



SHRIMP
INSIGHTS

guide to the
**INDIAN SHRIMP
INDUSTRY**

SHRIMP INSIGHTS REPORT SERIES



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This Shrimp Insights Guide is the result of having immersed myself in the Indian shrimp industry for over ten years. Some twelve years ago, I had the privilege of living in Chennai, India. There, I gained an understanding of the industry and started building a network. A cultural anthropology student at the time, I was asking shrimpers all kinds of questions about their business—trying to understand the strategy of India’s shrimp exporters to identify the future leaders of the industry. Since then, I’ve been visiting India at least once a year and I never stopped asking questions.

Meanwhile, my passion for the industry and the people working in it grew. The industry’s expansion comes with many challenges and responsibilities for the companies that drive it as well as for the government. The private sector supports a million livelihoods, if not more, including those working at one of India’s 100,000 shrimp farms. These companies can contribute to a sustainable and responsible growth of the industry. They can have a real impact on the quality of life of the people working in it and on the industry’s environmental footprint. Let’s get to know them and try to understand the reality they live in.

This guide aims to help you understand the structure and dynamics of the Indian shrimp industry and become familiar with the companies that drive it. It helps you to dive deep. You’ll find a best-effort facts-and-figures description of each segment of the supply chain—a unique feature for a publicly available report. Feel free to contact me at willem@shrimpinsights.com if any questions arise once you’ve read the guide, if you want to discuss further or need deeper insights.

I couldn’t have published this guide without the help of all the companies, organizations, and individuals who provided me with data and insights, and who reviewed and contributed to all the content. I want to thank a few people in particular. Let me start with Mr. Santhana Krishnan of the Global Seafood Alliance, who volunteered to read every chapter and elevate the guide with his knowledge and expertise. Then, Aditya Dash of Ram’s Assorted Cold Storage, who reviewed most of the content. But more importantly, who has spent ten days with photographer Bhavesh Bhati in the province of Andhra Pradesh to capture the industry in images and bring it to life. Finally, a big thank you to the team at Devi Sea Foods for generously answering my questions and facilitating Mr. Dash’s photo trip.

The generous support of sponsors made it possible to publish this guide open access. You’ll find more about them on the next page. I believe that widely available information contributes to a well-informed industry with powerful connections. From there, we can build stronger collaborations to move the industry toward a sustainable future.

Enjoy reading!

Willem van der Pijl
Shrimp Insights

LIST OF ABBREVIATIONS

ASC	Aquaculture Stewardship Council
BAP	Best aquaculture practices
BMC	Broodstock multiplication center
CRZ	Coastal regulation zone
EHP	Enterocytozoon hepatopenaei
EU/EUROPE	“EU” is used for the EU-27 countries, excluding the United Kingdom and Russia; “Europe” refers to the continent
FY	Financial year
HLSO	Headless shell-on
HOSO	Head-on shell-on
MSC	Marine Stewardship Council
MT	Metric ton
NBC	Nucleus breeding center
PL	Post-larvae
PPL	Parent post-larvae
R&D	Research & development
SPF	Specific pathogen free
WFS	White feces syndrome
WSSV	White spot syndrome virus

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Thank you!





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Protected

shrimp are constantly exposed to environmental fluctuations. Stressors, negatively impacting

solutions to protect the risk of health and production cycle.



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3-5 September 2024 we convene the th of the Global Shrimp Forum, a fully d meeting place for the warm water shrimp in Utrecht, the Netherlands. We will gather level executives representing the whole s dustry value-chain. Be there.

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FARMING



Following the introduction of *L. vannamei*, the industry experienced a decade of rapid growth, with production peaking in 2021 at 930,000 MT. Since then, due to global oversupply, prices have decreased and output has stagnated. It's unlikely that production will grow further unless market conditions improve. The previous comfortable margins for farmers and other supply chain segments have decreased considerably.

With approximately 100,000 farms, the farming landscape remains fragmented, with little consolidation or integration. Most farms are smaller than 2 ha. On the farms, there's no trend of intensification. Although exceptions exist, most farmers have reduced their stocking densities to an average of 20-40 pcs/m². In simple earthen ponds, farmers believe that with these low densities, they can better manage diseases and optimize their profits. Owing to the small-scale and low-intensity characteristics of India's shrimp farming systems, technology adoption has been slow.

Responsible for approximately 75-85% of India's shrimp production, Andhra Pradesh continues to dominate the country's output. While other states, such as Odisha, West Bengal, and Gujarat, have expanded shrimp production over the past decade and still have great potential, it has become clear that producers outside Andhra Pradesh struggle to compete under the current market conditions. The main reasons for this are Andhra Pradesh's relatively low electricity, PL, and feed costs. Therefore, production outside Andhra Pradesh is expected to not grow much further unless the market conditions improve. Production in Andhra Pradesh in some areas, mainly inland, continues to expand.

P. monodon has become a viable alternative for shrimp farmers who struggle with *L. vannamei*. Due to local infrastructure development, domesticated SPF *P. monodon* genetics (which grows fast and survives well) are now available. *P. monodon* is only viable for farmers with access to a high-salinity water source, so it's mainly limited to farms connected to brackish water canals, creeks, and lagoons. These farms are primarily located in Gujarat and the south of Andhra Pradesh. Farmers in these regions grow one 8-10 month *P. monodon* crop, mostly harvesting U15 shrimp.

PL PRODUCTION



India's shrimp farmers require 80-100bn PL annually. Although the hatchery segment is the smallest segment of India's shrimp supply chain, representing a sales value of \$210-280m, it's responsible for supplying farmers with PL that grow fast and survive well in the Indian context, which is crucial for the industry's success.

India's hatchery segment is still relatively fragmented, with over 450 hatcheries owned by approximately 350 groups. However, consolidation is on its way, with a few more prominent players acquiring other hatcheries and, by doing so, gaining market share. The most prominent players in the hatchery segment are Sapthagiri Group, Vaisakhi Bios, CP Group, BMR Group, and Golden Marine. The number of new entrants is limited; however, a few exceptions exist. For example, Apex Frozen Foods and Sandhya Aqua, both key processors and exporters, have recently invested in the hatchery segment and will be significant players moving forward.

While hatcheries primarily import broodstock from approved overseas suppliers, the number of local BMCs is also growing. BMCs depend on overseas genetics. Rather than adult broodstock, they import parent PL, which they grow into adult broodstock. A selection of the best performing adult broodstock is then supplied to hatcheries, resulting in higher quality and more affordable products. All the private BMCs are (co-)owned by local hatchery operators such as Ananda Group, BMR Group, CP Group, Sapthagiri Group, and Vaishnavi Aquatech.

Regarding domestic breeding programs, one successful program for *P. monodon* has been established in the Andaman Islands. This program has recently been commercialized through a BMC in Andhra Pradesh. The government is also subsidizing efforts to develop a breeding program for *P. indicus*, a native species. There are no current efforts to establish a domestic *L. vannamei* breeding program.

FEED MANUFACTURING



At the current production levels, the Indian shrimp feed market amounts to between 1.1m and 1.3m MT, equivalent to \$1.15-1.25bn. Although the feed segment of India's shrimp industry remains relatively consolidated, the top players are changing. With a 50% market share, Avanti Feeds' position remains unchallenged. However, some historically large players, such as CP Group, have seen their market share drop. CP Group is still the second largest supplier of shrimp feed, but its position is challenged by newcomers, such as Deepak Nexgen, Devi Sea Foods, and Sandhya Marines, whose supplies have rapidly grown. In total, the five companies have an 80-85% market share.

Besides the top 5, around 15 feed manufacturers take up the remaining market, and a further 15 companies (approximately) have idle shrimp feed manufacturing capacity. In general, feed companies are experiencing tough times due to the (1) contraction of global shrimp demand and Indian production, (2) intense competition between feed manufacturers because of overcapacity, (3) high costs of raw materials and farm production, (4) inability to pass on inflation costs, and (5) lack of cash flow. Further consolidation of the market may be expected as smaller players struggle to maintain their position.

Regarding feed ingredients, India has the luxury of a sizeable domestic availability of crucial feed ingredients such as wheat, rice, soy, fishmeal, and fish oil. However, moving forward, dependence on domestic ingredients (mainly marine ingredients) may also pose a challenge to the industry. Key markets increasingly require marine ingredients from ecolabel-certified origins or from fisheries that are part of a Fisheries Improvement Program (FIP). These certifications and FIPs have not yet been widely established in India. Therefore, feed companies that want to meet the requirements of overseas markets may have to import more expensive ingredients, resulting in higher shrimp feed prices for farmers.



MARKETS

Although it's thought that India's domestic market has great potential to absorb a significant portion of domestic shrimp production, today, the industry depends heavily on export markets. Estimates vary, but currently around 95% of Indian farmed shrimp is exported.

India's largest export market is the US, where it primarily supplies peeled shrimp to the retail sector. India is the US's largest raw and cooked peeled shrimp product supplier. US retailers demand ecolabel-certified shrimp and require Indian suppliers to invest in the certification of processing plants, farms, hatcheries, and feed mills. This has resulted in many BAP and, more recently, ASC certified facilities. In recent years, Ecuador has been pressing India's position in the US market as it has become the US's second largest shrimp supplier. Hence, India's exporters are looking to diversify their products and markets.

India's second largest market is China, to which it primarily supplies HLSO blocks used as raw materials for producing value-added products. In the EU, India's third largest market, India is still confronted with stringent antibiotic testing requirements, which makes it difficult to increase its market share. Nevertheless, with Ecuador advancing on India in the US market, India is pushing into other markets to gain market share. In addition to the EU, this includes markets such as Canada, Japan, Russia, and the UK.

With a 50% market share, the position of Avanti Feeds remains unchallenged

PROCESSING



India's shrimp processors and exporters generate approximately \$5bn in export revenue, of which more than 90% comes from farmed shrimp. This makes shrimp an essential source of foreign exchange and a significant contributor to the economy of many Indian states, especially Andhra Pradesh, as well as other states such as Odisha, Tamil Nadu, and West Bengal. In total, around 350 processing plants can process and export shrimp. Approximately 250 companies own these plants, and only 100-150 of them are fully dedicated to shrimp.

Historically, India primarily exported raw frozen products. Cooked and value-added product supplies were dominated by countries such as China, Indonesia, Thailand, and Vietnam. However, Ecuador and other countries such as Venezuela and Sri Lanka have since grown their production and are targeting the raw frozen markets. Consequently, India's processors and exporters have been rapidly investing in capacity for cooked and other highly value-added products. As a result of these enhanced capacities, and once a skilled labor force is developed, India's exports of cooked and value-added (such as breaded) products are likely to increase over the next few years. India may gain market share in these segments from countries such as Indonesia and Vietnam.

With the rise of *P. monodon* production and the particularly large sizes that farmers prefer to produce, processors with access to *P. monodon* raw materials are also investing. Large-sized *P. monodon* is primarily desired by markets that require HOSO products. Investments are needed in the supply chain, in terms of improved harvesting and transport logistics, to ensure that the quality of raw materials meets HOSO standards. Moreover, investments in processing equipment, such as brine freezing lines, are required to meet the preferred product specifications of high-end Chinese buyers.

Distributors take risks that feed companies often cannot take: they pre-finance shrimp production and enable farmers to optimize their crop cycles

TRANSACTIONS

With approximately 100,000 shrimp farmers, distributors and middlemen are essential to India's supply chain. Distributors are mainly involved in feed transactions, while middlemen transfer products between the farm and the processing plant.



Distributors buy feed from manufacturers and sell it to farmers. Although they purchase feed from manufacturers in cash or on short credit terms, they sell shrimp to farmers on longer credit terms. Distributors are essential because they take risks that feed companies often cannot take. They pre-finance shrimp production and enable farmers to optimize their crop cycles. Farmers will still aim to pay as quickly as possible; as the quicker the payment, the less interest they'll have to pay on the outstanding loan.

Middlemen are crucial for coordinating purchase activities and arranging post-harvest logistics for processors. Depending on the company they supply to, the agents coordinate with farmers regarding which raw material can be collected, or they facilitate the entire harvesting and transport logistics to bring the raw materials from the farm to the plant. They also play an essential role in financing the purchase of raw materials. While processors often pay the middlemen with longer credit terms, the latter pay farmers instantly or at least with much shorter credit terms.

Q1 2024 at a Glance

This report has been more than a year in the making. The information in the various chapters is as up to date as possible. However, a brief overview of the latest developments in Q1 2024 is presented below.

EXPORTS

Similar to 2023, in January 2024, with an export volume of 50,601 MT, exports continue to outperform expectations. Although it's a 16% decrease from December 2023, it's a 9% increase compared to January 2023. A more detailed look shows that in January 2024, raw *L. vannamei* exports increased by 10% year-on-year, raw *P. monodon* exports increased by 37%, and value-added exports increased by 3%. Wild-caught shrimp exports have decreased by 5%. The preliminary ruling of the countervailing duty case in the US was still pending in March, which partly explains the increase in exports. Exporters shipped orders before having to deposit the duties.

PRODUCTION

While farm gate prices increased between January and March 2024, prices began to drop towards the end of March. The optimistic price trend encouraged some farmers to stock their first crop of the year, but the price decline has raised fears among farmers and, at least to some extent, delayed further stocking activities. The impact will become apparent from April onwards, which typically marks the start of the first crop harvest.

After a 23% drop in *L. vannamei* broodstock supplies from 2022 to 2023, in January and February 2024, *L. vannamei* broodstock imports declined again by 16% compared to the same period in 2023, and by 40% compared to 2022. Although the decline in broodstock supply did not result in a drop in *L. vannamei* exports last year, it's expected that if broodstock supplies continue to drop, it will eventually reflect in production and exports. The first signs may become visible in May and June, when most of the year's first crop will have been harvested.

While *L. vannamei* broodstock supplies have declined, *P. monodon* broodstock supplies have increased. Coastal Aquaculture Authority (CAA) data shows that from December to February, 16,554 *P. monodon* broodstock were supplied to the market and used to produce PL for farmers who opted to stock *P. monodon* instead of *L. vannamei*. Considering that Indian farmers tend to grow large-sized *P. monodon*, requiring a grow-out period of at least eight months, a large harvest is expected from September 2024 onwards.

COUNTERVAILING DUTIES

In the ongoing countervailing duty case (Ecuador, India, Indonesia, and Vietnam—see the box on p. 32), a preliminary ruling was published on 26 March 2024. The US Department of Commerce (DoC) preliminarily determined that countervailing subsidies are to be provided to producers and exporters of frozen warmwater shrimp from India. As a result, the DoC will impose a countervailing duty of 4.72% for Devi Sea Foods, 3.89% for Sandhya Aqua, and 4.36% for all other Indian exporters. The investigation took place in 2023–2024 and looked at the period from 1 April 2022 to 31 March 2023. The central countervailing subsidies that Devi Sea Foods and Sandhya Aqua received from the Indian government during this period were related to the purchase of import equipment and products for their processing operations in the form of duty exemptions and grants.

As a result of the ruling, the US Customs and Border Protection will be required to collect a cash deposit equal to the determined rates. While Ecuador's producers are confronted with a much higher duty (on average 7.55%) than India's, producers from Vietnam face a lower duty of 2.84%, and Indonesian exporters do not have to pay additional duties at all. As such, the countervailing duties impact the already competitive landscape, even though they're preliminary. The final rulings in the countervailing duty case will be made on 5 August 2024.

LABOR RIGHTS ISSUES

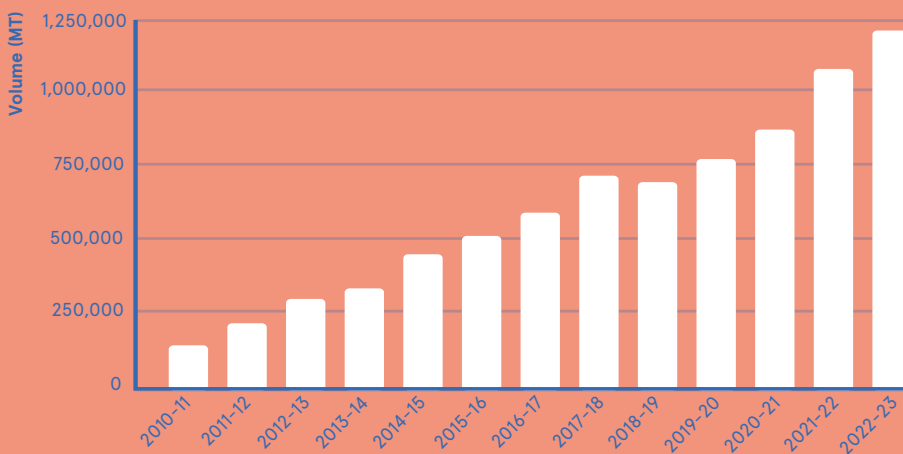
In March 2024, several publications by the Ocean Outlaw Project, the Associated Press, and the Corporate Accountability Lab identified possible human rights violations in the Indian shrimp industry. In their initial response, the companies involved and industry representative bodies, such as the Marine Products Export Development Authority and the Seafood Exporters Association of India, have clarified that the findings in the report are not representative of the situation in the Indian shrimp industry. Nine Indian members of the Seafood Task Force requested support on how to improve labor conditions from the organization moving forward. An initial conference will be held in Mumbai on 29 April 2024. The next steps will be defined from there.

Some Figures

The Indian shrimp industry is a source of healthy proteins, offers employment to over 1 million people, and contributes immensely to India's foreign exchange. Up to 100,000 farms jointly produce around 1m MT of farmed shrimp each year. And wild-caught and farmed shrimp exports combined have recently exceeded \$5bn annually. Let's take a look at some of the industry's key figures.

Production may have actually dropped to 850,000 MT

FIGURE 1: INDIA'S FARMED SHRIMP PRODUCTION FROM FY 2010-2011 TO FY 2022-2023

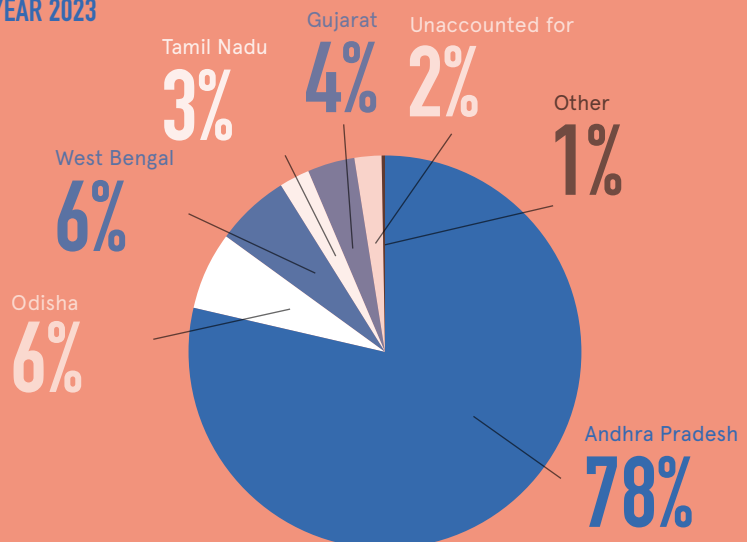


Source: MPEDA

According to the Marine Products Export Development Authority (MPEDA), farmed shrimp production grew non-stop between FY 2018-2019 and FY 2022-2023: from around 700,000 MT to 1.2m MT. The Society of Aquaculture Professionals, however, argues that since the peak of 930,000 MT in calendar year 2021, production dropped to around 850,000 MT two years later. Both institutions agree that *L. vannamei* accounts for around 95% of production and *P. monodon* for around 5%, with the share of the latter growing.

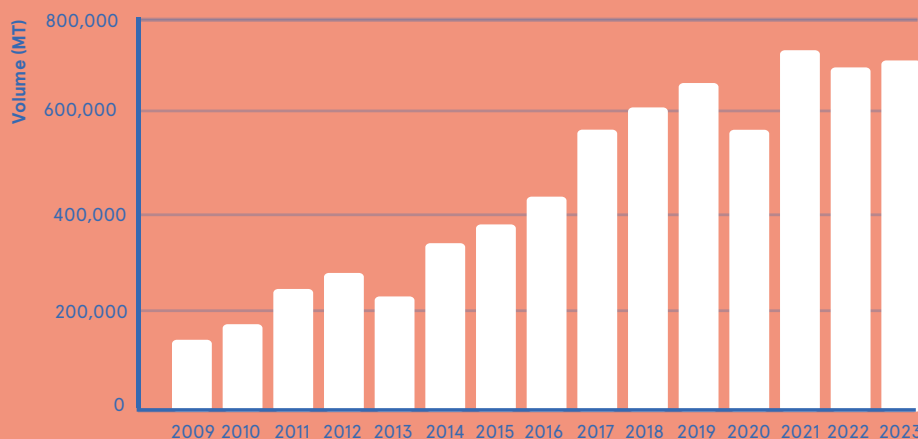
The state of Andhra Pradesh is responsible for around 75-85% of total farmed shrimp production. Other states such as West Bengal, Odisha, and Gujarat have growth potential, but generally deal with higher electricity, feed, and PL costs. Combined with the current low farm gate prices, farmers struggle to make a profit, causing production in these 'other' states to drop as a result.

FIGURE 2: INDIA'S FARMED SHRIMP PRODUCTION PER STATE IN CALENDAR YEAR 2023



Source: Society of Aquaculture Professionals

FIGURE 3: INDIA'S FARMED SHRIMP EXPORTS BETWEEN CALENDAR YEARS 2009 AND 2023



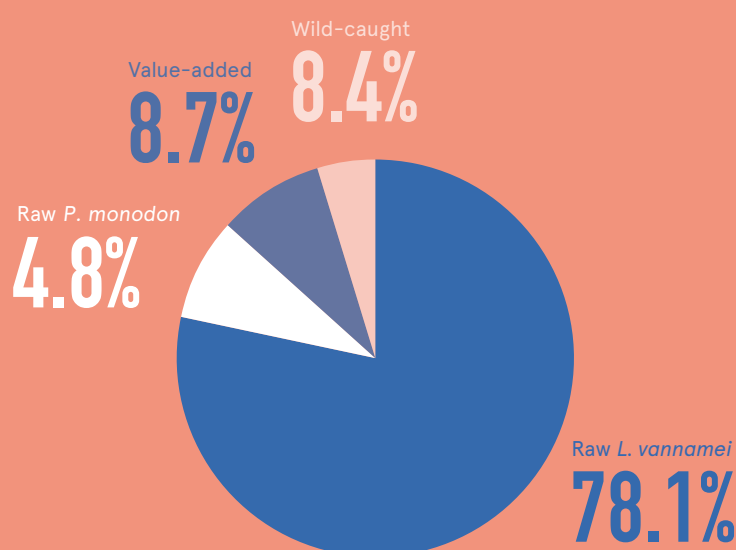
Source: ITC Trademap

EXPORTS

At its peak in 2021, India exported around 730,000 MT of shrimp. However, growth stagnated by the end of 2021 due to a global oversupply and a drop in shrimp prices. The US is India's largest export market, followed by China, the EU, Vietnam, and Japan.

In 2023, farmed shrimp accounted for 85-90% of exports. Wild-caught shrimp is mainly exported raw, but some quantities are cooked. Farmed shrimp primarily consists of raw and cooked *L. vannamei*, accounting for around 80-85% of total exports. *P. monodon* exports are rising, but still only account for less than 5%.

FIGURE 4: INDIA'S SHRIMP EXPORTS IN CALENDAR YEAR 2023



VALUE CHAIN SEGMENTS

	 Hatcheries	 Feed mills	 Farms	 Processing plants
NUMBER OF ESTABLISHMENTS	+/- 450	+/- 50	100,000	+/- 243
SALES VALUE IN 2022*	\$0.18-0.24bn	\$1.15-1.25bn	\$4bn	\$5bn
TOP 5 PLAYERS**	Sapthagiri Group Vaisakhi Bios Golden Marine BMR Group CP Group	Avanti Feeds CP Group Deepak Nexgen Devi Sea Foods Sandhya Marines	Not available	Devi Fisheries Devi Sea Foods Sandhya Aqua Kader Exports Nekkanti Sea Foods

* Rationals are provided in each value chain segment.

** The top 5 for hatcheries is based on broodstock procurement in 2023; for feed it's based on an estimation of sales in FY 2022-2023; and for processing it's based on an estimation of export volume in 2023.

Jobs and Livelihoods

India's shrimp industry offers employment at farms, processing plants, hatcheries, and feed mills. Looking at the broader ecosystem, jobs can be found at feed ingredient suppliers, manufacturers of farm health products, technology suppliers, feed distributors, buying agents, and harvesting teams. Not to mention the number of indirect jobs related to each part of the value chain and the number of family members supported by direct and indirect jobs in the industry. Some literature, such as a 2020 **report** by the Indian Council of Agricultural Research together with the Central Institute for Brackishwater Aquaculture, suggests that the total amount of (in)direct jobs related to India's farmed shrimp industry exceeds 1 million. While locals find jobs in their own states, the industry also attracts inter-state migrant workers: wages for unskilled workers in, for example, Andhra Pradesh can be significantly higher than wages in other states, such as Assam, Kerala, Odisha, and West Bengal.

DIRECT EMPLOYMENT IN THE MAIN VALUE CHAIN SEGMENTS



FARMS



Although exact figures on the number of farm owners, farmers, and their workforce are missing, we can make a good estimate. Data from the Marine Products Export Development Authority (MPEDA) suggests that there's at least 174,000 ha under cultivation, around 30% (60,000 ha) of which for extensive *P. monodon*. Since not all farms are registered by MPEDA, the total area may be slightly larger, especially in areas where new farms have recently been set up or where paddy and fish farms have switched to shrimp.

Estimates of how many jobs every ha of farm creates vary. One source argues that every ha provides one job if it's a small-scale farm and up to 1.3 jobs if it's a larger corporate farm. Each person manages two ponds of approximately 0.5 ha each. On corporate farms there would be other staff as well, such as technicians or cleaners, increasing the

number of jobs per ha. Other sources estimate that the number of jobs per ha, direct and indirect combined, may even be around 2. Based on

these numbers, it's fair to estimate that shrimp farms provide around 200,000 to 300,000 jobs.



Roughly over 90% of farm owners, farmers, and their workforce are men. A study based on a 2022 survey suggests that 58% of the workforce on farms are domestic migrant workers. According to the same study, workers are commonly between 23 and 53 years old.



PROCESSING PLANTS

While no data is available on the number of people employed in shrimp processing, looking at various processors can give us a proper estimate. A processor in Andhra Pradesh, which exports around 25,000 MT of finished product yearly, claims to have employed around 2,100 workers and staff in its two processing plants. This example is representative of other dedicated shrimp processing

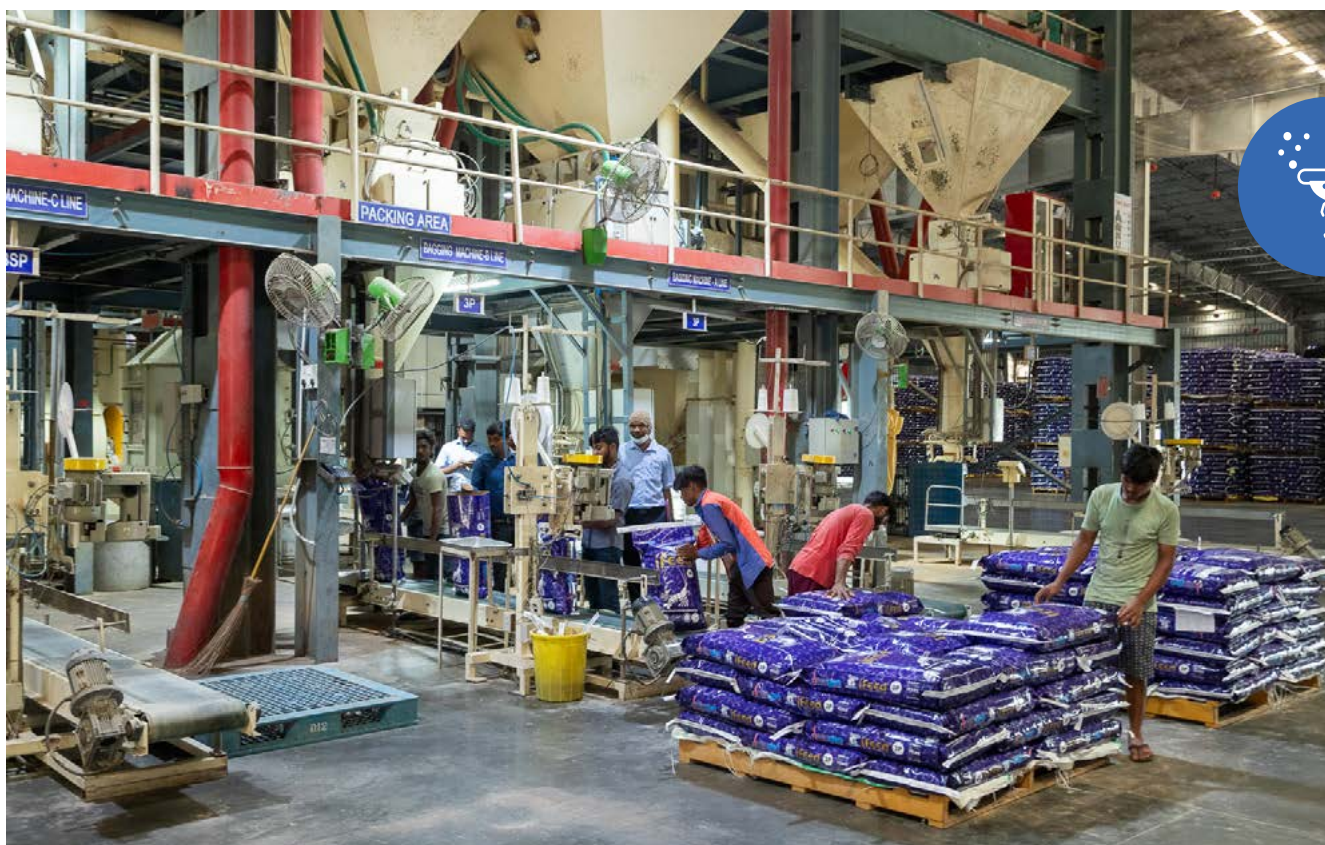


establishments as well. If we multiply the number of workers at this processor's facilities relative to India's total farmed shrimp export volume in 2022 (704,030 MT), we get to an estimate of 60,000-75,000 jobs provided by India's shrimp processing sector.

Unlike in other parts of the value chain, 90% of workers in shrimp processing facilities are women. The delicate work of shrimp peeling is typically done by women. By comparison: in one hour, workers can process 50 kg of HOSO shrimp into HLSO shrimp and 10 kg of HLSO shrimp into peeled shrimp. The more value-added products a processor produces, the more labor is involved. A significant part of the shrimp processing workforce comprises domestic migrants from states with lower wages. Employment relationships are typically more formal than in other parts of the value chain, such as in harvesting logistics.

HATCHERIES

A typical hatchery in India employs 20 to 50 workers, averaging around 40 employees per facility. With about 450-500 hatcheries throughout the country, this segment provides about 18,000-20,000 jobs. The main activities for people working in hatcheries include feeding larval stock, cleaning and preparing tanks, harvesting spawned PL, and transporting broodstock and PL between different sections of the hatchery. Hatcheries employ primarily men and a mix of skilled and unskilled personnel.



FEED MILLS

Anecdotal evidence suggests that a 100,000 MT feed mill in India may employ around 55 workers per shift and operate three shifts per day on average. This comes down to 165 workers that are needed daily. Depending on the feed manufacturer's size and business model, the company may also have a sales and technical assistance team acquiring and servicing customers.

With roughly 35 companies active in the feed segment that together operate over 50 feed mills, about 4,000-5,000 people are directly employed in the feed manufacturing segment.

Work in a feed mill usually means working under harsh conditions, and most of the workforce consists of young men. Both the technical and sales

teams, as well as the mill staff who operate the equipment, carry out skilled labor. Only about a third of the people who work in logistics and support are unskilled.



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Our Commitment

We have established a 2-MW solar plant, showcasing our commitment to green energy. With plans to expand this to 5 MW, we are not only embracing renewable energy but also leading the way to a more sustainable future.

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Processed carefully with comprehensive food safety standards:



Coast to Coast: A Deep Dive into India's Geography

QUICK FACTS



7th largest country by area



Population: more than 1.4bn
World's most populous country



Mainline coastline: 5,423 km
Shares maritime border with Thailand,
Myanmar, and Indonesia

LEGEND



Farming (MT)



Hatcheries (#)



Feed mills (#)



Processing (#)

West Bengal



62,000



2



1



38

Odisha



73,000



3



7



25

Gujarat



35,000



4



5



51

Andhra Pradesh



600,000+



36



364



93

Tamil Nadu



23,000



4



83



30

Kerala



<5,000



0



0



62

Source: Department of Fisheries (hatcheries), Shrimp Insights (feed mills), Society of Aquaculture Professionals (farming), and the Marine Products Export Development Authority (MPEDA) (processing)

Note: The number of processing facilities is based on comparing MPEDA's database and actual exports based on bill of lading information. Although some facilities may be fully dedicated to farmed shrimp, others may only process small quantities.

This chapter briefly examines the six main states in India that are engaged in the shrimp industry: Andhra Pradesh, Odisha, West Bengal, Gujarat, Tamil Nadu, and Kerala.

The Farming chapter on page 40 dives deeper into shrimp production in each state.



ANDHRA PRADESH

Andhra Pradesh is located on India's East Coast between Tamil Nadu in the south and Odisha in the north. With 974 km, the state has India's second largest coastline and a population of almost 53 million. It's one of India's wealthiest states, with only 6% living below the poverty line, according to the Multidimensional Poverty Index. The state is home to the Godavari and Krishna river deltas, where most shrimp farming activities are concentrated. Its capital is Amravati, but its largest city is Visakhapatnam. The state took its present form in 2014, when the state of Telangana was formed and split off from Andhra Pradesh.

Producing 75-80% of farmed shrimp, Andhra Pradesh can rightly be considered the backbone of India's shrimp industry. Shrimp farming primarily consists of coastal farms in the southern coastal districts, a combination of coastal and inland farms in the central coastal districts, and primarily coastal farms in the northern coastal districts. Around 70,000 farmers grow shrimp in Andhra Pradesh, and this number continues to grow.

Feed mills and processing plants are located throughout Andhra Pradesh within the state's main farming hubs along the coastline. Most of these facilities are concentrated in the triangle between Kakinada, Rajahmundry, and Vijayawada, the heart of the Andhra Pradesh shrimp industry. Hatcheries are concentrated in a few districts along the coastline which provide the best conditions.

Contrary to most other states, the shrimp sector in Andhra Pradesh is mainly self-sufficient. An exception is the southern part, which uses supporting infrastructure from within Andhra Pradesh and from Chennai and wider Tamil Nadu. This mainly concerns feed supplies and sales of harvested shrimp.

Andhra Pradesh houses the headquarters of most of India's largest shrimp conglomerates. Many are based out of Visakhapatnam, also home to the largest seaport on the East Coast. This includes Avanti Feeds, Devi Sea Foods, and Sandhya Marines.

ODISHA

The state of Odisha borders Andhra Pradesh in the south and West Bengal in the north. It has a coastline of roughly 450 km and a population of around 42 million. Its capital is Bhubaneswar. Odisha is one of India's poorest states engaged in shrimp farming. The Mahandi is Odisha's most extensive and India's sixth largest river. The state is also home to Chilika Lake, the world's largest brackish water lagoon.



After Andhra Pradesh, Odisha has become India's second largest manufacturer of farmed shrimp, and is closely followed by West Bengal. However, farmers are generally much smaller and more dependent on loans to finance their crops. Shrimp farming in the state is concentrated in the Balasore and Bhadrak districts but also takes place in other districts along its coastline.

Odisha has a history of seafood processing, and many of today's processors engaged in farmed shrimp used to be involved in the processing and exporting of wild-caught seafood. The old processing establishments are concentrated in and around Odisha. Although there are many smaller players, the state is home to Falcon Marine—one of the country's largest vertically integrated shrimp conglomerates—and

large processors such as Sreeragam and Magnum.

Feed manufacturing capacity is slowly evolving in Odisha, with companies such as Falcon Marine and Pasupati Group establishing local feed mills. However, due to the strong dealer networks of more prominent feed players such as Avanti and CP Group, local players struggle to compete and as a result don't have significant market shares. There aren't many hatcheries in Odisha, making farmers largely dependent on hatcheries from northern Andhra Pradesh and Tamil Nadu.



WEST BENGAL

West Bengal is India's most northern state on its East Coast. It borders Odisha in the south and Bangladesh in the east. The capital is Kolkata. The state has a coastline of just 158 km and a population of around 98 million, with 12% living below the poverty line. Despite the short coastline, it has vast potential for shrimp farming as it's part of a large delta region. West Bengal is home to the Ganges Delta, one of the world's largest river deltas, and the Sundarbans, the world's largest mangrove forest.

Shrimp farming in West Bengal traditionally consisted of trap and hold systems where farmers produce shrimp at low stocking densities in large multi-hectare ponds in the districts close to the Sundarbans. The farmers in these regions grow *P. monodon*, primarily processed and exported for niche markets in Japan, the Middle East, and Europe. More recently, since the introduction of *L. vannamei* in 2009 the farming sector in West Bengal has expanded rapidly. The state has become India's second or third largest manufacturer of farmed shrimp, after top performer Andhra Pradesh and just behind Odisha.

Kolkata has an extensive seafood processing hub known as the Benfish Complex. Amidst the expansion of the shrimp farming sector, however, quite a few new plants have re-

cently been built in other locations around the city and closer to the farming regions. While the state doesn't house prominent players such as Andhra Pradesh and Odisha, some well-known players include S.A. Exports, KNC Agro, and IFB Agro.

Shrimp manufacturers in West Bengal primarily depend on PL purchases from hatcheries in Tamil Nadu and Andhra Pradesh. For feed they depend on Andhra Pradesh manufacturers, who have strong local dealer networks. However, in recent years, local players in West Bengal have attempted to establish their own brands. These include companies such as Nouriture, a broadline animal manufacturer, and IFB Agro, a diversified business conglomerate and a seafood processor. It's unclear to what extent they've been successful.

GUJARAT

Gujarat is India's most northern state on the West Coast. It borders Pakistan in the northwest and Maharashtra in the south. Gandhinagar is its capital city. Its coastline stretches 1,600 km—the longest coastline of the country—most of which is part of the Kathiawar peninsula. The state has a population of around 64 million, 12% of which lives below the poverty line.



Though Gujarat has been rapidly on the rise as a farmed shrimp producer, farmers in the region have been confronted with many challenges related to disease and production costs. This makes it hard to compete with shrimp produced in Andhra Pradesh and other states. In 2019, production even collapsed and has only slowly recovered since.

Gujarat shrimp farming is concentrated in the southwestern districts just above Mumbai, Maharashtra. Due to the state's location, Gujarati shrimp farmers are limited to one or, at best, two crops a year. Most of the farms in Gujarat use high-salinity water from creeks which makes their farms well suited to produce *P. monodon*. While the introduction of *L. vannamei* gave farmers hope of increased productivity and profits, many farmers are returning to *P. monodon* now that the market has changed and better *P. monodon* genetics are available.

As shrimp farming in Gujarat was expected to grow, several feed manufacturers have established their presence in the state. This includes Avanti, Gujarati company Ishi Marine Technologies, and Skretting, a newcomer to the Indian market. But for PL, farmers almost entirely depend on East Coast hatcheries. While Gujarati farmers have a few local processors they can sell their harvest to, a lot of product is sold to processors in Mumbai.



TAMIL NADU

Tamil Nadu is India's southernmost state on the East Coast, stretching from Tuticorin in the south to the capital city Chennai in the north. The state borders with Andhra Pradesh on the East Coast and with Kerala on the West Coast. It has a coastline of 907 km and a population of around 76 million.

While Tamil Nadu is a relatively small shrimp manufacturer, it has always had a large fishing industry, with an extensive seafood processing industry in Tuticorin in the south and Chennai in the north. Chennai also has several of the largest seaports on India's East Coast and is an essential hub in shrimp export logistics.

Shrimp processors in Tamil Nadu source shrimp from local farms and from southern Andhra Pradesh, to which they are relatively close. The same is true for feed companies. In the early days of the farmed shrimp industry expansion, some feed manufacturers settled around Chennai and catered to the farming sector in Tamil Nadu and farms in southern

Andhra Pradesh. This includes the feed mills of CP Group, Grobest Group, and Guangdong Haid Group. Due to Chennai's significance during that period, the Coastal Aquaculture Authority (CAA) is also located there.

Tamil Nadu is also vital as India's second largest PL production hub. Favorable conditions ensure that the quality of PL from this region is often seen as superior. Tamil Nadu hatcheries are mainly located between Puducherry and Chennai and supply farmers across the country. The state is also home to the Aquatic Quarantine Facility (AQF), where all imported broodstock has to pass through.

KERALA

Kerala is India's southernmost state on the West Coast and has a population of 36 million. It borders Karnataka in the north and Tamil Nadu in the south. Its coastline is 590 km long. While Thiruvananthapuram is its capital, Kochi is the heart of Kerala's seafood sector.

Even though Kerala is a small farmed shrimp manufacturer, the state is home to a significant part of India's fishing fleet, including shrimp trawlers. As such, the city of Kochi has always been a large seafood processing hub, and processors based there export a significant part of India's wild-caught shrimp. Because of its historically prominent position in India's seafood industry, MPEDA is also headquartered in Kochi.

Kerala's largest seafood processing groups, such as Abad Group and Choice Canning, have expanded to the East Coast and are now exporting farmed shrimp. Kerala has a large labor force experienced in peeling shrimp. Many of these people work in processing facilities in other parts of India and send home remittances to support their families.



OTHER

In addition to the six main shrimp producing states, several other states are involved in the shrimp industry on a smaller scale. These include Goa, Karnataka, and Maharashtra on the West Coast and inland states such as Punjab and Haryana in the north. The report touches upon these states where relevant.



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In 2021, India's shrimp exports peaked at 704,160 MT, a live weight equivalent of around 1m MT of shrimp. In 2022 and 2023, growth stagnated due to oversupply in the global market and resulting price drops.



