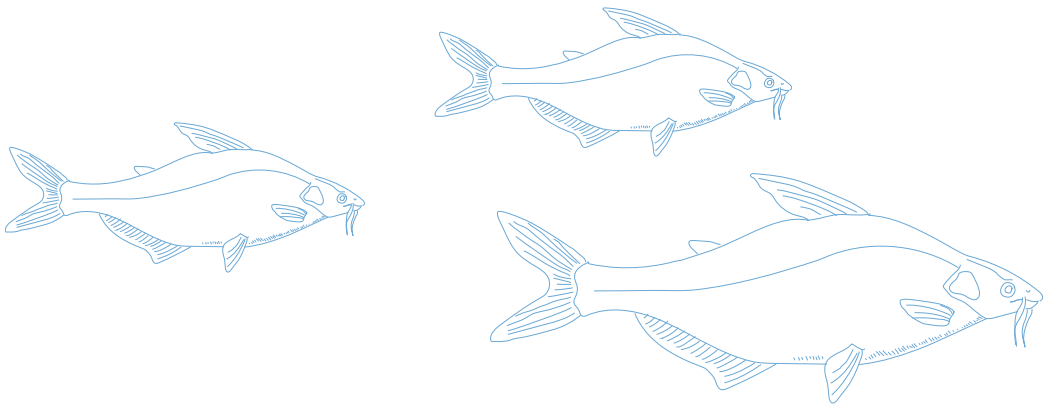
Traditionally, Indonesia had 11 major Pangasius processing plants located primarily in Java and Sumatra, producing frozen fillets for export markets, while another processing facility specialized in frozen whole Pangasius. In recent years, however, the industry has expanded considerably with the establishment of additional medium- and large-scale processing units, particularly in Java, Sumatra, Kalimantan and Sulawesi. These facilities collectively support the increasing demand for processed Pangasius in both domestic and international markets.



Role of the Processing Industry

The Pangasius processing sector is essential for maximizing the economic value of aquaculture production. Processing not only extends the shelf life of fish but also improves product quality, enhances marketability and increases export competitiveness. Modern processing plants operate under internationally recognized food safety and quality management systems, including Hazard Analysis and Critical Control Point (HACCP) and Good Manufacturing Practices (GMP), and increasingly hold certifications such as BRCGS and ISO 22000 to satisfy the requirements of global seafood markets. Processing industries also generate substantial employment opportunities in harvesting, grading, filleting, packaging, cold storage, transportation, quality assurance and export logistics, thereby contributing significantly to regional economic development.

- Java remains the principal processing hub for Indonesian Pangasius. Provinces such as West Java, Central Java and East Java host several modern seafood processing facilities owing to their proximity to major aquaculture production areas, well-developed transportation networks and access to export ports.
- Sumatra, particularly North Sumatra and South Sumatra, represents another important processing region. The availability of large volumes of farmed Pangasius has encouraged the establishment of integrated processing facilities supplying both domestic retail chains and international markets.
- Kalimantan has witnessed gradual growth in seafood processing capacity alongside the expansion of freshwater aquaculture, with new facilities being developed to reduce transportation costs and improve market access for producers in the region.
- Sulawesi is emerging as a promising processing centre, supported by increasing investments in aquaculture infrastructure and government initiatives aimed at strengthening regional seafood value chains.



10 Market Prices

Market Price of *Pangasius hypophthalmus* Seed (2025)

Sl. No.	Length (inches)	Length (cm)	Average weight (g)	Price in 2025 (Rp/piece)	Price in 2025 (USD /piece)
1	0.5–0.9	1.27–2.28	0.5–1.0	140–150	0.008-0.009
2	1.5–2.0	3.8–5.08	1.8–2.3	250–350	0.014-0.020
3	2.5–3.0	6.35–7.62	3.0–5.3	350–400	0.020-0.023
4	3.0–4.0	7.62–10.16	5.3–13.1	400–500	0.023-0.029
5	4.0–5.0	10.16–12.7	13.1–22.8	600–700	0.034-0.040
6	5.0–6.0	12.7–15.24	22.8–33.2	800–1000	0.046-0.057
7	6.0–7.0	15.24–17.78	33.2–51.2	1000–1200	0.057-0.069
8	7.0–8.0	17.78–20.32	51.2–68.3	1200–1500	0.069-0.086
9	>8.0	>20.32	>70.8	1500–2500	0.086-0.143