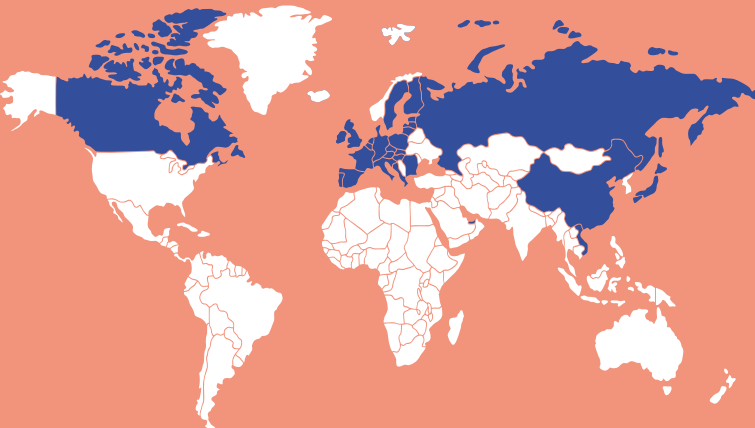
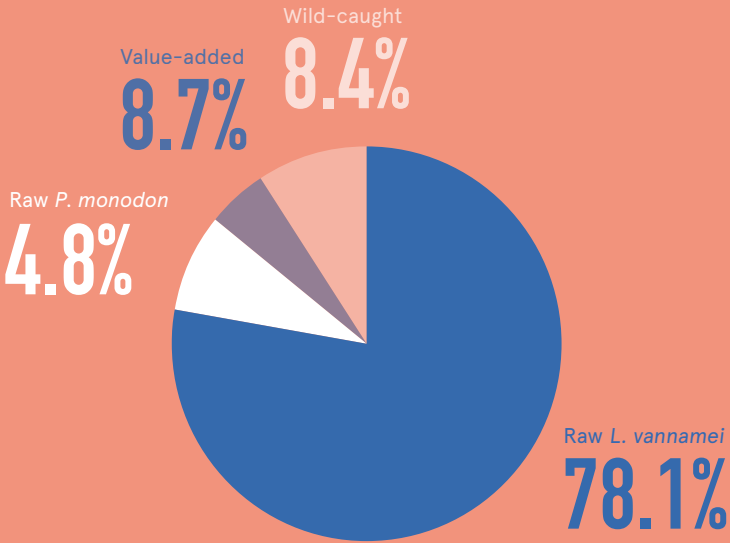
The US is India's largest export market, accounting for around 40-50% of total exports. While India remains the US's largest shrimp supplier, Ecuador is gaining market share. India especially loses market share to Ecuador in the HLSO segment, and to a lesser extent in the peeled segment.



Also in many of these markets, India faces increased competition from Ecuador in the HLSO and peeled market segments, which India often used to dominate.

Key Insights

FIGURE 1: DETAILED BREAKDOWN OF EXPORT PRODUCTS AND SPECIES IN 2023



In order of significance, other markets that imported more than 10,000 MT of shrimp from India are China, the EU, Vietnam, Japan, the Middle East and Africa, Russia, Canada, and the UK.



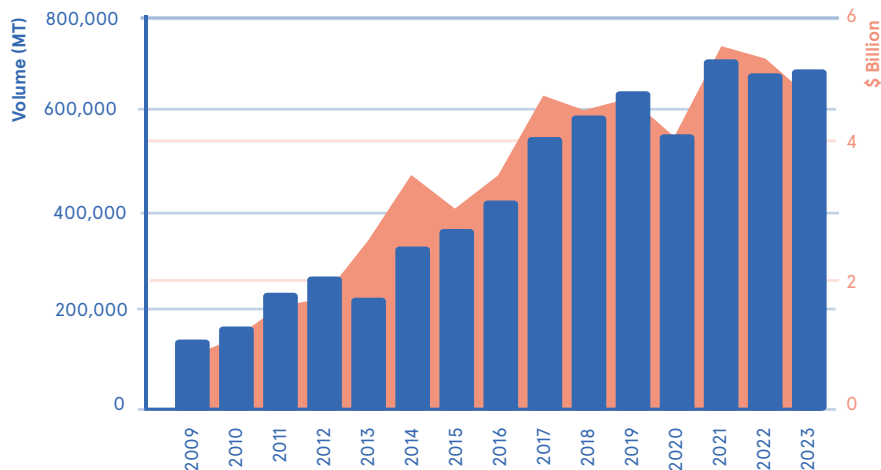
In the future, Indian domestic consumption may grow and offer an alternative sales venue for India's shrimp farmers. However, its short-term potential shouldn't be overestimated as developing this market will take time



Having recently invested in cooking lines and breading facilities, India expects to increase its exports of cooked and breaded products over the next couple of years and gain market share from countries such as Indonesia, Thailand, and Vietnam.

Having examined India's shrimp farming sector in detail, let's now take a look at India's shrimp markets. Around 95% of India's farmed shrimp is currently exported but domestic market potential is also developing.

FIGURE 2: INDIA'S EXPORT VOLUME AND VALUE FROM 2009 TO 2023 (INCLUDING WILD AND FARMED)



Source: ITC Trademap

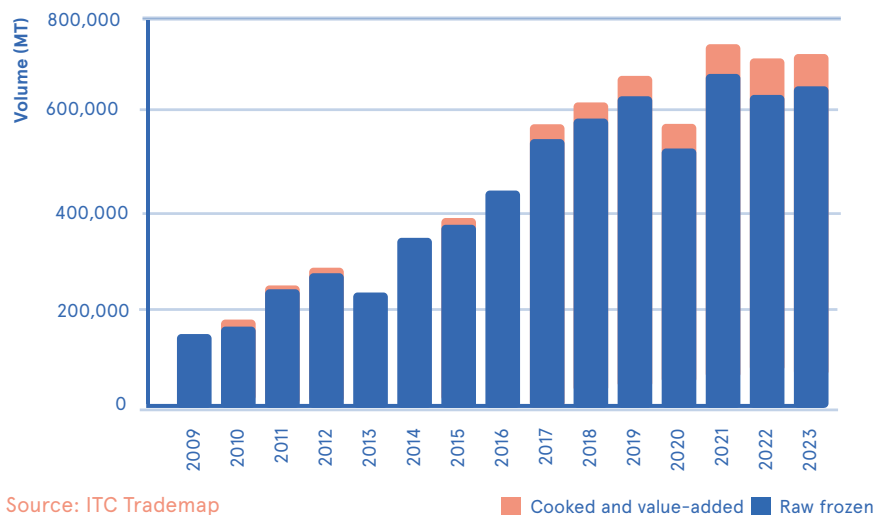
In 2023, *L. vannamei* shrimp exports accounted for 86% of total raw frozen exports, wild-caught shrimp accounted for 9%, and farmed *P. monodon* for only 5%

THE EXPORT LANDSCAPE VOLUME AND VALUE

Coming from a volume of less than 200,000 MT worth just over \$1bn in 2010, the growth of India's exports has been enormous. In the peak year 2021, India recorded an export volume of 734,160 MT at a value of \$5.73bn, making shrimp India's most valuable seafood export product.

From 2012-2019, shrimp exports recorded a 19% compound annual growth rate (CAGR). The growth resulted primarily from the rapid expansion of *L. vannamei* production. In 2020, exports temporarily dropped amidst COVID-19-related logistical challenges. But in 2021, the export volume saw a 28% surge, and the industry seemed to be back on its growth trajectory. The 2021 peak was driven by strong retail demand in the US and overseas markets.

FIGURE 3: INDIA'S EXPORTS OF RAW FROZEN AND VALUE-ADDED SHRIMP



Source: ITC Trademap

■ Cooked and value-added ■ Raw frozen

Growth stagnated in 2022 and 2023 when prices dropped due to oversupply. At the end of 2023, average export prices were just above the level of 2020, when COVID-19 supply chain disruptions caused panic harvests. If we would adjust these prices for inflation, today's shrimp prices are at their lowest point. The fact that growth has now really stalled illustrates the industry's challenges.

SPECIES AND PRODUCTS

India's shrimp exports include a range of wild-caught and farmed species. Wild-caught exports include Asian pink shrimp and a variety of *Penaeus* species. Farmed shrimp exports are limited to *L. vannamei* and *P. monodon*. Most shrimp, 91% of total exports, is raw frozen (exported under HS 030617); the remainder is exported as cooked and breaded products (exported under HS 160521/29).

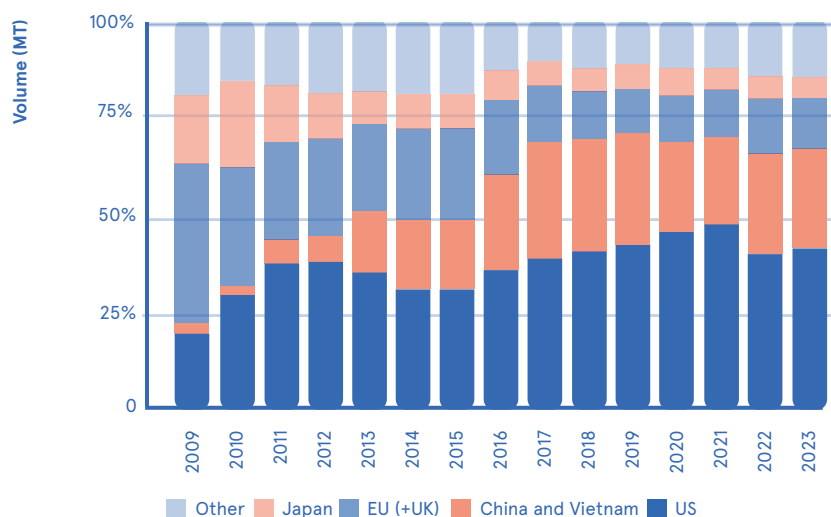
Since April 2020, Indian customs provide a breakdown by HS code. This data allows us to break down India's exports of raw frozen shrimp to the species level. In 2023, *L. vannamei* shrimp exports accounted for 86% of total raw frozen exports, wild-caught shrimp accounted for 9%, and farmed *P. monodon* for only 5%. Although exact data for value-added exports isn't available, *L. vannamei* likely accounts for around 70%, and the remainder comprises wild-caught shrimp. While exports of wild-caught shrimp are stable at best, exports of *L. vannamei* and *P. monodon* are growing.

Exact data on product types (HOSO, HLSO, peeled, and breaded) is unavailable. But, based on an assessment of the product basket for each of India's export markets, a rough estimation suggests that peeled shrimp accounts for around 55-60% and HLSO shrimp for about 35-40% of total exports. The rest is a mix of HOSO and breaded products. The exports of breaded products will increase over the next couple of years.

MARKETS

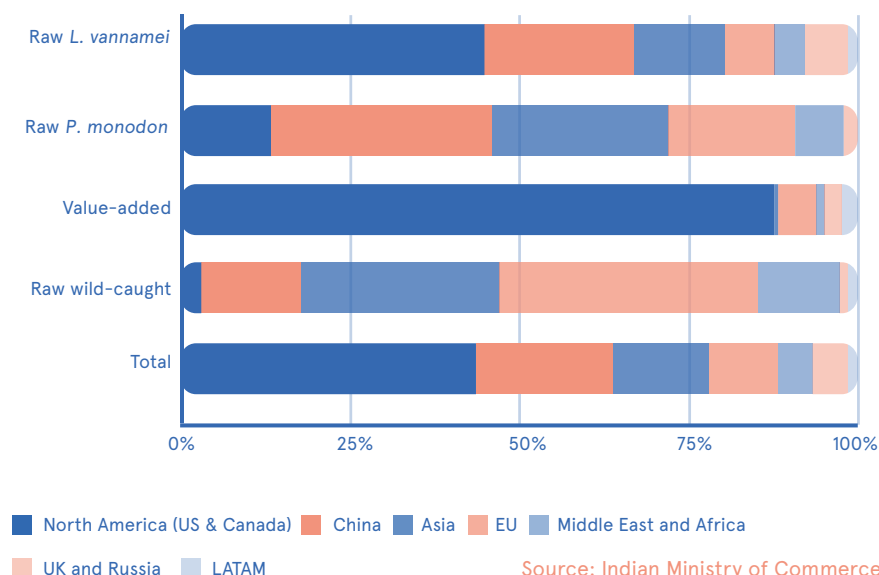
India's shrimp exporters mainly depend on the US market. From 2013, that dependency grew to almost 50% before dropping to about 40% in 2022 and 2023. During the same decade, exports to China and Vietnam grew. Figures of the two countries are combined in Figure 4 because exports to China were initially shipped through Vietnam. Nowadays, most shipments destined for China are sent directly, and shipments to Vietnam are used for reprocessing activities. In this section, we'll look at nine of India's biggest export markets, to which it exports more than 10,000 MT each year. Figure 5 shows that the actual export market distribution varies wildly from species to species and between raw frozen and value-added products.

FIGURE 4: INDIA'S OVERALL EXPORT MARKETS FROM 2009–2023



Source: ITC Trademap

FIGURE 5: INDIA'S EXPORT MARKETS PER MAJOR PRODUCT CATEGORY IN 2023



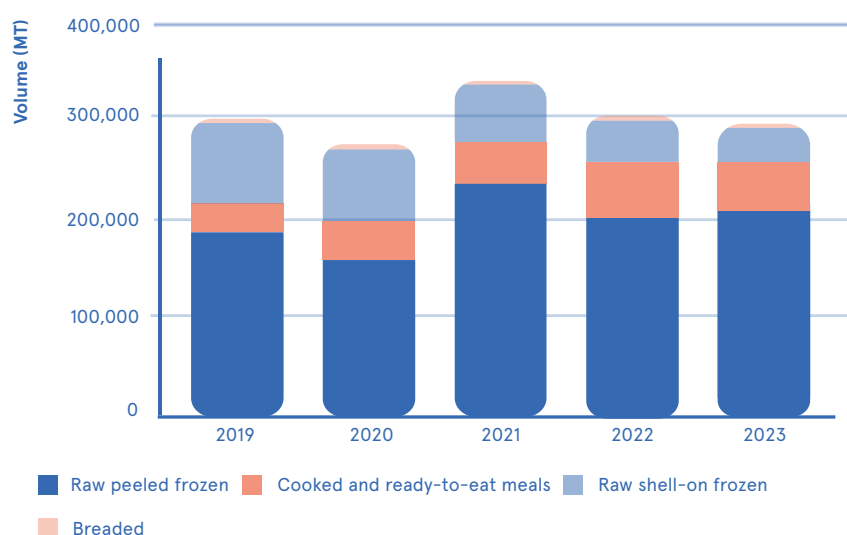
Source: Indian Ministry of Commerce

THE US

Since 2013, India has been the largest shrimp supplier to the US. US imports have fluctuated since 2019. Exports dropped from 300,672 MT in 2019 to 271,735 MT in 2020 at the start of the COVID-19 pandemic. Amidst COVID-19 lockdowns and strong retail demand in 2021, exports to the US peaked at 340,387 MT. Then, in 2022, due to oversupply, exports dropped yet again—to 303,557 MT. In 2023, at 295,961 MT, exports were 1% behind 2022.

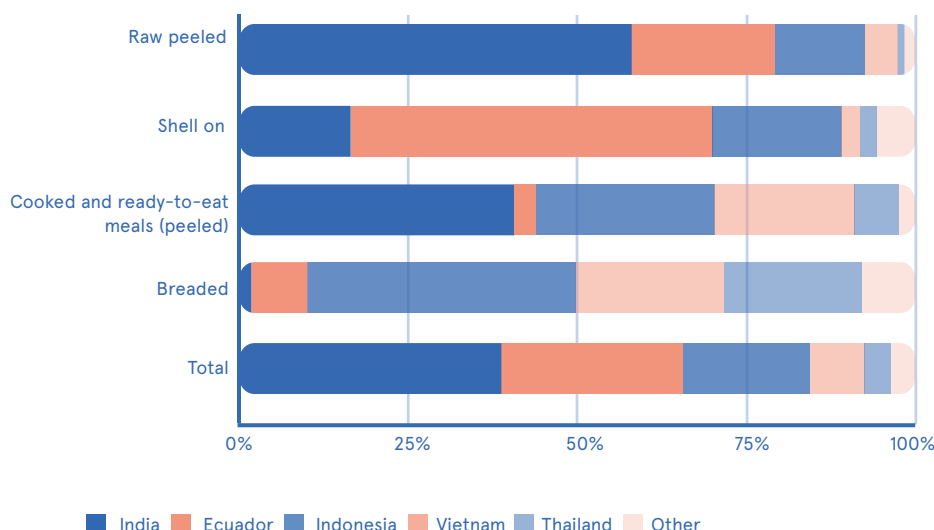
Amidst COVID-19 lockdowns and strong retail demand in 2021, exports to the US peaked at 340,387 MT

FIGURE 6: THE US'S IMPORTS FROM INDIA FROM 2019–2023



Source: NOAA

FIGURE 7: INDIA'S POSITION AMIDST OTHER SUPPLIERS PER PRODUCT CATEGORY IN 2023



Source: Indian Ministry of Commerce

Ecuador, on the other hand, has kept growing its exports to the US, from 82,968 MT in 2019 to 199,813 MT in 2022 (a growth of 240%), and slightly further to 201,969 MT in 2023. While India remains the US's largest shrimp supplier, Ecuador's success has resulted in India's market share dropping from 43% in 2019 to 39% in 2023 and Ecuador's market share increasing from 12% to 27% over the same period. Indonesia, Vietnam, and Thailand complete the top 5 of the US's largest suppliers. Together, the five suppliers control 97% of US shrimp imports. Let's have a look at the different prod-

uct categories these top players supply to the US to understand the underlying dynamics.

HLSO

While the US's total imports in the category of HLSO shrimp dropped by 11% to 216,580 MT from 2019 to 2023, India's export volume plummeted from 84,943 MT in 2019 to 35,755 MT in 2023. Its market share, too, dropped: from 35% in 2019 to 17% in 2023. Meanwhile, Ecuador's exports of HLSO shrimp grew significantly, from 48,865 MT in 2019 to 116,435 MT in 2023, and its market share increased

Combined, Ecuador, Indonesia and India supply 90% of all HLSO shrimp to the US

from 20% to 54%. In 2023, Indonesia has become the US's second largest supplier of HLSO shrimp—resulting in a third position for India. Combined, Ecuador, Indonesia and India supply 90% of all HLSO shrimp to the US.

Raw and Cooked Peeled

If we assume that practically all of the US's imports of cooked shrimp and ready-to-eat meals consist of peeled products, the peeled shrimp category grew from around 400,000 MT in 2019 to 550,000 MT in 2021 and then dropped back to 512,000 MT in 2022 and 491,183 MT in 2023. Around 372,000 MT of the 2023 total consisted of raw peeled shrimp, and the remainder of cooked peeled shrimp.

In the raw peeled segment, India's market share dropped from 61% in 2019 to 56% in 2023. Ecuador's exports of raw peeled shrimp to the US grew. Its market share went up from 10% in 2019 to 21% in 2023, overtaking Indonesia as the second largest supplier of raw peeled shrimp as of 2021. Indonesia's market share decreased from 16% in 2019 to 13% in 2023. The only other major supplier of raw peeled shrimp to the US is Vietnam, which saw its market share grow slightly: from 3% in 2019 to 5% in 2023.

A segment where India has done quite well over the years is the cooked peeled segment: India's market share went up from 30% in 2019 to 41% in 2023. Ecuador doesn't play a signif-

Anti-Dumping Duties

The US started to impose anti-dumping duties on Indian shrimp in 2004. The number of Indian exporters active in the US market dropped from more than 200 in 2004 to only around 75 in 2009. The regulations required Indian exporters to set up import businesses in the US, and Indian shrimp exporters had to deeply integrate into the US import landscape—which, over time, led to these exporters building strong relationships with US retailers and food service companies.

After the 17th administrative review of the current duties on Indian shrimp in 2023, the dumping rate for Indian exporters increased from 3.76% to 3.88%. Anti-dumping duties for Chinese, Vietnamese, and Thai exporters also remain in place. Ecuador and Indonesia have so far been excluded from these duties. However, this may change with a recent petition submitted by the American Shrimp Processors Association (ASPA) in October 2023 to investigate dumping allegations for warmwater shrimp.

The ASPA has filed petitions with the US Department of Commerce (DoC) and the US International Trade Commission (ITC), seeking anti-dumping duties on imports of frozen warmwater shrimp from Ecuador and Indonesia to protect the US market from shrimp being dumped for prices below production cost. Similarly, the ASPA has petitioned for countervailing duties being applied to shrimp imports from Ecuador, India, Indonesia, and Vietnam that have benefitted from government subsidies in the country of origin.

Although chances are that the ruling will be unfavorable for the shrimp suppliers under investigation, Akin Gump explains that if the ITC and DoC make a preliminary decision in favor of the petitioners, US importers will be required to post cash deposits in the amounts of the estimated anti-dumping duties and countervailing duties for all shrimp shipments from the date the decision is announced. The recent petition includes a wide range of wild-caught and farmed shrimp in raw and value-added products. Only breaded shrimp is excluded. The petitioners seek dumping/subsidizing rates of 4.8–111.4% for Ecuador and 4.85–37.36% for Indonesia. No specific rates are mentioned for the other countries.



The investigation started on 14 November 2023. Akin Gump expects it to take until 9 December 2024 before orders for anti-dumping and countervailing duties are issued.

Read a review of the petition by US lawyer Akin Gump [here](#)

icant role in cooked shrimp and had a market share of just 3% in 2023. The leading players that India competes with in this segment are Indonesia, Vietnam, and Thailand, which have market shares of 26%, 21%, and 10%, respectively. With many new cooking lines recently installed, India will likely attempt to take market share from these players over the next few years.

Breaded

Although the segment of breaded shrimp is small, it's steadily growing. Imports increased from around 50,000 MT in 2019 to about 71,000 MT in 2022 and dropped back to about 60,000 MT in 2023. Traditionally, China was the largest supplier to the US in this segment, but amidst the trade feud between China and the US, Indonesia, Vietnam, and Thailand have taken over much of these supplies. Today, these three suppliers have market shares of 40%, 22%, and 21%, respectively. China's market share dropped to 6%, and Ecuador has an 8% market share. With just a 3% market share, India's role here has been insignificant. Still, with the recent construction of several breading facilities in the US and other markets, India will try to gain market share over the next few years.

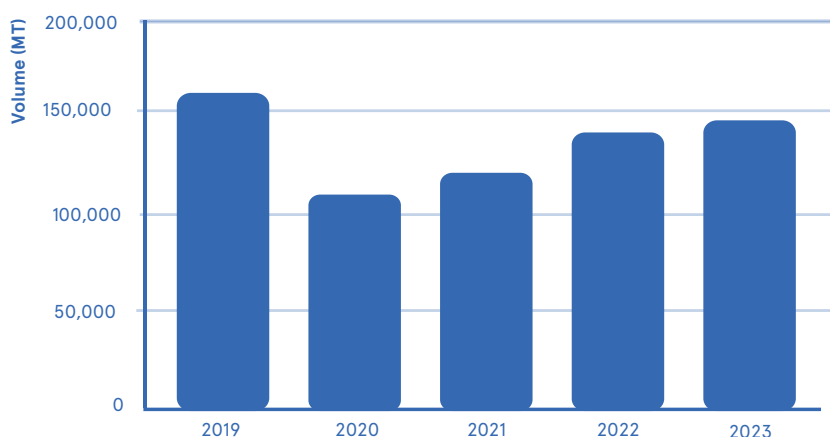
In 2023, with 19% of total shrimp exports going there, China is India's second biggest market

CHINA

In six years' time, India's shrimp exports to China (combined with Vietnam to capture the border trade between Vietnam and China) grew exponentially from 59,724 MT in 2014 to 191,571 MT in 2019. 2020 saw a drop to 132,036 MT, but since then exports slowly increased back to the level of 2019. Around 94% of India's exports to China is accounted for by raw *L. vannamei*, 4% by wild-caught Asian pink shrimp, and 2% by *P. monodon*. In 2023, with 19% of total shrimp exports going there, China is India's second biggest market. And, with a 24% market share, India is China's second largest shrimp supplier.

Although Ecuador's growth in China may appear to threaten India's exports, the two countries actually supply different customers. The products that India sells to China mainly consist of HLSO bulk material destined for reprocessing in seafood processing clusters in China's southern provinces.

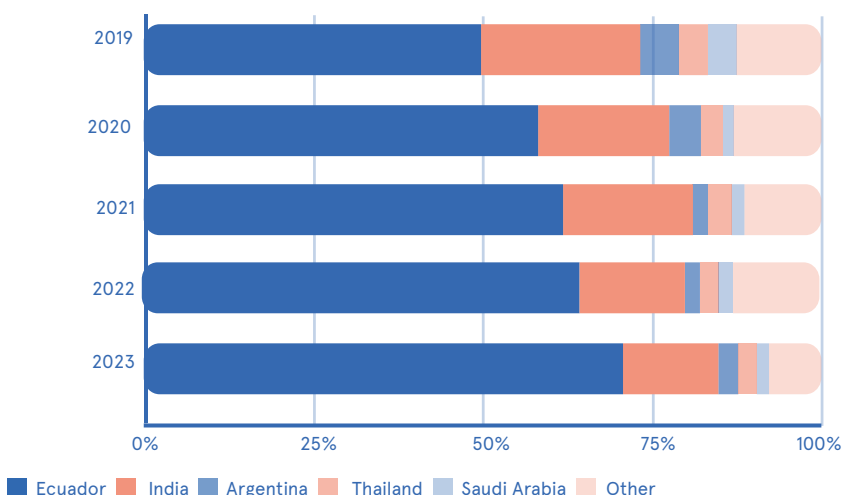
FIGURE 8: CHINA'S SHRIMP IMPORTS FROM INDIA FROM 2019-2023



Source: Chinese Customs

Note: contrary to in the text below, the numbers in this figure exclude India's exports to Vietnam, which earlier may have been partly shipped to China through the Vietnam-China border trade.

FIGURE 9: CHINA'S SHRIMP IMPORT ORIGINS FROM 2019-2023



Source: Chinese Customs

Based on China's customs data, the importers of these products are primarily located in Guangdong and Zhejiang, which have many of such large seafood processing clusters.

China's imports from Ecuador come from importers throughout the country, though importers from northern provinces, with major population clusters Tianjin and Beijing, play a more critical role. Ecuador's exports to China mainly consist of HOSO and HLSO products in finished packages destined for wholesale and retail markets. There aren't many Indian compa-

nies that compete in this segment, one exception being Abad Overseas, a joint venture between India's Abad Group and Spain's Nueva Pescanova. This company has developed the infrastructure to produce, process, and export high-quality HOSO shrimp to Southern Europe, China, and other overseas markets for HOSO products.

Political tensions between the governments of China and India are a risk for shrimp trade between the two countries, as this can lead to non-tariff or tariff trade barriers being imposed.

THE EU

While under pressure from stringent EU food safety authority measures, India's shrimp exports to the EU decreased from 67,695 MT in 2014 to 51,892 MT in 2020. The decline was entirely accounted for by a drop in raw *L. vannamei* exports from 44,538 MT in 2014 to 26,236 MT in 2020. More recently, however, EU imports from India have picked up again, increasing to 63,803 MT in 2021 and 78,640 MT in 2022. The EU has never imported as much shrimp from India as in 2022.

EU import data shows that raw *L. vannamei* and *P. monodon* primarily drove the growth of imports, but imports of wild-caught Asian pink shrimp also increased (Figure 10). According to Indian export data, in 2022, the country's exports to the EU consisted of 53% raw *L. vannamei*, 35% wild-caught shrimp, 8% raw *P. monodon*, and 4% cooked and breaded shrimp.

Raw *Penaeus* Shrimp

Taking a closer look at the EU's import of *Penaeus* shrimp (in the EU, the customs code for *Penaeus* shrimp includes *L. vannamei* and *P. monodon*, both wild-caught and farmed), India's market share dropped from around 24% in 2014 to 17% in 2020 and then climbed back to 21% in 2022. During this period, India has structurally been the EU's second largest supplier of *Penaeus* shrimp, behind Ecuador, whose market share has grown to 44% in 2022. Other suppliers of raw *Penaeus* shrimp with smaller market shares include Vietnam (10%), Venezuela (8%), and Bangladesh (5%). While Vietnam's market share has remained stable over the years, the market share of most other countries has declined.

The EU can be divided into two main blocks: Southern EU (Cyprus, France, Greece, Italy, Portugal, and Spain) and Northwestern EU (Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, and Sweden). The Southern EU

is the largest consumer of *Penaeus* shrimp: France and Spain are the biggest markets, followed by Italy, Portugal, Greece, and Cyprus. Consumers in these countries primarily consume HOSO shrimp, which is why Ecuador and other Latin American countries dominate these markets. India controls the smaller peeled market in the Southern EU.

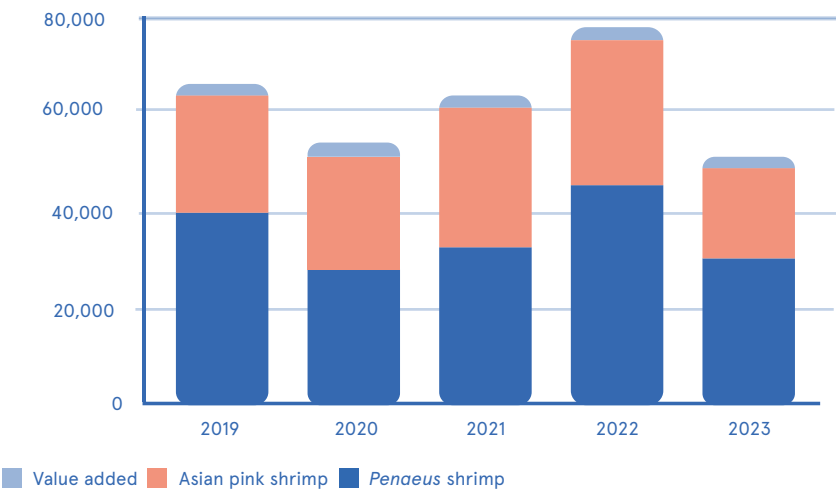
As regards the Northwestern EU’s imports of *Penaeus* shrimp, Belgium and the Netherlands are the biggest importers, followed by Germany and Ireland. Belgium and the Netherlands are the gateway to much of the European continent, as a lot of shrimp imported through these countries ends up in markets across the EU. Contrary to the Southern EU, the market in the Northwestern EU is primarily one for peeled shrimp. As a result, Asian suppliers, mainly India, have traditionally dominated it. India’s market share of the raw *Penaeus* segment in the Northwestern EU may be as high as 50%.

Although *L. vannamei* dominates the Northwestern EU market, *P. monodon* shouldn’t be overlooked. While Bangladesh previously controlled the market for *P. monodon*, nowadays, Vietnam and India also supply to these markets and their market shares are growing.

Cooked-at-Origin and Breaded

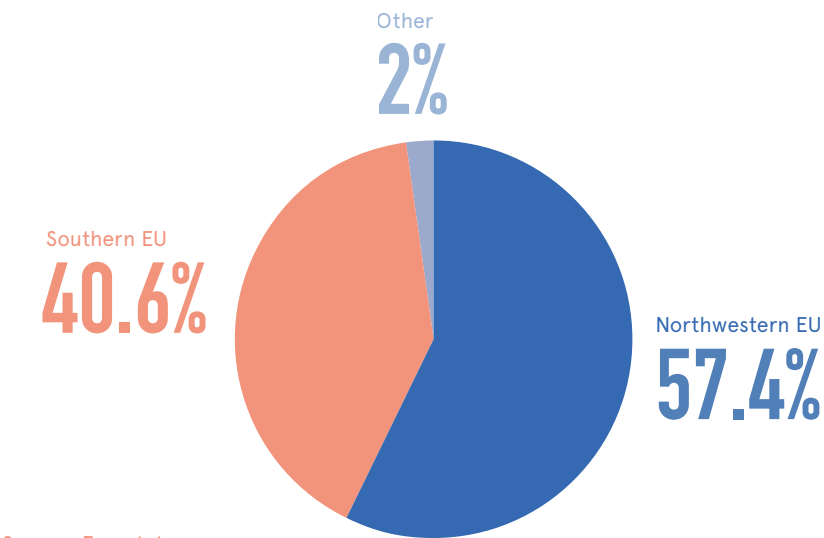
The cooked-at-origin and breaded segments in the EU may be as large as 35,000-40,000 MT for *Penaeus* shrimp, though India has yet to play a major role here. Today, Vietnam dominates both segments with a market share of around 75%. With increased competition from Ecuador in the US market, Indian exporters must reinvent themselves and diversify their capabilities and markets. Having recently invested in cooking lines and breading facilities, Indian exporters are aiming to gain market share in these segments in the EU over the next few years.

FIGURE 10: EU IMPORTS OF ALL INDIAN SHRIMP FROM 2019–SEPTEMBER 2023

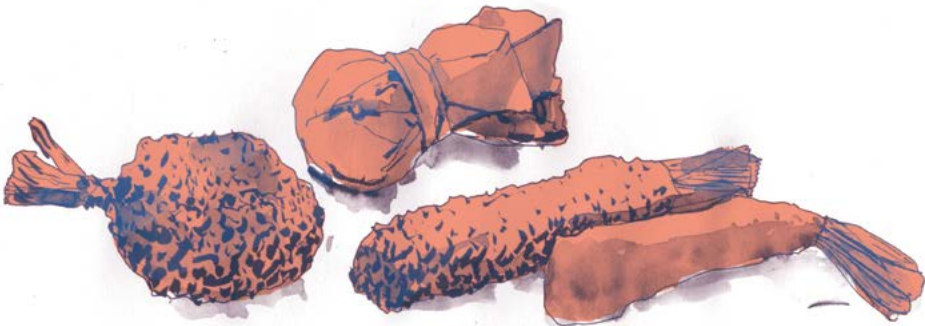


Source: Eurostat

FIGURE 11: THE EU MARKET FOR *PENAEUS* SHRIMP FROM INDIA IN 2022



Source: Eurostat





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EU Measures Pose Challenges for India's Exports

Following several audits that raised concerns about the use of antibiotics in Indian shrimp farms, the EU started implementing a testing requirement of 20% for Indian shrimp in 2010, adding cost and risk for EU importers buying Indian shrimp. In 2016, the EU increased the testing requirement to 50% of shipments to be tested once they arrive at the EU port. Measures became even more stringent after another audit in 2019: Indian authorities had to test all the shipments to the EU before leaving the Indian port.

The most controversial measure taken by EU authorities was that, from 2019, Indian exporters who tested positive for antibiotics lost their EU approval number. New factories wouldn't get such a number at all. Until today, exporters who lost their EU approval number haven't had the chance to reclaim it. Usually, after several negative tests, a company would be allowed to return to the regular import regime, making the EU's measure particularly severe.

The Indian industry generally perceives the EU measures as unfair, as antibiotics problems also exist in other countries of origin. Looking at EU import alerts, these problems may even be more severe in other countries. The report of the last audit, which took place in September 2022, finds that the EU is largely satisfied with how Indian authorities have handled suggestions for ensuring that shrimp exported to the EU isn't contaminated with antibiotic residues. However, whether the measures will be relaxed soon is still being determined.

VIETNAM

Vietnam, unfortunately, doesn't publish shrimp import volumes. We must therefore rely on India's export data, which shows that it exported 44,331 MT to Vietnam in 2023. This makes Vietnam India's fourth largest market. Based on data from other suppliers to Vietnam—such as Ecuador (25% of Vietnam's imports) and Argentina (4% of Vietnam's imports)—India's share would amount to around 60% of Vietnam's total imports. Although some of the exports to Vietnam may be re-exported to China without any value addition, most of Vietnam's imports are used as raw materials for producing value-added products. These products are then re-exported to markets around the world. India's exports to Vietnam in 2023 consisted of 94% raw *L. vannamei* and 4% raw *P. monodon*. The remainder is a mix of raw wild-caught species.

JAPAN

Over the past decade, Japan's shrimp imports have remained relatively stable at around 200,000 MT. The country has always been India's fourth or fifth largest shrimp market, and India has steadfastly been Japan's second, third or fourth largest shrimp supplier. In 2022, India had a 17% market share, equal to Indonesia and Thailand. With 24%, only Vietnam's market share was bigger. In 2023, raw *L. vannamei* accounted for only 50% of India's exports to Japan, raw wild-caught shrimp accounted for 35%, and raw *P. monodon* constituted 15% of India's total exports to Japan.

MIDDLE EAST AND AFRICA

As its sixth market, the Middle East and Africa have always been essential for India. In 2023, India's export volume to the Middle East and Africa amounted to 36,197 MT—a market share of around 40-45% in this region, which in 2022 imported around 85,000 MT of shrimp in total. The largest markets within the region are

the United Arab Emirates (57% of India's exports), Kuwait (15%), Mauritius (5%), and Saudi Arabia (5%). Exports to the Middle East and Africa in 2023 consisted primarily of raw *L. vannamei* (71%), wild-caught shrimp (20%), and raw *P. monodon* (7%).

RUSSIA

Since 2015, Russia's imports have steadily increased and are now back to their peak level of 2007. In 2023, Russia has grown to become India's seventh market, importing 22,053 MT of Indian shrimp, up by 48% from 2022. While China's supplies to Russia came down from a peak of 15,452 MT in 2010 to 3,769 MT in 2022, imports from Argentina, Ecuador, India, and Vietnam all increased. In 2022, Ecuador supplied 25,411 MT and India supplied 17,424 MT, followed by Argentina (7,339 MT), and Vietnam (6,117 MT). Almost all of India's exports to Russia (92% in 2022) consist of raw *L. vannamei*; cooked products account for the remainder.

CANADA

Although Canada is a relatively small market, its shrimp imports increased from 51,498 MT in 2014 to 68,001 MT in 2022. In 2023, Canada is India's eighth market, and India is also Canada's largest supplier. In 2022, India had a 31% market share, followed by Vietnam (25%), China (15%), and Thailand and Ecuador (each 8%). Ecuador's market share is tiny, but its exports are growing faster than India's. India's exports to Canada in 2023 consisted of 73% raw frozen *L. vannamei*, 23% cooked and breaded *L. vannamei*, and 3% raw *P. monodon*.

THE UK

During the past ten years, the UK's shrimp imports from India have been stable, with a volume between 11,000 and 15,000 MT since 2014. In 2023, exports to the UK amounted to 15,091 MT, making it India's ninth market. Exports to the UK consist of almost

93% of raw *L. vannamei*. The remainder is a mix of cooked and breaded (2%), wild-caught (4%), and *P. monodon* (1%). India was the largest shrimp supplier to the UK until 2017, after which Vietnam overtook it. Since 2020, Ecuador's exports to the UK have grown fast and compete for market share with Vietnam and India. In 2022, Vietnam had a market share of 25%, followed by India (18%) and Ecuador (10%). The UK imports a relatively large amount of coldwater shrimp, which in 2022 had a 25% market share.

INDIA'S FUTURE MARKET PENETRATION

So what will the future bring for India in terms of its shrimp markets, particularly in light of strong competition from Ecuador? The following three areas will be significant to consolidate and expand India's shrimp export markets: (1) strengthening the existing markets for specifically the raw peeled *L. vannamei* segment, (2) developing the market for cooked and breaded shrimp products, and (3) investing in setting up a market for large-size HOSO *P. monodon* products.

1. CONSOLIDATING AND EXPANDING THE MARKETS FOR RAW PEELED *L. VANNAMEI*

Moving ahead, India can count on fierce competition in the HLSO and peeled *L. vannamei* markets in the US, the EU, and other markets.

As Ecuador's shrimp production volume grows, the volume of products it cannot sell as HOSO will also increase. Partly because some of the harvested shrimp with soft shells or broken tails do not meet HOSO quality requirements and partly because, at some point, HOSO markets will be saturated. As labor costs in Ecuador are relatively high compared to India, most Ecuadorian companies have first focused on HLSO markets where they're more competitive—resulting in its current dominance of the US HLSO market.

Once Ecuador's output grows further and the HLSO market is saturated, Ecuadorian exporters will also start competing more in the peeled markets.

For Indian exporters, it will be crucial to maintain its market position for peeled products in the US. Indian exporters have long-term relationships with all US supermarkets, wholesalers, and food service companies. It must foster those relationships, and ensure it remains price competitive and meets increasingly stringent market requirements regarding social and environmental responsibility and traceability. If India succeeds, it may in the future even expand its market share in the US peeled market, providing a stable basis for India's processors to sustain their businesses.

While the US market remains crucial, the time when India's exporters could almost entirely depend on it is over. Indian exporters must focus on developing other markets for its peeled products. Where India has not prioritized the EU market due to the regulatory challenges it has been confronted with, now it could shift its focus more towards the EU peeled market and try to outcompete other suppliers such as Ecuador, Venezuela, and Vietnam. Other peeled markets with growth potential for India include Japan, Russia, South Korea, and the. While Indian exporters used to be comfortable with most of their business being focused on the US, now they need to penetrate and develop these other markets to sustain their business.

How the competitive landscape will evolve will largely depend on the outcome of the current anti-dumping and countervailing duty investigations. If, for example, Indonesia and Ecuador are confronted with anti-dumping duties, but India is not confronted with countervailing duties, India might become more competitive. The outcome of these investigations could change

the global competitive landscape considerably. The same goes for the cooked and breaded markets, on which more below.

2. EXPANDING THE MARKET FOR COOKED PRODUCTS AND DEVELOP ONE FOR BREADED PRODUCTS

While India may continue to lose market share to Ecuador in some market segments, it also has market share to gain from suppliers in other market segments, such as those for cooked and breaded shrimp.

While India already has a significant market share of the US's cooked shrimp market, it's still largely absent in the EU's cooked shrimp market. India's main competitor in the US is Indonesia, and Vietnam dominates the EU market. With recently installed capacity and an increased eagerness to expand the value-added markets, India's exporters should be able to gain market share. In the US market, this could come at the cost of Indonesia, especially if Indonesia is confronted with anti-dumping duties. In the EU, although India's exporters may be more competitive than Vietnamese producers in terms of production costs, Vietnamese producers benefit from a free trade agreement, which makes the playing field unequal. Therefore, for India to penetrate the EU market, it's vital that the government makes progress with the EU-India Free Trade Agreement negotiations.

The breaded shrimp market also offers a lot of opportunities. Although India currently doesn't have a presence in this market, companies such as Amalgam Frozen Foods, Avanti Frozen Foods, Choice Canning, Devi Fisheries, Devi Sea Foods, and Nekkanti Sea Foods have all been investing in bread-making facilities. It's a matter of time before India's exporters gain experience in bread-making and start offering breaded

India must foster the close business relationships it has in the US, and meet increasingly stringent market requirements

products to the US and other overseas markets. While the market for breaded shrimp was previously dominated by China, Vietnam took over after China was confronted with hefty US tariffs for its value-added shrimp. India will aim to take market share in this segment from Indonesia, Thailand, and Vietnam. With many factories investing in cooking lines and several breeding facilities having recently been constructed, as well as the need for India's exporters to diversify their presence in other segments, we'll soon start seeing exports of cooked and breaded shrimp more prominently in trade data.

3. SETTING UP A MARKET FOR LARGE-SIZE *HOSO P. MONODON*

India's production of *P. monodon* shrimp will undoubtedly increase over the next few years. The combination of oversupply and low prices in the *L. vannamei* market, and improved infrastructure for growing *P. monodon* in India will make many farmers switch species. For this endeavor to succeed, India's shrimp farmers must work closely with exporters to develop markets where buyers' preferred sizes match with sizes the farmers tend to go for. If supply and demand do not match, prices may easily collapse. Read the more in-depth chapter on India's increasing *P. monodon* production and exports on p. 64.

Developing a Flourishing Domestic Market

India has a population of over 1.4 billion, and 40–50% of the population eats meat, fish, or seafood weekly. Therefore, India is, unsurprisingly, often mentioned as the market with the most significant growth potential in terms of shrimp consumption. With the current apparent consumption of around 0.5 kg/year/person (local production plus imports, minus exports), if this number is a good indication of reality and, say, could be doubled, consumption could easily increase to around 350,000 MT—about 30–40% of India's farmed shrimp production. Developing a local market should provide a more stable environment for shrimp farmers, as increased demand for shrimp will likely result in more stable price levels. A vibrant domestic market would be a welcome alternative to the highly volatile export market.

In 2023, the Global Shrimp Forum hired Arnd Jan Gulmans, a seasoned marketing consultant, to investigate how the shrimp industry could drive global consumption. In his study, he argues that before India starts actively promoting domestic shrimp consumption through advertising and campaigning, the stakeholders in the country should first unite to improve the availability and affordability of shrimp to Indian consumers. In February 2024 during Aqua India, Gulmans presented his views on how to promote shrimp consumption in India in more detail. While there's great potential for the domestic market, Gulmans states that shrimp in India is currently (1) not readily available in all parts of the country, (2) not easily affordable for much of the population, and (3) not frequently bought at all—not even by those who can afford it.

The first two challenges, says Gulmans, will solve themselves over time: the middle class will grow, and cold chain infrastructure will improve. Only then can marketing make a difference in promoting shrimp consumption. Marketing can help make shrimp



a part of the middle class diet by emphasizing its health benefits as a high, low-fat protein, and can also help change the way people think about shrimp, focusing more on the psychological and social factors. Imagine that shrimp is marketed as an essential food at the table shared with family and friends during India's most important cricket matches: if people start to connect shrimp with healthy eating and kinship, it may become a staple of the middle class's daily menu. And, if this growing middle class buys more shrimp, farmers' livelihoods will benefit from more stable demand and prices.

Download the report!

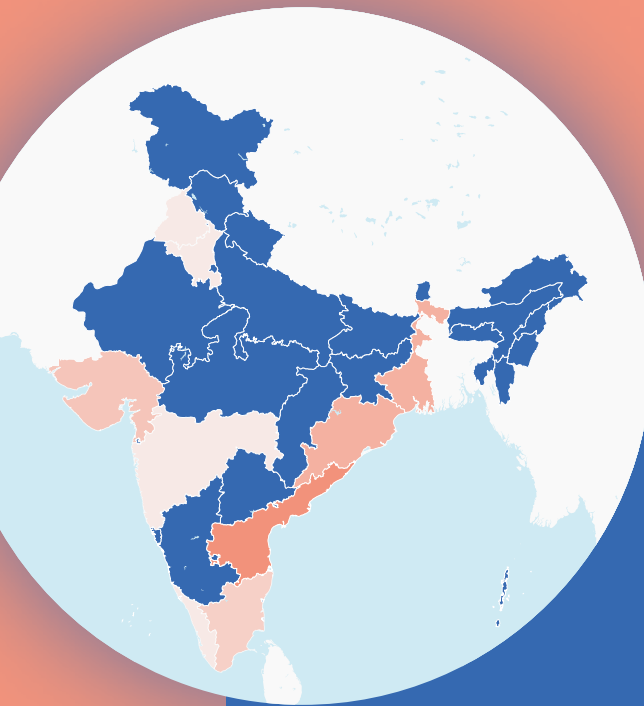




FARMING

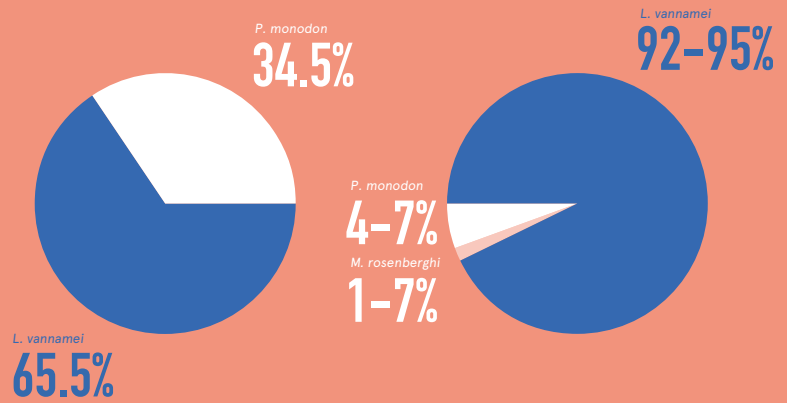


India counts around 100,000 shrimp farms, most of them smaller than 2 ha. Larger independent and corporate farms only represent a fraction of total production and are often operated by vertically integrated shrimp companies.



The state of Andhra Pradesh produces roughly 75-85% of all Indian shrimp. In order of significance, other states involved in production are West Bengal, Odisha, Gujarat, Tamil Nadu, Maharashtra, and more recently Punjab and Haryana.

Key Insights



A total of 191,882 ha of land is used for shrimp farming, 66,209 of which for *P. monodon* (primarily larger extensive ponds) and 125,673 for *L. vannamei* (smaller semi-intensive ponds).

L. vannamei accounts for around 92-95% of farmed shrimp production. Other species include *P. monodon* (4-7%) and *M. rosenbergii* (1-2%).



In some states, *L. vannamei* shrimp farming is expanding along the creeks where farmers can use water with high salinity. In other states, inland expansion has driven recent growth, and farmers use water with lower salinity levels from borewells.



Farmers stock *L. vannamei* in earthen ponds at moderate stocking densities from 20-60 PL/m². More intensive farming practices, as we see evolving in other Asian countries, are rare. Adoption of technology such as autofeeders and other "smart" digital solutions is slow.



Ever since import permits for domesticated SPF *P. monodon* were granted in 2019 and local infrastructure was put in place, production of SPF *P. monodon* has grown.



The return of *P. monodon* is mostly limited to farms that use creek- or seawater with a salinity of over 20 ppt. In lower salinity environments, survival rates drop significantly.

This chapter provides an overview of India's shrimp farming landscape, the most characteristic part of India's shrimp industry. We'll first look at the history of shrimp farming before diving deeper into today's production landscape and geography. Although no one knows the exact number of farmers in India, most estimations are in the range of 100,000. They create jobs and livelihoods for India's coastal and agricultural communities, whether at the farm or further in the supply chain in hatcheries, feed mills, and processing plants. The farming sector is truly the backbone of the Indian shrimp industry.

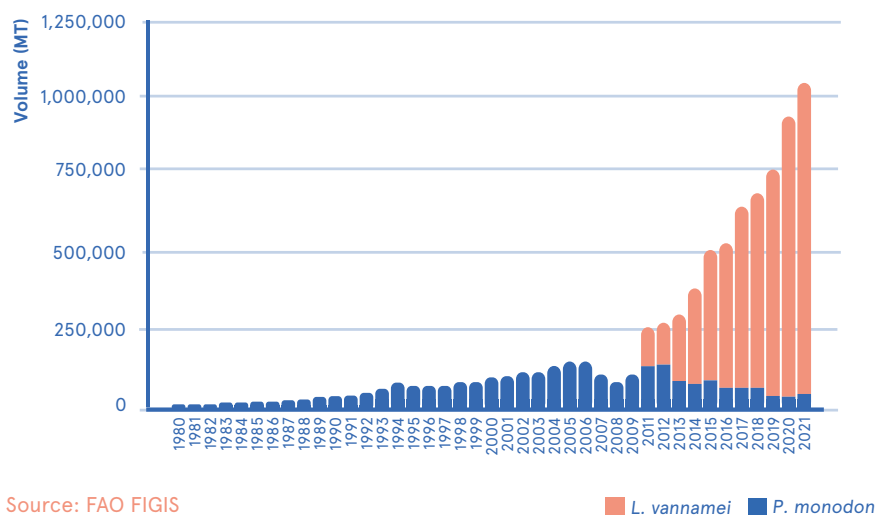
A HISTORY OF SHRIMP FARMING

For many years, traditional extensive farming in so-called “trap and hold”-ponds—in which animals would be trapped when sluice gates closed after water intake—existed in West Bengal and Kerala, among other states. However, more commercial shrimp farming only started to develop in the late 1980s, and this section gives an insight into its different phases since then.

Late 1980s-1994: Introducing Commercial Farming Practices Leads to Production Expansion

In the late 1980s, the Indian government starts promoting semi-intensive production methods for *P. indicus* and later *P. monodon*. The Marine Products Export Development Authority (MPEDA) sets up a commercial demonstration farm and establishes the first commercial hatcheries. Subsidies for farmers to adopt semi-intensive practices (using aerators and commercial feed) and subsidies and beneficial tax regimes for companies wanting to get involved in breeding, feeding, and processing, result in a period of steady growth. The semi-intensive shrimp farming starts mainly in Andhra Pradesh and Tamil Nadu, not the traditional shrimp farming states of West Bengal and Kerala.

FIGURE 1: INDIAN *P. MONODON* AND *L. VANNAMEI* SHRIMP PRODUCTION BETWEEN 1980 AND 2021



Source: FAO FIGIS

Note: 2021 is the latest available year in FAO FIGIS.

1995-2009: Widespread Disease Outbreaks and Legal Challenges Limit Further Growth of *P. Monodon* Production

In 1994, the first recorded widespread outbreak of the WSSV in India abruptly halts the growth of shrimp production. Even after an initial crop holiday by most shrimp farmers, disease issues persist. Although the government attempts to introduce *M. rosenbergii* as an additional shrimp species, after an initial period of successful expansion, farmers soon also experience serious disease issues with this species.

Another hurdle hampers shrimp production during this period. In 1995, the Supreme Court orders a ban on new aquaculture operations and the destruction of existing operations within the Coastal Regulation Zone (CRZ)—within 500 meters of the high tide line. It sends a shockwave through the industry. After an intense lobbying campaign, the upper house of Parliament accepts The Aquaculture Bill in 1996, a constitutional bill temporarily setting aside legal action on shrimp farms. It takes almost 11 years before this bill is enacted in Parliament as the Aquaculture Authority Bill, which leads to the establishment of the Coastal Aquaculture Authority (CAA) in 2005. From that point on, the CAA regulates aquaculture operations in the coastal zone. It develops shrimp farming standards and starts a registration process for existing and new farming operations.

Once it becomes clear that the authorities won't demolish shrimp farming operations, production gradually expands from 1996 onwards, but yearly production stagnates at around 150,000 MT. In 2006, the industry is confronted with another rampant WSSV outbreak, which causes production to collapse almost entirely.



Shrimp farmers in Andhra Pradesh in the 1990s used wild-caught spawners to harvest nauplii that would be stocked to the grow-out ponds. During this time, pond preparation was largely done manually and farms had just started using aerators.

Photos: Devi Sea Foods

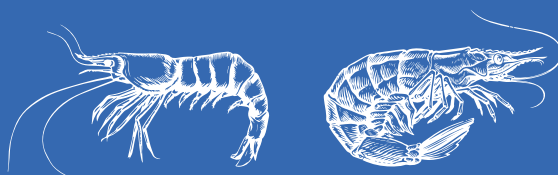




Two Species

Today, *L. vannamei* dominates the Indian shrimp industry, though recently *P. monodon* has been making a comeback. Each species has its particularities and farmers can choose the species that best matches their requirements. Read more about *P. monodon*'s return on p. 64.

PARTICULARITIES OF *P. MONODON* AND *L. VANNAMEI* PRODUCTION IN 1 HA EARTHEN PONDS IN INDIA



	<i>L. vannamei</i>	<i>P. monodon</i>
SALINITY	10-25 ppt	20-35 ppt
STOCKING DENSITY	20-40 PL/m ²	10-15 PL/m ²
DAYS OF CULTURE	90-110	100-140
INVESTMENT COSTS	High	Low
MARKET PERCEPTION	Commodity	Niche

2009-2021: Permitting Imports of *L. Vannamei* Shrimp Genetics Leads to Over a Decade of Growth and Prosperity

The latest WSSV outbreak causes the industry to lobby with the government to permit the introduction of *L. vannamei*. The industry positions the exotic species as more tolerant to disease and having better growth rates and productivity. It points to China and Thailand, countries that have already introduced the new species and see their industries grow.

The government starts small-scale trials in 2006 before conducting larger-scale commercial trials in 2008 and approving commercial production of *L. vannamei* in 2009. This is the start of another period of rapid growth. Many farmers who abandoned shrimp return to the industry, first in Andhra Pradesh and later in other states. New farms are established throughout the country, with the land under cultivation rapidly expanding from around 100,000 ha before 2009 to almost 200,000 ha in 2021. The sector experiences a decade of growth, bringing prosperity to farmers and the wider industry. Despite growing concerns about disease challenges that cause mortalities and higher production costs, farmers manage to increase the country's total output year after year.

This trend only stops in 2020 when production is hampered due to COVID-19 logistical challenges. In 2021, production rebounds amidst solid global demand, which results in favorable prices. Until the scenario completely changes.

2021-Present: Global Oversupply Causes India's Production to Decline and Some Farmers to Transition Back to *P. Monodon*

India's farmers enjoy relatively solid prices for many years until the world's largest producers, Ecuador's shrimp farmers silently overcome disease challenges and go into growth mode. While this goes relatively unnoticed at first, with China absorbing most of Ecuador's growth, India starts to experience stiff competition in markets it used to dominate, such as the US. Unfortunately for India, Ecuador has become so efficient that it increasingly outcompetes everyone else in the marketplace.

The continuous growth of India, Ecuador, and other producers leads to a global oversupply, which causes prices to collapse. As a result, farmers and financiers of operational costs limit their stocking activities. This causes production to drop by around 3-5% in 2022, and expectedly by another 10-15% in 2023. The industry anticipates growing demand once global economic conditions improve. Still, it's uncertain whether improved demand can balance the continuous growth of shrimp production and let prices return to previous levels or whether the industry will have to adjust to a new reality with lower prices.

In recent years, the government and the private sector have established infrastructure for distributing domesticated *P. monodon* PL. While India used to depend on wild-caught *P. monodon* broodstock, which didn't produce PL that performed well in semi-intensive production systems, today's domesticated *P. monodon* genetics perform much better. Farmers stock *P. monodon* at 10-15 PL/m² in the same ponds where they produce *L. vannamei*. Farmers in coastal zones, where salinity levels are favorable, consider returning to *P. monodon* a good option. Although they'll produce less shrimp, they need to invest less and expect to make larger margins.

LIMITATIONS OF INDIA'S PRODUCTION DATA

Since actual shrimp production data is lacking, to get an estimate, the government and private sector calculate a “live weight equivalent” of the export volume. They use a ratio of 0.75-0.85 to calculate how much HOSO is needed to produce the export volume of finished products (HOSO, HLSO, and peeled). To arrive at the final estimation, they add a rough calculation of the domestic shrimp market size, but this estimate varies widely. In order to break down production numbers geographically, the government and private sector look at the area under production in each state and use their network to understand what’s happening on the ground. Although this method is far from perfect, it’s the best one there currently is.

MPEDA and the Society of Aquaculture Professionals (SAP) both publish shrimp production estimates, but with different data: (1) MPEDA publishes financial year data and the SAP calendar year data, (2) MPEDA publishes numbers per species while the SAP publishes one number only, and (3) the SAP provides a rationale behind the numbers, MPEDA doesn’t. Nevertheless, comparing the two data sets gives us a good insight into shrimp production in the coastal states. The gap between MPEDA’s and the SAP’s estimates have grown over the past couple of years. While MPEDA continues to show an upward trend, with production for the first time surpassing 1m MT in 2021-2022, the SAP’s estimates show a downward trend since 2021. Considering India’s shrimp exports during these recent years, these estimates seem to be more realistic.

TODAY'S STATE-WISE SHRIMP PRODUCTION

This section places MPEDA’s and the SAP’s state-level production numbers in context, starting from the largest and ending with the smallest contributor.

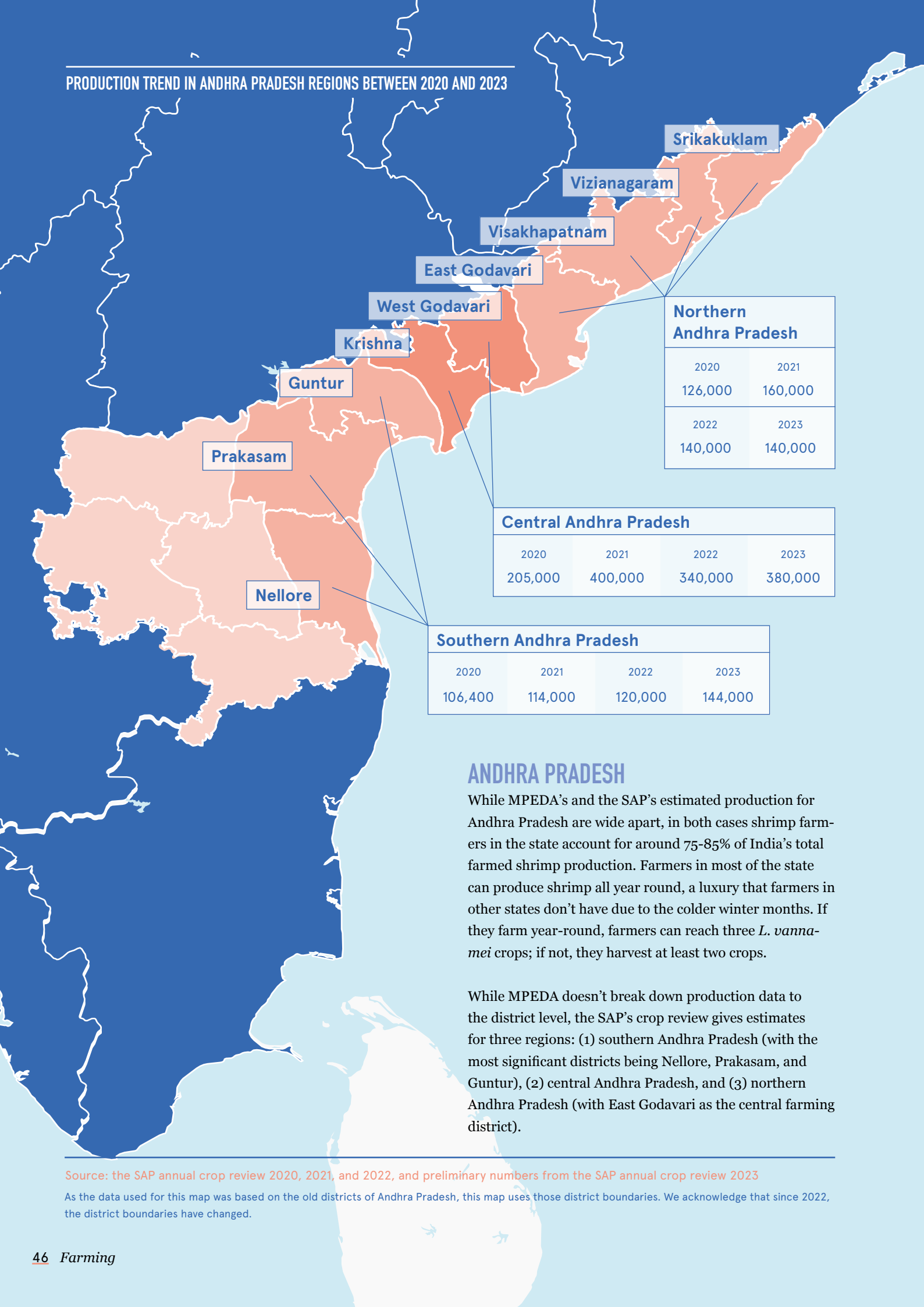
TABLE 1: INDIA'S SHRIMP PRODUCTION PER STATE ESTIMATED BY MPEDA AND THE SAP

	MPEDA financial year 2022-2023 (MT)			SAP calendar year (MT)		
	<i>L. vannamei</i>	<i>P. monodon</i>	Total	2021	2022	2023
ANDHRA PRADESH	912,439	17,617	930,056	674,000	600,000	664,000
ODISHA	46,460	2,288	48,748	70,000	73,000	54,200
WEST BENGAL	46,021	24,345	70,366	88,000	61,825	50,000
GUJARAT	45,340	17,250	62,590	28,000	35,000	34,000
TAMIL NADU	39,558	65	39,623	23,000	26,500	21,618
OTHERS	7,663	1,476	9,139	17,000	41,200	8,500
UNACCOUNTED FOR*				30,000	65,000	20,000
TOTAL	1,097,481	63,041	1,160,522	930,000	902,525	852,318

Source: MPEDA annual report 2022-2023, the SAP’s annual crop review 2021 and 2022, and preliminary numbers from the SAP’s annual crop review 2023

* The SAP includes an “unaccounted for”-category to cover the gap between calculating a live weight equivalent of the local market and export volumes, and the volume it can allocate to each state based on member feedback.

PRODUCTION TREND IN ANDHRA PRADESH REGIONS BETWEEN 2020 AND 2023



Northern Andhra Pradesh

2020	2021
126,000	160,000
2022	2023
140,000	140,000

Central Andhra Pradesh

2020	2021	2022	2023
205,000	400,000	340,000	380,000

Southern Andhra Pradesh

2020	2021	2022	2023
106,400	114,000	120,000	144,000

ANDHRA PRADESH

While MPEDA's and the SAP's estimated production for Andhra Pradesh are wide apart, in both cases shrimp farmers in the state account for around 75-85% of India's total farmed shrimp production. Farmers in most of the state can produce shrimp all year round, a luxury that farmers in other states don't have due to the colder winter months. If they farm year-round, farmers can reach three *L. vannamei* crops; if not, they harvest at least two crops.

While MPEDA doesn't break down production data to the district level, the SAP's crop review gives estimates for three regions: (1) southern Andhra Pradesh (with the most significant districts being Nellore, Prakasam, and Guntur), (2) central Andhra Pradesh, and (3) northern Andhra Pradesh (with East Godavari as the central farming district).

Source: the SAP annual crop review 2020, 2021, and 2022, and preliminary numbers from the SAP annual crop review 2023

As the data used for this map was based on the old districts of Andhra Pradesh, this map uses those district boundaries. We acknowledge that since 2022, the district boundaries have changed.



Farmers struggle with diseases, primarily EHP, which is most common in high-salinity areas

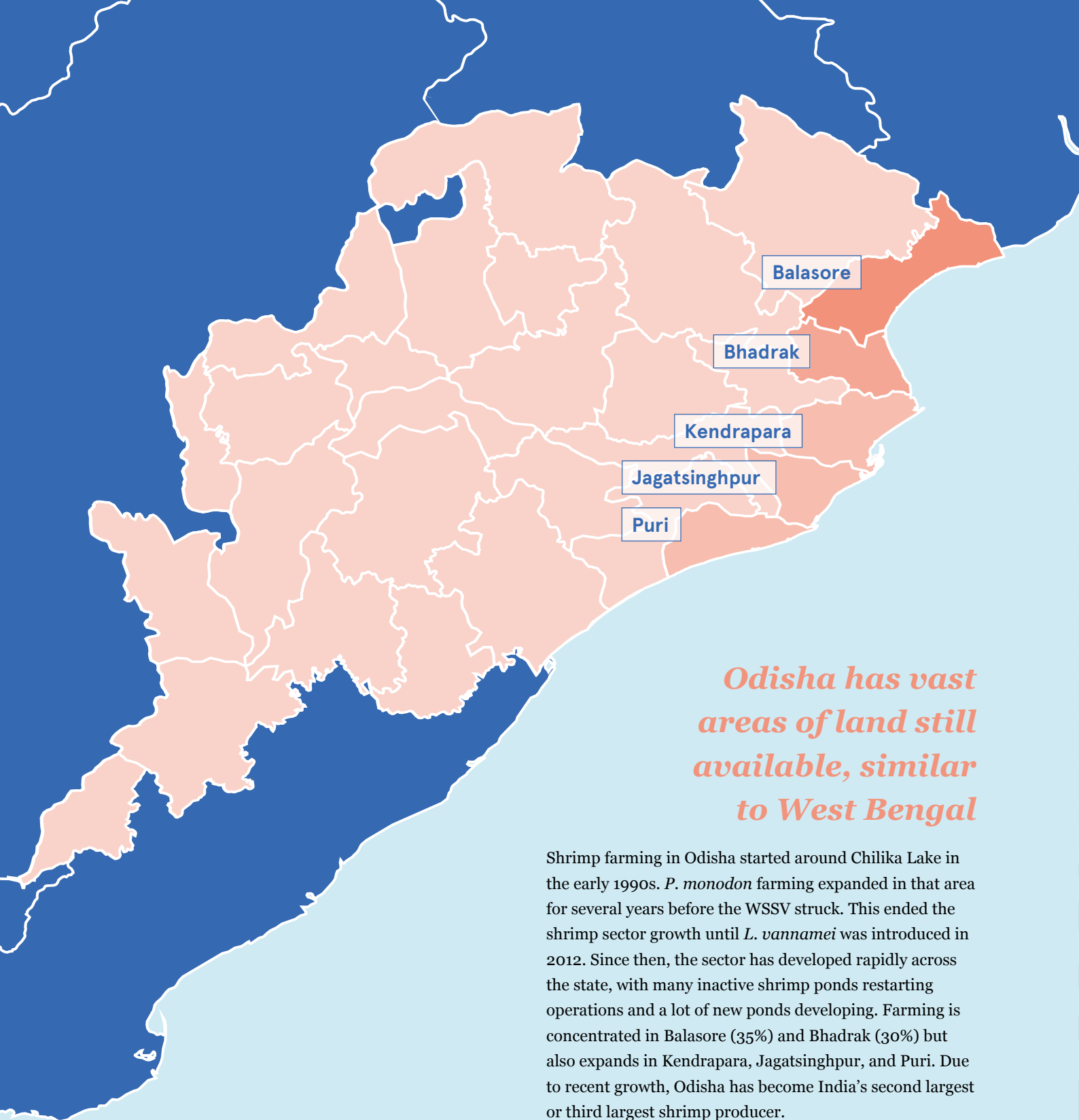
While farmers in lower salinity areas in Andhra Pradesh used to grow rice or freshwater fish, many recently transitioned to shrimp and numerous new shrimp farms emerged

Future growth in Andhra Pradesh should come from further expansion of inland farming areas

Shrimp production initially developed in Andhra Pradesh's coastal zone, where farmers use high-salinity creek water. The largest coastal farming areas are in southern Andhra Pradesh, between Nellore and Bapatla. This was also the region where *L. vannamei* was first piloted in farms of local players such as BMR Group and Sharat Industries, and where a first production surge occurred. In recent years, production in southern Andhra Pradesh has somewhat stagnated and hasn't grown as quickly as in some other regions. Farmers struggle with diseases, primarily EHP, which is most common in high-salinity areas. As farmers often use the same creeks for water intake and discharge, diseases spread quickly. To alleviate disease pressure, farmers choose PL from genetics suppliers that are believed to be more tolerant to EHP or switch to *P. monodon*, a species that's less affected by EHP and performs well in high-salinity environments.

More recently, shrimp farming in Andhra Pradesh has expanded inland, primarily in the West Godavari and Krishna districts, and to a lesser extent in the East Godavari district in the north. The Krishna and Godavari river deltas flow through these districts. While farmers here used to grow rice or freshwater fish, many recently transitioned to shrimp, and numerous new shrimp farms emerged in the region. Inland farms primarily use borewell water, which is lower in salinity than creek water. While still suitable for growing *L. vannamei*, it's unsuitable for *P. monodon*. Generally speaking, disease pressure in lower salinity environments is less, and biosecurity is higher as the farms don't share a common waterbody. Farmers have been relatively successful in these areas in recent years. However, especially during adverse weather conditions when water quality can suddenly change, even these farmers face higher disease pressure, and success rates may decline.

As the suitable and available coastal land for brackish water is already highly developed, future growth in Andhra Pradesh should come from further expansion of inland farming areas. However, this may be challenged as saltwater intrusion in regions where brackish water aquaculture operations expand possibly negatively impacts the fertility of agricultural land. Shrimp production could also grow if existing farms invested in improved pond infrastructure, use of technology, and better inputs. This may result in higher survival rates and higher stocking densities. However, most farms are currently not making these investments.



Odisha has vast areas of land still available, similar to West Bengal

Shrimp farming in Odisha started around Chilika Lake in the early 1990s. *P. monodon* farming expanded in that area for several years before the WSSV struck. This ended the shrimp sector growth until *L. vannamei* was introduced in 2012. Since then, the sector has developed rapidly across the state, with many inactive shrimp ponds restarting operations and a lot of new ponds developing. Farming is concentrated in Balasore (35%) and Bhadrak (30%) but also expands in Kendrapara, Jagatsinghpur, and Puri. Due to recent growth, Odisha has become India's second largest or third largest shrimp producer.

ODISHA

MPEDA estimates production in Odisha in 2022-2023 to have reached 48,748 MT. The SAP's estimates show production reaching 70,000 MT in 2021 and 73,000 MT a year later, and dropping to 54,200 MT in 2023. With today's low prices, shrimp farmers in the state seem to struggle to make a profit, causing production to slow down. But under the right market conditions, shrimp farming in Odisha could expand further, as the state has vast areas of land still available, similar to West Bengal.

Contrary to Andhra Pradesh and West Bengal, expansion in Odisha has mainly been limited to locations around the coastline and its creeks, without much expansion inland. The rapid coastal shrimp farming expansion brings with it risks of deforestation and encroachment of farms on protected land, which the government tries to deal with by enforcing existing regulations. Although a few larger farmers are active throughout the state, including Falcon Marine, the vast majority of farmers are small-scale. They're generally poorer and more dependent on loans and credit than small-scale farmers in Andhra Pradesh.



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MANUFACTURING
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BRAND IN
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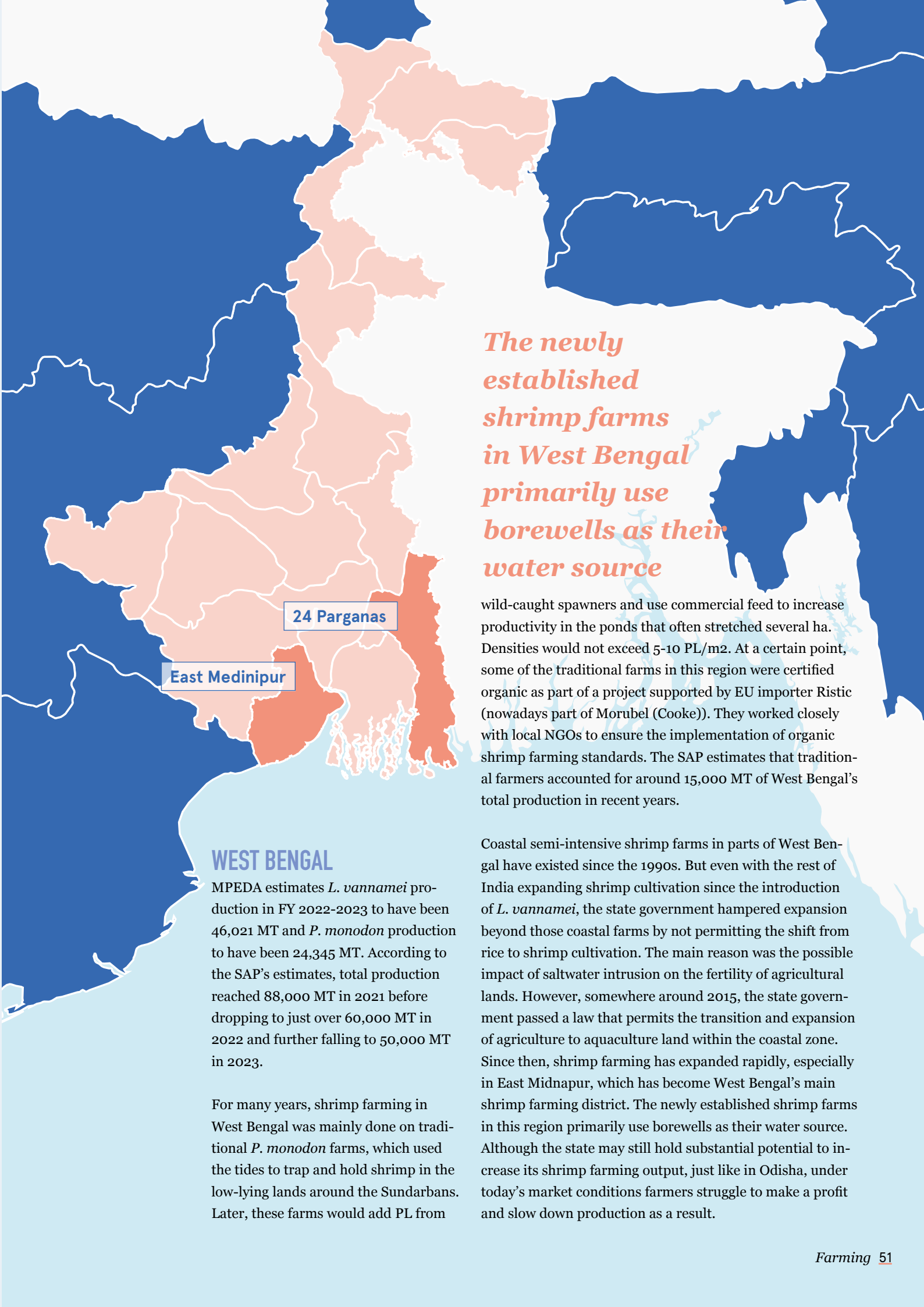
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The newly established shrimp farms in West Bengal primarily use borewells as their water source

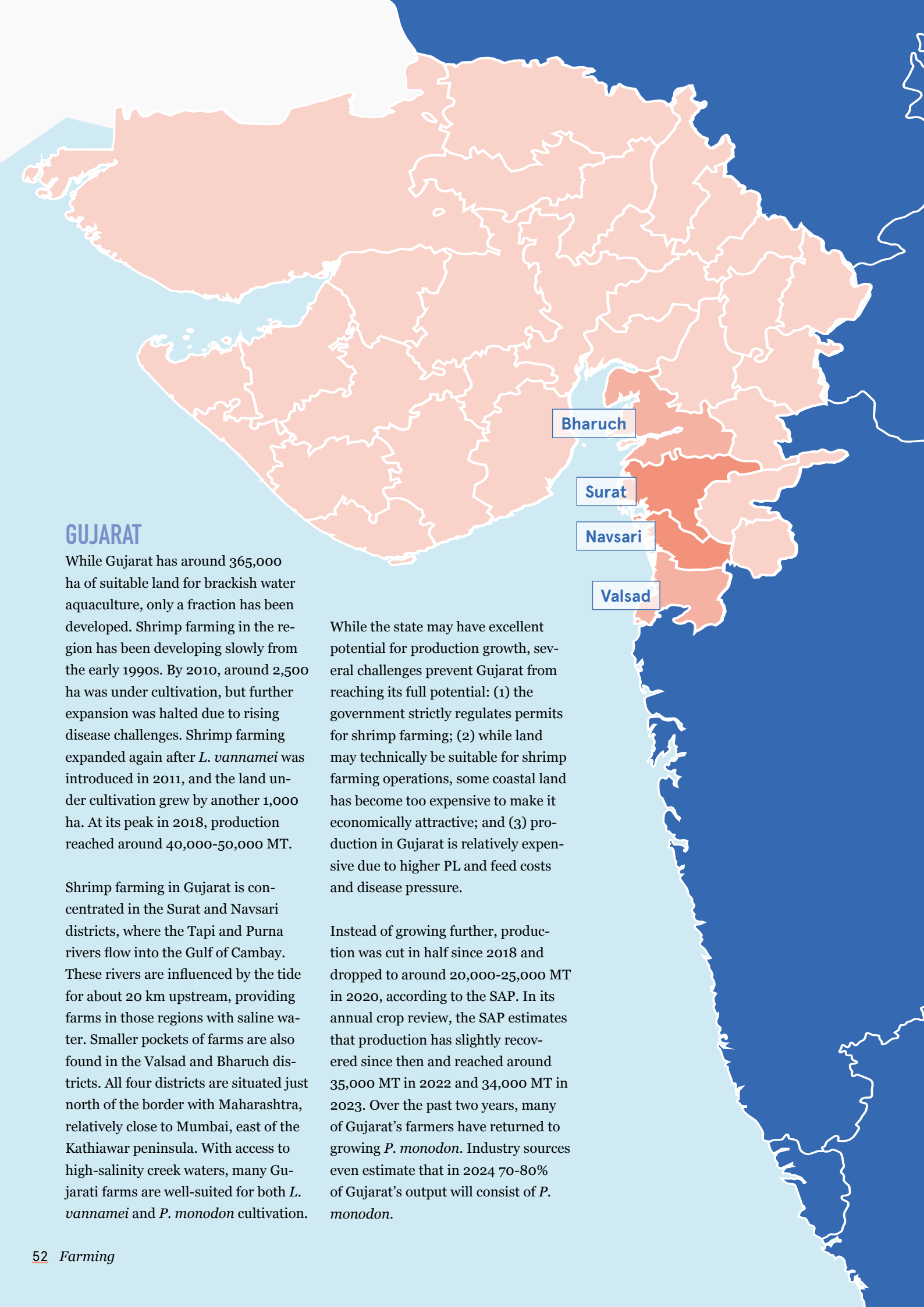
wild-caught spawners and use commercial feed to increase productivity in the ponds that often stretched several ha. Densities would not exceed 5-10 PL/m². At a certain point, some of the traditional farms in this region were certified organic as part of a project supported by EU importer Ristic (nowadays part of Morubel (Cooke)). They worked closely with local NGOs to ensure the implementation of organic shrimp farming standards. The SAP estimates that traditional farmers accounted for around 15,000 MT of West Bengal's total production in recent years.

WEST BENGAL

MPEDA estimates *L. vannamei* production in FY 2022-2023 to have been 46,021 MT and *P. monodon* production to have been 24,345 MT. According to the SAP's estimates, total production reached 88,000 MT in 2021 before dropping to just over 60,000 MT in 2022 and further falling to 50,000 MT in 2023.

For many years, shrimp farming in West Bengal was mainly done on traditional *P. monodon* farms, which used the tides to trap and hold shrimp in the low-lying lands around the Sundarbans. Later, these farms would add PL from

Coastal semi-intensive shrimp farms in parts of West Bengal have existed since the 1990s. But even with the rest of India expanding shrimp cultivation since the introduction of *L. vannamei*, the state government hampered expansion beyond those coastal farms by not permitting the shift from rice to shrimp cultivation. The main reason was the possible impact of saltwater intrusion on the fertility of agricultural lands. However, somewhere around 2015, the state government passed a law that permits the transition and expansion of agriculture to aquaculture land within the coastal zone. Since then, shrimp farming has expanded rapidly, especially in East Midnapur, which has become West Bengal's main shrimp farming district. The newly established shrimp farms in this region primarily use borewells as their water source. Although the state may still hold substantial potential to increase its shrimp farming output, just like in Odisha, under today's market conditions farmers struggle to make a profit and slow down production as a result.



GUJARAT

While Gujarat has around 365,000 ha of suitable land for brackish water aquaculture, only a fraction has been developed. Shrimp farming in the region has been developing slowly from the early 1990s. By 2010, around 2,500 ha was under cultivation, but further expansion was halted due to rising disease challenges. Shrimp farming expanded again after *L. vannamei* was introduced in 2011, and the land under cultivation grew by another 1,000 ha. At its peak in 2018, production reached around 40,000-50,000 MT.

Shrimp farming in Gujarat is concentrated in the Surat and Navsari districts, where the Tapi and Purna rivers flow into the Gulf of Cambay. These rivers are influenced by the tide for about 20 km upstream, providing farms in those regions with saline water. Smaller pockets of farms are also found in the Valsad and Bharuch districts. All four districts are situated just north of the border with Maharashtra, relatively close to Mumbai, east of the Kathiawar peninsula. With access to high-salinity creek waters, many Gujarati farms are well-suited for both *L. vannamei* and *P. monodon* cultivation.

While the state may have excellent potential for production growth, several challenges prevent Gujarat from reaching its full potential: (1) the government strictly regulates permits for shrimp farming; (2) while land may technically be suitable for shrimp farming operations, some coastal land has become too expensive to make it economically attractive; and (3) production in Gujarat is relatively expensive due to higher PL and feed costs and disease pressure.

Instead of growing further, production was cut in half since 2018 and dropped to around 20,000-25,000 MT in 2020, according to the SAP. In its annual crop review, the SAP estimates that production has slightly recovered since then and reached around 35,000 MT in 2022 and 34,000 MT in 2023. Over the past two years, many of Gujarat's farmers have returned to growing *P. monodon*. Industry sources even estimate that in 2024 70-80% of Gujarat's output will consist of *P. monodon*.

TAMIL NADU

Tamil Nadu's shrimp industry grew rapidly in the 1990s and the first years of the 2000s. However, shrimp farming was heavily impacted by the tsunami in December 2004 that devastated coastal communities, decimating farming systems and killing at least 230,000 people across South Asia. It wasn't until after the introduction of *L. vannamei* that shrimp production in the state picked up again and expanded. Until 2017, Tamil Nadu was India's largest shrimp producer after Andhra Pradesh, but production has come down in recent years. While MPEDA estimates it to have reached 39,623 MT in FY 2022-2023, according to the SAP, production dropped to only 21,618 MT in 2022.

Most Tamil Nadu farms are located between Puducherry in the north and Ramanathapuram in the south, with the highest concentration of farms in the Nagapattinam district in the east. Farms are primarily located near the coast, using seawater and creek water. Under the right market conditions, production in the state may rebound to its peak of 45,000-50,000 MT between 2015 and 2019.

KERALA, KARNATAKA, GOA, AND MAHARASHTRA

Some farming activities exist in other states on India's West Coast. According to MPEDA, in FY 2022-2023, together they produced around 9,000 MT of shrimp. In Kerala, shrimp farming mainly consists of extensive *P. monodon* production (some farms were even certified by Naturland, the German association for organic farming). In the states of Karnataka, Goa, and Maharashtra, farmers mainly produce semi-intensive *L. vannamei*.

PUNJAB AND HARYANA

Far from the country's coastline, large areas of land that have become infertile due to saline groundwater are available in Punjab and Haryana. The

Under the right market conditions, production in Tamil Nadu may rebound to its peak of 45,000-50,000 MT

governments in the two states have been promoting brackish water aquaculture for both fish and shrimp as a new livelihood for farmers whose lands have become unsuitable for producing crops that aren't saline-resistant. Both states use the government's PMMSY scheme to give farmers financial aid, and some shrimp farms have been established and have achieved various degrees of success. The growth of aquaculture in the region has already resulted in a few feed companies showing interest in setting up local manufacturing capacity.

Despite this potential, shrimp farmers in Punjab and Haryana face a few challenges. With a long winter from November-December till February-March, shrimp farming is restricted to 7-8 months of the year, and farmers can grow two crops annually at best. With relatively low salinity levels, the region is only suitable for *L. vannamei*. Moreover, farmers largely depend on feed and PL from other parts of the country, resulting in high production costs. And without processors in the area, farmers are confronted with lower prices as processors and their agents calculate higher transport costs. All these challenges make it hard for farmers in the region to compete with other states. But there's potential for growth if market conditions improve.

CAA AND MPEDA FARM REGISTRATION

Farm registration is needed to legalize farming activities and to ensure that India's exporters can meet the requirements of regulators in overseas markets, such as the US and EU. Although many shrimp farms aren't registered yet, the number of registered farms continues to expand. The most prominent federal organizations registering farms are the CAA and MPEDA.