Note on the USD conversion: *These figures are approximate- actual exchange rates fluctuate day to day and the Rp/USD rate here is inferred from a single reference point in the report rather than a live rate. Aquaculture overview: In Pangasius farming, seed price is essentially a function of survival risk shifted from the buyer to the seller. Very small fry (0.5–2 inches) are cheap Rp 140–350 because they are still highly vulnerable: fragile, prone to disease, cannibalism and handling stress, with mortality rates that can be steep in the first few weeks. Farmers who buy at this stage take on more risk themselves but pay far less per fish.*

As seed size increases toward 4–8 inches, price rises sharply (up to Rp 1,200–2,500), because the hatchery has already absorbed the costliest, riskiest phase of rearing feeding, water quality management and grading out weak individuals and delivered a fish with a much higher chance of surviving to harvest. For many grow-out farmers, this is actually the more economical choice overall: a higher purchase price is offset by lower losses, shorter time to market size, and more predictable stocking density in the pond.

In short: *the pricing curve reflects a classic aquaculture trade-off — smaller seed = lower cost but higher farmer-side risk and management burden; larger seed = higher cost but reduced mortality, faster turnaround, and more predictable production outcomes. Farmers choose their entry point on this curve based on their capital, pond infrastructure, and tolerance for early-stage losses.*

Farm-Gate Price of *Pangasius hypophthalmus* Whole Live Fish (2025)

Weight range (g)	Price (Rp/kg)	Price(USD/kg)
100–200	9,000–10,000	0.51-0.57
200–250	10,000–11,000	0.57-0.63
250–350	11,000–12,000	0.63-0.69
400–500	13,000–13,500	0.74-0.77
500–800	13,500–13,800	0.77-0.79
1,000–1,100	14,000–17,000	0.80-0.97
1,200–1,500	18,000–21,000	1.03-1.20
1,500–2,000	21,000–25,000	1.20-1.43
2,000–3,000	25,000–35,000	1.43-2.00
More than 3 kg	30,000–35,000	1.71-2.00

Seasonal note: *prices in Banjarmasin, South Kalimantan rose to Rp 35,000/kg (USD 2.00) during the local festival period — the same rate seen at the top of the "above 3 kg" breeding-stock tier, suggesting festival demand temporarily pushed regular market fish up toward breeding-stock price levels.*

Aquaculture overview: *The "sweet spot" — 400g to 1,100g (High demand, Rp 13,000–17,000/kg):*
This is the market's preferred size range for whole Pangasius the size that fits household cooking portions, market stall display, and processing into fillets. Farmers who time their harvest to land in this window get both the best price per kg and the easiest, fastest sale, since buyers actively want this size. This is the target most grow-out farmers plan their feeding and stocking cycles around.

Undersized fish — 100g to 350g *(Less demand, Rp 9,000–12,000/kg):*
These are essentially fish harvested too early — either due to a farmer needing cash urgently, a partial/emergency harvest, or fish that didn't grow fast enough within a cohort. They fetch the lowest price per kg because they're less useful to buyers (too small for standard fillet processing, less meat yield relative to cost of transport/handling). From a farming standpoint, holding fish longer to reach the 400g+ range is almost always more profitable if the farmer can afford to wait — the price roughly doubles.

Oversized fish — 1,200g and above *(Less demand again, despite higher price/kg):*
This is the more counterintuitive part. Prices per kg keep climbing (up to Rp 35,000/kg for 2–3kg fish), but demand drops. This isn't because oversized fish are worthless — it's because they serve a different, smaller market: mostly breeding stock, specialty orders, or festival/ceremonial demand (like the Banjarmasin spike noted). A farmer can't assume they'll get top price just by growing fish bigger; they need a buyer who specifically wants breeding-size or premium fish, which is a much thinner market than the everyday 400g–1.0kg segment.

Practical takeaway for a farmer:

- *Don't rush to sell underweight fish unless forced by cash flow — the price penalty is real.*
- *Aim grow-out cycles to hit the 400g–1.0 kg window; this is where volume demand and good pricing intersect.*
- *Growing past 1.5kg is a strategic bet, not a default plan — it only pays off if you already have a buyer lined up (breeder, festival market or niche restaurant demand), otherwise the fish sits unsold despite the attractive Rp/kg figure.*
- *Seasonal/local price spikes (like the Banjarmasin festival premium) are opportunistic upside, not something to plan a whole production cycle around — but worth watching regionally.*

In short: this table shows that in Pangasius farming, timing the harvest to match market demand matters as much as maximizing fish weight — growing fish bigger doesn't automatically mean more profit if there's nobody actively buying at that size.

Market Price of Pangasius Feed (2025)

Protein (%)	Price/ kg in 2025 (Rp)	Price(USD/kg)
20	8,000–8,300	0.46-0.47
22	8,300–9,300	0.47-0.53
24–26	9,300–10,000	0.53-0.57
26	10,000–10,300	0.57-0.59
28	10,400–10,500	0.59-0.60
30	12,000–12,500	0.69-0.71
32	12,300–12,500	0.70-0.71
35	15,000–16,000	0.86-0.91
38	18,000–18,500	1.03-1.06
40–42	19,800–20,000	1.13-1.14

Aquaculture overview: *Price rises steadily and steeply with protein content — from around Rp 8,000/kg at 20% protein to nearly Rp 20,000/kg at 40–42% protein. That's roughly a 2.5x price jump from lowest to highest protein feed.*

Why this matters to a farmer:

- *Low-protein feed (20–26%) is cheap, but Pangasius needs adequate protein to grow efficiently, especially at fry/juvenile stages. Underfeeding protein slows growth, extends the grow-out period and can lower survival — costs that don't show up on this table but hit the farmer's bottom line indirectly through longer pond occupancy and higher cumulative overhead (pumping, labor, risk exposure).*
- *Mid-range feed (28–32%) is generally the working range most commercial Pangasius farmers use, since Pangasius is known for being efficient at converting moderate-protein feed into body mass — part of why it's cheaper to farm than carnivorous species like shrimp that need 35%+ protein diets.*
- *High-protein feed (35–42%) costs significantly more and is typically reserved for specific life stages (fry, early nursery) where rapid, dense nutrition speeds up survival and early growth — not something farmers feed throughout the whole cycle, since it would be uneconomical.*

The real decision farmers face:
It's not "buy the cheapest feed" or "buy the highest protein feed" — it's optimizing Feed Conversion Ratio (FCR) per Rupiah spent. A slightly pricier, higher-protein feed that produces faster growth and better survival can actually be cheaper per kg of fish produced than a low-cost, low-protein feed that takes longer to reach harvest weight (during which the farmer is still paying for water, labor, pond rental and risk of loss).

Bottom line: *This table represents the biggest lever a farmer has over production cost. Choosing feed isn't just about the price tag on the bag — it's about matching protein level to the fish's growth stage to get the best cost-per-kilogram-of-fish-produced, not the best cost-per-kilogram-of-feed-bought.*

11 PANGASIUS PRODUCT & BY-PRODUCT PRICES

Pangasius Products

Whole fish, fillets (all glaze grades) and cut pieces sold directly as edible product through wholesale, retail or domestic markets.

Item	Price (Rp/kg)	Price(USD/kg)	Remarks
Fresh fish (whole)	19,000–40,000	1.09–2.29	Not in open market; only for small-scale industries making by-products
Frozen fish (whole)	20,000–35,000	1.14–2.00	Not popular
Frozen fish with head (without viscera & gills)	30,000–40,000	1.71–2.29	Not popular
Fish fillets, NBL — 0%	55,000–60,000	3.14–3.43	Popular; available wholesale and retail
Fish fillets, NBL — 10%	55,000–60,000	3.14–3.43	
Fish fillets, NBL — 20%	51,000–52,000	3.14–3.43	
Fish fillets, NBL — 30%	47,000–50,000	2.91–2.97	
Fish fillets, NBL — 40%	43,000–45,000	2.69–2.86	
Fish fillets, NBL — 45%	39,500–42,000	2.49–2.57	
Fish fillets, NBL — 50%	36,000–40,000	2.26–2.40	
Fish fillets, BL — 0%	57,500–60,000	2.06–2.29	
Fish fillets, BL — 10%	52,500–55,000	3.00–3.14	
Fish fillets, BL — 20%	47,500–50,000	2.71–2.86	
Fish fillets, BL — 30%	42,500–45,000	2.43–2.57	
Fish fillets, BL — 35%	40,500–42,000	2.31–2.40	
Fish fillets, BL — 40%	38,000–42,000	2.17–2.40	
Fish fillets, BL — 45%	36,000–38,000	2.06–2.17	
Fish fillets, BL — 50%	33,000–35,000	1.89–2.00	
Fish fillets, BL — 50–60%	29,000–30,000	1.66–1.71	
Pieces of fresh fish	14,000–17,000	0.80–0.97	Local fresh-fish markets; domestic use only
Pieces of frozen fish	13,500–14,000	0.77–0.80	Not popular