Although many shrimp farms aren't registered yet, the number of registered farms continues to expand

The CAA

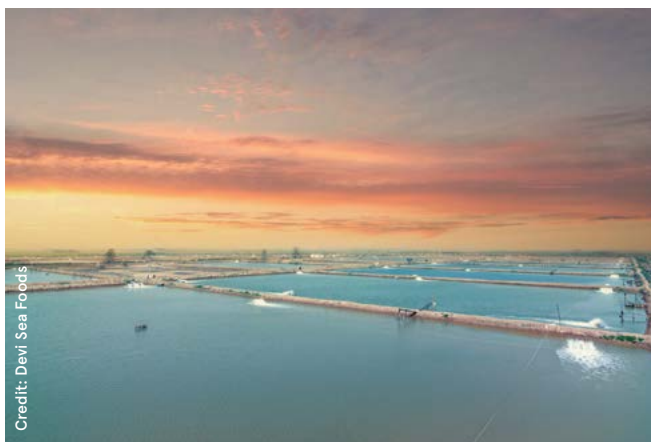
As per the Coastal Aquaculture Authority Act, the CAA is solely responsible for regulating aquaculture activities within 5 km of the Indian coastline. Its mandate stems from the Coastal Zone Regulation Act, which requires the CAA to register and approve all aquaculture activities so that they can't negatively impact the coastal zone. Since the start of its efforts, the CAA has registered 45,113 farms—about one third or half of India's shrimp farms. Local sources often explain the lack of registration by the costs; the CAA's farming standards, which are hard to comply with for small-scale farmers; and the CAA's lack of enforcement power. The new Coastal Aquaculture Authority Bill, approved by Parliament in 2023, should encourage more coastal aquaculture farms to enroll and make registration simpler under the "ease of doing business" principles of the government. More about that later in this chapter. ▶



MPEDA

► MPEDA

To meet EU and US regulatory requirements, MPEDA started its own voluntary farm registration system. Farms need to be registered with MPEDA to access its Pre-Harvest Testing System. Processors exporting to the EU can only source from farms with access to this system. By FY 2022-2023, more than 78,779 farms nationwide had enrolled with a total of 191,882 ha under culture. Of these farms, over 50,000 are located in Andhra Pradesh, 12,000 in West Bengal, 8,000 in Odisha, 2,500 in Tamil Nadu, and 1,200 in Gujarat. Although registration is voluntary, it's a thorough process. Farmers have to provide documentation to prove ownership and demonstrate the legality of the farm's location (no encroachment on government or forest-designated land). MPEDA also requires onsite physical verification of the farm perimeters via GPS. This process should ensure that registered farms don't violate the CAA regulations or any other state or federal-level regulations.



INDIA'S *L. VANNAMEI* SHRIMP FARMS

Industry insiders estimate that India has around 100,000 shrimp farms and possibly 200,000-300,000 shrimp ponds. Most farms consist of simple earthen ponds managed with semi-intensive production methods. Contrary to other Asian countries, India doesn't show any significant movement towards adopting more intensive production systems. On the contrary, farming practices have moved towards less intensity amidst heavy disease pressure and unfavorable market conditions. Table 2 gives an overview of some of the main characteristics of Andhra Pradesh's *L. vannamei* shrimp farms, which are mostly representative for farms across the country.

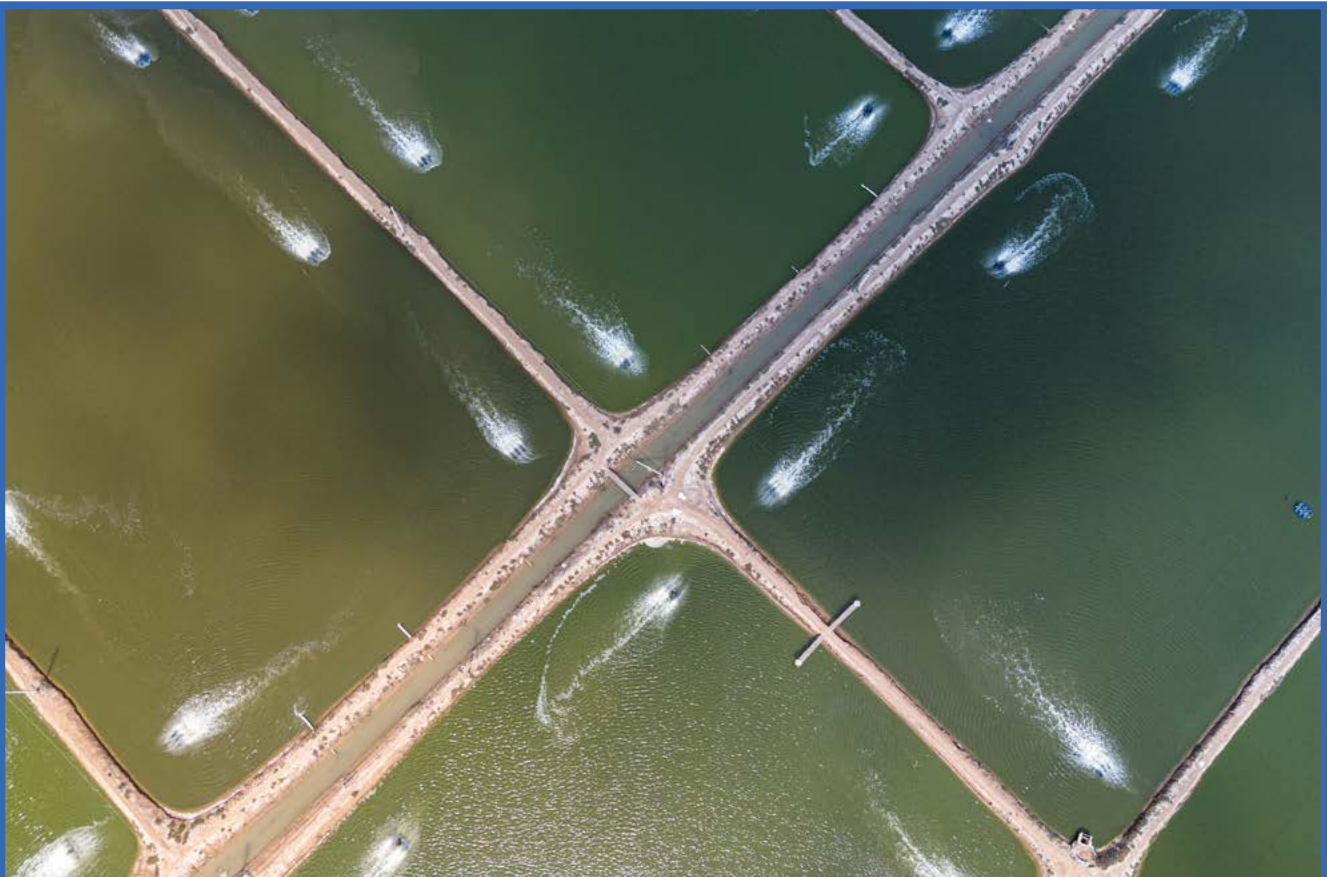


The Coastal Aquaculture Authority (Amendment) Bill, 2023

The Coastal Aquaculture Authority regulates coastal aquaculture. In 2023, Parliament voted in favor of amending the Coastal Aquaculture Authority Bill of 2005. This new regulation should (1) strengthen the mandate of the CAA and (2) help the coastal aquaculture sector overcome some of the regulatory challenges that limit its growth potential. The CAA also wants to promote the ease of business in coastal aquaculture. These are the main changes:

- Under the new Bill, if a farm is registered under the CAA, other authorities will treat this as permission under the CRZ regulation. It prevents small-scale farmers from having to obtain official CRZ clearances from other agencies to legalize their farming activities.
- Operating a shrimp farm in the coastal zone without CAA registration will no longer be treated as a criminal act but as a civil one. The sentence of up to three years imprisonment is dropped and replaced by penalties. However, establishing a shrimp farm in an ecologically sensitive area is still restricted.
- Hatcheries are exempted from the CRZ's No Development Zone, which prohibits the development of aquaculture operations within 200 m of the high tide line. Hatcheries, BMCs, and NBCs have now also been explicitly included in the CAA's mandate.
- The CAA mandate is broadened from shrimp farming alone to all coastal aquaculture activities, including cage farming, seaweed farming, and bi-valve farming. This may make it easier for coastal communities to diversify their livelihoods.
- The regulations provide a stronger mandate to fix or adopt standards that should prevent negative environmental impact of farms, making owners liable to pay demolition costs of their farms and the cost of environmental damage. The CAA refers to this as the "Polluter Pays Principle."
- To strengthen the CAA's position towards other authorities and the aquaculture industry, the Member Secretary of the CAA should hold the rank of Joint Secretary in the government.

TABLE 2: MAIN SEMI-INTENSIVE PRODUCTION CHARACTERISTICS IN ANDHRA PRADESH



Pond type	Pond size (ha)	Stocking density (PL/m2)	Floating aerators (pcs/ha)	Feeding method
Complete earthen	1	20-40	Up to 10	Manual

LAND OWNERSHIP

Some farm landowners are also shrimp farmers themselves. This mean that they farm on land in or near their residences. But many farms are owned by non-resident absentees who live in cities across the country, by companies or by government authorities. This way, land is farmed on a lease arrangement and farmers are remunerated with rental fees or a proportion of harvest proceeds. Lease terms vary. While private land lease agreements are often short term, government lease terms are usually longer term. The latter can require the farmer to comply with environmental regulations.

FARM SIZE

The vast majority of India’s shrimp farms are smaller than 1-2 ha. However, farms grow organically and through consolidation. A couple of thousand farms have grown to 5-10 ha, a few hundred to beyond 10 ha, but only a few dozen may have reached several hundred ha. Such larger farms are either local farmers who have grown their farms organically or corporate farms belonging to vertically integrated shrimp conglomerates.

POND INFRASTRUCTURE

Shrimp ponds in India usually have a rectangular or square shape and a size of around 1 ha. But in Odisha and West Bengal, pond sizes are typically only 0.2-0.5 ha, significantly smaller than in Andhra Pradesh. Pond depth is ideally about 1.8-2 m. Although there may be exceptions, farmers generally don’t use plastic or high-density polyethylene (HDPE) liners to cover the bottom of the pond and dykes. Some ponds may be constructed with central drains (shrimp toilets) to facilitate the removal of sediments, but most aren’t. Many farms have fences around their perimeter and are covered with bird lining to protect their ponds from disease being transmitted by frogs, crabs, birds, and other animals that may carry pathogens.

RESERVOIR AND SEDIMENTATION PONDS

Larger farms have canals that connect multiple ponds to reservoirs and sedimentation ponds, while small-scale farmers only operate a few ponds each and use all of them for actual production. Although the government has taken initiatives to help small-scale farmers form groups and collectively manage their ponds close to infrastructure and water bodies, most small-scale farms work independently of such farmer organizations.



Adoption of auto-feeders is only expanding slowly

WATER SOURCE

While inland farms depend on boreholes for water intake, most farms in the coastal zone depend on creeks and the sea. In the coastal area, most ponds have the same altitude as the water bodies they depend on, making relatively small pumps sufficient for water supply. Larger corporate farms often use more powerful pumping stations to transport water through their farms.

STOCKING DENSITIES

When growing *L. vannamei*, farmers in Andhra Pradesh and Gujarat stock their ponds at approximately 20-40 PL/m². Although CAA regulations permit densities of up to 60 PL/m², with high disease pressure and low carrying capacity of their ponds, farmers tend to prefer these lower stocking densities. The general idea is: the lower the prices or the heavier the rains, the lower the stocking density. But farmers in Odisha, Tamil Nadu, and West Bengal stock at higher densities, up to 60 PL/m².

AERATION

Indian farmers typically only use floating aerators with paddle wheels. A 1 ha pond would be equipped with six aerators. Farmers follow standardized aeration schedules. The use of other types of aeration technologies, such as nano bubbles, is uncommon, just like the structural use of oxygen and other water quality sensors. If used at all, they're often brought by technicians of feed companies or other input suppliers who regularly visit the farm. Several feed companies have established networks of laboratories where farmers can test water quality and shrimp health.

FEED

All farmers in India use commercial pelleted feed. While use of automated feeding machines has increased in many countries, in India adoption is limited. As labor costs are generally very low and farmers aren't particularly open to using technology, the adoption rate of new technologies and equipment is low. Feeding is mainly done manually by farmers or farm workers from the pond dykes or a small boat in the pond.

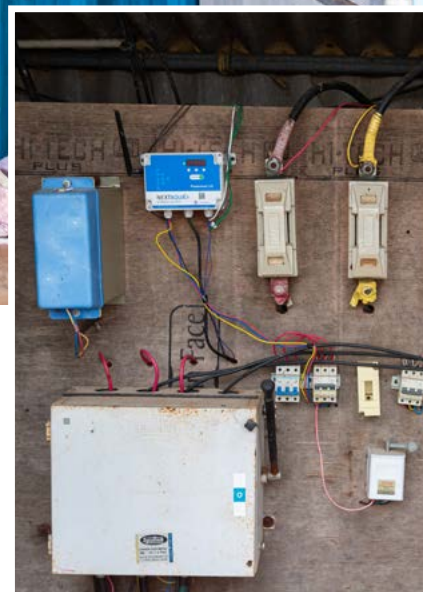






RESTING AREA
విశ్రాంతి ప్రదేశం

RESTING AREA
విశ్రాంతి ప్రదేశం



AquaExchange, an Indian technology start-up (p. 133), provides shrimp farmers with a solution that helps them to monitor farm equipment and save energy costs.

Diseases, Productivity, and Costs

It's beyond the scope of this report to dive deep into the diseases that challenge the success rate of farmers. However, it's crucial to understand what makes farms prone to disease outbreaks: for their water intake, they depend on creeks that they share with many other farmers. If the pond of one farm contains high vibrio and pathogen levels, and water from that pond is released into the shared creek from which other farms take water, diseases spread rapidly. Farms that use borewell water are less prone to spreading disease through water intake. Still, they're vulnerable to disease during sudden changes in weather conditions, such as heavy rains and temperature changes. Today's most common diseases in shrimp farming in India are EHP and WFS. If diseases do break out, productivity drops and production costs increase significantly.

ELECTRICITY

Depending on the location, farms are either connected to the electricity grid or depend on diesel to operate their equipment. Even farms using electricity have diesel-run backup generators, as power cuts are common, especially during the monsoon season. In Andhra Pradesh, farmers pay a reduced rate for electricity, as is common for agriculture as well.





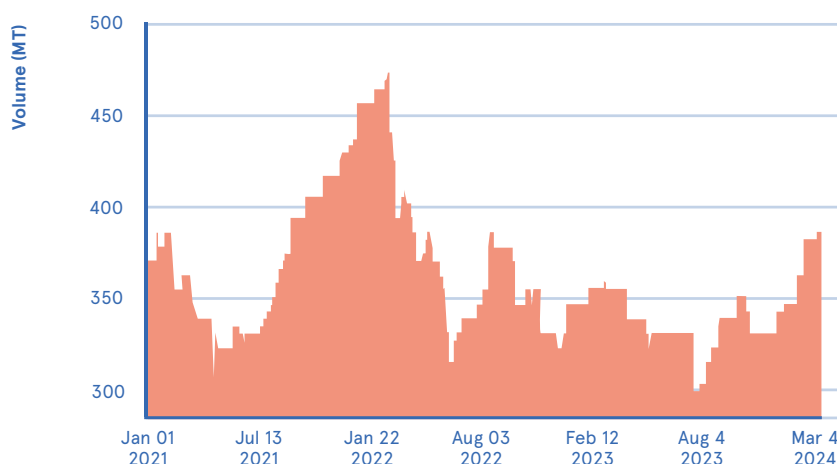
Despite government support, since mid-2022, farm gate prices have been hovering around all-time lows

FARM GATE PRICING VERSUS PRODUCTION COSTS

Farm gate prices have been highly volatile over the past few years. While they collapsed amidst the COVID-19 pandemic, prices again reached record levels towards the end of 2021, driven by strong consumer demand. But in early 2022, it became apparent that the industry was heading towards over-supply, and farm gate prices started collapsing again. Despite government support, since mid-2022, farm gate prices have been hovering around all-time lows.

Despite today's low prices, if farmers have a successful crop and aren't challenged by disease, they can still make a profit. Figure 2 shows prices per kg in Andhra Pradesh at 40 count/kg: while farm gate prices hovered around \$4/kg in December 2023, production costs were estimated to be around \$3-3.5 on average. However, as soon as farmers are confronted with disease challenges—not unlikely during monsoon season—production costs increase rapidly due to slow growth, higher feed consumption, or higher mortality rates. In this case, they may lose money under current market conditions. And in states other than Andhra Pradesh, where farmers face lower farm gate prices and higher costs, they may struggle to make a profit at all.

FIGURE 2: VANNAME/ SHRIMP EX-FARM BHIMAVARAM, AQUAEXCHANGE, 40 PCS/KG



Source: Undercurrent News



Feed is the main expense for farmers, amounting to around 50-60% of costs. Other essential costs include PL (10%), labor (10%), chemicals (10%), and electricity (5-10%). This breakdown is based on a successful farm in Andhra Pradesh with a feed conversion ratio of around 1.2. However, if the ratio increases due to disease presence or any other circumstances, the cost structure may change drastically, and feed may take up much more of the total production costs. Gujarati farmers, for example, are facing higher PL and electricity costs (0.091/unit versus 0.025/unit in Andhra Pradesh). As such, the cost structure may vary slightly per state.

Feed is the main expense for farmers, amounting to around 50-60% of costs

Seasonality and Cropping Patterns

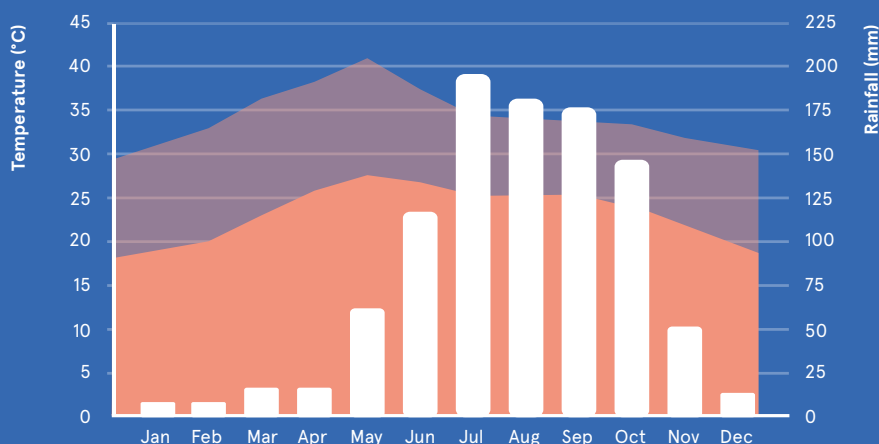
Shrimp farmers in Andhra Pradesh who grow *L. vannamei* traditionally grow two to three crops yearly. The first crop is stocked at the start of the pre-monsoon season in February or March and harvested before the rains start in May. The second crop is stocked during monsoon season in June and July and harvested between September and November. Only in central and southern Andhra Pradesh, where winter temperatures don't drop too low, can farmers manage a third crop, which they refer to as a winter crop. In northern Andhra Pradesh, Odisha, West Bengal, and Gujarat, farming is limited to two crops at best. The further north you go, the later the season starts and the earlier it finishes due to colder and longer winters.

Whether on the East or West Coast, during the first crop of the year, temperatures gradually increase and rainfall is limited. This is usually favorable for shrimp growth and survival rates and is considered the easier crop of the year. During the year's second crop, temperatures rise and heavy rains start. This typically results in more disease challenges due to sudden drops in salinity and temperature. It's also the period during which floods can cause significant damage to shrimp farming areas, as we've recently seen in Andhra Pradesh. During a heavy cyclone in December 2023, shrimp farming areas in certain parts of the state were flooded and production was lost.

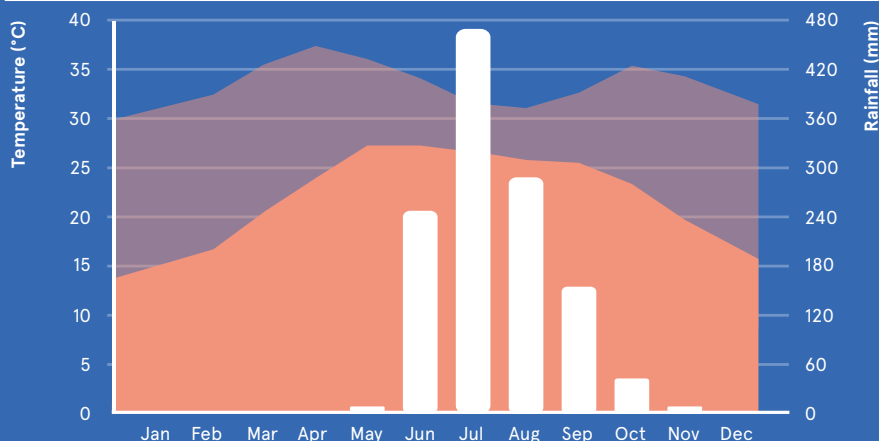
Contrary to the East Coast, shrimp farming in Gujarat on the West Coast is more suitable for one crop. Before the introduction of *L. vannamei*, farmers would generally stock their ponds with *P. monodon* only by March or even April and harvest four months later. Those farming *L. vannamei* so far have attempted two crops, with a more extended summer and a shorter monsoon crop, which has given disappointing results. Therefore, many Gujarati farmers have returned to *P. monodon* and will mostly limit themselves to one crop, targeting larger sizes.

FIGURE 3: TEMPERATURES AND RAINFALL IN VIJAYAWADA (ANDHRA PRADESH) AND SURAT (GUJARAT)

VIJAYAWADA



SURAT



Source: climatestotravel.com

■ Rainfall ■ Min ■ Max

The peak harvesting seasons in April-June and September-November would traditionally be perfectly aligned with solid demand for the holiday seasons in India's export markets. But due to the sudden price fluctuations that peak harvests caused in recent years, farmers tend to be more cautious about when they stock their ponds and sometimes wait a bit longer to prevent these sudden price drops when they're ready to harvest.

Farmers that grow *P. monodon* normally stock their ponds in February or March. They then grow for 6-8 months and harvest from August to November. Except in some pockets in Andhra Pradesh, *P. monodon* farmers rarely grow a second crop.

During a heavy cyclone in December 2023, shrimp farming areas in certain parts of Andhra Pradesh were flooded and production was lost

The Resurgence of *P. Monodon* Farming

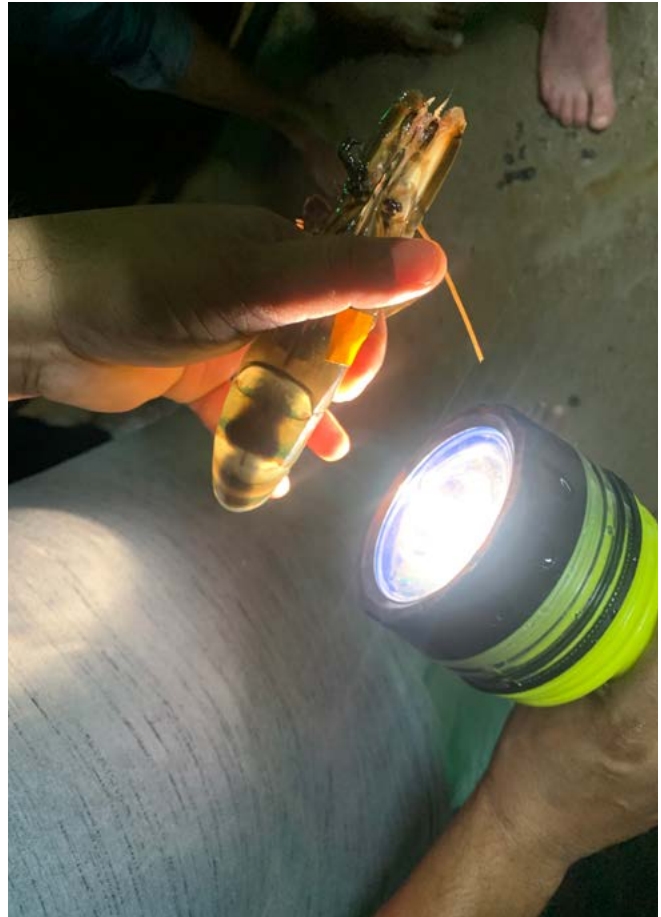
Since 2019, India's shrimp hatcheries and farmers have had access to SPF *P. monodon* genetics that perform well under local conditions in India. A number of companies started to produce *P. monodon* PL, which allowed farmers with suitable ponds to choose between species. Although the expansion of *P. monodon* production isn't going as fast as some companies projected, India's *P. monodon* production has already exceeded 50,000 MT in 2023 and will certainly increase over the next couple of years.

*It's hard to reproduce *P. monodon* in captivity in the first 5-10 generations and many companies don't have the capital or don't want to invest it*

IMPROVED GENETICS

Generally, breeding programs for *P. monodon* shrimp are more challenging than those for *L. vannamei* shrimp. The main reason is that it's hard to reproduce *P. monodon* in captivity in the first 5-10 generations. Many companies don't have the capital needed or don't want to invest it to overcome those critical years, of which the outcome is unknown. Until recently, this meant that no breeding program could offer proper domesticated SPF *P. monodon* genetics.

In the last decade, a few companies (CP Group from Thailand, Moana Technologies from Hawaii, Unima Group from Madagascar, and several smaller players in Asia and Australia) have persisted and have managed to overcome this critical phase. These companies now have domesticated genetics that achieve improvements (in terms of growth, survival, and uniformity) each generation, just like any *L. vannamei* breeding program, and they sell these genetics throughout the world.



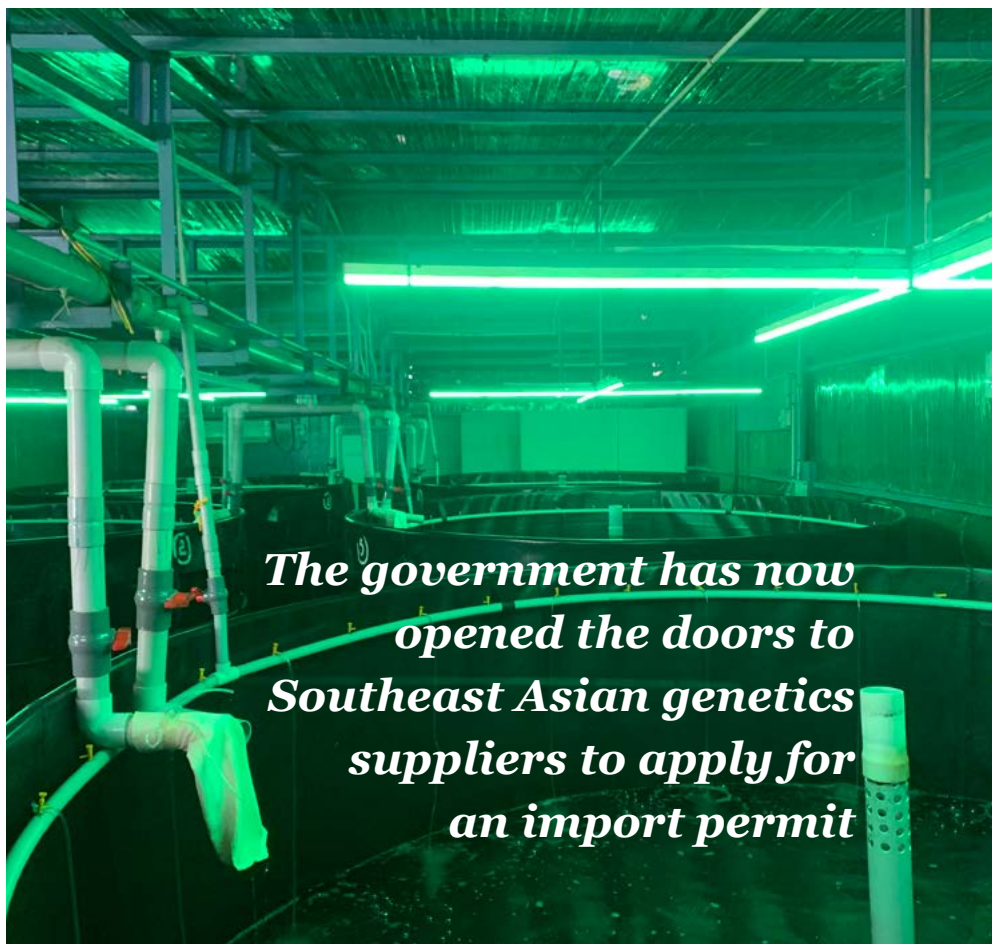
The companies offer relatively fast-growing genetics (PL that reach 40-45 g in 110-120 days of culture) that are tolerant to diseases such as EHP and WFS. These are among the most common diseases in India that, amidst today's low shrimp prices, make it hard for *L. vannamei* farmers to be profitable. As such, the availability of *P. monodon* genetics that grow well and are more tolerant to these diseases is a welcome alternative.

SPF *P. monodon* BROOD-STOCK AND PL AVAILABILITY

India has always produced *P. monodon*, but ever since the introduction of *L. vannamei* in 2011, production has been limited to extensive farming operations in Kerala, West Bengal, and some pockets of semi-intensive farms in Andhra Pradesh. Farmers depended on wild-caught broodstock to produce PL, which posed challenges regarding sustainability (overfishing) and productivity (slow growth and high mortality rates).

In 2019, after a strong lobby from the Indian shrimp industry, the government approved import permits for Moana Technologies and Aquaculture de la Mahajamba (also known as Aqualma, the breeding division of Madagascan shrimp producer Unima Group). Local infrastructure has been developed from that moment onwards, and *P. monodon* PL are now available through several channels:

- Moana Technologies teamed up with Gujarat-based Vaishnavi Aquatech. Vaishnavi Aquatech owns and leases five hatcheries in Andhra Pradesh and a BMC in Gujarat. The company imports PPL from Moana Technologies in Hawaii, which it grows into adult parent broodstock in its BMC. These adult broodstock are supplied to Vaishnavi's hatcheries to produce PL for sale to farmers. In 2023, Vaishnavi's own hatcheries used 15,396 broodstock.
- Soon after receiving an import permit, Madagascan shrimp conglomerate Unima and its subsidiary Aqualma established Unibio (India) Hatcheries, an Indian hatchery dedicated to *P. monodon* PL production in Tamil Nadu. In 2023, Aqualma provided 1,731 broodstock to Unibio. It also sold broodstock to three other Indian hatchery operators in 2023: 202 broodstock to Gayathri Bio Marine, 1,168 broodstock to Golden Marine, and 462 broodstock to MAS Aqua Techniks. The company works in close partnership with these hatcheries to ensure that farmers are guaranteed about the genuineness of the PL they buy.
- The Indian government has started to deploy genetics for commercial use from its own domesticated SPF *P. monodon* breeding program in the Andaman Islands. The program has been running since 2014 and, at the end of 2023, was producing the thirteenth generation. The government uses its BMC in Andhra Pradesh to grow PPL from its facilities in the Andaman Islands into adult broodstock. The BMC sells broodstock to independent hatcheries. In 2023, the BMC supplied 1,400 broodstock to BMR Group, 800 to Royal Hatcheries, and 100 to CP Group. And in January 2024, it supplied 1,400 broodstock to Vaisakhi Bios, 800 to Tandels and 250 to Amaze.

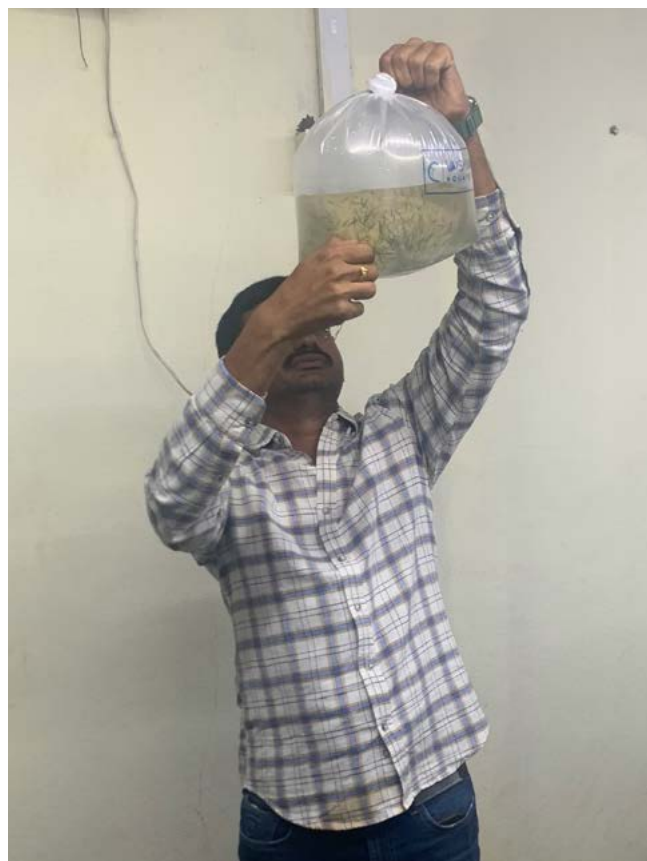


More sources of *P. monodon* genetics may become available for Indian hatcheries as the government has opened the doors to Southeast Asian genetics suppliers to apply for an import permit. This provides companies such as CP Group and Topgen Aquaculture from Thailand, and Viet-Uc and Moana Ninh Thuan from Vietnam the opportunity to enter the Indian market and work with hatcheries that don't have access to one of the existing sources.

Once hatcheries can access *P. monodon* broodstock suppliers, they must apply with the government to get accredited to produce *P. monodon* PL. When the number of hatcheries offering *P. monodon* PL increases, the price is expected to fall, and more farmers will likely opt for *P. monodon* moving forward.



At one of the hatcheries managed by Vaishnavi Aquatech, while a small farmer collects PL in his passenger car, a larger farmer checks the PL's quality while his products are loaded for transport in crates on a truck.



P. MONODON FARMING SYSTEMS AND GEOGRAPHY

The current SPF *P. monodon* genetics are best suited to be grown in high-salinity water with low stocking densities (10-20 pcs/m²). The ponds only require a little bit of aeration. Farmers don't need to invest in liners, shrimp toilets, and other technologies, which are common for more efficient and intensive *L. vannamei* production. Overall, operating costs are much lower than for *L. vannamei*: one crop in this lower-density system requires less feed and other inputs. It's commonly perceived as the least-investment option, which is why SPF *P. monodon* is sometimes called the "poor farmer's shrimp."

***P. monodon* is commonly perceived as the least-investment option, and is sometimes called the "poor farmer's shrimp"**

Farming SPF *P. monodon* shrimp in India is especially interesting for farmers near the coast who use high-salinity creek water. These farmers struggle with the impact of diseases such as EHP and WFS on their *L. vannamei* crops. While they could easily make a good profit in the past, even when disease struck, these farmers struggle to survive because of the current low prices. Making the change to SPF *P. monodon*, which is typically more disease tolerant and which can be farmed at lower cost, allows them to be (more) profitable.

This doesn't mean that growing SPF *P. monodon* is easy. Farmers who switch to SPF *P. monodon* tend to target larg-

Making the change to SPF P. monodon, which is typically more disease tolerant and can be farmed at lower cost, allows farmers to be (more) profitable

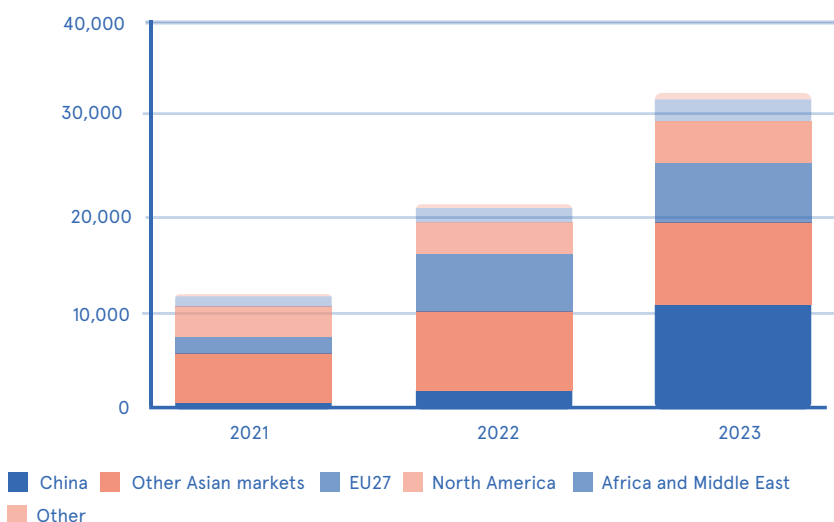
er sizes (mainly 60-100 g). Crops often take 180-240 days—a long wait. Farmers depend on creek water, which often carries high pathogen loads. Therefore, proper biosecurity and water quality management remain essential, even if production is extensive. If farmers

don't take precautions, there's a substantial risk that, at some point, diseases will break out and impact growth, survival, and costs. Especially as SPF *P. monodon* remains susceptible to WSSV, which is widespread in India.

According to local sources, the primary regions where farmers have likely transitioned to SPF *P. monodon* are Gujarat, the south of Andhra Pradesh (from Nellore to Guntur), the north of Andhra Pradesh (around Vizianagaram), and parts of Odisha and West Bengal. For all farmers that depend on creeks instead of borewells as water sources, with salinity levels above 20 ppt, SPF *P. monodon* is a suitable option.

India's production of *P. monodon* in 2023 reportedly exceeded 50,000 MT. Industry sources estimate that 40% is produced in Gujarat, 40% in Andhra Pradesh, and 20% in West Bengal.

FIGURE 1: INDIA'S EXPORTS OF *P. MONODON* FROM JANUARY-OCTOBER 2021-2023



Source: Ministry of Commerce, India

P. MONODON MARKETS

In 2023, India's *P. monodon* exports increased to 34,033 MT, 56% more than 2022 and almost triple the amount from 2021 (Figure 1). Companies such as Abad Overseas, Mindhola Foods and Kader Exports have been leading the growth in exports, offering

products to existing buyers in the US and Europe and developing new markets in China, for example. In this section, we'll briefly look at the main markets that have absorbed India's growth of *P. monodon* production since 2021.

THE EU

The EU bought much of India's increased *P. monodon* output from 2021 to 2022 when it imported 6,326 MT, up from 1,883 MT in 2021. However, with 6,414 MT imports in 2023, EU imports didn't go up much further and likely hit a ceiling. The unlikelihood of future growth has to do with a mismatch in sizes and prices, primarily in the HLSO and peeled markets. Mid-sizes (anywhere from 16-21 pieces/kg to 36-40 pieces/kg) are preferred in this market—not the sizes that Indian farmers primarily target. While the HOSO market in Southern EU—where they do prefer the bigger sizes—might seem attractive at first, it's actually a small market and growth potential is limited.

HLSO AND PEELED

The Northwestern EU market (such as Belgium, Germany, and the Netherlands) has traditionally been the most important EU market for *P. monodon*, primarily for HLSO and peeled products. In 2022, this region imported around 25,000-30,000 *P. monodon* products from countries such as Bangladesh, Vietnam, as well as India.

The increased imports of Indian *P. monodon* from 2021 to 2022 were primarily absorbed by the ethnic wholesale and retail market in Northwestern EU. Despite the availability of lower priced *L. vannamei*, these markets have continued to offer *P. monodon* products. Contrary to the mainstream market, certification is generally not required. Bangladesh is the main supplier in this segment. Importers that already sourced *L. vannamei* from India started to buy Indian *P. monodon* when they saw it was competitive with Bangladeshi prices.

In supermarkets, since *L. vannamei* has become so readily available at low prices, many buyers have over the past two decades shifted species in favor of *L. vannamei*. Even if buyers recognize

the premium character of *P. monodon*, it's a very price sensitive market. Buyers indicate that the market may (partly) turn back to *P. monodon* if the price gap between the species becomes smaller (e.g. less than \$0.50/kg). For supermarkets that do offer *P. monodon*, ASC certification is often a requirement for market access. Before being able to penetrate this market segment, the number of ASC certified *P. monodon* farms in India will have to increase.

While in 2022 the ethnic market in the EU was a welcome output destination for Indian farmers who didn't have many other options, it doesn't offer very good conditions for future growth. Besides the mismatch in preferred sizes, this market is very price-driven. Products are often heavily glazed and soaked to keep prices low. Overall, this is not a market that can pay the prices that Indian farmers hope for, nor one that will support India in building a strong market image around its products.

The ethnic market is very price-driven, and products are often heavily glazed and soaked to keep prices low

HOSO

In terms of HOSO *P. monodon*, the EU market is small, and it's mainly Southern EU countries (such as France and Spain) that are interested in this product.

Contrary to the HLSO and peeled market, this market has demand for larger

If Indian exporters invest in meeting HOSO quality requirements and sustainability certification, exports to the EU may grow

sizes and offers premium prices for *P. monodon* compared to *L. vannamei*. It's dominated by farmed and wild-caught *P. monodon* suppliers from countries such as Madagascar, Mozambique and Nigeria, which historically have had strong ties with buyers in Southern EU. Especially Madagascan *P. monodon* is positioned as a premium quality and sustainable product. In 2022, France and Spain imported a total of 15,000 MT *Penaeus* shrimp from Africa.

To compete in this segment, India would have to invest in promoting itself as a good alternative to existing suppliers, not only in terms of price but also in terms of quality and sustainability. Still, India is not doing so bad here: in 2023, the country exported around 1,200 MT to Spain and France—only slightly more than in 2022, but triple the amount of 2021. If Indian exporters invest in meeting HOSO quality requirements and sustainability certification, exports to this region may grow.

CHINA

Contrary to the EU, China has a growing market for large HOSO *P. monodon*. While China's imports from India only grew slightly from 439 MT in 2021 to 1,955 MT in 2022, in 2023 China's imports increased to an impressive 11,079 MT. Suddenly, China has be-

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come India's largest *P. monodon* export market. This is especially encouraging as there seems to be a perfect match in terms of prices and sizes.

Supplying a high-quality HOSO product means that the product must be delivered fresh to the factory

The increase in Chinese imports must be seen in the context of a rapidly developing market for *P. monodon*. Chinese *P. monodon* production has increased substantially over the past few years. CP Group is the largest supplier of *P. monodon* genetics to the Chinese market, and according to Robins McIntosh, the company's Executive Vice President, China may have produced around 180,000 MT *P. monodon* in 2022—up from 100,000 in 2020 and 150,000 in 2021. China's production is entirely domestically consumed. Locally produced *P. monodon* is considered a premium species compared to *L. vannamei* and is mainly sold as a chilled or live product to local fresh markets. Imported frozen *P. monodon* can complement the domestic supply as an alternative for retail and food service buyers, which prefer frozen products.

Moving forward, for China to absorb even more of India's *P. monodon*, farmers and processors will have to continue to invest in the post-harvest supply chain. Supplying a high-quality HOSO product means that the product must be delivered fresh to the factory. Suppliers such as Mindhola Foods and Abad Overseas are currently working closely with their supply chain to harvest live shrimp and deliver it fresh to



their factories. These companies also invest in brine freezing equipment which is the freezing method preferred by Chinese buyers. A strong post-harvest supply chain combined with strong marketing efforts in China are essential for Indian *P. monodon* farmers hoping to continue to receive good prices for larger sizes.

OTHER ASIAN MARKETS

India's exports to other Asian markets account for 8,970 MT in 2023: up from 5,390 MT in 2021 and 8,327 MT in 2022. The largest Asian buyers, besides those from China, are from Japan and Vietnam. Japanese buyers have always bought *P. monodon* shrimp from West Bengal, and these supplies compete with those from Kalimantan in Indonesia and Cà Mau in Vietnam. Vietnam, most likely, mainly imports from India for reprocessing and exporting. Another market that has started to buy Indian *P. monodon* is Malaysia, which has a large market for the species and a processing industry that imports, reprocesses, and exports.

NORTH AMERICA

The *P. monodon* markets in the US and Canada have become real niches since most buyers switched to *L. vannamei*. However, we can see a slight increase in imports from India over

the past couple of years. In 2023, the US imported 3,725 MT: up from 2,804 MT in 2021 and 2,809 MT in 2022. Canada imported 747 MT of Indian *P. monodon* in 2023, up from 369 MT in 2021 and 497 MT in 2022. Just like in the EU, the market for larger sizes in North America is small, but there may be some demand, especially from ethnic Asian retail and food service buyers. Some sources also say that for larger sizes HLSO Easy Peel, there's good growth potential. For medium sizes, though, the US will likely only be a significant growth market if prices of *P. monodon* come closer to those of *L. vannamei*.

THE MIDDLE EAST

With a large ethnic Asian diaspora and many wealthy consumers, the Middle East has traditionally been a large market for *P. monodon*. Suppliers from Bangladesh dominate this market, but Indian exporters are gaining some traction. The United Arab Emirates accounts for most imports in the Middle East region: in 2023, it imported 1,666 MT from India, up from 854 MT in 2021 and 1,152 MT in 2022. The United Arab Emirates re-exports a considerable part of imports to other countries in the region as well.



*For farmers struggling to profit from their *L. vannamei* production due to diseases and low prices, *P. monodon* is an alternative that allows them to continue production and sustain their livelihoods*



Manoj Sharma, one of India's most well-known farmers, harvested 55–60 g *P. monodon* shrimp from his farm in Gujarat in November 2023.

LOOKING AHEAD

India's *P. monodon* production will surely increase in 2024 and beyond. For 2024, this is illustrated by broodstock supplies which grew significantly year-on-year in November and December 2023 and January 2024. The PL produced from these broodstock have been stocked between January and April and will be harvested from September 2024 onwards. For farmers with ponds in suitable locations struggling to profit from their *L. vannamei* production due to disease challenges and low prices, *P. monodon* is an alternative that allows them to continue production and sustain their livelihoods.

Several industry sources mention that while in 2019 *P. monodon* was still seen as the "poor farmer's shrimp," in 2022 and 2023, this is no longer the case. Big and small farmers alike, from coast to coast, are going for *P. monodon*. While farming used to be restricted to farmers with access to high-salinity creek water, some sources claim that some of those who depend

on lower-salinity water sources are now also trying their luck with the species. In the foreseeable future, *P. monodon*'s share of India's shrimp product basket will continue to grow.

On the processing side, a wide range of companies has become involved in processing and exporting *P. monodon*. In 2023, leading exporters of *P. monodon* include companies such as Abad Group and Kader Exports in Andhra Pradesh; Seasaga Group, Mindhola Foods, and Zeal Aqua in Gujarat; Baby Marine Ventures in Kerala; and S.A. Exports in West Bengal. Gradually, more Indian exporters are expected to include *P. monodon* in their product ranges. For all these companies, having in mind that Indian farmers will continue to grow large sizes, and that the main market for large sizes exists for HOSO products, investments in post-harvest supply chains will be essential. Products must be delivered as fresh as possible to the factory and factories need to have the right freezing equipment to meet the demand of Chinese and other overseas buyers.

*Big and small farmers alike, from coast to coast, are now going for *P. monodon**

For *P. monodon* to deliver on its promise, farmers and exporters will have to work together to ensure that the sizes and specifications that farmers produce match market demand. If there's a mismatch, prices may plummet—something which occurred in 2022, when Indian exporters mainly relied on EU buyers that turned out not to be looking for the large sizes they sold. Should farmers want to continue producing primarily larger sizes, exporters will have to work on expanding their relationships in markets such as China, which can absorb India's production at satisfactory prices.





Key Insights



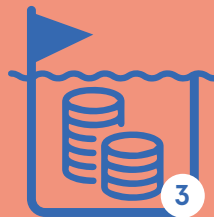
The size of the Indian shrimp feed market is estimated at around 1.3–1.35m MT in FY 2022–2023. In FY 2023–2024, the market size may contract to around 1.1–1.15m MT. At today's average price of INR 90/kg and the exchange rate of January 2024, feed sales would be valued at INR 95–105bn, equivalent to \$1.15–1.25bn.



The Indian industry uses at least 200,000 MT of fishmeal, 450,000 MT of soy meal, and 340,000 MT of wheat flour each year. All three ingredients are primarily produced domestically. India remains dependent on imports for feed additives and premixes.



India has around 35 companies that manufacture shrimp feed. Together they run more than 50 feed mills with a combined manufacturing capacity of around 3.5m MT.



Feed companies are experiencing tough times due to the (1) contraction of global shrimp demand and Indian production, (2) intense competition between feed manufacturers as a result of overcapacity, (3) high raw material and farm production costs, (4) inability to pass on inflation costs, and (5) lack of cash flow.



Avanti Feeds, the largest manufacturer, had a market share of around 40% in 2022. In 2023, in a contracting market, the company expects its market share to have grown to around 45%.

The top 5 manufacturers (Avanti Feeds, CP Aquaculture India, Deepak Nexgen, Devi Sea Foods, and Sandhya Marines) together have a market share of around 80%. The remaining market share is divided over around 10–15 other companies with active shrimp feed manufacturing operations.

This chapter first briefly discusses feed ingredients and the shrimp feed products sold on the Indian market. After that, it will provide a detailed overview of the companies manufacturing shrimp feed and how they sell feed to farmers.

FEED INGREDIENTS FISHMEAL AND FISH OIL

Local production of fishmeal amounts to around 300,000-400,000 MT annually. Fish oil production amounts to tens of thousands MT annually. With more than 200,000 MT, the Indian shrimp industry is the largest domestic purchaser of fishmeal and oil. Depending on the brand and species, fishmeal inclusion ranges from 14-18% for *L. vannamei* feed and 20-22% for *P. monodon* feed. Fish oil inclusion for both species is around 1%. But India is also a significant exporter of fishmeal and oil, so Indian shrimp feed manufacturers compete for these ingredients with buyers from overseas.

Around 50-60 companies produce fishmeal and oil in India. They're concentrated along the West Coast and the southern part of the East Coast. Producers offer fishmeal in various grades with different protein content levels. Most fish oil comes from "mixed fish." Only around 20% of the fishmeal is 100% made of Indian oil sardine, which is considered a premium quality product. "Mixed fish" fishmeal includes a maximum of 30% Indian oil sardine, and the remainder is typically a mix of other small pelagic species.

One of the reasons to source fishmeal from abroad is the lack, in India, of fishmeal and oil that meets the market-driven sustainability requirements. None of the Indian fisheries supplying raw material for marine ingredient production are currently MarinTrust or MSC certified. This may cause future challenges in complying with increasingly stringent sustainability standards, such as those of ASC and BAP. If fisheries aren't certified, these

standards will gradually require feed manufacturers to import marine ingredients from certified or fishery improvement project (FIP) origins. Currently, only the Indian Oil Sardine FIP (Goa and Maharashtra) fishery is engaged in a MarinTrust FIP.



None of the Indian fisheries supplying raw material for marine ingredient production are currently MarinTrust or MSC certified

ESTIMATION OF VOLUME REQUIRED



Average fishmeal inclusion rate in shrimp feed: 16%
Fishmeal volume required: 216,000 MT



Average fish oil inclusion rate in shrimp feed: 1%
Fish oil volume required: 13,500 MT



SOYBEAN MEAL

India produces around 11-13m MT of soybeans annually and its domestic oilseed crushing industry produces around 6-8m MT of soybean meal. Soybean meal is mainly supplied to the animal feed sector, primarily to the poultry branch. While for marine ingredients the shrimp industry is the primary buyer, for soy, shrimp feed manufacturers only account for a small portion. India has traditionally been a significant supplier of soybean meal to South and Southeast Asia. However, since 2017 exports have rapidly declined due to the swift growth of domestic animal protein production.

In 2021 and 2022, the government had to permit the imports of 1.2m MT of soybean meal to relax domestic supply shortages and high prices. Since then, supply and demand have been better balanced and prices have been stable. Noteworthy about the production of soy in India is that the government doesn't permit the production or import of genetically modified soy. Therefore, the Indian industry is well positioned to supply markets that prefer shrimp produced without genetically modified feed ingredients.

The government doesn't permit the production or import of genetically modified soy

WHEAT FLOUR

Wheat is widely produced in Northern and Central India, where wheat flour mills are prevalent. Production is estimated at around 100-110m MT annually. Indian shrimp feed manufacturers can often source wheat flour close to their factories, limiting logistics costs. Domestic supply shortages are rare, and imports are uncommon. That said, in 2023 India has seen a rare shortage of wheat flour production. Should such a shortage occur, the government has a backup plan and can intervene by releasing wheat stocks from its national reserves. If necessary, it can also cut the 40% import tariff usually applied to wheat flour imports.

ESTIMATION OF VOLUME REQUIRED



Average soybean meal inclusion rate in shrimp feed: 30%
Soybean meal volume required: 405,000 MT

ESTIMATION OF VOLUME REQUIRED



Average wheat flour inclusion rate in shrimp feed: 25%
Wheat flour volume required: 340,000 MT

PREMIXES AND ADDITIVES

Although there is some local production capacity of premixes and additives, most of these ingredients are imported. Some of the largest suppliers are DSM-Firmenich and Proviron (Cargill), but many others, such as Adisseo, BASF, Elanco, Hinter Group, Huvepharma, and Phibro Animal Health, are also involved. Most operate through local distributors, and some have extensive local sales teams. Trouw Nutrition—like Skretting, part of Nutreco—is an example of a foreign company that produces premixes and additives locally.

ALTERNATIVE FEED INGREDIENTS

Alternative feed ingredients, such as algae oil and insects, are often considered to be more sustainable than traditional marine ingredients. Although in the future downstream val-

ue chain partners may request Indian feed manufacturers to include these alternatives, this isn't a common practice yet. One reason is that feed ingredient import duties are often high, making these ingredients too costly in most manufacturers' least-cost formulation software. The readiness to adopt alternative feed ingredients may only change when market pressure increases, and investment in alternative ingredient production in India gains traction so local availability and affordability improve. Still, a few local companies are already focusing on alternative ingredient production, such as Sea6 Energy, which produces seaweed-based feed additives, and Insectifii, which cultivates black soldier fly.

Shrimp Feed Products and Pricing

PELLETED VS. EXTRUDED

Practically all shrimp feed sold on the Indian market is pelleted and not extruded. Contrary to Ecuador, extruded feed has not yet gained traction in India, and industry experts don't expect a shift happening soon. It would require a change of mindset and significant investments in manufacturing capacity. As far as known, only Growel Group has installed extruding technology. The company uses its equipment to produce specialized feed for early growth stages and some extruded feed for exports.

PELLETS AND NUTRITION FOR DIFFERENT GROWTH STAGES

Indian shrimp feed manufacturers have various products for the different growth stages of shrimp. For each growth stage, the pellet size differs. With the tendency of Indian shrimp farmers to harvest *L. vannamei* at smaller sizes than in the past, finisher feed lines today only represent a minor part of the market (see Table 1).

The average nutrition value of Indian shrimp feed is provided in Table 2, with some minor differences between *L. vannamei* and *P. monodon* feed, and a somewhat higher protein content for the earliest growth stages.

TABLE 1: PELLETS FOR DIFFERENT GROWTH STAGES

	Dimension (mm)	Shrimp size (g)	Past contribution to feed volume (%)	Current contribution to feed volume (%)
STARTER I	0.3-0.6	0.02-0.5	1	2
STARTER II	0.5-1.0	0.5-2	4	6
STARTER III	0.8-1.2	2-5	12	19
PRE-GROWER	1.6	5-15	35	38
GROWER	1.8	15-25	30	30
FINISHER	2.0-2.2	25-harvest	18	5

Source: The Waterbase

TABLE 2: NUTRIENTS IN INDIAN SHRIMP FEED

NUTRIENTS	P. monodon			L. vannamei		
	Starter	Grower	Finisher	Starter	Grower	Finisher
CRUDE PROTEIN (%)	38-42	38-40	35-38	35-40	35-38	32-35
LIPID (%)	6-7	6-7	6-7	5-6	5-6	5-6
CARBOHYDRATE (%)	10-16	15-20	20-25	10-15	15-25	20-30
CRUDE FIBER (%)	2-3	2-3	2-4	2-4	2-4	3-4
ASH (%)	10-12	10-15	12-18	10-15	10-16	10-18
ENERGY (KCAL/100G)	350-400	380-420	380-420	350-400	350-400	350-400

Source: The Waterbase

BRANDS

Most feed manufacturers sell brands differentiated between budget, regular, and premium feed lines based on protein content and the inclusion of functional feed ingredients. Nearly all brands include specific products for starter, grower, and finisher feed lines. Only a few also

offer nursery and pre-starter products requiring different manufacturing capabilities. With the resurgence of *P. monodon* production, most manufacturers also offer a specific line for this species with a higher protein content than most *L. vannamei* feed.

TABLE 3: MAJOR *L. VANNAMEI* AND *P. MONODON* FEED BRANDS AVAILABLE ON THE INDIAN MARKET

COMPANY	<i>L. vannamei</i>				<i>P. monodon</i>
	Nursery	Budget	Regular	Premium	Regular
AVANTI FEEDS	High boost	Manamei	Profeed 3M	Titan	Prostar
CP GROUP			Blanca Extra	Perfect	Monodon Advance
DEEPAK NEXGEN			ifeed Blue, ifeed Red	ifeed+	ifeed 1
DEVI SEA FOODS			Devee Premium		Devee Premium
SANDHYA MARINES			Sandhya Premium		Sandhya Premium
IB GROUP			Abis		
GODREJ AGROVET			Indica, White Diamond	Extavit, Indica Advanced	Super Tiger
THE WATERBASE			Baywhite	VanaMax	Ultra XL
GROBEST GROUP	Goldshield		Pacific White	Leader, Aqua Prima, Aqua Supreme	
BMR GROUP		Bharosa	Harvest Gold		Spectra
GROWEL GROUP	Nutriva F-15		Nutriva, Marigold	Sprint-LS, Nutriva F-15	Tigeron
FEDORA SEA FOODS			Marrva		
FALCON FEEDS			Falcon Fresh		
SHENG LONG BIO-TECH			Lion	Royal Dragon	Tiger
DEVI FISHERIES			Devi Prime		Devi Prime
SKRETTING	Lorica		Gamma	Xpand	
ROYALS MARINE			Premium, Hypro	Functional	Tiger
CARGILL			Purina		

Source: Own research and company information

With the number of feed companies on the rise, farmers increasingly expect better performance from regular feed brands which they previously only expected from premium brands. This includes feed that helps with disease preven-

tion, fast growth, and better water quality management. Increased competition between feed manufacturers may positively benefit the feed quality that farmers can choose from.

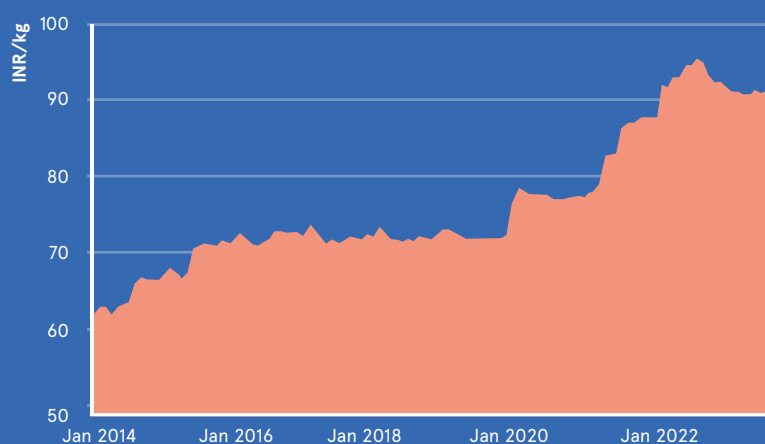


PRICING

India's shrimp feed price has been stable from 2016 to 2020, fluctuating between 71 and 73 INR/kg. 2021 then showed a slow increase, mainly due to rising soy meal prices. The surge, with its peak of 93 INR/kg in September 2022 (Figure 1), only softened towards the end of 2022 and stabilized in 2023. While soy meal prices stabilized, prices of fishmeal continued to increase into the first part of 2023 due to a surge in demand amidst global shortages.

To prevent feed prices from increasing further, in September 2022, the Andhra Pradesh government intervened and negotiated between feed mills and farmers that feed prices would be limited to INR 92/kg. Fishmeal prices only started to abate in the second half of 2023 when the fishing season started. Lower soy and fishmeal prices are reflected in the further softening of shrimp feed prices since September 2022.

FIGURE 1: INDIA'S SHRIMP FEED PRICE FROM JANUARY 2014 TO SEPTEMBER 2023



Source: Local industry sources

The price in Figure 1 is an average price based on the feed that manufacturers sell to their dealers or corporate farmers. Feed manufacturers provide considerable discounts depending on payment terms (up to 6% for cash payments) and annual volume purchased (up to 8%). Distributors would do the same for farmers; the payment terms determine the price of the feed. The numbers in Figure 1 indicate the trend of the wholesale price.

One significant challenge that feed manufacturers face is that the sales of animal feed in India are subject to the Essential Commodities Act, which allows the government to control prices. As a result, feed companies say they haven't been able to pass the total cost of inflation on to the farmers and have seen their margins evaporate. Many say that their profitability has been challenged, with raw material purchases now representing around 90% of their net sales realization. Although controlling feed costs is a meaningful way to protect farmers, there's also a risk that feed companies reduce the quality of their feed to remain profitable, which may cause a negative spiral in India's industry.

THE FEED MANUFACTURERS' LANDSCAPE

There are around 35 companies in India that manufacture shrimp feed, with a combined capacity of about 3.5m MT. In FY 2022-2023, their combined shrimp feed sales were around 1.35m MT. In this section, we'll dive into these companies and their operations.

MANUFACTURING CAPACITY

India's total shrimp feed market in FY 2022-2023 was estimated at around 1.3-1.35m MT. With a processing capacity of about 3.5m MT, there's a significant overcapacity. While the five leading shrimp feed manufacturers operate at 40-75% utilization levels, a second group only operates between 15-30%. Yet another group manufactures shrimp feed only occasionally or may have stopped production entirely. This situation may worsen as some capacity expansion is still expected while production growth is unlikely to increase at an equal rate.

MARKET SHARES

Avanti Feeds is the largest shrimp feed manufacturer. In 2022, it reported sales of 525,000 MT, a 40% market share. In 2023, the company expects to maintain its sales volume, but its market share will grow to around 45% in a contracting market. Avanti Feeds does not produce fish feed, but with its current shrimp feed sales volume the company is not only India's largest shrimp feed manufacturer, but also its largest overall aquafeed manufacturer.

CP Group doesn't disclose its sales volumes, but industry insiders estimate sales at around 200,000-250,000 MT, a 15-20% market share. Complemented by Deepak Nexgen and Devi Sea Foods (each selling between 100,000 and 150,000 MT), and Sandhya Marines (selling just below 100,000 MT), the top 5 shrimp feed manufacturers account for almost 80-85% of total shrimp feed sales. Important to note is that Deepak Nexgen also produces fish feed. If we'd look at total aquafeed production, the company claims that it is currently India's second largest producer, following Avanti Feeds.

While Avanti's market share in shrimp feed is growing, CP Group's share has remained stable at best amidst the surge of new players. All other three companies in the top 5 are reporting year-on-year growth of shrimp feed sales.

TABLE 4: AN OVERVIEW OF INDIA'S COMPANIES WITH SHRIMP FEED MANUFACTURING CAPACITY

COMPANY	First shrimp feed mill	Aqua-feed mills	Location of feed mills	Production capacity			Shrimp feed sales FY 2022-2023**
				Shrimp*	Fish**	Land animals	
AVANTI FEEDS	1993	6	Andhra Pradesh (East Godavari (2), West Godavari (3)), Gujarat (Pardi (1))	Very large	No	No	Very large
CP GROUP	1996	6	Andhra Pradesh (West Godavari (1), East Godavari (1), Krishna (1), Vizianagaram (1)), Gujarat (Valsad (1)), Tamil Nadu (Chennai (1))	Very large	Medium	Yes	Large
DEEPAK NEXGEN	2017	3	Andhra Pradesh (Krishna (3))	Large	Large	No	Medium
DEVI SEA FOODS	2017	3	Andhra Pradesh (Kakinada (2), Prakasam (1))	Large	No	No	Medium
SANDHYA MARINES	2019	2	Andhra Pradesh (West Godavari)	Medium	No	No	Small
GROWEL GROUP	2012	4	Andhra Pradesh (Krishna (3)), Odisha	Large	Large	No	Small
BMR GROUP	2016	2	Andhra Pradesh (Nellore)	Medium	No	No	Small
IB GROUP (ABIS)	2012	1	Telangana (Hyderabad)	Medium	Large	Yes	Small
GODREJ AGROVET	2001	1	Andhra Pradesh (Krishna)	Medium	Yes, unknown	Yes	Small
THE WATERBASE	1993	2	Andhra Pradesh (Nellore)	Medium	No	No	Small
FALCON MARINE	2019	1	Odisha (Bhubaneswar)	Small	No	No	Small
GROBEST GROUP	2002	1	Tamil Nadu (Chennai)	Small	No	No	Small
SANDHYA AQUA	2023	1	Andhra Pradesh (East Godavari)	Small	No	No	Small
SHENG LONG BIO-TECH	2014	1	Tamil Nadu (Chennai)	Small	No	No	Small
CARGILL AQUA NUTRITION	2018	2	Andhra Pradesh (Kakinada, Krishna)	Very small	Medium	No	Small
FEDORA SEA FOODS	2015	1	Andhra Pradesh (Nellore)	Very small	No	No	Small
PASUPATI GROUP	2019	1	Odisha (Cuttack)	Small	No	Yes	Very small
ROYALS MARINE	2019	1	Andhra Pradesh (Guntur)	Small	No	No	Very small
DEVI FISHERIES	2020	1	Andhra Pradesh (East Godavari)	Small	No	No	Very small
RNK AGRO & CHEMICALS	2015	1	Telangana (Hyderabad)	Small	Yes, unknown	No	Very small
COASTAL FEEDS	1994	1	Andhra Pradesh (Krishna)	Small	Yes, unknown	No	Very small
RUDRA TECHNO FEEDS	2010	1	Andhra Pradesh (West Godavari)	Very small	Small	No	Very small
SKRETTING INDIA	2023	1	Gujarat (Surat)	Very small	Very small	No	Very small
ANANDA GROUP	2008	1	Andhra Pradesh (West Godavari)	Very small	Medium	No	Very small
ISHI MARINE TECHNOLOGIES	2014	1	Gujarat (Bharuch)	Very small	No	No	Very small
BHARAT LUXINDO AGRIFEEDS	2006	1	Andhra Pradesh (West Godavari)	Very small	Small	No	Very small
NAGA HANUMAN GROUP	2014	1	Andhra Pradesh (Eluru)	Very small	No	No	Very small
AMRIT FEEDS	2012	1	West Bengal	Very small	Medium	Yes	Very small
BISMI FEEDS	2008	1	Tamil Nadu	Very small	No	No	Very small
SHARAT INDUSTRIES	1994	1	Andhra Pradesh (Nellore)	Very small	No	No	Very small
NG FEEDS	2018	1	Andhra Pradesh (Krishna)	Very small	Medium	No	Very small
KWALITY FEEDS	2014	1	Andhra Pradesh (Krishna)	Very small	Small	No	Very small
NIPPAI SHALIMAR FEEDS	2014	1	West Bengal (Paschim Medinipur)	Very small	Yes, unknown	Yes	Very small

Source: Industry sources, company websites, and personal communications

* Very large = > 400k MT, large = 200-400k MT, medium = 100-200k MT, small = 50-100k MT, very small = < 50k MT.

** Very large = > 400k MT, large = 200-400k MT, medium = 100-200k MT, small = 20-100k MT, very small = < 20k MT. If the production capacity is unknown, this is indicated.

Disclaimer: Not all companies publicly disclose their information and therefore it's sometimes impossible to verify exact capacity and sales numbers. Therefore, in Table 4, manufacturers are categorized based on approximate numbers. More detailed per-company data is provided in the company profiles of India's leading feed manufacturers on pp. 154-193.

Besides the top five, around 10-15 companies with active shrimp feed manufacturing plants account for the remaining 15-20% of shrimp feed sales.

HISTORY

Avanti Feeds and CP Group have been producing shrimp feed since 1992, when commercial *P. monodon* farming began to develop in India. They have established well-known brands and strong distributor networks. Some other players, such as Coastal Feeds, Sharat Industries, and The Waterbase, have also been around since the early 1990s but only have minor market shares today.

While a few new players entered the market in the first decade of the 21st century, most did so during the surge of *L. vannamei* production since 2010. From that time onward, 23 new companies have started shrimp feed manufacturing operations. Most of the new entrants have struggled to expand beyond the need of their farms and captive farmer networks. Of the current top 5, Deepak Nexgen (2016), Devi Sea Foods (2017), and Sandhya Marines (2019) have only started manufacturing shrimp feed in the 2010s.



The success of these three companies is primarily related to their existing farmer and distributor networks. In the case of Devi Sea Foods and Sandhya Marines, it's related to their processing businesses, and Deepak Nexgen benefits from its previous engagements in aquafeed. Neither of the three were new to shrimp feed distribution, but they have now taken manufacturing into their own hands.

GEOGRAPHY

India's shrimp feed manufacturing capacity is concentrated in Andhra Pradesh, close to the main shrimp farming regions in the state's central and southern districts. Central Andhra Pradesh's feed mills are primarily situated in the districts of East and West Godavari and Krishna. In the south, the feed mills are mostly located in Nellore. The feed mills in the neighboring state of Tamil Nadu also cater to the market in southern Andhra Pradesh. The feed mill cluster in the central districts has been responsible for much of the recent capacity growth, with only a few new feed mills having been established in the south.

Several companies have recently set up feed mills in Gujarat on the West Coast and in Odisha and West Bengal in the northern part of the East Coast. The companies that opened their feed mills in these regions anticipated shrimp production in these states to grow. It's unclear whether that will happen under the current market conditions. By cutting logistics costs and fostering relationships with local feed distributors and farmers alike, they expect to be better positioned to compete with companies that have to deliver their feed from Andhra Pradesh.





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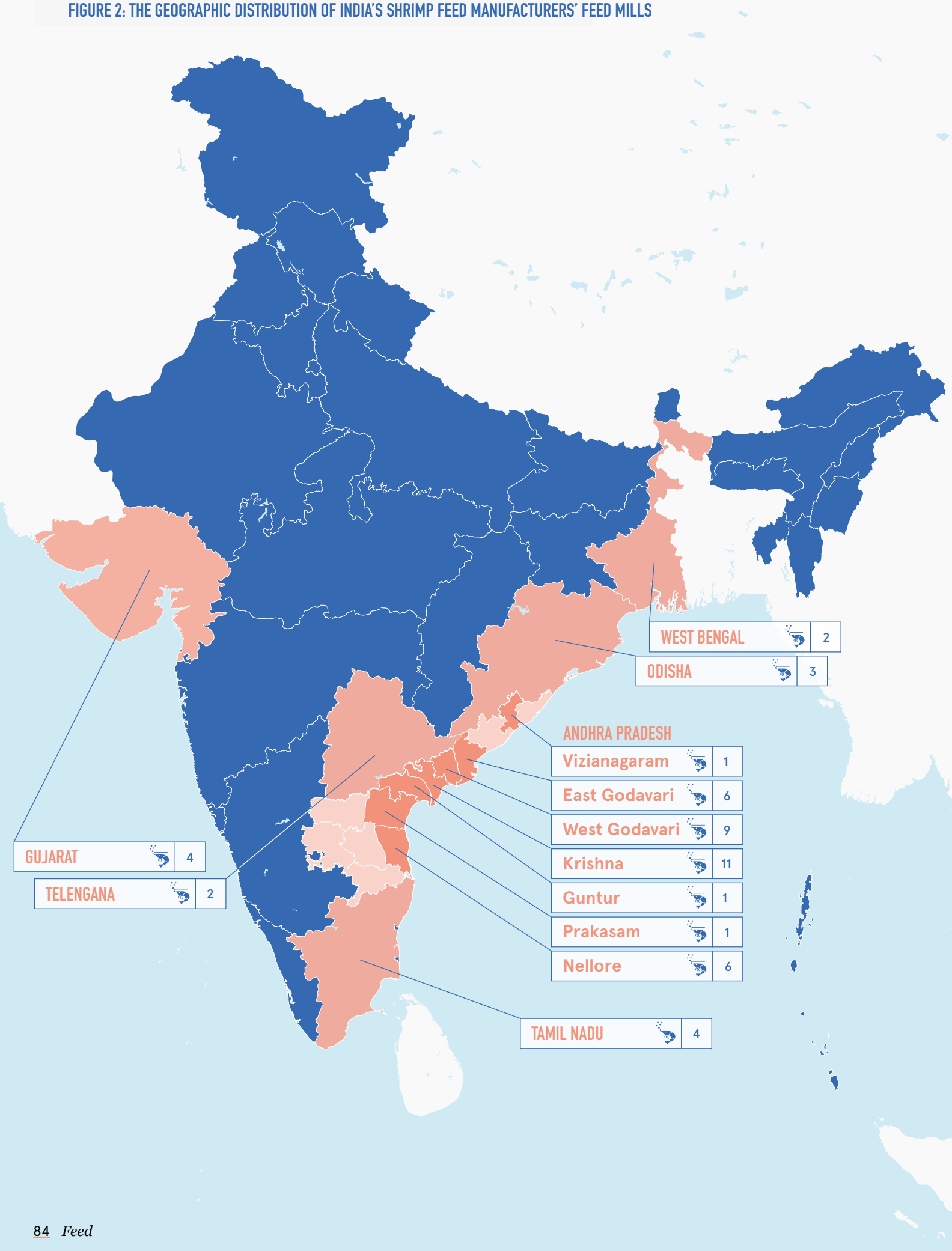
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FIGURE 2: THE GEOGRAPHIC DISTRIBUTION OF INDIA'S SHRIMP FEED MANUFACTURERS' FEED MILLS



Foreign direct investment has been pouring into shrimp feed manufacturing for many years, with large multinational animal and dedicated aquafeed manufacturers having entered the Indian market

- Thai Union Group invested in Avanti Feeds in 2009 and today owns 24% of Avanti's shares. The companies also co-own Avanti Frozen Foods, a shrimp processor and exporter.
- Sheng Long Bio-Tech is a subsidiary of Guangdong Haid Group, one of China's largest shrimp feed manufacturers. The company opened its first shrimp feed mill in Chennai in 2014 and also operates a hatchery.
- Cargill has been active in the Indian fish and shrimp feed market since 2006. Until 2018, it toll manufactured locally. But in 2018, the company acquired its first dedicated aquafeed mill from Mulpuri Feeds.
- While Skretting, owned by Nutreco, has been active on the Indian market for some time, selling from its facilities in Vietnam, the company didn't open its first feed mill in India until 2023.

The mill is located in Gujarat and produces both fish and shrimp feed.

- Chinese animal feed and shrimp conglomerates Guangdong Evergreen Feed Industry and Zhanjiang Guolian Aquatic Products also tried to establish feed operations in India. Both companies founded a local subsidiary and signed memorandums of understanding with local partners, but both projects were called off for reasons that were not made public.

Besides (co-)ownership of Indian feed mills, other foreign companies export shrimp feed to India from overseas facilities. Today, one of the most active companies in this regard is Uni-President, which ships shrimp feed from Vietnam and sells it through an Indian dealer network.

FOREIGN DIRECT INVESTMENT

Foreign direct investment (FDI) has been pouring into shrimp feed manufacturing for many years, with large multinational animal and dedicated aquafeed manufacturers having entered the Indian market. But besides Thai Union and CP Group, the volumes of shrimp feed sold by these foreign companies are small. The following foreign companies are involved:

- CP Group entered the Indian shrimp industry in 1992 and opened its first feed mill in 1996 in Chennai. It owns two companies engaged in aquaculture in India that together run six feed mills, a processing plant, and several hatcheries.
- In 1994, Grobest Group from Taiwan opened a feed distribution business in India. In 2002, it opened a feed mill in Chennai. After several upgrades, the company continues to operate this mill today.

COMBINING FISH AND SHRIMP FEED MANUFACTURING

At least 16 of India's shrimp feed manufacturers can also produce fish feed. While shrimp is primarily farmed along India's coastline, fish is mainly farmed in India's many inland lakes and reservoirs. India is among the world's largest producers of Indian major carp and Chinese carp, and other freshwater fish species.

Andhra Pradesh and Odisha are among the leading farmed fish producers in India. Many companies in Andhra Pradesh, therefore, do not only produce shrimp feed but also fish feed. Some even started with fish and only later installed capacity for shrimp. Companies engaged in fish and shrimp feed include some of the top 5 shrimp feed manufacturers, such as CP Group (although industry sources say that CP Group recently stopped producing fish feed in India) and Deepak Nexgen; other large players such as Ananda Group, Cargill, Growel Group, and NG Feeds; and many smaller players. Interestingly, all these companies primarily originate from an aquaculture feed manufacturing background rather than from a shrimp processing background. The companies with a shrimp processing background seem uninterested in producing other aquafeed.

Extensive large-scale freshwater fish farming also occurs in northern states such as Assam, Bihar, Uttar Pradesh, and West Bengal. Fish farmers in the northern states are primarily catered to by companies that have already established feed dealer networks in these states for other animal feed, primarily poultry. This includes India's largest animal feed manufacturers, such as Godrej Agrovet and IB Group, but animal feed manufacturers (primarily poultry) from West Bengal should also be mentioned, such as Amrit Feeds, Nippai Shalimar Feeds, and Anmol Feed. Most of these primarily target fish feed but have been attempting to enter the shrimp feed segment in their regions. So far, these attempts haven't been reported to be very successful.



FISH MEAL

62% - 63%

PRODUCT OF

PRODUCT OF INDIA

PRODUCT OF INDIA

PRODUCT OF INDIA



Credit: Growel Group



VERTICAL INTEGRATION

Many of India's leading shrimp groups today have integrated feed manufacturing and shrimp processing into one operation. Some feed players invested in feed first before moving to shrimp processing. This includes players such as Avanti Feeds, CP Group, Deepak Nexgen, and Growel Group. Others were processors and exporters who went on to invest in feed manufacturing. Some of these are among today's largest shrimp feed manufacturers, such as Devi Sea Foods and Sandhya Marines. Many others operate at a smaller scale, such as BMR Group, Devi Fisheries, Falcon Marine, and Royals Marine. The shrimp feed manufacturers that haven't gotten involved in processing include broadline animal feed manufacturers such as Amrit Feeds, Godrej Agrovvet, and IB Group.

One of the main reasons companies integrate feed manufacturing and shrimp processing relates to how shrimp feed

*Vertically
integrated
companies will
likely maintain
or grow their
market shares*

is sold: mostly on credit. Feed manufacturers and the dealers they work with prefinance feed for farmers. When those farmers harvest, they may be unable or unwilling to settle their dues quickly. The fastest way for a feed company or dealer to recover cash and reduce risk of outstanding credit is to buy back the shrimp and pay the distributor and farmer the balance. If the feed company has its own processing operation, it can process and sell the shrimp and recover

cash from the export markets. This is also why some feed companies such as CP Group and Growel Group export primarily to China; Chinese buyers often pay cash against documents, which is the quickest way to get paid. The companies involved can optimize their cash flow and margins when they have feed manufacturing, shrimp processing and shrimp exports in their own hands. India's shrimp feed distribution model will be discussed in more detail in the chapter on transactions on p. 122.

Vertically integrated companies will likely maintain or grow their market shares as the industry requires feed companies to recover cash through buy-back arrangements. This trend may only change when larger animal feed manufacturers can out-compete today's players due to their scale of operations, their financial strength, or the perceived superiority of their products.

From exposed to protected

In aquaculture, fish and shrimp are constantly exposed to pathogen pressures, environmental fluctuations and other production stressors, negatively impacting survival and productivity.

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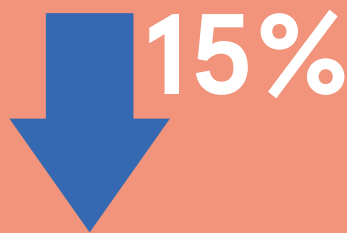


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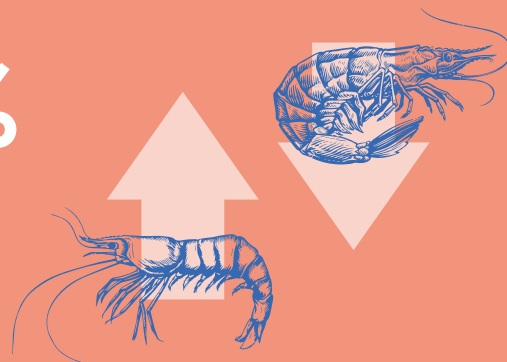
POST-LARVAE



The Indian *L. vannamei* PL market was at its peak in 2021 and amounted to around 100bn PL. The total value of PL sales in that year is estimated at around \$210–280m. Since 2021, the market size has shrunk by roughly 15%.



Broodstock supplies of *P. monodon* and *L. vannamei*—both imports and local production—reached a total of 223,874 in 2023, a drop of 15% from 2022.



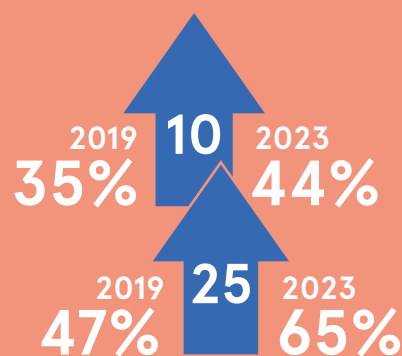
L. vannamei broodstock accounts for the largest part of broodstock supplies, reaching 198,145 in 2023. The remainder consists of *P. monodon*. While *L. vannamei* broodstock supplies are dropping, *P. monodon* broodstock supplies are rising.



Since 2019, the Indian government has granted market access to two SPF *P. monodon* genetics suppliers. In 2023, the domestic government-run *P. monodon* breeding program also started providing broodstock to local hatcheries.



There are around 450 shrimp hatcheries in India owned by roughly 350 groups. Only 89 of these groups imported or locally sourced broodstock in 2023. The majority of hatcheries are individually owned and operate at a small scale.



The hatchery segment is consolidating. The import share of the top 10 groups increased from 35% in 2019 to 44% in 2023, while the import share of the top 25 increased from 47% to 65% over the same period.

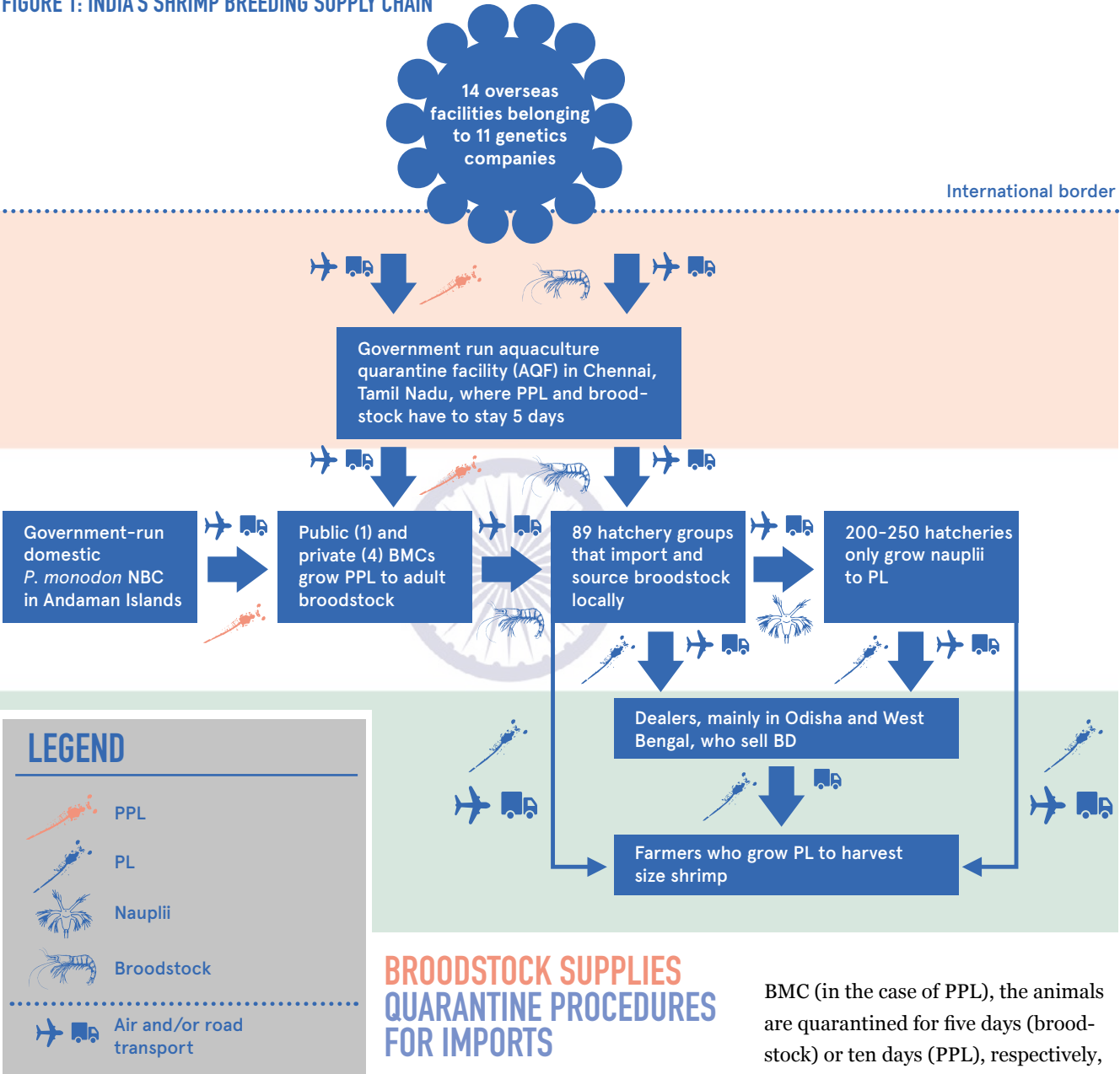


Local broodstock production is on the rise. Five BMCs have been established in India, four of which are already operational. Three of these BMCs produce *L. vannamei* broodstock, the other two produce *P. monodon*. One of the five is run by the government, the others are privately owned.

In this chapter you'll get an overview of India's genetics supply chain, including the import and local production of broodstock, the hatchery landscape, and the production of PL. It will also provide insights into local breeding programs and suppliers of specialized hatchery feeds.

THE SUPPLY CHAIN

FIGURE 1: INDIA'S SHRIMP BREEDING SUPPLY CHAIN



Today, India almost entirely depends on overseas broodstock and PPL suppliers. These suppliers transport their product in oxygenated bags in boxes from their facilities to a local airport by truck. From there, the products are transported by plane directly or via transfers to the airport in Chennai, India.