Note: *NBL (Non-Belly Less) – With belly portion (More fat, softer texture, usually lower processing cost)*
BL (Belly Less)- Without belly portion (Leaner, more uniform fillet, attractive for premium market)

Pangasius By-Products

Processing residuals — skin, bone, fat, meal, oil, trimmings, and offcuts — sold mainly as inputs for animal feed, edible oil, pharmaceuticals, or value-added products such as surimi.

Item	Price (Rp/kg)	Price(USD/kg)	Remarks
Fish head (fresh/frozen)	2,000–8,000	0.11–0.46	Food
Flesh and bone	1,500–2,000	0.09–0.11	For duck feed
Fresh or frozen fish skin	11,000–15,000	0.63–0.86	By-product of fillets (food supplements & pharmaceuticals)
Fresh fish wastes (head, viscera, fin, etc.)	1,000–2,000	0.06–0.11	Fish feed
Fish belly	800–1,000	0.05–0.06	Feed ingredient
Trimming	1,500–2,000	0.09–0.11	Feed ingredient
Kerok trimming	1,500–2,000	0.09–0.11	Feed ingredient
Kerok duri	1,500–2,000	0.09–0.11	Feed ingredient
Fresh fish fat	5,000–15,000	0.29–0.86	Edible oil & fish feed
Fish meal (≥60% protein)	12,000–13,000	0.69–0.74	For fish feed
Fish oil	10,000–12,000	0.57–0.69	Edible oil & fish feed
Surimi	10,000–13,000	0.57–0.74	Value added product

Note: *USD figures use an approximate reference rate of Rp 17,500 = USD 1, inferred from a single conversion point noted elsewhere in the source report, not a live exchange rate.*

A Buyer's-Eye View

These tables aren't really one market — they representit's at least three distinct buyer segments, each making a different kind of purchasing decision.

1. Fresh/frozen whole fish (Rp 19,000–40,000) — Not really available to typical buyers
The "not in open market" and "not popular" remarks are the key signal here: a retail or food-service buyer generally can't buy whole Pangasius at this price point. If you're a buyer seeing this price, it's not a shopping option, it's upstream input cost information.

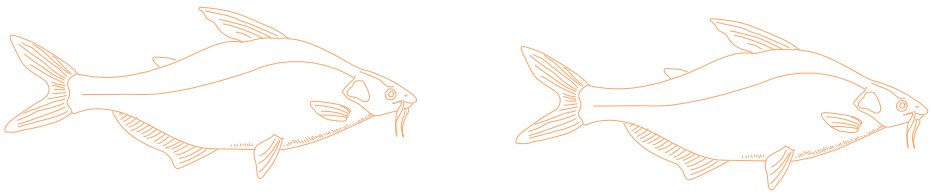
2. Fillets — the real commercial product, and where buyers make trade-off decisions
This is the section that matters most to a purchasing decision. A few things a buyer should read into it:

NBL vs BL are two different fillet grades/processing types, each offered across a range from 0% up to 50–60%. That percentage is a glazing or added-moisture level — frozen fillets are commonly coated in an ice glaze to protect them in cold storage, and that glaze adds weight without adding actual fish. So a "0%" fillet is closer to pure fish meat, while a "50%" fillet has proportionally more ice/moisture in every kilogram sold.

This explains the price drop as % rises — Rp 60,000/kg at 0% down to Rp 29,000/kg at 50–60%. It's not that quality is degrading — the buyer is simply paying for less actual fish per kilogram as glaze % increases.

Buyer implication: a lower price per kg isn't automatically a better deal. A buyer should calculate cost per kg of actual fish content, not just shelf price — a 50% glazed product at Rp 29,000/kg may cost more per real kilogram of fish than a 0% product at Rp 60,000/kg, depending on the glaze ratio. This is a classic frozen-seafood sourcing trap.