Before being supplied to the Indian hatchery (in the case of broodstock) or

BMC (in the case of PPL), the animals are quarantined for five days (broodstock) or ten days (PPL), respectively, at the Aquatic Quarantine Facility (AQF) in Chennai, to prevent the introduction of diseases. The facility is operated by the Rajiv Gandhi Centre for Aquaculture (RGCA) of the Marine Products Export Development Authority (MPEDA). Opened in 2009, after several expansions, the facility can today accommodate more than 700,000 broodstock annually. India is the only major shrimp producer with a centralized quarantine facility.

CAA Accredited Broodstock and PPL Suppliers

L. VANNAMEI



AMERICAN
PENAID

1. American Penaeid,
the US (Florida)



Benchmark
Genetics

2. Benchmark
Genetics, Colombia
and the US (Florida)



GLOBAL GEN

3. Bibit Unggul
(Global Gen), Indonesia



BLUE GENETICS
Caring for life

4. Blue Genetics,
Mexico and the US
(Texas)



KONA BAY
HENDRIX GENETICS

5. Hendrix
Genetics-Kona Bay,
the US (Hawaii)



Molokai Broodstock Company

6. Molokai
Broodstock,
the US (Hawaii)



HAWAII
PACIFIC
UNIVERSITY

7. Oceanic Institute,
the US (Hawaii)



SHRIMP
IMPROVEMENT
SYSTEMS

8. Shrimp Improvement
Systems, Singapore
and the US (Florida and
Hawaii)



SyAqua

9. SyAqua, the US
(Florida)

P. MONODON



MOANA
Marine Biotech

10. Moana Technolo-
gies, the US (Hawaii)



unima
LA UNIVERSITE DE MAHAJAMBA

11. Aquaculture de la
Mahajamba (Unima),
Madagascar



ACCREDITED OVERSEAS SUPPLIERS

To access the Indian market, overseas suppliers need to apply for accreditation with the Coastal Aquaculture Authority (CAA). So far, the CAA has accredited eleven companies. Nine companies are certified to supply *L. vannamei*, and two are accredited to supply *P. monodon*. The *L. vannamei* suppliers are mainly based in the US (Florida, Hawaii, and Texas), and to a lesser extent in Indonesia and Mexico, while the *P. monodon* suppliers are located in Madagascar and the US (Hawaii).

Due to disease concerns, suppliers from Southeast Asia have been banned since 2013 and are therefore absent from the Indian market. A new CAA regulation dated February 2023 has lifted the ban and welcomed suppliers from countries such as Thailand and Vietnam. The new regulation is likely to have an impact on the broodstock landscape:

**A new CAA
regulation dated
February 2023
has welcomed
suppliers from
countries such
as Thailand and
Vietnam**

- Suppose CPF Thailand's operations gain market access. In that case, its Indian subsidiary would be allowed to import broodstock from the company's breeding program rather than buying from third parties.
- New SPF *P. monodon* sources may become available from suppliers such as CPF and Top Aquaculture Technology (two Thai companies). This will benefit farmers as today's suppliers have exclusive relationships with certain hatchery operators. If more suppliers are approved, more hatcheries will have access to SPF *P. monodon* genetics.

LOCAL BMCs

While Indian hatcheries used to only have access to broodstock reared overseas, in recent years, the Indian government has encouraged overseas suppliers and hatchery companies in India to set up BMCs in India.

Today, India has five BMCs (see Figure 2). MPEDA's RGCA operates one; the other four are run privately. Two private BMCs are a joint venture between an overseas broodstock supplier and a local hatchery operator. Indian hatchery groups own the other two. Only one of the privately operated BMCs is designated for *P. monodon*. The other BMCs are all designed for *L. vannamei*. MPEDA's RGCA BMC also produces *P. monodon* PPL broodstock from its domestic breeding program

in Andaman (see the box on p. 99). The five BMCs can produce around 400,000 broodstock annually, more than the market currently needs.

Rather than importing adult broodstock, the local BMCs obtain PPL from overseas. The RGCA BMC is an exception, as it secures PPL from a domestic breeding program. The BMCs grow the PPL into adult broodstock. After culling, only the best performing animals are supplied as adult broodstock to hatcheries. The locally raised broodstock is said to have experienced less stress than imported broodstock, perform better than imported broodstock because it has been raised under local conditions, and is more affordable due to reduced logistics costs.

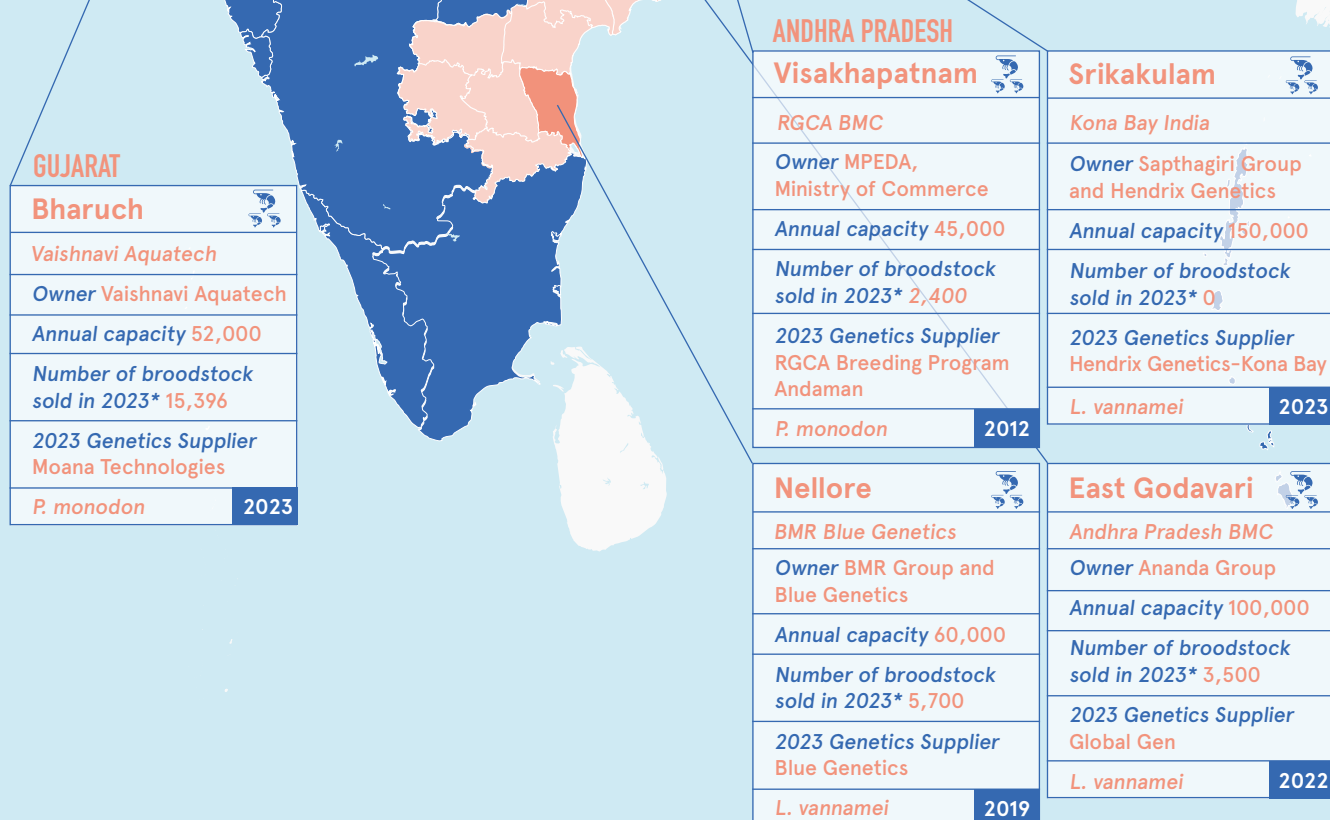
Local BMCs need local hatcheries to trust the quality of their broodstock

But the local BMCs are also confronted with challenges. Most importantly, they need local hatcheries to trust the quality of their broodstock. This is not straightforward because the Indian BMC owners also operate the hatcheries. As they're a broodstock supplier at the same time, they could be a competitor in the PL market. As a result, most BMCs primarily supply their own hatcheries. Only if local BMCs can prove that their broodstock performs well, they can gain significant market share over the next few years.



Credit: Hendrix Genetics

FIGURE 2: AN OVERVIEW OF INDIA'S LOCAL BMCS



* Source: The CAA

TOTAL SUPPLIES

India's *L. vannamei* broodstock imports peaked at 274,662 in 2021 before dropping to 255,338 in 2022. In 2023, imports decreased further to 193,288, well below 2019-2022 figures (see Figure 3). Local BMCs increased production from almost zero in 2021 and 2022 to 9,200 broodstock in 2023, and compensated partly for the drop in imports.

P. monodon broodstock supplies increased rapidly since the first companies received import permits in 2019. In 2022, there wasn't any BMC production yet, and imports amounted to 7,441. The number of *P. monodon* broodstock supplied to the market increased to 21,359 in 2023, 3,563 of which were imported and 17,796 produced by local BMCs.

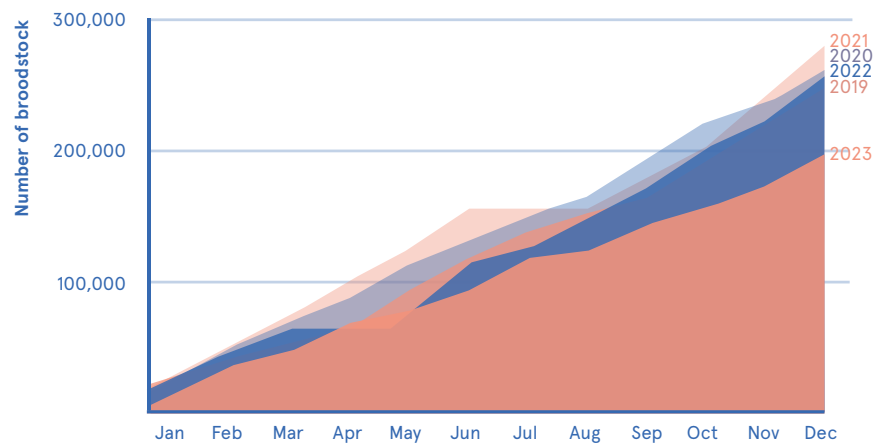
Broodstock supplies of *P. monodon* and *L. vannamei*—both imports and local production—reached a total of 223,874 in 2023. This drop of 15% (from 263,379 in 2022) is in line with the dip in India's production that's expected in 2023 due to the global oversupply.

MARKET SHARES *L. VANNAMEI*

While nine companies are accredited to supply broodstock to India, a few dominate the market (see Figure 4). Shrimp Improvement Systems (SIS) has been the largest supplier recently, with a market share ranging between 41% and 56% from 2019 to 2022. Its slightly increased market share in 2020 and 2021 resulted from logistics challenges that suppliers from Hawaii were confronted with due to limited availability of air cargo during the COVID-19 pandemic. While SIS could divert to its facilities in Florida, Hendrix Genetics-Kona Bay, another top player, had to improvise to supply its customers in India during this period. SIS' increased market share in 2023 again had to do with Hendrix Genetics-Kona Bay, which lost access to the Indian market for several months. In absolute numbers, SIS's supplies declined from 110,213 broodstock in 2022 to 93,851 in 2023.

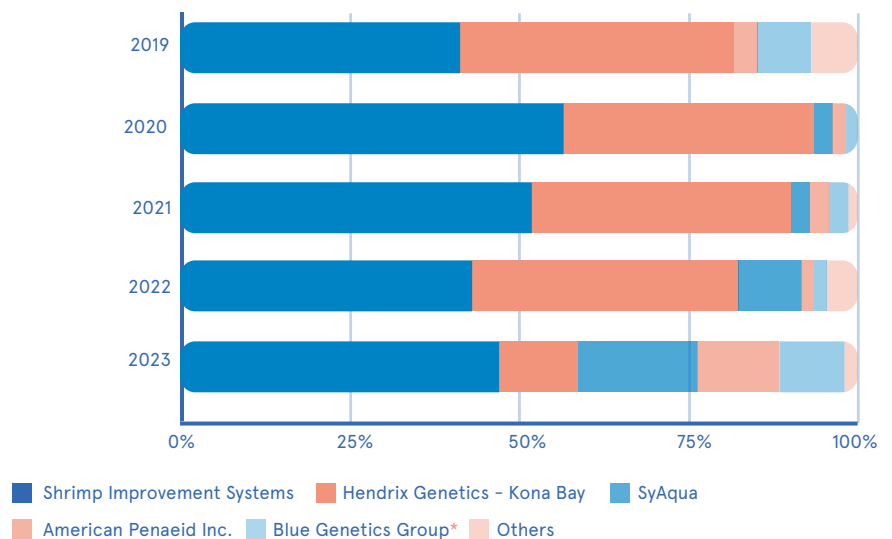
*The drop of 15%
in broodstock
supplies is in
line with the dip
in India's pro-
duction that's
expected in 2023
due to global
oversupply*

FIGURE 3: CUMULATIVE MONTHLY *L. VANNAMEI* BROODSTOCK IMPORTS 2019-2023



Source: The CAA

FIGURE 4: MARKET SHARES OF CAA ACCREDITED OVERSEAS *L. VANNAMEI* BROODSTOCK SUPPLIERS AND LOCAL BMCs



Source: The CAA

* Blue Genetics Group includes supplies from Blue Genetics Mexico, Sea Products Development in the US, and BMR-Blue Genetics in India.







Broodstock in Florida being prepared for air transport to India

Hendrix Genetics-Kona Bay temporarily lost market access due to a positive EHP test for one of its broodstock consignments

Hendrix Genetics-Kona Bay has been India's second largest supplier between 2019 and 2022, with a 37-40% market share. In 2023, they dropped to fourth place. The reason? According to the Department of Fisheries' annual report for FY 2022-2023, the company temporarily lost market access due to a positive EHP test for one of its broodstock consignments tested by the AQF in December 2022. After working with the Indian government to resolve this issue, Hendrix Genetics-Kona Bay was relisted as accredited supplier in August 2023. Since then, the company

has restarted shipments to India. In the meantime, several other suppliers such as SyAqua and American Penaeid (API) gained market share. But with the opening of its BMC in India in October 2023, Hendrix Genetics-Kona Bay's market share may grow in 2024 and beyond.

Besides these two historically most prominent players, SyAqua has also gained significant market share over the past two years. As a major hatchery feed supplier, SyAqua has used its existing network to promote its new Balanced genetics line. SyAqua PL have become known among farmers for performing well in the face of the white feces disease, which helped SyAqua penetrate the market. While the company grew its market share in 2022 to 9%, and even further to 18% in 2023, it's rumored that it cannot sustain further growth until its capacity expansion has been completed. In 2023, with 35,196 broodstock supplied, SyAqua was India's second largest imported broodstock supplier.

API is also trying hard to enter the Indian market. Besides its Dragon line, the company sells a line that it produces in partnership with CP Group's Homegrown Shrimp USA: the Kong line. According to API, in 2023 it sold 23,838 broodstock to India. With a market share of 12%, that makes it India's third largest imported broodstock supplier.

Another company that remains active in the Indian market is Blue Genetics. It operates a local BMC and sells broodstock on the open market. Since merging with US broodstock supplier Sea Products Development (SPD), and, as a result, being able to ship from Mexico and the US, it has grown its business in India significantly in 2023: with a market share of 5% and 18,040 broodstock supplied in 2023, it holds a fifth position after the four companies discussed earlier.

Domestic Breeding Programs

During COVID-19, it became clear how vulnerable India's dependency on overseas PPL and broodstock suppliers is when logistics from Hawaii and Florida were hampered. To make India less dependent, MPEDA and the Department of Fisheries have been investing in domestic breeding programs in recent years.



P. MONODON

Moana Technologies has an exclusive partnership with Vaishnavi Aquatech. While it has been supplying Vaishnavi Aquatech's hatcheries with broodstock since 2022, Moana Technologies has recently started supplying Vaishnavi Aquatech's new BMC in Gujarat with PPL. According to the CAA, in 2023, Vaishnavi imported PPL to produce 15,396 broodstock locally. The company supplied all broodstock exclusively to its own hatcheries; it owns and leases five hatcheries under the following names: Vaishnavi, Kushi, BKMN, Nandan, and Munnagi.

Malagasy company Aquaculture de la Mahajamba is part of Unima Group, Madagascar's largest vertically integrated shrimp company. The company supplies broodstock to four Indian hatchery operators: Unibio (a hatchery co-owned by the company itself), Gayathri Bio Marine, Golden Marine hatcheries, and MAS Aqua Techniks. In 2023, Aquaculture de la Mahajamba supplied 3,563 broodstock to the Indian market, making it a much smaller player than Vaishnavi Aquatech, but equally important as it sells to a range of hatcheries, which increases farmers' options.

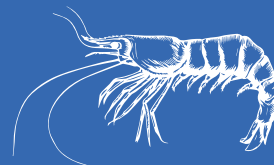
In November 2023, the RGCA government-run BMC also started selling broodstock produced from PPL from its own *P. monodon* breeding program in the Andaman Islands. Within two months, it supplied CP Group, BMR Group, and Royal Hatcheries with a total of 2,400 broodstock. The BMC can sell on the open market as long as the hatcheries are approved by the CAA for production of *P. monodon* PL.

P. MONODON

In 2005, MPEDA's RGCA established a domestic breeding program for *P. monodon*. It took until 2013 before the NBC, located in an isolated area in the south of the Andaman Islands, was completed. The program, called the "Domestication of Tiger Shrimp Project," started operations in 2014 and today runs its thirteenth generation, holding nearly 50 SPF families.



In 2023, MPEDA invested in transforming its BMC for *L. vannamei* in Andhra Pradesh into a facility suited for *P. monodon* production. In the last months of 2023, the BMC started supplying various hatcheries with *P. monodon* broodstock raised from PPL from its NBC. The BMC's transformation was funded by the , implemented by the Department of Fisheries.



L. VANNAMEI

In 2020, MPEDA and its research division RGCA concluded a tender to set up an NBC for *L. vannamei*. The tender was awarded to the Oceanic Institute, which was tasked with supplying MPEDA with: (1) technical guidance related to setting up the NBC infrastructure, (2) technical direction for proper management of the breeding program, and (3) germplasm to start the breeding program in the NBC. Once into operation, the NBC should produce sufficient PPL to supply its BMC in Andhra Pradesh with 45,000 broodstock annually. To what extent this tender agreement has been carried out is unclear at this point. But, with the recent shift in the industry towards *P. monodon*, plans for a domestic *L. vannamei* breeding program may be postponed. It is rumored, though, that some of the companies involved in the BMCs also aspire to set up local NBCs.



P. INDICUS

Since 2021, the Indian government has supported the development of a breeding program for *P. indicus*, a species native to India. The goal is to move away from a single-species model for its shrimp industry as part of the "Make in India" initiative. The government has provided funds to the Central Institute of Brackishwater Aquaculture (CIBA) based out of Tamil Nadu to set up a full-fledged breeding program. The breeding program aims to make significant genetic improvements and offer hatcheries in India and worldwide an alternative species that can be grown at moderate stocking densities in semi-intensive production systems. If successful, the broodstock will take five to ten years to become commercially available. The program is funded by the PMMSY program.

The hatcheries combined probably have an annual production capacity of around 200bn PL

Some of today's largest hatchery groups have been active in India's hatchery segment since the 1990s

L. vannamei hatcheries are primarily located in Andhra Pradesh and Tamil Nadu



THE HATCHERY LANDSCAPE

At the end of FY 2021-2022, the CAA approved 305 hatcheries (facilities with maturation units) to import SPF *L. vannamei* broodstock and another 155 nauplii rearing hatcheries (NRHs) (facilities without maturation units) for *L. vannamei* PL production. Industry sources mention that the hatcheries combined probably have an annual production capacity of around 200bn PL. Although the actual market size is only around 100bn PL, extra capacity is needed to deal with peak season demand.

HISTORY

Some of today's largest hatchery groups, such as BMR Group and CP Group, have been active in India's hatchery segment since the 1990s when commercial *P. monodon* farming started to expand. Around eight companies of today's top 25 hatchery operations were active at the time; they started with basic hatcheries without maturation units (which weren't needed to produce *P. monodon* PL from

wild spawners). Most of today's top 25 hatchery operators haven't been around that long, though, and started their business during the first decade of the 21st century. These include leading operators such as Sapthagiri Hatcheries, Vaisakhi Bios, and Golden Marine, each operating over five hatcheries along India's East Coast and the first even operating over 25. But also smaller operators with up to three facilities in one location in Tamil Nadu or Andhra Pradesh started during the beginning of the 21st century.

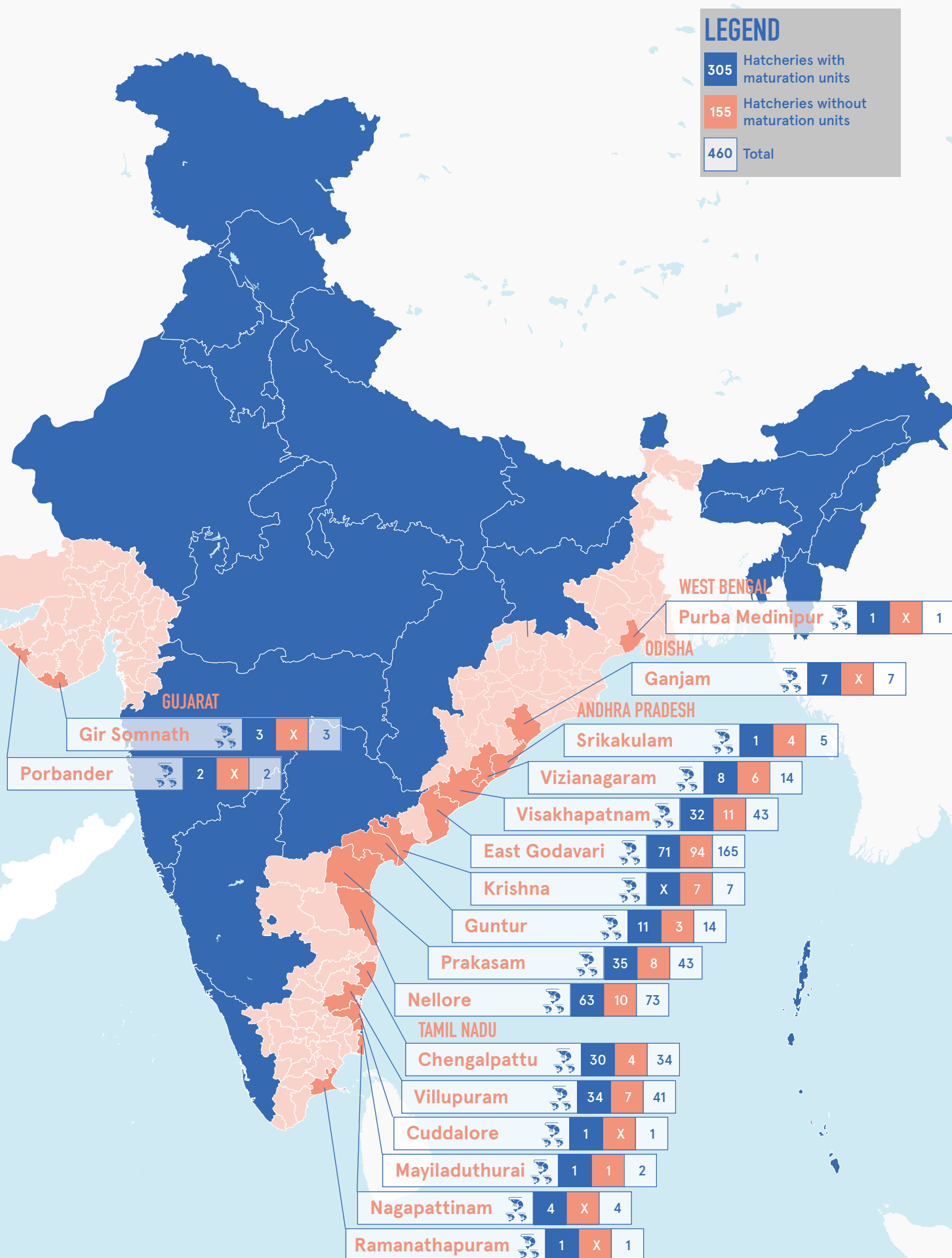
Although fewer in numbers, we've seen some new hatchery entrants over the last ten years. These include vertically integrated shrimp conglomerates such as Devi Sea Foods, Devi Fisheries, Avanti Feeds, Sandhya Aqua, and Apex Frozen Foods but also a few smaller players that set up new facilities.

GEOGRAPHY

L. vannamei hatcheries are primarily located in Andhra Pradesh (75%) and Tamil Nadu (20%); the remainder is spread over Odisha, Gujarat, and West Bengal. Within Andhra Pradesh, the hatcheries are concentrated in East Godavari and Visakhapatnam in the north and Nellore and Prakasam in the south. In Tamil Nadu, the hatcheries are mainly located between Pondicherry and Chennai in the Villupuram and Chengalpattu districts. Whereas hatcheries in Andhra Pradesh cater primarily to markets close to home, hatcheries in Tamil Nadu produce more than local demand and supply to states without sufficient production capacity, such as Gujarat, Odisha, and West Bengal.

The CAA has also approved six *P. monodon* hatcheries with maturation units and five without maturation units for SPF PL production. Jointly, these hatcheries can easily produce 3-5bn PL annually. These eleven approved hatcheries are located in Tamil Nadu and Andhra Pradesh.

FIGURE 5: INDIA'S HATCHERIES WITH AND WITHOUT MATURATION UNITS AND THEIR PL PRODUCTION CAPACITY



INDIA'S LARGEST HATCHERY OPERATORS

As no figures on PL sales are public, the only way to establish trends in the number of companies engaged in PL production is to look at the broodstock sourcing data provided by the CAA.

L. VANNAMEI

According to CAA data, 89 hatchery operators imported or locally sourced *L. vannamei* broodstock in 2023. The top 15 are listed in Table 1. While the top four stands out, there's a large group of mid-sized operators whose

position changes frequently depending on the market. Although the amount of broodstock doesn't equal PL sales, it's a good indication of the role the companies play in the market.

TABLE 1: INDIA'S TOP 15 HATCHERY OPERATORS BASED ON NUMBER OF IMPORTED AND LOCALLY SOURCED *L. VANNAMEI* BROODSTOCK IN 2023

COMPANY NAME	AMOUNT OF IMPORTED AND LOCALLY SOURCED BROODSTOCK*						Number of hatcheries**	Location of hatcheries***
	Active since	2019	2020	2021	2022	2023		
SAPTHAGIRI GROUP	2001	13,960	17,760	17,600	25,120	15,288	27	Andhra Pradesh
VAISAKHI BIOS	2001	14,876	17,132	18,280	18,144	14,020	8	Andhra Pradesh (5), Tamil Nadu (3)
BMR GROUP	1991	13,212	12,980	18,500	13,096	13,476	11	Tamil Nadu (5), Andhra Pradesh (6)
CP GROUP	1996	8,800	5,100	7,200	7,898	10,000	7	Andhra Pradesh (4), Tamil Nadu (2), Gujarat (1)
GOLDEN MARINE	2008	7,200	5,720	7,700	9,264	7,488	11	Tamil Nadu (10), Gujarat (1)
SVR GROUP	Unknown	7,999	8,000	6,600	11,420	6,824	2	Andhra Pradesh
SRI MAHALAKSHMI HATCHERIES	Unknown	2,380	4,900	3,580	7,100	4,700	3	Andhra Pradesh
MEENAKSHI HATCHERIES	2001	6,420	3,110	5,180	5,750	4,350	2	Andhra Pradesh
NGR AQUATECH	1994	4,900	3,480	5,920	4,944	4,204	X	
GAYATHRI HATCHERIES	1998	6,140	5,220	4,680	4,272	4,060	3	Andhra Pradesh (2), Tamil Nadu (1)
SRI MANJUNATHA HATCHERY	2016	4,000	2,280	2,780	4,860	3,840	2	Andhra Pradesh
SANDHYA AQUA	2020	0	580	2,380	3,000	3,410	2	Andhra Pradesh
SAI MARINE EXPORTS	Unknown	3,360	3,540	3,560	4,800	3,300	2	Andhra Pradesh
NSR AQUA FARMS	2006	3,600	3,560	2,400	5,864	3,160	3	Andhra Pradesh
RAVI HATCHERIES	2016	1,160	2,090	3,660	3,672	3,060	2	Andhra Pradesh

Source: Broodstock import and BMC data from the CAA; number of hatcheries and locations from the CAA, company websites, and personal communications

* Since 2023, the CAA has reported detailed data on broodstock production from BMCs. This was earlier not readily available. Until 2023, broodstock production from BMCs was relatively small. In this table, broodstock deliveries from BMCs are only included for 2023.

/ The number of hatcheries per company and their locations are estimated based on information from company websites, company credit rating reports, and personal communication with company owners, staff, and other industry experts.

P. MONODON

Based on CAA figures, Vaishnavi Aquatech focuses on *P. monodon*. With 15,396 broodstock supplied to its hatcheries, it's among India's largest hatchery groups. Today, the company operates five hatcheries. While the hatcheries operating under the names Vaishnavi and Kushi have maturation units, those operating under BKMN, Nandan, and Munnagi don't have

maturation units and only rear nauplii to PL. All Vaishnavi Aquatech's hatcheries are located in Andhra Pradesh, and its BMC is in Gujarat.

The other hatchery groups in Tamil Nadu and Andhra Pradesh that already source *P. monodon* broodstock are BMR Group, CP Group, Gayathri Bio Marine, Golden Marine, MAS

Aqua Techniks, Royal Hatcheries, and Unibio (partly established by Unima and Aqualma). However, combined these groups only used 5,963 broodstock in 2023. Though the amount of broodstock doesn't equal the PL supplied to the market, the fact that Vaishnavi Aquatech uses almost three times more broodstock than the other groups combined illustrates its dominance.

VAISAKHI BIOS

FARMS

HATCHERIES



EXPORTS

TRULY INTEGRATED...



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yelra@rediffmail.com



Ravi Kumar Yellanki is the Managing Director of Vaisakhi Bios and the President of the All India Hatchery Association.

TABLE 2: MARKET SHARES OF BROODSTOCK IMPORTS OF INDIA'S TOP HATCHERY OPERATORS

	2019	2020	2021	2022	2023
TOP 10 HATCHERY OPERATORS	35%	32%	34%	42%	46%
TOP 25 HATCHERY OPERATORS	47%	44%	48%	61%	65%

Source: Raw data from the CAA, enriched by proprietary research

CONSOLIDATION

CAA data shows that the number of companies importing and locally sourcing broodstock has shrunk from a peak of around 145 companies in 2020 to 89 in 2023. The number of companies importing and locally sourcing broodstock cannot be automatically equated to the number of companies producing PL because some importers may also supply third-party hatcheries. However, industry insiders confirm that it gives a good indication. Anecdotal evidence from companies and industry insiders suggests that the number of companies owning hatcheries is declining while the number of hatcheries per company grows.

The larger integrated producers that recently entered the hatchery segment have been gaining market share from independent hatchery groups as they take the PL supply to their own farms and captive supply chain into their own hands. However, with the industry contracting in 2023, it's unclear whether these companies continue to expand their market share. Sandhya Aqua, one of the integrated producers, has seen its market share grow, though this may be due to its overall business growth strategy. The market shares of other larger integrated producers haven't grown much between 2022 and 2023.

The number of companies owning hatcheries is declining, while the number of hatcheries per company grows



Hatchery Feeds

The market size for hatchery feed (here limited to broodstock diets, PL diets, and artemia cysts) is around \$20–25m annually.

INVE Aquaculture, ADM (BernAqua and Epicore), SyAqua, and Zeigler Bros. dominate the broodstock and PL diet segment. All their feeds are imported. Although these companies have the largest market share, many others try to enter the market, often with specialized products. These include companies such as BioMar, Maktub, Catvis, and Higashimaru. Local feed companies don't have the necessary equipment to produce hatchery feeds. Growel Group is an exception; the company has recently launched a locally produced PL diet. Skretting will also likely enter this market in the future.

The artemia supplies are dominated by INVE Aquaculture, Great Salt Lake Artemia, ADM (BernAqua), and I&V Bio. While the first three companies supply dry artemia cysts, I&V Bio supplies live wet artemia. Today, the company operates two facilities in Andhra Pradesh and plans to further expand its presence in India.

Supplies of other inputs, such as polychaetes and squid, used to feed broodstock, are partly locally produced and partly imported. Companies like Megasupply and SPF Shrimp Feeds are relevant players for these two products, especially for hatcheries that prefer these inputs to be screened for pathogens. Microalgae are usually produced in hatcheries.

Most international suppliers work through local distributors such as Priyanka Enterprises, which sells a wide range of inputs to hatcheries and is the local distributor of Zeigler's broodstock and PL diets and Great Salt Lake Artemia's products.

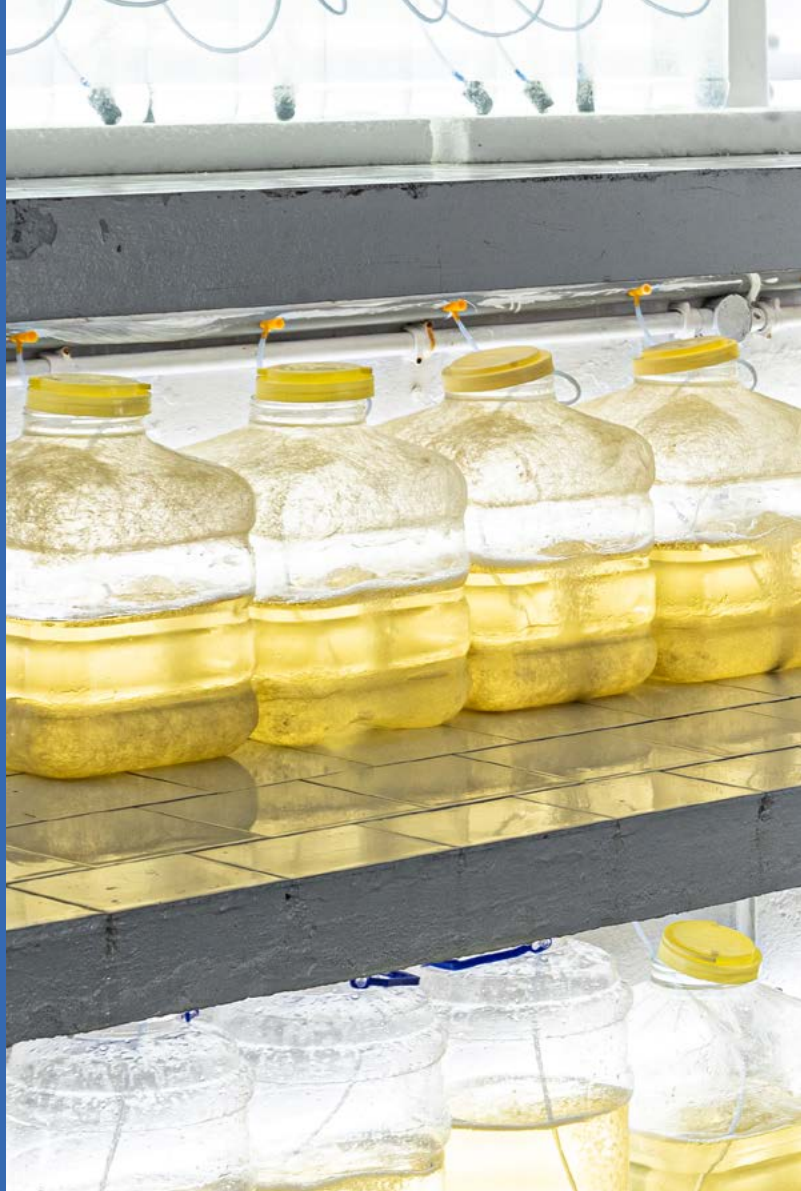


TABLE 3: THE LARGEST HATCHERY FEED SUPPLIERS AND THEIR MOST ESSENTIAL BRANDS ACTIVE IN THE INDIAN MARKET

COMPANY	Hatchery feed				Nursery feed
	Formulated broodstock diets	Formulated PL diets	Artemia	Microalgae	
INVE AQUACULTURE	Breed-S	Epac Black, FRIPPAK, LANSY-Shrimp	Artemia AF/BF, Artemia EG/TQ, IL Artemia		FRIPPAK Raceway
		Mackay Marine Black Flake Diet	Golden West, Sanders, Dancing Crane, Summits, NABS	Mackay Marine Spirulina Microfine	
GREAT SALT LAKE ARTEMIA					
SYAQUA	GCMAT	ENCAP, HiPro, MPF	Instar GOLD	SPIRU-PRO	
ADM (BERNAQUA AND EPICORE)	Omega Spawn S, Royal Oyster, Epifeed	Royal Caviar, Biosphere, Royal Pepper Protein, Royal Seafood, Epifeed, Epibal	BernAqua	BernAqua	MeM, MPeX, WEAN, Epibal
ZEIGLER BROS.	Broodstock, Maturation, Redi-Mate, EZ Mate	EZ Artemia Ultra, EZ Artemia, EZ Larva, Larva Z Plus, Z Pro			PL Raceway, PL Raceway+, Brine Shrimp Flake, Larval Shrimp Flake
I&V BIO		BIO Z, BIO M, BIO PL	INSTART, INSTART ENERGY, M-BRYO		

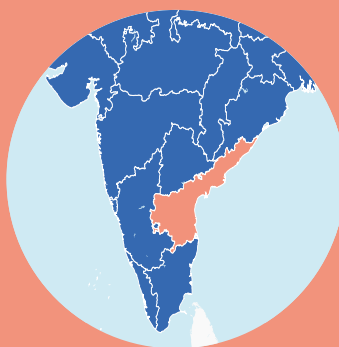


PROCESSING

Key Insights



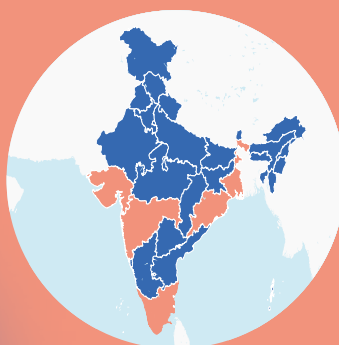
In 2023, India's processors were responsible for exporting 712,914 MT of shrimp with a total value of \$4.9bn.



The vast majority of India's shrimp processors are based in Andhra Pradesh. Andhra Pradesh is home to an estimated 95 processing plants owned by 65 companies, of which most are fully dedicated to shrimp.



While there are more than 600 registered processing plants, only 350 of them process and export shrimp, owned by approximately 250 companies. Of these companies, only around 100-150 are fully dedicated to farmed shrimp. Others also export wild-caught fish and other seafood.



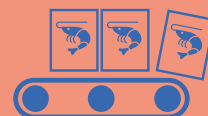
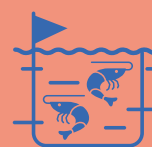
Clusters of processors exist in other states along the coastline, in Gujarat, Maharashtra, Kerala, Tamil Nadu, Odisha, and West Bengal. Often, these companies process both shrimp and other fish and seafood.



Vertical integration happens from processing into other parts of the supply chain as well as vice versa. Some processors, for example, have invested in feed manufacturing. At the same time, companies that started as agents, feed dealers, feed manufacturers, or hatchery operators have invested in processing.



Recently, many processors have invested in processing capacity for value-added products. This includes infrastructure and equipment for cooking, dusting, and breading shrimp, and for high-quality HOSO products. Some companies are also considering to invest in fish processing. For India, all this will likely increase the variety of products in its export basket.



Most of India's fully dedicated shrimp processors are vertically integrated to some extent. They own hatcheries, feed mills, and shrimp farms. By controlling the value chain, they increase revenues and optimize their margins.

This chapter is a continuation of the chapter about India's shrimp markets, in which we've discussed where India's shrimp is exported and in what product forms. This chapter will dive deeper into the shrimp processing and exporters' landscape. It will look at the number of processors, the historical development of shrimp processing, the geographical location of shrimp processing plants, and some trends in shrimp processing in India. How exactly shrimp processors procure shrimp is covered in the chapter on transactions in the supply chain on p. 122.



If the company lacks its own pre-processing capacity, it may source HLSO material from third parties

THE PROCESSING LANDSCAPE CAPACITY

According to MPEDA's directory of seafood processing plants, India has more than 600 plants that process seafood. We can link these plants to around 500 companies. Company websites suggest that 350 of these plants process shrimp, but only 100-150 are fully dedicated to farmed shrimp. Others also process wild-caught shrimp and other fish and seafood. Compared to other countries, such as Ecuador or Indonesia, 100-150 dedicated farmed shrimp processors is a sizeable potential supplier base. It's unclear how much combined capacity these companies have, but, in today's situation, where capacity has been developed on the assumption that production will grow while it has actually stagnated, there's substantial overcapacity. Nevertheless, new processing plants are still being built.

Freezing equipment is not the only element that defines processing capacity. It's also characterized by a company's pre-processing capacity in terms of the volume of products it can transform into HLSO and peeled products. This depends on the space of its facilities and the size of its workforce. If the company lacks its own pre-processing capacity, it may source HLSO material from third parties.

MARKET SHARES

India's biggest exporter, Devi Fisheries, claims to have processed and exported around 35,000 MT of finished products in 2023. This represents a market share of just under 5% of India's total exports. Another 10-12 companies (among which Asvini Fisheries, Apex Frozen Foods, Devi Sea Foods, Falcon Marine Exports, Kader Exports, Nekkanti Sea Foods, Sagar Grandhi Exports, Sandhya Aqua, Sandhya Marines, Sreeragam Exports) processed between 15,000-30,000 MT of finished products each. These companies combined have a market share of around 30-35% of total exports. You can find a more detailed overview of India's largest processors per state in Table 1.

What Does a Shrimp Processing Plant Look Like from the Inside?



RECEIVING RAW MATERIAL

All factories have a raw material receiving area where suppliers offload their products. Here, the product is inspected, washed, and graded. Depending on how sophisticated the plant is, processors increasingly use smart equipment to optimize the process. They weigh the product and conclude the transaction, depending on the purchase arrangements.



PRE-PROCESSING AREA

During pre-processing, the HOSO shrimp is beheaded into HLSO. Most large processors have pre-processing units as part of their operation. Only when they lack space or workforce, or during the peak of the season, do processors outsource pre-processing. Also, when sourcing from further away and when the quality of HOSO material is hard to maintain, processors may outsource pre-processing to third parties closer to the source and then bring the HLSO material to their plants.



PROCESSING AREA

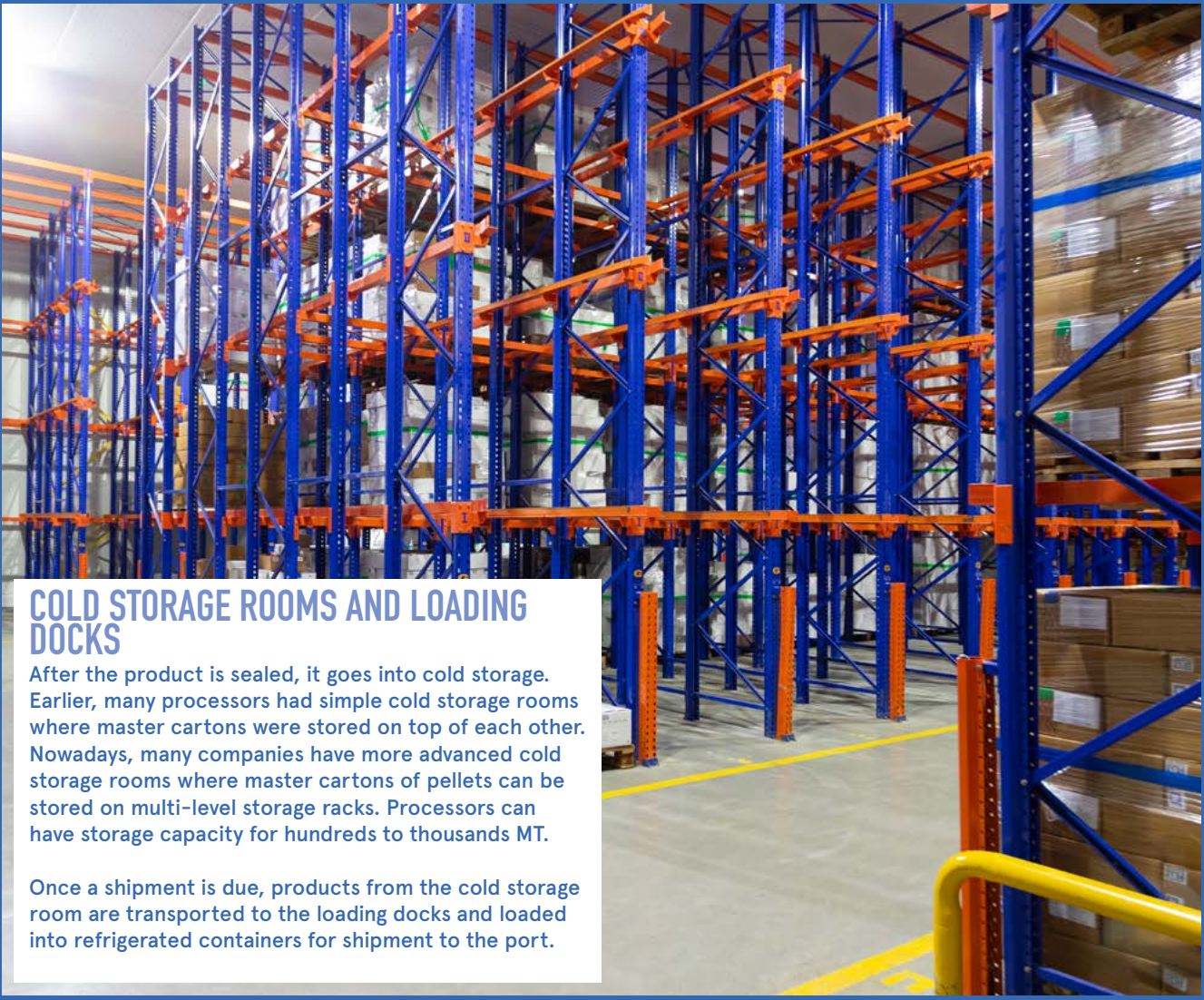
In this area, shrimp is peeled according to a wide range of specifications such as HLSO Easy Peel or Peeled Deveined. This is the most labor-intensive activity in the factory, where hundreds, sometimes thousands of workers peel shrimp on a daily basis. Once peeled, products are treated according to customer specifications.



COOKING, FREEZING, AND PACKING LINES

Shrimp is transferred from the processing area to the cooking or freezing lines. Because blanching and cooking shrimp is considered to carry a high risk in terms of food safety, factories that produce cooked shrimp have a separate isolated production line. These lines usually consist of a cooking machine attached to a cooling, glazing, and an individual quick freezing (IQF) freezing line.

Most factories in India have IQF tunnel and plate freezers, and some continue to operate blast-freezing rooms. The IQF freezing lines consist of glazing, hardening, and freezing equipment. Once frozen, the product is packed in printed bags or carton boxes. In the plate freezers, shrimp is put in trays with water and comes out as frozen blocks, packed in carton boxes.



COLD STORAGE ROOMS AND LOADING DOCKS

After the product is sealed, it goes into cold storage. Earlier, many processors had simple cold storage rooms where master cartons were stored on top of each other. Nowadays, many companies have more advanced cold storage rooms where master cartons of pellets can be stored on multi-level storage racks. Processors can have storage capacity for hundreds to thousands MT.

Once a shipment is due, products from the cold storage room are transported to the loading docks and loaded into refrigerated containers for shipment to the port.

HISTORY

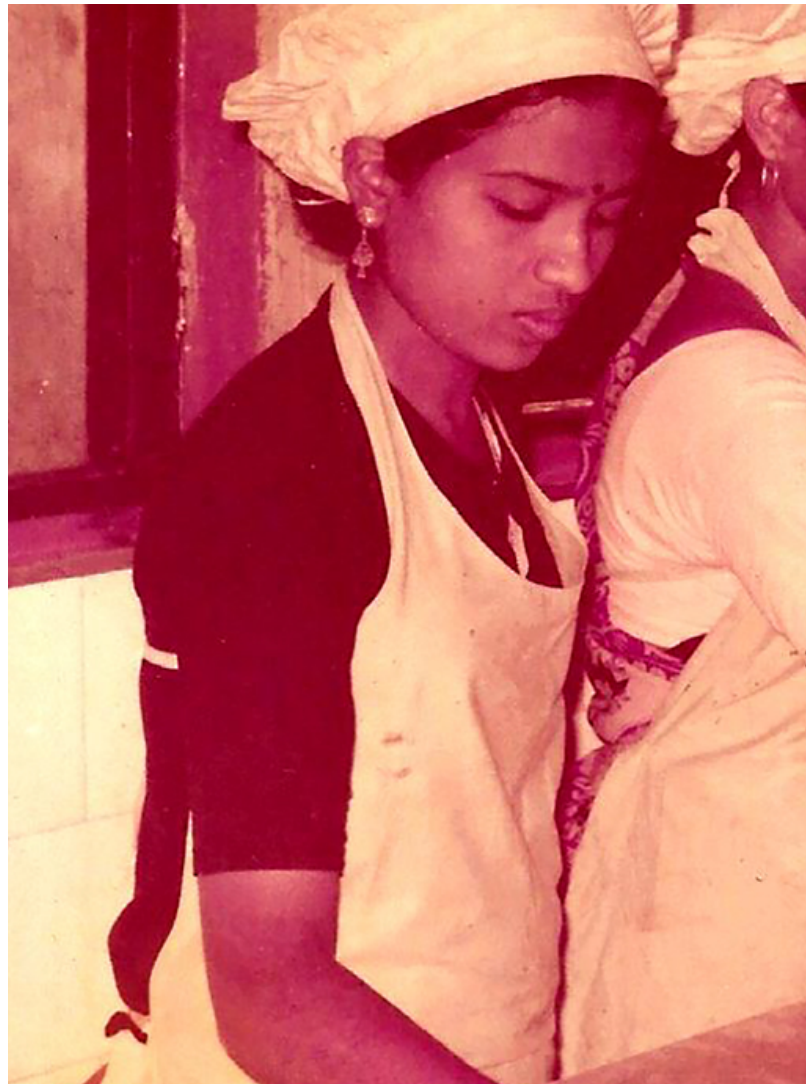
1960s and 1970s: Expansion of Wild-Caught Fish and Seafood Processing Capacity

The first group of shrimp processors in India starts to come up in the late 1960s when commercial shrimp trawler fleets catching a range of wild shrimp species need to process these prior to export. Later, when farmed shrimp production increases, they started to process this shrimp too. Even today, on the West Coast in places like Kochi (Kerala) and Veraval (Gujarat), the largest shrimp exporters have a fisheries background. The same happens on the East Coast in West Bengal, Odisha, Andhra Pradesh, and Tamil Nadu, where the first shrimp processing plants are built during the 1960s and 1970s for the processing and exporting of wild-caught fish and shrimp. With the farmed shrimp sector developing in the 1990s, these companies, too, add farmed shrimp to their product basket. Some companies from the West Coast, such as Abad Group and Choice Group, are investing in processing establishments in Andhra Pradesh. Farmed shrimp is now the core of their business. However, most companies from the West Coast remain diversified, offering their clients a wide range of seafood products.

Late 1980s and 1990s: Shrimp Processing Capacity Develops while Semi-Intensive *P. Monodon* Production is on the Rise

On the East Coast, the next wave of companies ventures into shrimp processing in the late 1980s and the 1990s. The farmed shrimp sector starts to expand rapidly after the introduction of semi-intensive *P. monodon* production. The government even subsidizes the construction of processing plants to support the industry's expansion. The farming sector's growth starts in the south of Andhra Pradesh, around Nellore, where initially most processing plants are set up, and in Tamil Nadu, around Chennai, from where most of the production is exported. As the expansion continues in other parts of Andhra Pradesh, processing plants are soon established across the state. For example, in the region around Bhimavaram and Kakinada we can now find the most significant cluster of processing facilities in terms of capacity and production output. In other states, too, many processing plants spring up during this initial period of expansion, for example in Odisha and West Bengal. They're often clustered in designated areas, such as the Benfish Complex in Kolkata.

Most large shrimp processors and exporters in Andhra Pradesh that started in the late 1980s and 1990s don't come from a fisheries background but from an agricultural background. The families behind these companies are often landowners and have been involved in Andhra Pradesh's agricultural sector for generations. When the shrimp business began to flourish, they start leasing their land to shrimp farmers and begin trading in shrimp. As their businesses



grow, they add processing and exporting to their activities. Some of the fully dedicated farmed shrimp processors that start during this period are among today's largest exporters. They're now often vertically integrated, owning farms, hatcheries, feed mills, and in some cases even overseas import divisions. Not all companies from this period are still around, though. Many left the industry in the late 1990s and first decade of the 21st century when it was particularly tough.

2009-Present: Farmed Shrimp Processing Capacity Grows Further During the Introduction and Expansion of *L. Vannamei* Farming

A new wave of processing companies enters the stage from 2009 onwards, when the industry burgeons due to the introduction of *L. vannamei*. Many companies that start during this period are already engaged in the shrimp industry in some way and decide to venture into processing and exports. However, several joining the ranks are new to the shrimp industry, attracted by its fast expansion.



Shrimp processing and packaging in the 1990s.

FIGURE 1: INDIA'S SHRIMP PROCESSING PLANTS

GEOGRAPHY

Around 85% of India’s farmed shrimp exports leave the country from seaports on the East Coast. All major farmed shrimp exporters operate from here. Shrimp is processed in around 185 plants owned by about 135 companies, located mainly in Andhra Pradesh but also in Tamil Nadu, Odisha, and West Bengal. Most of these companies, especially in Andhra Pradesh, are fully dedicated to processing farmed shrimp.

The West Coast has around 165 plants engaged in shrimp processing, owned by about 105 companies. These companies and their plants are located in places such as Kochi in Kerala, Veraval in Gujarat, and Mumbai in Maharashtra. Farmed shrimp is just part of the business of most of these plants—they process a combination of wild-caught fish, seafood, and some farmed shrimp. There are exceptions, especially in Gujarat near the farming regions Surat and Nasvari, where some companies are purely farmed shrimp processors and exporters.

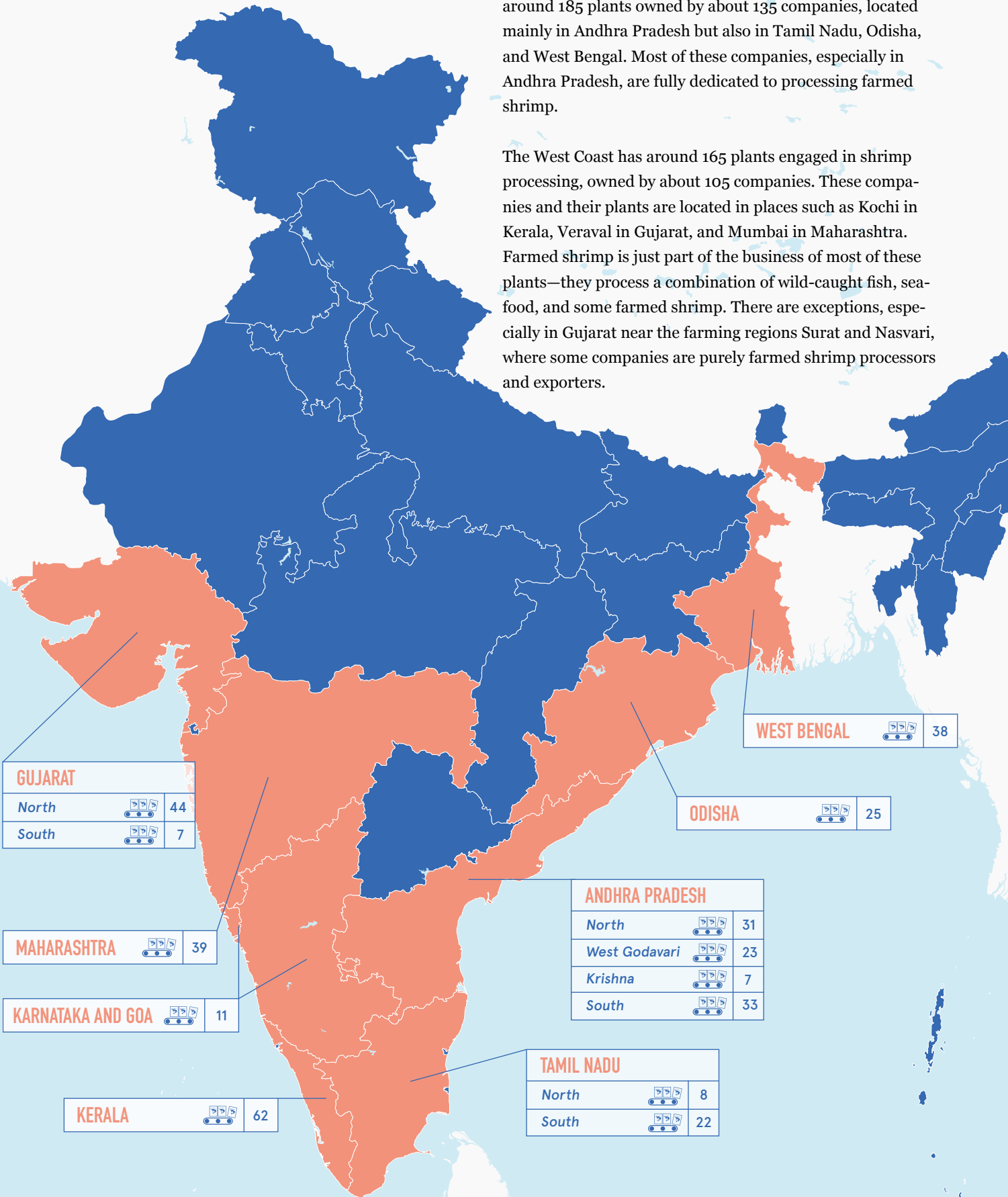


TABLE 1: A SELECTION OF INDIA'S LARGEST SHRIMP PROCESSORS AND EXPORTERS

COMPANY HQ	Company name	Established in	Number of plants	Location of factories	Size of shrimp exports*
ANDHRA PRADESH	Ananda Group	1988	3	West Godavari	Very large
	Apex Frozen Foods	1995	2	East Godavari	Very large
	Devi Fisheries	1992	6	East Godavari, Visakhapatnam	Very large
	Devi Sea Foods	1992	4	Prakasam, West Godavari	Very large
	Nekkanti Sea Foods	1983	5	East Godavari, Nellore, Visakhapatnam, West Godavari	Very large
	Sandhya Aqua	2005	4	East Godavari, Krishna, Prakasam	Very large
	Sandhya Marines	1987	3	Prakasam, West Godavari	Very large
	Avanti Frozen Foods	1993	3	East Godavari	Large
	Sai Marine Exports	1995	2	Nellore, Visakhapatnam	Large
	Suryamitra Exim	1998	2	West Godavari	Large
	Coastal Aqua	2017	1	Kakinada	Medium
	Coastal Corporation	1986	3	Andhra Pradesh (Visakhapatnam, West Godavari), Odisha	Medium
	Jayalakshmi Sea Foods	1995	2	West Godavari	Medium
	Sprint Exports	2003	1	Visakhapatnam	Medium
	Royale Marine Impex	2011	1	Prakasam	Medium
ODISHA	Falcon Marine Exports	1985	4	Odisha (Balasore, Jagatsinghpur, Khordha)	Very large
	Sreeragam	2011	2	Odisha (Nayagarh), West Bengal	Very large
	B-One Business House	2012	2	Khorda, Balasore	Medium
	Highland Group	2018	2	Odisha (Balasore), Kerala (Ernakulam)	Medium
	Magnum	1995	2	Balasore, Khorda	Small
WEST BENGAL	KNC Agro	1998	1	Purba Medinipur	Medium
	Pasupati Aquatics	1994	1	Purba Medinipur	Medium
	S.A. Exports	1995	1	North 24 Parganas	Medium
	IFB Agro	1996	1	Kolkata	Small
TAMIL NADU	Asvini Fisheries	1986	2	Northern Tamil Nadu, Andhra Pradesh (West Godavari)	Very large
	Sagar Grandhi Exports	1996	2	Andhra Pradesh (Nellore, Prakasam)	Very large
	Wellcome Fisheries	1987	2	Andhra Pradesh (West Godavari)	Large
	BMR Group	1994	1	Andhra Pradesh (Nellore)	Medium
	Diamond Seafood Exports	1976	4	Southern Tamil Nadu	Medium
KERALA	Abad Overseas	1995	3	Andhra Pradesh (Guntur, Nellore, Visakhapatnam)	Large
	Choice Group	1962	3	Kerala and Andhra Pradesh (Guntur, East Godavari)	Large
	Penver Products	1999	2	Kerala and Andhra Pradesh (Nellore)	Large
	Mangala Group	1967	4	Kerala	Small
	Baby Marine Ventures	1969	2	Kerala	Small
GUJARAT	Mindhola Foods	1990	1	Surat	Small
	Zeal Aqua	2009	1	Gujarat (Surat)	Small
	Tandels	2009	1	Gujarat (Navsari)	Small
MAHARASHTRA	Kader Exports	1978	5	Andhra Pradesh (Visakhapatnam, West Godavari), Tamil Nadu	Very large
	Castlerock Fisheries	1960	4	Maharashtra (Thane, Raigad), Gujarat (Gir Somnath)	Medium
	Forstar Foods	1992	2	Raigad	Small
	Sanchita Marine Products	1991	2	Raigad	Small
	Seasaga Group	1993	3	Maharashtra (Thane, Raigad), Andhra Pradesh (Visakhapatnam)	Small

* Very large = > 15,000 MT, large = 10,000–15,000 MT, medium = 5,000–10,000 MT, small = < 5,000 MT

Disclaimer: The size of exports is not officially reported. It's provided here based on secondary research, individual communication with companies, and opinions of industry experts. Especially for Andhra Pradesh more medium-sized players could have been listed. If you are interested in a more detailed overview of a particular state, please contact me at willems@shrimpsights.com.

For the location of factories in Andhra Pradesh we have used the old district names, for reasons of consistency.

Financial Performance of Publicly Listed Companies Reflects a Tough 2022 and 2023, But There Are Some Positive Signs in Early 2024

While most of India's shrimp companies are privately owned, a few have gone public over the years (see Table 2). The first companies that went public did so during the expansion of semi-intensive *P. monodon* production. This included a few companies that raised funding to establish fully vertically integrated operations, such as The Waterbase and Sharat Industries and India's largest feed manufacturer, Avanti Feeds. The last few companies went public in 2016 and 2017 when they wanted to expand their business during the rapid increase of production when *L. vannamei* became booming. Most companies in Table 2 are listed on the National Stock Exchange of India (NSE India) and the Bombay Stock Exchange (BSE). Their performance is a good indication of how the industry overall is doing.

TABLE 2: KEY INFORMATION ON INDIA'S SEVEN LISTED SHRIMP COMPANIES*

	 COASTAL CORPORATION LIMITED	 KINGSINFRA	 The Waterbase Limited	 SHARAT INDUSTRIES LIMITED	 Avanti Feeds Limited	 ZEAL AQUA LIMITED	 APEX FROZEN FOODS LTD
Listed since	1985	1987	1992	1992	1994	2016	2017
Company activity		 	   	   	  	 	 
NSE stock price (INR)**	293	186	75	50	518	10	220
Total revenue FY 2022-2023 (INR)	3,528m	609m	3,040m	3,325m	50,869m	3,664m	10,703m
Net income FY 2022-2023 (INR)	67m	57m	-35m	65m	2,786m	71m	359m
TTM*** net profit margin (%)	0.38	9.16	-2.24	1.93	6.69	1.77	1.28

 Processing  Feed  Farming  Hatchery

* While the companies IFB Agro and ITC Limited are also publicly listed and engaged in shrimp, shrimp is only a minor part of their business and therefore they're not included in this table.

** Checked on 5 and 6 March 2024.

*** Trailing 12 months.

The financial information for FY 2022-2023 shows that most of the companies have been operating under meager profit margins that year. This reflects the crisis that the industry has been confronted with of low market prices and increased production costs. Only Avanti Feeds and Kings Infra Ventures realized higher margins. The evolution of stock prices in FY 2023-2024 shows that since December 2023, amidst political unrest in Ecuador and improved farm gate prices in India, most companies' stock prices have improved. This might indicate that profit margins improved in the last quarter of FY 2023-2024. Whether profit margins in FY 2024-2025 will grow largely depends on whether the improved price levels will be sustained when farmers harvest the first crop of 2024 from May onwards.

In 2018, the valuation of many of India's shrimp companies skyrocketed. This was after Apex Frozen Foods successfully went public in 2017, raising \$22m with its initial public offering (IPO). In response to their companies' high valuation, in early 2018, a few of these companies filed documents to go public, among which Devi Sea Foods (\$130m IPO), Nekkanti Sea Foods (\$110m IPO), Sandhya Marines (\$44m IPO), and Penver Products (\$35m IPO) (for all of these numbers, the 2018 average INR/\$ exchange rate of 0.0146 was used). Although these companies were all well-funded, the valuation of their companies at that time was so high that it was a no-brainer for them to try to capitalize on that. But when the market cooled down again and valuations were adjusted, they all withdrew their filings and continued their businesses as privately owned companies.

With current market conditions, company valuations, and company financial positions, companies won't likely try again anytime soon. Most of India's companies will therefore remain privately held.

MERCHANT EXPORTERS

India's shrimp production is stagnating, which leaves many companies having processing plants with considerable overcapacity as they've developed their capacity based on assumptions of growth. Often, if they aren't significant exporters themselves, these companies try to lease their plants to others or offer toll manufacturing services. This involves a merchant exporter signing a contract to use the facility and the workforce for a specific volume in a particular time frame. Two merchant exporters can then use the same facility. This way, processors who don't have enough raw material to process themselves can continue to run their factories at the required capacity and remain profitable.

Many companies with processing plants have considerable overcapacity as they've developed their capacity based on assumptions of growth

Companies contemplating to venture into shrimp processing and exports take advantage of this and, instead of investing in a proprietary processing plant, use the capacity of others. Such new players are often already engaged in the supply chain as farmers, dealers, agents, feed manufacturers, or hatchery operators and aim to benefit from having direct access to the export market. Even an exporter who owns a processing plant can simultaneously be a merchant exporter if it rents processing capacity elsewhere to complement

its capacity. Almost 600 merchant exporters are registered with MPEDA for all seafood combined. About half are established on the West Coast, and the other half on the East Coast.

While some merchant exporters are relatively small, others are mid-sized players exporting considerable volumes. The biggest merchant exporter is ITC, one of India's major publicly listed agricultural companies. The company has been active in the shrimp industry since the 1990s but has never invested in its own processing plant. A company can simultaneously be a manufacturing exporter (with one or more proprietary processing plants) and a merchant exporter. This can occur when a company operates its facility at capacity but has more product demand or expands into regions where it doesn't have its own processing capacity.

Toll manufacturing in leased plants makes a lot of sense for new players trying to enter the export market

Especially in the current climate of considerable overcapacity among India's processors, toll manufacturing in leased plants makes a lot of sense for new players trying to enter the export market. Once they've gained experience with processing and exporting and have developed a steady overseas demand for their products, they may, at some point, invest in their own plant.

Processing and exporting cooked products is currently in the hands of around 20 companies

LOOKING AHEAD VERTICAL INTEGRATION

The chapter on shrimp feed manufacturing already describes how many leading shrimp feed manufacturers have invested in shrimp processing and vice versa (p. 74). But this isn't the only kind of vertical integration in India's shrimp processing landscape. Some of the country's leading hatchery groups, such as BMR Group and CP Group, have already invested in processing plants, and Vaisakhi Bios, another major hatchery player, will open one soon. Aquatech companies also venture into processing. One such company is AquaConnect, which recently started as a merchant exporter. It runs a platform through which it sells inputs to distributors and (indirectly to) farmers. Through this activity, the company has excellent insights into shrimp farming and has started to buy back shrimp from the dealers it works with. AquaConnect processes this shrimp in a leased facility and exports it to various markets worldwide. It's the company's ambition to establish a premium brand, and eventually, if the export business grows, it will likely invest in its own processing business. And the trend of vertical integration doesn't stop here—many other companies across the shrimp value chain aspire to start processing and exporting.

VALUE ADDITION INCREASED CAPACITY FOR PROCESSING COOKED SHRIMP

Due to increased demand for cooked shrimp products, mainly from the US, Indian processors have been investing to expand their capacity for cooked products. Processing and exporting cooked products is currently in the hands of around 20 companies, mainly from Andhra Pradesh. Although more companies have installed cooking capacity, the volume that they can process is often limited. The largest exporter of cooked shrimp is Sandhya Aqua, which, according to the company, in 2023 exported around 10,000 MT of cooked products—almost entirely to the US. In its pursuit of penetrating the cooked shrimp market further, India can be expected to gain market share from Vietnam and Indonesia in the US, the EU, and other markets.



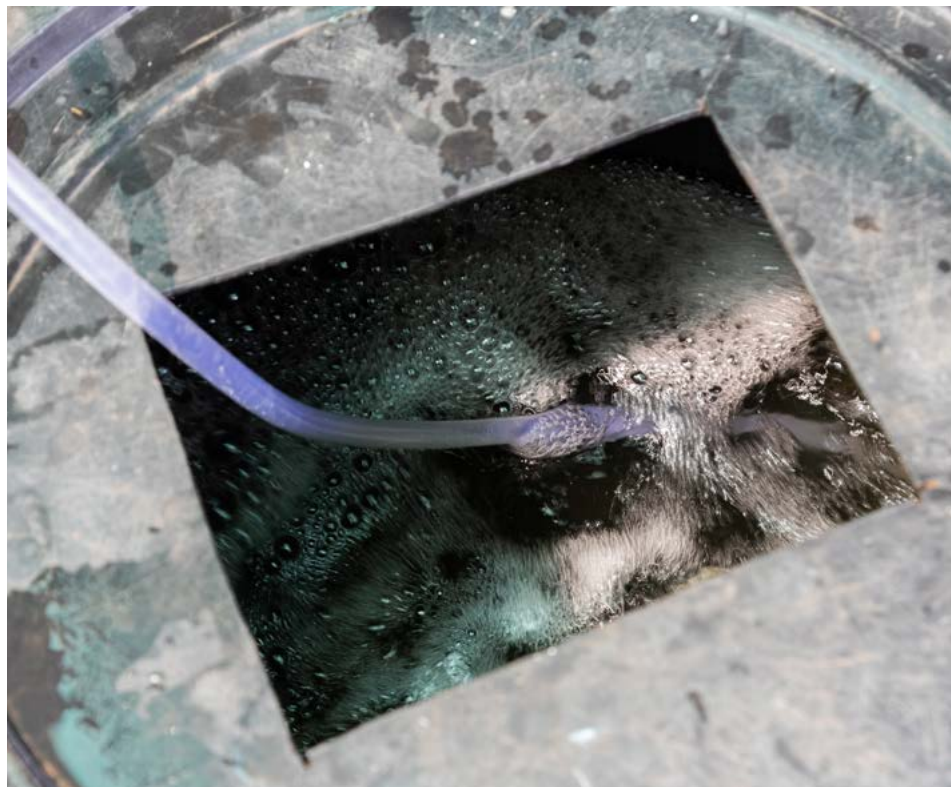
Abad Overseas is one of the companies that has set up a live harvesting supply chain to deliver the highest quality shrimp from pond to factory and process and export it as HOSO products.

INCREASED CAPACITY FOR PROCESSING DUSTED AND BREADED SHRIMP

Over the last few years, Indian processors have been expanding their capacity to process dusted and breaded and other value-added products. Choice Canning and Amalgam Frozen Foods are believed to be India's largest exporters of breaded shrimp. Other companies already having breeding lines or planning to take them into operation soon include Apex Frozen Foods, Avanti Frozen Foods, Devi Fisheries, Devi Sea Foods, Nekkanti Sea Foods, Sai Marine Exports, and Sandhya Aqua—though it'll take time before they have developed their markets for dusted and breaded products. Still, with India's aim to diversify its export product basket, the country will surely export more of these products in the coming years. India will compete for market share with countries such as China, Indonesia, Thailand, and Vietnam.

INCREASED CAPACITY AND DEVELOPMENT OF SUPPLY CHAINS FOR HOSO PRODUCTS

Some companies have been investing in yet another form of value addition: establishing supply chain infrastructure and processing equipment to produce and export high-quality HOSO products. While some specialize in HOSO *L. vannamei*, most companies invest in *P. monodon*. The latter is primarily produced in larger sizes (>15 pcs/kg), and China is a good market for it; China mainly requires HOSO products, and freshness and quality are of the utmost importance.





To maintain the quality of HOSO products post-harvest, some companies have started harvesting and transporting live shrimp instead of applying conventional chill-kill methods and metabisulfite, which is common practice in Ecuador and other countries that primarily produce HOSO shrimp. By transporting live shrimp, it arrives in the factory as fresh as possible, preventing any quality issues that would make the raw material unsuitable for HOSO processing. In the factory, these companies invest in brine-freezing equipment preferred by high-end HOSO markets, especially China.

The most well-known companies that have made these investments are Abad Overseas and Mindhola Foods. With the expansion of *P. monodon* production, more companies in southern Andhra Pradesh and Gujarat, where *P. monodon* production is concentrated, are expected to adopt this strategy.

DEVELOPING PROCESSING CAPACITY FOR FISH

Besides investments in value-added shrimp processing, Indian exporters are also looking to invest in processing capacity for fish products. With lower labor costs, India wants to take business from China, which is under heavy pressure due to labor rights concerns in seafood processing plants. To facil-

Developing a skilled labor force will take time

itate these investments, the government has implemented policies that favor the import of fish for processing and exports. According to industry sources, the first fish processing plants are underway. One of the companies reportedly investing in such a facility is Sandhya Aqua, which also runs a diversified seafood import and distribution business in the US, with smaller investments in Canada and the EU.

SKILLED LABOR REQUIRED TO INCREASE CAPACITY FOR NEW PROCESSING ACTIVITIES

To enable the processing and export of value-added fish and shrimp products, investments in equipment and labor are required. Indian processors are therefore hiring skilled labor from abroad to learn from them and train their workforce accordingly. Developing a skilled labor force will take time, impacting the pace at which Indian processors gain market share in the value-added seafood market.

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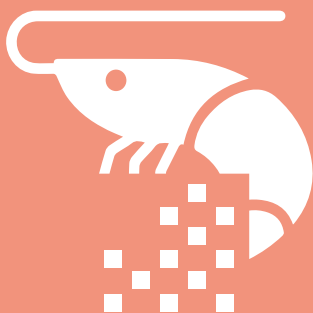
PROCESSING
PLANTS

CERTIFICATIONS & ACCREDITATIONS



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The fragmentation of India's shrimp farming sector and the small-scale character of farms give feed dealers and raw material agents an important role in the supply chain.



Farmers mainly buy PL directly from hatcheries and usually pay them in cash. As farmers are generally responsible for transport, smaller farmers often team up to reduce transaction costs.



While dealers mainly pay feed manufacturers in cash, they usually sell to farmers on credit. As such, feed dealers play a crucial role in pre-financing shrimp production.



Feed sales mainly take place through a network of dealers. There are roughly 2,000 dealers throughout the country, with the top 100 having a market share of around 50%.



Agents often still maintain buy-back agreements with farmers. When such an agreement is in place, the agent pre-finances feed and seed for the farmer and in exchange has the right of first refusal when the product is harvested. This gives agents an important role in pre-financing shrimp production.



Agents aren't involved in financing transactions but do often play an important role in providing farmers with harvesting teams and taking care of post-harvest logistics. They're therefore essential players in the supply chain.

Processors procure raw materials primarily through agents. While they used to buy a lot of shrimp through buy-back agreements, with the current abundant supply, spot payments between processors and agents have become more common. Processors will pay agents in cash if they can, but they sometimes pay on credit. In such case, they pay a higher price.

The shrimp supply chain in India is fragmented due to the small-scale character of most of the country's 100,000 shrimp farms and due to geographic dispersion. In the supply chain, transactions often involve one or more layers of intermediaries, locally referred to as distributors, dealers, aggregators, or agents. They're essential in providing buyers and sellers with market information, coordinating the planning of transactions, providing logistics, and financing transactions with credit terms suited to both parties involved. This chapter discusses transactions at each level of the supply chain: transactions of feed manufacturers and hatcheries selling their products to farmers, transactions of farmers selling their products to processors, and transactions of processors selling their products to overseas buyers.



SHRIMP FEED

Although some shrimp feed sales may take place directly between manufacturer and farmer, most go through a network of dealers and sub-dealers. Feed dealers can be local business owners who deal feed as their primary activity. They can also be large shrimp farmers who distribute feed to other farmers or shrimp processors with a feed dealership on the side.

According to Indian manufacturer The Waterbase, over 2,000 dealers are active in India. Most of them handle multiple feed brands and farm health products. The top 100 are estimated to have a market share of around 50%, and the top 500 account for about 90%. Of the remaining dealers, around 25% leave the business each year and are then replaced by new dealers from the farming community.

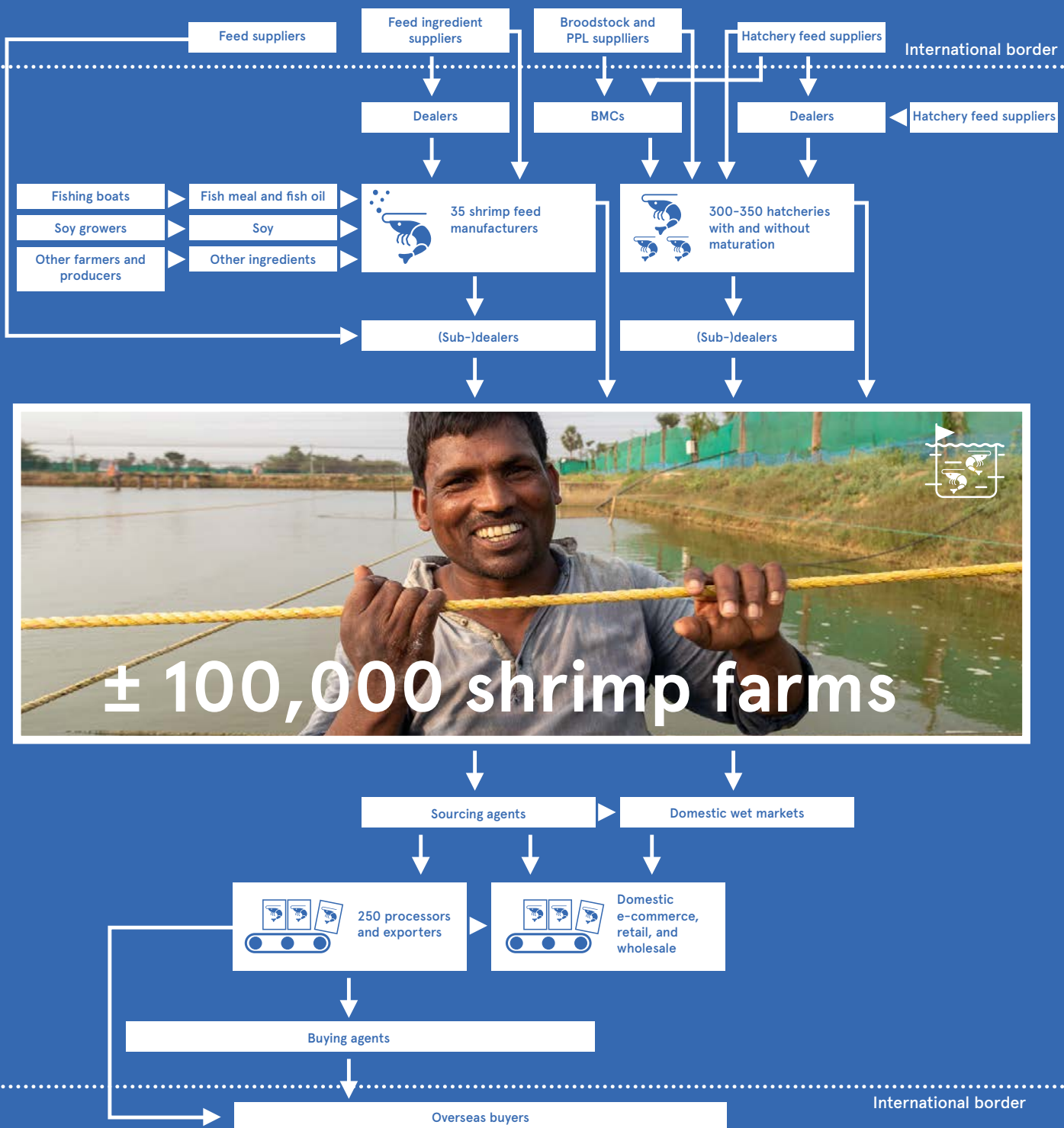
Out of the total sales feed manufacturers make to dealers, around 30% is on credit, and the remainder is in cash. When sold on credit, the payment term at this level usually is 30-60 days. Around 90% of sales from dealer to farmer are on credit, with only 10% made in cash. If sold on credit, the payment term for a farmer often exceeds 60 days. Apart from the feed sales margins, dealers collect interest over the credit period. With these numbers, dealers are clearly crucial for financing feed sales in India.

Feed companies often compete to work with the most powerful dealers. The financially stronger the dealer, the less feed the company will need to sell on credit, resulting in smaller margins for the feed company due to the volume and cash discounts. The risk and cost of outstanding capital are also lower. Buy-back arrangements between dealers and farmers further reduce financial risks by enabling dealers to settle dues.

India's Shrimp Supply Chain

Understanding the role of each player in the main transactions in the supply chain is key to understanding the dynamics of India's shrimp industry, as its supply chain is complicated. Players in each segment carry out direct transactions with suppliers and buyers, but each player uses a network of dealers and agents to reach other suppliers and buyers. Dealers and agents play an important role in negotiating prices, coordinating logistics, and often also in pre-financing transactions.

FIGURE 1: A SIMPLIFIED OVERVIEW OF INDIA'S SHRIMP SUPPLY CHAIN





SHRIMP PL

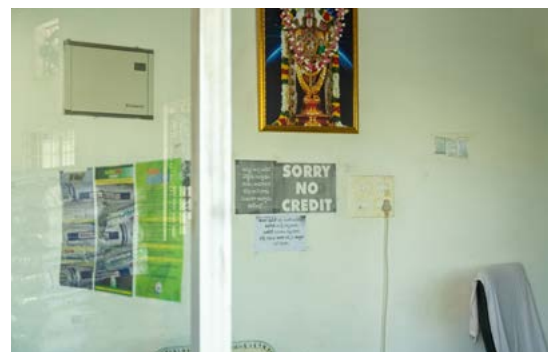
When visiting Vaisakhi Bios in February 2023, Managing Director Mr. Ravi Kumar Yellanki was on his phone almost non-stop. He talked to farmers about their orders for the upcoming PL harvests from his hatchery operations. Mr. Yellanki explained that most of his PL sales are directly made to farmers who come to his hatcheries to pick up the PL. Vaisakhi Bios owns hatcheries in Andhra Pradesh and Tamil Nadu. The hatcheries in Andhra Pradesh mainly supply farms in the direct vicinity, while those in Tamil Nadu sell to farmers in Tamil Nadu, Gujarat, Odisha, and West Bengal. Mr. Yellanki sells almost exclusively in cash as credit sales are considered risky throughout the industry.

Mr. Yellanki's views are representative of the PL sales dynamics throughout the sector. Most PL sales take place directly between the hatchery operator and the farmer, and most transactions are paid in cash. There are only two scenarios in which PL is sold on credit: (1) when farmers get a reference from a feed dealer or (2) when a hatchery has produced more PL than it can sell to its regular clients and has to push its product more aggressively.

Unlike feed sales, dealers play a minor role in the sales of PL. This is especially the case for farms in Andhra Pradesh and Tamil Nadu, but also for Gujarati farmers who typically fly the PL from hatcheries in Tamil Nadu to their farms in Surat or other districts. In Odisha and West Bengal, it's more common for farmers to purchase PL from dealers working with the big hatchery groups in Andhra Pradesh and Tamil Nadu. Some industry sources say that in West Bengal and Odisha, around 60-70% of PL sales happen through these dealers.

Whether buying directly from a hatchery or through a dealer, farmers will sometimes have the PL tested for WSSV and EHP and overall health by an independent lab before accepting them. To compensate farmers for possible mortality after transport from hatchery to farm, many hatcheries provide up to 50% more PL than the farmer pays for. The extent of free PL varies from hatchery to hatchery and from deal to deal, but the vast majority of hatcheries observe this practice.





HARVESTED SHRIMP

Agents are essential in India's supply chain. Most likely around 75-85% of all Indian shrimp that is supplied from farm to factory is facilitated by an agent. Agents coordinate demand and supply between farmers and processing plants, provide harvesting and post-harvest logistics, and often finance the purchase of raw materials. While most processors buy from agents on relatively long credit terms, most agents purchase from farmers on short or even cash payment terms. This key financing role gives agents a strong position.

Many researchers and NGOs working on supply chain improvements consider the role that agents play in the supply chain to be negative, as they don't have much incentive to control quality, maintain traceability, and ensure fair prices for farmers. These critics therefore argue that agents should be excluded from the supply chain. But they often underestimate the value of agents' services for the processing plants that have to source shrimp from 100,000 farms. Rather than trying to exclude agents, the aim should be to incentivize them to adopt practices that strengthen the supply chain regarding wealth distribution, quality assurance, and traceability. Another goal should be to find different business models that ensure fair pricing for farmers.

It's not easy to categorize agents as they fulfill many different roles, and often take on different roles in one enterprise: many are also shrimp farmers or feed dealers. Nevertheless, here are three of the most important types of agents.