NBL runs consistently more expensive than BL at the same % — suggesting NBL is the higher-processed or higher-quality-standard grade. A buyer prioritizing yield, plate presentation, or fewer bones (e.g., hotel/restaurant buyers) would lean NBL; a cost-driven bulk buyer (e.g., breading/processing plants that will further cut and coat the fish anyway) might accept BL.

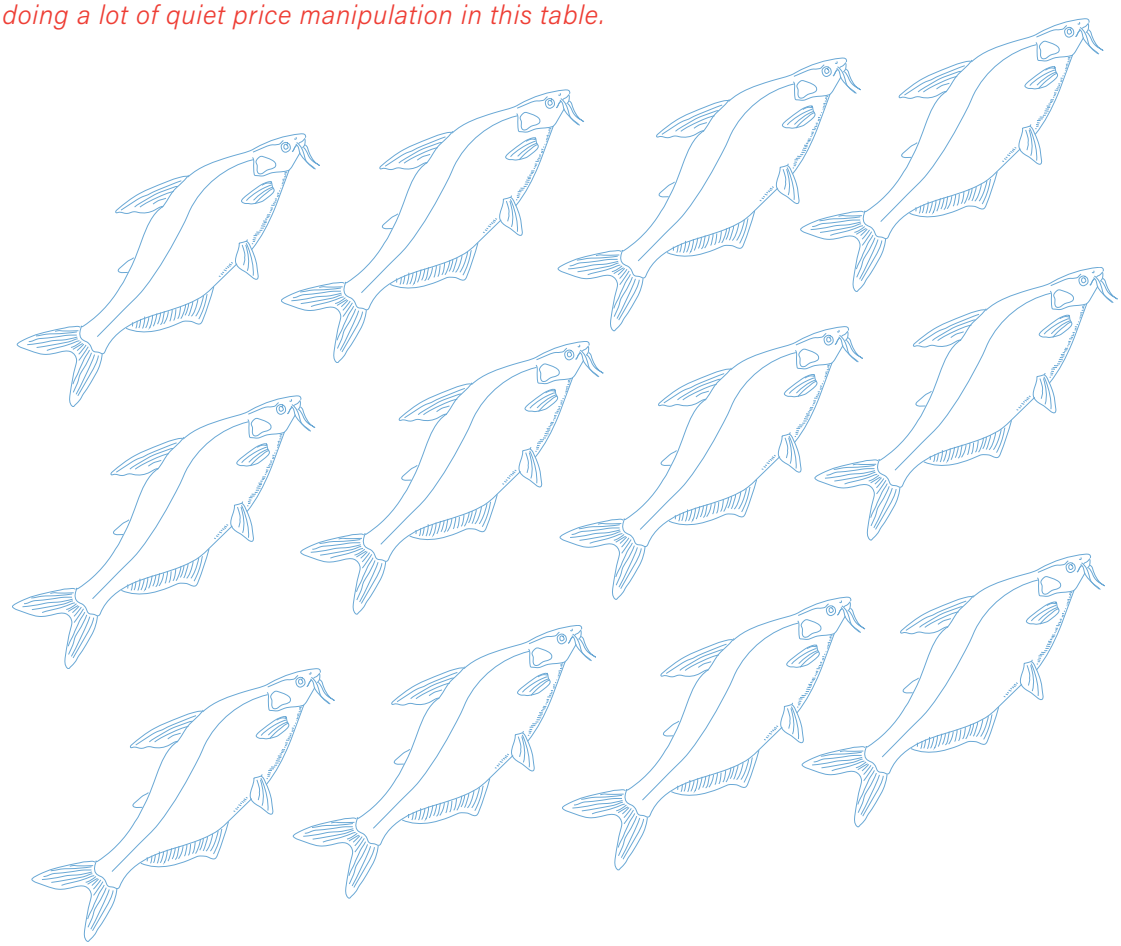


3. Cuts, pieces, and offcuts (Rp 13,000–17,000) — Local/domestic retail only
"Pieces of fresh fish" is the everyday wet-market product for household buyers — cheaper than full fillets, sold locally, not for export-grade buyers.
4. By-products (skin, fat, meal, oil, surimi, waste) — Industrial B2B buyers, not consumers
This entire lower block (Rp 800–15,000) isn't food-retail pricing at all — it's input pricing for other industries:

- Skin pharma/supplement buyers
- Fat/oil edible oil or feed manufacturers
- Meal animal feed producers
- Waste/bone/flesh duck farms, feed compounders

A buyer in this segment is sourcing raw industrial material, so the relevant comparison isn't "quality of fish" but consistency of supply and specification (protein %, moisture content) matching their production needs.

Bottom line for a buyer: *the real decision only happens in the fillet block. Everything above it (whole fish) is inaccessible to normal buyers, and everything below it (by-products) serves a completely different industrial buyer, not a food buyer. Within fillets, the smart move is comparing effective fish-content cost, not sticker price per kg — the glazing percentage is doing a lot of quiet price manipulation in this table.*



Data Sources & Methodology

Primary data were collected through extensive field visits to major Pangasius-producing regions in Indonesia. The study included visits to key aquaculture clusters located in Riau (Kampar Regency), South Sumatra (Palembang and the Musi River basin), Jambi, Lampung, South Kalimantan, Central Kalimantan and West Java, which collectively represent the principal production areas for Indonesian Pangasius farming. The field surveys were conducted with the active support and coordination of the respective Regional Fisheries Departments, whose technical staff facilitated access to important aquaculture production areas and provided regional production information. During these visits, direct interactions were carried out with a wide range of stakeholders involved in the Pangasius value chain.

Primary Respondents

- *Pangasius grow-out farmers operating both smallholder and commercial farms*
- *Hatchery owners and technical personnel involved in broodstock management, seed production and fingerling distribution*
- *Feed suppliers and aquaculture input dealers*
- *Fish collectors and traders*
- *Processing unit managers engaged in the production of fresh, frozen, smoked and value-added Pangasius products*
- *Officials from Regional Fisheries Departments and aquaculture extension services*

Collection of Farm-Gate Prices

Farm-gate prices were collected directly from farmers, hatchery operators, fish traders and processing units during field visits. Since prices fluctuate according to season, fish size, production volume, market demand, transportation costs and local supply conditions, price information was obtained from multiple respondents within each production region.

It was observed that farm-gate prices showed slight regional variations due to differences in production costs, availability of seed and feed, distance from major wholesale markets, processing infrastructure and local market demand. Consequently, prices presented in this publication are reported as price ranges rather than fixed values. The reported ranges are intended to represent the prevailing market conditions observed during the survey period and provide a more realistic estimate of producer prices across different production regions.

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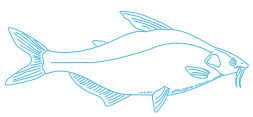
Conclusion

The story this report has traced from stagnating capture fisheries to a booming freshwater aquaculture sector and from a regional Mekong River fish to a commodity traded in over 140 countries is not really a story about one species. It is a preview of how the world will feed its growing demand for protein over the coming decades.

Global capture fisheries have plateaued at 86-94 million tonnes for nearly four decades, constrained by the biological limits of wild stocks rather than by lack of demand or investment. Aquaculture, by contrast, has grown almost uninterrupted, crossing 100 million tonnes of aquatic animal production for the first time in 2024 and now supplying the majority of the world's aquatic food. This is not a temporary trend; it is a structural transition, and freshwater species sit at its center. Producing 64 million tonnes annually nearly two-thirds of all farmed aquatic animals, freshwater aquaculture has quietly become one of the most important food-production systems on the planet, precisely because it is accessible: low capital barriers, simple pond infrastructure, and species that convert feed efficiently into affordable protein for exactly the populations that need it most.

Pangasius is the clearest proof of what this transition can achieve at scale. Its rise from a subsistence river fish to a globally traded whitefish rested on a combination that is rare in aquaculture biological hardiness, farming efficiency and a nearly perfect fit with industrial processing and that combination has now been replicated across two very different national models. Vietnam built the export powerhouse; Indonesia is building something more domestically rooted, anchored in smallholder communities like Kampar's Kampung Patin, expanding hatchery and processing capacity across Sumatra, Kalimantan and Java, and feeding a population of over 280 million people for whom fish remains a nutritional staple rather than a luxury.

What ties these threads together is a single underlying reality: as the world's population grows and the ceiling on wild capture fisheries holds firm, freshwater aquaculture species with the profile of Pangasius- hardy, efficient, affordable and farmable at smallholder scale - are not a niche alternative. They are positioned to carry a growing share of global food security itself. It is anticipated that the next chapter of Blue Economy will be written less on the open ocean and more on the ponds, floodplains and river basins where fish like Pangasius are already being farmed today.



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