1. TRADERS

Traders are purely focused on buying and selling shrimp. They earn INR 3-5/kg and pay farmers within 14 days after harvest or sooner. These enterprises usually have a base—a building with insulated vehicles, crates, ice, and a reception. On the day of harvest, their harvesting teams arrive with trucks and ice at the farm. The trader negotiates the harvest price and determines the count before returning the raw material to its base. Once there, the shrimp is cooled, and, depending on pending orders, the trader packs the product on larger trucks and sends it to packers nearby or further away. Traders mainly buy from independent farmers and sometimes from (sub-)dealers. They often operate on a spot market basis without solid ties between the parties involved.

2. (SUB-)DEALERS

Dealers and sub-dealers are often farmers themselves and also trade in aquaculture inputs. They sell inputs on credit, and in exchange they buy back raw materials. They usually have a long-term relationship with farmers that depend on them for financial reasons. Though they can theoretically sell to anyone, dealers and sub-dealers often do business with a few companies that have preferred access to their

raw materials. Just like traders, dealers and sub-dealers often have a base with infrastructure and a workforce to consolidate raw materials before sending them to buyers. The (sub-)dealer makes money by financing the purchase of inputs and selling raw materials. When (sub-)dealers reach a certain size, they may consider becoming processors or exporters.

3. TECH COMPANIES

Aquatech companies, such as AquaConnect and AquaExchange, are expected to play an increasingly important role in India's shrimp supply chain. These companies collect farmer's data on ongoing crops with their digital farm management and IoT solutions. They then enable farmers to sell their crops through these platforms. Aquatech companies facilitate swift payments, allow farmers to buy new inputs for the next crop on credit, and aim to help farmers improve their margins.

How shrimp is delivered from farms to processing plants mainly depends on how stringent the buyer's requirements are in terms of quality, sustainability, and traceability. There are two main options: pond-side harvesting and delivery at the processing plant.

Some of India's major exporters with well-established farmer networks still purchase most of their shrimp at the pond side. These companies keep their fleet of refrigerated trucks and an extensive team of receiving supervisors. They use their capacity to facilitate logistics for their farms and the raw materials they procure from third-party ASC or BAP certified farms. Processors might also buy from farmers at the pond side when they pre-financed directly or buy back raw materials. In the latter case, their (sub-)dealers often coordinate the planning of harvests, but processors would use their own transport and procurement team. The extent of processors buying at the pond side for third-party farms that they haven't pre-financed differs per company.

When procuring a harvest at the pond side, the processor would ideally send a team member to the farm to take a pre-harvest sample the day before harvest and have it tested for antibiotics in a private lab. If the test result is negative, the processor would send its team to the farm the next day to monitor the harvest, determine the size and price, and collect the raw material. The receiving supervisors accompanying the truck and driver to the farm are crucial as they determine the count at the pond side to set the price and oversee the transaction between farmer and processor. Many processors only buy some of their shrimp from the pond side and let their agent deliver the product to their factories. The capacity of their truck fleet, a reliable field



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procurement team, and coordination with many farmers make working through agents more efficient. If processors don't buy from the pond side, they usually have the product delivered to the factory gate or, in some cases, send a truck to the agent. The agent then sends harvesting crews to farms and receives and aggregates raw materials before sending them to one of its buyers.

In this case, the first time the processor sees the product is at the factory and the procurement team determines the counts and price there. Processors might deduct a certain amount (say 10 INR/kg) from the total price as putting the shrimp on ice adds to the weight. They might also refuse the product if the shrimp doesn't meet their quality requirements. Instead of having a big team of supervisors in the field, they need just a few supervisors in the factory. Processors who purchase at the factory gate have stringent control measures when receiving the raw materials to ensure traceability, and that the product is tested for quality and antibiotics. They need to invest in the relationship with their suppliers and ensure that the right incentives are in place to have suppliers comply with procurement agreements.

In reality, many processors procure shrimp in two ways: they buy and collect part of their shrimp directly from their corporate farms, certified independent farms, and some other farms they have pre-financed. They receive the remainder of their shrimp at the factory gate or pick it up at the agent's. The more stringent the buyer requirements, the more likely processors collect at the farm.

In the case of Indian exporters, over the past two decades, companies such as Devi Sea Foods and Sandhya Aqua (AZ Gems) have invested in US-based import and distribution operations. This brings them closer to the market and enables them to be in direct business with prominent US supermarkets and food service distributors. These direct relationships are crucial for developing long-term tie-ups, resulting in secured demand and more stable prices. In today's oversupplied market, these relationships can be essential for Indian companies to sustain their businesses. Although highly successful in the US, Indian exporters have not invested in such import and distribution operations in other markets. Consequently, Indian exporters mainly do business through local importers and often use agents to coordinate some of their sales activities.

While many exporters would prefer to do business directly with importers, business is often done with the help of agents (individuals or companies). These agents are hired by one of the two parties to help coordinate their sales and purchase activities and are often referred to as "buying agents." Their role can cover several tasks, including (1) delivery and request of product offers, (2) coordination of price negotiations, (3) quality control in factories before packing, and (4) support with export documentation. Agents often work on a commission basis and will sometimes charge both parties. Most agents have long-term relationships with the importers and the exporters they work with. Agents come and go. While some have a bad reputation, others are well-known and well-reputed, doing meaningful work and helping business transactions run more smoothly.

The Innovation Ecosystem: Disrupting Farming Practices and the Supply Chain

Small-scale farmers dominate the Indian shrimp farming sector. Contrary to larger farmers in India and other parts of the world, they usually take a bit longer to adopt tech and instead use conventional farming methods. As they depend on intermediaries, these farmers often buy feed and PL and sell harvests at unfavorable prices. They also usually depend on expensive credit to finance their crops. Meanwhile, companies that sell inputs to and buy crops from these farmers rely on the same intermediaries to identify, reach, and monitor the farmers they can potentially do business with. Due to the complexity of the supply chain, shrimp buyers struggle to ensure that quality, sustainability, and traceability requirements are met.

Various startups aim to overcome these challenges by offering tech solutions to improve farm efficiency, reduce production risks, and provide access to more favorable prices and payment terms, aiming to level the playing field between small producers and their larger corporate peers. This chapter lists some of the most prominent startups. They can be divided into three main categories: (1) full-stack farm-centered service providers aiming to help farmers improve their efficiency and profitability, (2) B2B and B2C seafood distribution companies aiming to overcome supply chain challenges in fresh meat and fish markets in India and overseas, and (3) other tech providers.



FULL-STACK FARM-CENTERED SERVICE PROVIDERS

Service providers AquaExchange, AquaConnect, and eFishery all operate a platform through which they aim to help small-scale farmers become more efficient, purchase high-quality inputs, and sell their crops at favorable prices and payment terms. All to make shrimp farmers more profitable and improve their livelihoods. By doing so, these companies also aim to ensure the overall competitiveness of Indian shrimp in the marketplace.



B2B AND B2C SEAFOOD DISTRIBUTION COMPANIES

Many stakeholders in the shrimp industry believe that developing India's domestic market should be a priority. If the country's 1 billion fish-eating consumers would eat, on average, 500 g of shrimp a year, India could absorb 500,000 MT of shrimp. That's 5-10 times more than the 50,000-100,000 MT of shrimp that consumers eat today. A vibrant domestic market would make India less dependent on the oversupplied export market and possibly result in more stable and higher prices for shrimp farmers. Although some argue that many consumers cannot afford shrimp, it's clear that

with the ever-growing middle class, the Indian market has a lot of potential.

Indian consumers prefer to eat fresh animal protein bought at the wet markets close to their homes. Unfortunately, shrimp is often unavailable in these markets, especially outside the coastal states. If it is available, it's often not fresh due to the extended supply chain and lack of a cold chain, and consumers may have quality and food safety concerns. Some companies try to overcome these challenges and deliver high-quality, sustainable, fresh, and chilled shrimp to consumers' doorsteps. Although many companies have popped up, just a few dominate today's market. The most important are Licious, Fresh to Home, and, to some extent, Captain Fresh.



OTHER TECH PROVIDERS

Besides the full-stack farm-centered service providers and the B2B and B2C seafood distribution companies, other companies focus on more specific tech. This section discusses three of those players on the Indian market: GalaxEye, Ambrotechs, and TOMOTA. GalaxEye aims to launch its satellite into orbit in Q4 2024, giving the shrimp industry unequalled insights into shrimp production from space. Ambrotechs supports hatcheries in digitizing their operations and improving their business relationships with the farming community. And although it's a Vietnamese company, TOMOTA is also increasingly visible in India, helping Indian hatcheries to better count and size their PL.



Aqua Exchange



Leadership: Pavan Kosaraju (Co-Founder and CEO)

Year of establishment: 2020

Website: aquaexchange.com

Investors: Accion Venture Lab, Endiya Partners,

Ocean 14 Capital, among others

Investment raised: \$9m

Today, farmers covering more than 15,000 ha of ponds combined are connected to AquaExchange's services

AQUAEXCHANGE

When AquaExchange was established in 2020, it was primarily a marketplace connecting Indian farmers and processors. In 2022, it merged with NextAqua, another Indian startup that offered hardware solutions to farmers. Today, the company is known as AquaExchange and headed by CEO Pavan Kosaraju. Together with his co-founders Kareemullah Mohammad, Hemasundar Dhavili, and Kiran Kumar he's still deeply involved. The corporate headquarters of AquaExchange are in Hyderabad, Andhra Pradesh, and its manufacturing facility and field operations are located close to Vijayawada, almost 300 km further. In February 2024, the company announced its latest funding round of \$6m, bringing on board Ocean 14 Capital as a new investor.

AquaExchange operates across the value chain and offers various products and services:

- A Fintech-enabled e-commerce platform that offers high-quality inputs directly from manufacturers at the best prices. The company also works with banks to give farmers affordable loans, which they can use on the AquaExchange platform to purchase inputs.
- A "Hardware-as-a-Service" model for farm automation—providing smart, reliable, and easy-to-deploy Internet of Things (IoT) devices under the brand name "NextAqua"—on a subscription basis, for automated feeding and 24/7 farm monitoring. Its power management tool "PowerMon" and feed management tool "AquaBot" are patented. PowerMon gives farmers complete farm power monitoring and aeration control through an app, helping them save electricity costs. AquaBot, a moving auto-feeder, allows farmers to feed their

ponds efficiently while maintaining good feed conversion ratios. The feeder is deployed in India and at farms abroad, such as Madagascar and Ecuador. Both products are aimed at making farmers more profitable.

- A "Harvest-as-a-Service" market linkage platform, which offers transparent pricing and assured spot payments to smallholder farmers.

Besides servicing farmers, AquaExchange claims that another unique selling point is its ability to gather, analyze, and provide real-time crop insights at scale to help supply chain partners—such as feed companies and shrimp processing companies—streamline their sales and purchase activities. Through collecting detailed data on the farmers who use its services and the transactions they make, AquaExchange also provides traceability solutions. Today, farmers covering more than 15,000 ha of ponds in India combined are connected to its services.

aquaconnect®



Leadership: Rajamanohar Somasundara
(Founder and CEO)

Year of establishment: 2017

Website: aquaconnect.blue

Investors: 6G Capital, AgFunder, Flourish, Hatch, Lok Capital, Louis Dreyfus Company, Omnivore, Rebright Partners, S2G Ventures, Suneight

Investment raised: \$32m

AquaConnect has established its presence in seven Indian states

AQUACONNECT

Founded in 2017 and a participant in the 2018 Hatch Accelerator Program, AquaConnect is headquartered in Chennai, Tamil Nadu. The company has operational capacity across seven major aquaculture states in India. In December 2022, AquaConnect raised \$15m, bringing on board new investors such as Lok Capital, Louis Dreyfus Company, and AgFunder. In January 2024, the company raised another \$4m in a pre-series B round led by S2G Ventures.

As a full-stack aquaculture tech platform, AquaConnect offers farm advisory services, access to farm inputs, and post-harvest market linkage through its retail partners (Aqua Partners) and seafood buyer network. The startup leverages its tech-enabled platform “AquaSAT” with data-driven solutions to offer its partner network intelligence on farm input demand and harvest supply prediction. In 2021, AquaConnect pivoted its business operations from a farmer-direct to a partner-driven model, delivering services through a network of Aqua Partners and seafood buyers. Since then, the company has established its presence in seven Indian states, working with over 600 Aqua Partners and 20 seafood buyers to enable market linkages throughout the pre- and post-harvest value chain.

AquaConnect’s products and services include:

- Aqua Partner program: AquaConnect has onboarded a network of rural entrepreneurs, the so-called “Aqua Partners,” to give farmers access to farm inputs and farm advisory. Aqua Partner stores are located close to the farmers and serve as their last-mile touchpoint.

- Aqua Bazaar: a post-harvest platform that enables direct market linkage between farmers and seafood buyers and processors for procuring harvest produce.
- Aqua Cred: this formal credit program connects Aqua Partners and seafood buyers with financial institutions, fulfilling their working capital needs to upscale their business.
- AquaSat: a tech-enabled platform leveraging AI and satellite remote sensing to make the aquaculture value chain more transparent and predictable. Geospatial data analysis predicts pond culture trends, providing insights into farm input demand and harvest supply prediction. This intelligence enhances the benefits of the “Aqua Partner,” “Aqua Bazaar,” and “Aqua Cred” platforms.

eFishery



Leadership: Gibran El Farizy (Co-Founder and CEO)

Year of establishment: 2013

Website: efishery.com

Investors: 500 Southeast Asia, Aqua-Spark, G42

Expansion Fund, International Finance Corporation,

Northstar Group, Sequoia Capital, SoftBank,

Temasek Holdings, Wavemaker Partners, among others

Investment raised: \$343m

EFISHERY

Indonesia-based eFishery is the aquaculture industry's first startup to have reached unicorn status. After its last funding round in July 2023, the company collected \$200m and was valued at over \$1bn. Among other things, the most recent funding would be used to expand to India.

Contrary to AquaExchange and AquaConnect, which were both established to support shrimp farmers, eFishery began its journey supporting fish farmers and has only recently become engaged in Indonesia's shrimp farming sector. The company offers an intelligent feeding solution, an input marketplace, and a harvest distribution channel. On top of that, it offers farmers tech support and affordable credit that can be used on its platform. As part of its entry into Indonesia's shrimp industry, eFishery has also started procuring, processing, and exporting shrimp. The company aims to offer sustainable and fully traceable shrimp to customers in the US, the EU, and other parts of the world.

In December 2023, eFishery announced that it had successfully concluded its first commercial pilot in India, which involved a significant number of fish farmers, 1,000 ha of ponds, and 3,000 MT of feed distributed. The company's entry into the Indian aquaculture sector is led by Neil Wendover, who previously worked for Cargill. eFishery will initially focus on India's fish farming sector, but in due time will also target working with the shrimp farming sector.

***eFishery
announced that it
had successfully
concluded its first
commercial pilot
in India***



Leadership: Vivek Gupta and Abhay Hanjura
(Co-Founders)

Year of establishment: 2015

Website: licious.in

Investors: 3one4 Capital, Amansa Capital, Avendus, Axis Growth Avenues, Bertelsmann Investments, Brunei Investment Agency, InnoVen Capital, Kotak Private Equity, Mayfield Fund, Nichirei Corporation, Temasek Holdings, UCLA VC Fund, Vertex Ventures, among others

Investment raised: \$490m

Licious plays a significant role in driving domestic shrimp consumption

LICIOUS

Licious aims to revolutionize India's fresh meat and fish market. The company is based in Domlur, Bangalore, and invests in integrating fish and seafood production into its supply chain. It offers an e-commerce platform and fast last-mile delivery of fresh quality meat, fish, and seafood to consumers nationwide. The company raised almost \$500m to establish its national sourcing and distribution network and is known as the first unicorn in this space.

While meat represents 70% of total sales, fish and seafood are on the rise. Shrimp makes up 20% of sales value within the fish and seafood category, comprising a wide range of locally farmed and wild-caught species. Licious claims that its quality and sustainability standards are higher than those of other companies on the Indian domestic market. The company also invests in value-addition, offering peeled and further value-added products on top of HOSO shrimp, which consumers are used to buying on the wet markets.

Licious plays a significant role in driving domestic shrimp consumption. If consumers get to know more about the benefits of shrimp as a protein source, this may open up a whole new customer base throughout the country. While Licious was primarily B2C oriented, it aims to enter the B2B segment. For example, it has recently set up a joint venture with Growel Group, a vertically integrated aquaculture company that produces fish and shrimp feed, and processes and exports shrimp. With Growelicious, the two companies aim to expand India's B2B fresh and chilled (previously frozen) fish and seafood market.



Leadership: Shan Kadavil (Co-Founder and CEO) and Mathew Joseph (Co-Founder and COO)

Year of establishment: 2015

Website: freshtohome.com

Investors: Abu Dhabi Investment Office, Amazon Smbhav Venture Fund, Ascent Capital, Investcorp, Investment Corporation of Dubai, Iron Pillar, US DFC, Peter Thiel, David Krane, among others

Investment raised: \$258m

Fresh to Home offers more than 2,000 meat and fish products

FRESH TO HOME

Bangalore-based Fresh to Home is another online platform for fresh meat, fish, and seafood that delivers at consumers' doorsteps. Established in 2015, one of the founders had a long history in India's seafood industry and the other in Silicon Valley. The company raised \$104m in its 2023 Series D round led by Amazon Smbhav Venture Fund, bringing the total funding to \$258m. Although its most recent value is unknown, the company could be the second unicorn in the space.

The company is active in more than 160 Indian cities and processes over 1.5m orders every month. Fresh to Home offers more than 2,000 meat and fish products. The company claims its core strength to be its tech-enabled platform, Commodities Exchange, which empowers over 4000 fishers and farmers to electronically auction their produce on freshtohome.com. It eliminates middlemen and enables customers to access the freshest shrimp within 24-36 hours of sourcing. With a robust end-to-end cold supply chain, Fresh to Home transports fish and seafood in temperature-controlled trucks bolstered by IOT-driven tech to retain freshness, enhance quality, and ensure only toxin-free fish and seafood are sourced from ports across India.

Fresh to Home is now focused on expanding its business beyond India. While India is responsible for the most significant part of the company's revenues, in 2023, sales in the UAE accounted for about 15% of its overall revenues. Much of its recently raised funds will be used to grow its export markets, further focusing on expansion in the Middle East and Africa.

captain fresh



Leadership: Utham Gowda (Founder and CEO)

Year of establishment: 2020

Website: captainfresh.com

Investors: Accel Partners, Prosus Ventures, Matrix Partners India, Tiger Global Management, Evolve Capital, Incubate Fund India, SBI Investment, Ankur Capital, British International Investment, Nekkanti Sea Foods

Investment raised: \$170m+

CAPTAIN FRESH

Although it has a different business model than Licious and Fresh to Home, Captain Fresh also focuses on improving seafood delivery from farmers and fishers to B2B and B2C clients in India and other parts of the world. Contrary to the previous two companies, Captain Fresh focuses equally on frozen products and fresh fish and seafood.

Based out of Bangalore, Karnataka, Captain Fresh claims to be India's fastest-growing tech-led seafood distributor. As of December 2023, the company has a \$250m+ annual turnover. It claims that it has become the largest procurer of seafood from fishers and farmers in the country, and over 100,000 MT of fish and seafood passes through its supply chain every year. Over the last 24 months, Captain Fresh has focused on expanding its exports and international business, forming the lion's share of its revenues today. The company has offices in Dubai, Paris, and the US, and has more planned in northern Europe and Southeast Asia.

Captain Fresh's tech platform forms the backbone of its products and services. It digitizes factories and upgrades the supply chain between fish and shrimp farmers and fishers on the one hand, and the many fish and seafood buyers in the highly fragmented global market landscape on the other hand. The company offers software to digitize each step of the supply chain and the inventory that moves through it:

- **Fishgram:** includes satellite-empowered tools to optimize farm management on the one hand and boat management and catch log tools for fishers on the other. Its marketplace platform allows farmers and fishers to sell their products to local and international buyers.
- **FaaS:** a custom-built fish and seafood enterprise resource planning (ERP) suite which enables factories to digitize their workflow and product flow, optimize operations, and become more productive and profitable.
- **Optimus:** an ERP solution for seafood distributors. The app helps with purchase management, inventory management, finance and accounting, and customer relationship management, among other things. The app tracks customers' orders and includes a last-mile delivery planner.
- **Smart Fishbed management:** software and operational services to optimize and manage fresh seafood counters in supermarket chains. Captain Fresh provides end-to-end management: from procurement to sales. It works on a profit-sharing model with supermarkets, helping them improve category management, reduce food waste, and increase profits.

To expand its market overseas, in 2023 Captain Fresh strategically acquired Senacrus, a shrimp cooker in France. In March 2024, the company also acquired CenSea, a major US seafood importer and distributor. Captain Fresh is believed to aspire more such acquisitions to expand into salmon and other seafood products over the next couple of months. By having its own import and distribution companies in key markets, Captain Fresh will more easily create demand for the products from its supply network in Asia and other parts of the world.



Leadership: Suyash Singh (Co-Founder and CEO)

Year of establishment: 2021

Website: galaxeye.space

Investors: Anicut Capital, Artha Group, Google, Speciale Invest, Upsparks, Veda VC

Investment raised: \$3.5m

GALAXEYE

The space tech startup GalaxEye was founded by five students from the Indian Institute of Technology Madras, Tamil Nadu. It was the only Asian finalist at the prestigious SpaceX Hyperloop Pod Competition of 2019 and is today based out of Bangalore. The company expects to close its Series A fundraising in the first half of 2024. GalaxEye Blue is their brand for the aquaculture industry.

GalaxEye is building the world's first multi-sensor imaging satellite, the Drishti mission, referring to the Sanskrit word for "focused gaze." It aims to enable governments, the defense industry, and various other industries to perform advanced geospatial analysis. The Drishti mission brings intuitive, all-weather imagery from space, at any time (both during the night and the day). It's currently being developed and is scheduled to launch into space in Q4 2024. Until its own satellites are launched, the company uses satellite imagery from other companies to analyze shrimp farming activities from space. The aquaculture industry is one of the main sectors that GalaxEye is focused on for commercializing its products and services. On top of monitoring and predicting stocking and harvesting activities, it uses multi-sensor imagery that allows users to check a range of water quality parameters without taking pond samples. With its user dashboard, feed companies and processors can monitor farm activity and detect possible threats to production regarding changes in water quality.

Once GalaxEye has successfully launched its small satellite constellation, it plans to expand its services, for example by increasing the frequency of its image updates, improving the quality of its images, and expanding its geographical coverage.

GalaxEye aims to launch its satellite into orbit in 2024



Ambrotechs



Leadership: Jagan Kuturi (Founder and CEO)

Year of establishment: 2018

Website: ambrotechs.com

Investors: Unknown

Investment raised: Bootstrapped

Ambrotechs can help forecast PL production and availability and support hatcheries in matching supply and demand

AMBROTECHS

Ambrotechs is an early startup managed by entrepreneurs invested in the nursery segment of India's shrimp industry. The company is based in Hyderabad, Telangana, and focuses on supporting hatcheries in digitizing and optimizing their operations. Its flagship product is BluHatch, a "hatchery cloud" data-driven approach using advanced analytics across the hatchery operation.

By capturing data from each part of the operation, Ambrotechs can help forecast PL production and availability and support hatcheries in matching supply and demand. It also helps hatcheries improve their breeding programs; the company uses data-driven insights to produce PL with traits that are in high demand and command premium prices or to produce PL with specific requirements requested by farmers connected to its services. Ambrotechs' digital marketplace Market-Connect allows hatcheries to offer their PL for sale, opening up new markets nationwide.

Several hatcheries have already implemented Ambrotechs' BluHatch platform. Its partnerships with Vaisakhi Bios and JJ Group, two of India's largest hatchery groups, have been publicly announced.



Leadership: Vũ Văn Vân (Co-Founder and CEO)

Year of establishment: 2020

Website: tomota.vn

Investors: Unknown

Investment raised: Unknown

TOMOTA

TOMOTA, meaning “farmer’s friend” in Vietnamese, is a comprehensive digital platform for the entire shrimp value chain. Based in Ho Chi Minh City, the company was developed by Vietnamese company Otanics Technology JSC, which was founded by Van Vu, Tuan Nguyen, and Minh Phu Seafood Corp. TOMOTA caters to all stakeholders of the shrimp industry, including hatcheries, farms, and processing plants. It offers various IoT and AI-powered products for farms and hatcheries to ensure accurate data collection and informed decision-making:

- TOMOTA IoT: automates all pond devices, such as paddle wheels, pumps, and feeders. It detects instrument failure in real-time, thereby minimizing risks of unexpected instrument failures.
- TOMOTA S3: an AI-enabled smartphone-based shrimp counting and sizing tool that offers superior accuracy and a seamless user experience. It ensures accurate stocking density and monitors growth. It also suggests feed requirements, growth rates, and harvest times.
- TOMOTA A3: an AI-enabled product for minimizing water usage. It integrates water parameter data from different sources and makes recommendations based on daily water exchange. The A3 box measures important parameters that sensors fail to pick up on.
- TOMOTA Farm Management System (TOMOTA FMS): an ERP system specifically designed for shrimp farming that supports farmers in making decisions.

Connected to these products, TOMOTA offers a wide range of services to farms and hatcheries, such as collecting some of the data that is needed for certification and traceability, and remote management of operations. It also provides a marketplace for trading PL, feed, and harvested shrimp.

The company claims that its products are used by over 100 hatcheries and 3,000 farms across 13 countries. Expanding beyond Vietnam, TOMOTA has entered India, Indonesia, and Thailand, among others. In India, the company has mainly supplied its S3 shrimp counting and sizing device. But it signed an agreement with local company Amiti Empiric Technologies to distribute its full range of products. Golden Marine, one of India’s leading hatchery groups, uses TOMOTA products in many of its facilities.

Certification and Aquaculture Improvement Projects

Indian shrimp exporters are the world's largest suppliers of shrimp to US retailers, institutional food service providers, and large restaurant chains. Outside the US, Indian exporters supply similar clients in, for example, the EU, Japan, and the Middle East. Increasingly, overseas shrimp buyers must comply with sustainable sourcing policies requiring producers to be certified by third-party schemes such as BAP or ASC; to be positively rated by schemes such as Seafood Watch or Ocean Wise; or to be involved in a credible and measurable aquaculture improvement project (AIP).

This chapter gives you a short overview of BAP and ASC certification in India, followed by brief profiles of three AIPs for Indian shrimp.



FACTS AND FIGURES ABOUT BAP AND ASC CERTIFIED FACILITIES IN INDIA

		
FARMS 	- Across the globe, 1,529 shrimp farms are BAP certified, with a combined annual production capacity of 773,136 MT. - With 791 BAP certified farms with a production capacity of 225,586 MT, India has the most BAP certified shrimp farming sites and the largest certified shrimp volume globally. India is followed by Vietnam (469 farms and 79,498 MT), Thailand (143 farms and 26,480 MT), Indonesia (47 farms and 38,588 MT), and Ecuador (21 farms and 219,285 MT).	- 638 shrimp farms are ASC certified, with a combined annual production capacity of 425,467 MT. - India has the second largest number of ASC certified shrimp farming sites globally: 127. With 277 certified farm sites, only Vietnam has more. Ecuador (79), Honduras (20), and Thailand (20) complement the top 5. - With a production capacity of 25,531 MT, India produces the world's sixth largest ASC certified shrimp volume. The top 5 consists of Ecuador (126,777 MT), Vietnam (76,934 MT), Saudi Arabia (40,000 MT), Venezuela (35,245 MT), and Honduras (31,192 MT).
HATCHERIES 	45 hatcheries, belonging to around 35 companies, are BAP approved.	ASC doesn't have a standard for hatchery operations but requires certified farms to comply with specific requirements related to the sourcing of PL.
FEED MILLS 	22 shrimp feed mills, belonging to 19 companies, are BAP certified. Their combined capacity for fish and shrimp feed is 830,496 MT.	The first feed mills are expected to be ASC certified in 2024.
PROCESSING 	- 82 processing units are able to supply BAP 4* certified shrimp products. These factories belong to around 62 companies. - This is by far the largest number of companies, with Indonesia (28), Vietnam (27), Ecuador (12), and China (8) following at a distance.	- 70 processing units, belonging to around 56 companies, are ASC Chain of Custody (CoC) certified. - With 105 CoC certified units, only Vietnam has more (109). Ecuador (39), Malaysia (20), and Mexico (11) complement the top 5.

Source: BAP and ASC certification databases consulted in October 2023 and direct communications in November 2023

One of the main challenges for Indian producers to get certified is that small-scale farmers dominate the sector. With around 100,000 farms, it's unlikely that a significant portion of India's farms will get certified. Certification costs for small-scale farmers are high, and the route to certification is often complex. With the launch of a new AIP, ASC and the Sustainable Fisheries Partnership aim to overcome these challenges. They aim to support small-scale farmers on their route towards certification by taking a landscape-level approach towards improvements and certification.

Seafood rating organizations themselves also struggle with the sector's fragmented nature. Providing all the information and evidence required for rating assessments is often complicated. After an assessment in 2021, Monterey Bay Aquarium's Seafood Watch rated Indian shrimp "red," thus advising consumers not to buy it. Since then, the organization has been working with the Indian industry and overseas buyers committed to its AIP in India to define a roadmap towards achieving a "yellow" (good alternative) rating by 2025. These types of projects will make India's shrimp production more sustainable and give buyers more options to source sustainable shrimp from India.

MONTEREY BAY AQUARIUM (MBA)

Project started: 2019

Implementing partners: MBA

Source of funding: MBA and private companies

Project team:

- Wendy Norden, Program Director, Global Ocean Conservation
- Cormac O'Sullivan, Aquaculture Innovation, Science and Verification Lead
- Morgan Smith, Business Partnership Manager
- Sudhakar Mathsa, India Program Manager
- K.S.J. Swaroop, Aquaculture Scientist

Partners involved: A memorandum of understanding was signed in 2022 by AquaConnect, AquaExchange, Avanti Frozen Foods, Bon Appétit Management Company, Chicken of the Sea, Devi Sea Foods, Fair Trade USA, Growel Group, High Liner Foods, IDH, Ram's Assorted Cold Storage Limited, Resonance, Shrimp Insights, Society of Aquaculture Professionals, The Cheesecake Factory, Tucker Consulting Services, and XpertSea



MBA's Global Ocean Conservation team member meeting with shrimp farmer in Andhra Pradesh

farms in a specific region have joined the IVP, and their performance meets the Seafood Watch standard, Seafood Watch may rate an entire region "yellow" or "green," not only the farms that participated.



From Red to Yellow by 2025

In 2021, Seafood Watch rated Indian farmed shrimp

"red" due to high environmental risks such as a high prevalence of disease outbreaks, and a lack of health management, farm registration, and data availability. This rating meant that Seafood Watch recommended buyers committed to its program to only buy farmed shrimp from India that's ASC or BAP certified.

Since publishing its assessment, MBA has been working on a collaborative pilot project to finetune its IVP and use it to drive the change needed for all *L. vannamei* farmed shrimp production in Andhra Pradesh to receive

PROJECT BACKGROUND, SCOPE, AND ACTIVITIES

To protect ocean health while meeting the growing demand for food, MBA focuses on improving the sustainability of aquaculture around the world. MBA's Seafood Watch program assesses the environmental impacts of aquaculture species that are important to the US market and assigns green, yellow, and red ratings to highlight areas of environmental risk. MBA's Global Ocean Conservation team then focuses on collaborative efforts to tackle the intertwined social and economic issues needed to move aquaculture species rated "red" toward improved ratings.



The Improvement Verification Platform

Small-scale shrimp farmers are vital in meeting the increasing demand for environmentally sustainable shrimp products. However, eco-certification (such as ASC and BAP) is out of reach for most small-scale farmers because of cost and complexity. To

address this challenge, MBA developed the Improvement Verification Platform (IVP). Powered by a tablet, the IVP app allows users to quickly collect farm-level data, instantly determining whether a farm meets Seafood Watch standards for low environmental impact. It also identifies production areas—such as water quality, health management, or feed use—that may need improvement. The IVP uses evidence-based sampling strategies to represent the performance of all farms in a group or an area, allowing producers and suppliers to offer buyers a sustainable product without the high cost or complexity of certification. Once sufficient



a “yellow” Seafood Watch rating by 2025. As part of the initial pilot project, several companies, including Avanti Feeds, Deepak Nexgen, Devi Sea Foods, and Growel Group, use the IVP to assess small-scale Indian shrimp farmers in their networks. To scale this up, MBA is finalizing supply chain partnerships between US seafood buyers and importers, and Indian shrimp processors and producers.

One partnership that’s currently in the making involves US importer Beaver Street Fisheries, Indian shrimp supplier Sandhya Aqua, and Indian aquatech supplier AquaExchange. Jointly, these companies aim to work on the necessary improvements to bring “yellow”-rated shrimp to the US market.

Launch of the Community Development Fund

On top of its work on environmental sustainability, MBA recently completed a baseline study in Andhra Pradesh to understand the economic and social issues that farmers and their families face at the community and individual levels. The team is also developing indicators to track improvements in socio-economic conditions for small-scale aquaculture producers in collaboration with the Acharya Nagarjuna university in Andhra Pradesh. The results will help determine ways to address the needs of farmers in this region and will be made public in early 2024. The results will also serve as guidance for designing a program that will help farmers and their families improve their livelihoods.

MBA has launched a Community Development Fund to help address the needs identified by seafood-producing commu-

nities in countries around the globe. The Fund is already supporting a project in Vietnam, and Bon Appétit Management Company has made a \$25,000 commitment to the Fund for India that will be deployed in 2024.



Use of Antibiotics and Aquaculture Governance Indicators

In 2022 and 2023, MBA has brought together more than 50 experts from across the world to better understand how to manage the risks and impacts of the use of antibiotics in aquaculture. Their aim? To help small-scale shrimp farmers in India struggling with disease management improve their environmental performance. This year, MBA will conduct workshops in India to raise awareness and offer means to reduce the use of antibiotics.



Finally, MBA has partnered with Wageningen University in the Netherlands to develop a set of aquaculture governance indicators (AGIs) that take a holistic approach to assessing the governance of the aquaculture industry. The AGIs are used to develop profiles that look at a range of public and private governance processes and practices to develop responses to sustainability challenges. The two partners recently released a profile for Indian farmed shrimp.

Want to get involved? Contact Program Director Wendy Norden at wnorden@mbayaq.org.

ASC AND THE SUSTAINABLE FISHERIES PARTNERSHIP

Project started: 2023

Implementing partners: Sustainable Fisheries Partnership (SFP) and ASC

Source of funding: Walmart Foundation

Project team:

- Dave Martin, SFP Program Director
- Paul Bulcock, SFP Aquaculture Information Manager
- Jill Swasey, ASC Head of Impacts
- Roy van Daatselaar, ASC Improver Program Global Lead

Partners involved: Not yet identified



Roy van Daatselaar (center): having initial conversations with Indian shrimp farmers about the development of ASC's aquaculture improvement program.

PROJECT BACKGROUND, SCOPE, AND ACTIVITIES

SFP and ASC announced the start of their aquaculture improvement project in India in September 2023. They state that, today, only about 24% of farmed shrimp from India falls under an internationally recognized third-party certification scheme. As demand from international markets for certified products grows, the Indian shrimp sector must certify more of its production to meet this demand.

The collaboration between SFP and ASC aims to build strategies that support small-scale farmers in Andhra Pradesh in improving their farming practices and enabling the certification of a more significant part of Indian shrimp production. Instead of individual farm-level improvements, the project will focus on landscape-level advancements in aquaculture, for example within a district or a sub-district in Andhra Pradesh. This should result in large-scale environmental and social improvements across multiple farms and increased assurances on all parts of the supply chain.

Developing a Foundation

As a first step towards improving shrimp farming, in consultation with the sector, the SFP and ASC will identify priority project locations, stakeholders, sustainability issues, and the associated improvement actions. Through this, the project aims to clarify the mechanisms needed to develop a successful AIP within the shrimp farming sector in India as well as in other countries.

Defining Incentives

While incentivizing farms to participate remains challenging, stakeholders increasingly recognize AIPs as a pathway to improve practices and as a stepping stone towards certification. Existing incentives to participate in an AIP come primarily from the market, where buyers require producers to participate in order to maintain market access and sometimes even commit to paying a premium. However, producers need AIPs to support them in realizing clear gains through, for example, improved yields, increased efficiency, and decreased input costs. Assessing the needs of producers and their supply chains will contribute to identifying and strengthening incentives to enter into these types of improvement pathways and remove any potential barriers, such as limited access to training, restricted capacity to implement interventions, and navigating complex regulations.



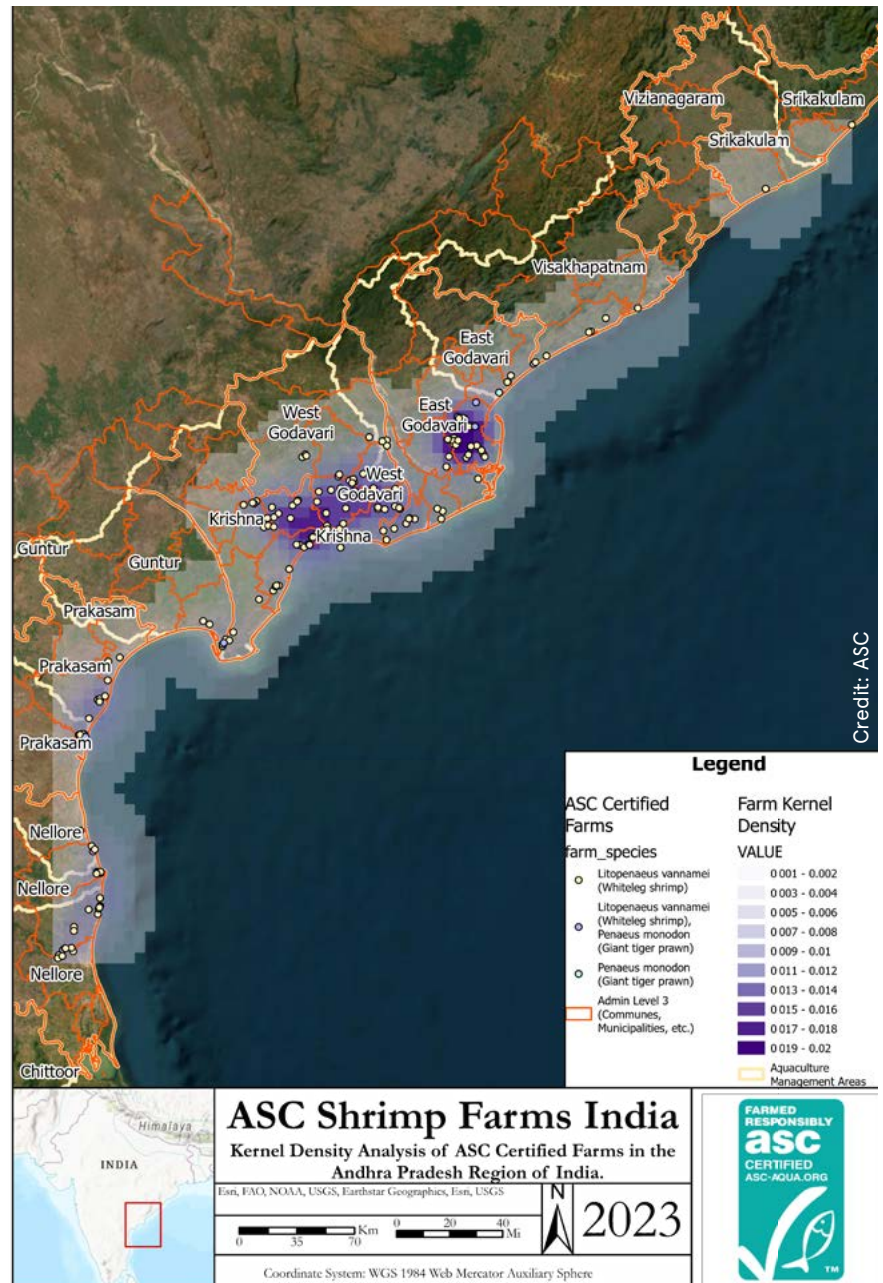
Technical Support to Drive Improvements

AIPs under ASC's Improver Programme, such as the AIP in Indonesia, have provided valuable lessons on the knowledge base needed to deliver meaningful

improvements. The two organizations state that the difference between conventional farming practices and those of certified farms can be significant. Producers whose farms aren't yet certified often don't know how to improve their farming practices and move towards certification. They may not know where to start and what activities to invest in. Transparent processes and mechanisms that designate step-by-step improvements across four key landscape-level impact area modules are necessary to support the transition of status quo operations into measurable steps towards improvement. These modules are: the impact on (1) sensitive and critical habitats, (2) feed use, (3) water quality, and (4) disease management.

Achieving Measurable Improvements

A key challenge in achieving meaningful change is identifying how improvements and outcomes will manifest in a project that potentially impacts multiple geographic levels (villages, districts, states, etc.). ASC and SFP have drafted a concept to tackle this issue. Through this project and between partner organizations, the collected information will help implement measurements to test where improvements from individual farmers lead to landscape-level advancements—from the farm, through to the AIP, to the jurisdiction (state or province), and ultimately at the national level. This will support the creation of sustainability metrics at these levels. Improved measurements will further support the supply chain assurances needed to secure market support and recognition for AIPs.



Initial project analysis showing ASC certified farms, administrative boundaries, and aquaculture management areas for Andhra Pradesh.

This project has been funded by the Walmart Foundation. The activities presented are those of ASC and SFP alone and don't necessarily reflect the opinions of the Walmart Foundation.

Want to get involved? Contact Roy van Daatselaar, ASC Improver Program Global Lead, at roy.vandaatselaar@asc-aqua.org.

THE CENTER FOR RESPONSIBLE SEAFOOD (TCRS)

Project started: 2023

Implementing partners: TCRS and The Nature Conservancy

Source of funding: Walmart Foundation

Project team:

- George Chamberlain, TCRS President
- Jeff Fort, TCRS Director
- Karel Kunz, TCRS Project Manager

Partners involved: AquaExchange, Tomota, Global Seafood Alliance, Seafood Solutions



George Chamberlain (left of center, blue shirt and light trousers) and part of his team meet small shrimp farmers in Andhra Pradesh to discuss joining a TCRS Improver Program.

PROJECT BACKGROUND, SCOPE, AND ACTIVITIES

A bottleneck preventing small farmers from obtaining conventional financing is the high risk associated with disease. Due to uncertainty about survival rates and consequent biomass in the pond, these farmers cannot estimate their crop value in real time. If this data were available, along with estimates of major costs such as feed, PL, and labor, financial groups could more confidently project profitability with much less risk. Another data challenge for small farms is the impending requirement for traceability to the pond level as mandated by the new US Food Safety Modernization Act. Any requirement for daily data entry would be onerous for small farmers, who rely mainly on their smart phones. They would thus greatly benefit from novel approaches that automatically upload the required data from on-farm devices.

AquaExchange, Otanics Technology JSC, and other digital solution providers are overcoming these challenges by digitizing the farm management process. For example, some of these apps assist feed managers in accurately estimating residual feed on check trays by using smart phone photos. And by tracking actual volume of feed distributed in ponds by auto feeders, these apps can automatically estimate shrimp biomass. Then, by arranging feed and PL purchases through their apps, farmers can also estimate major costs. This gives them an estimate of real-time profitability, which reduces risk and enables insurance and financing—a game changer for small shrimp farmers.

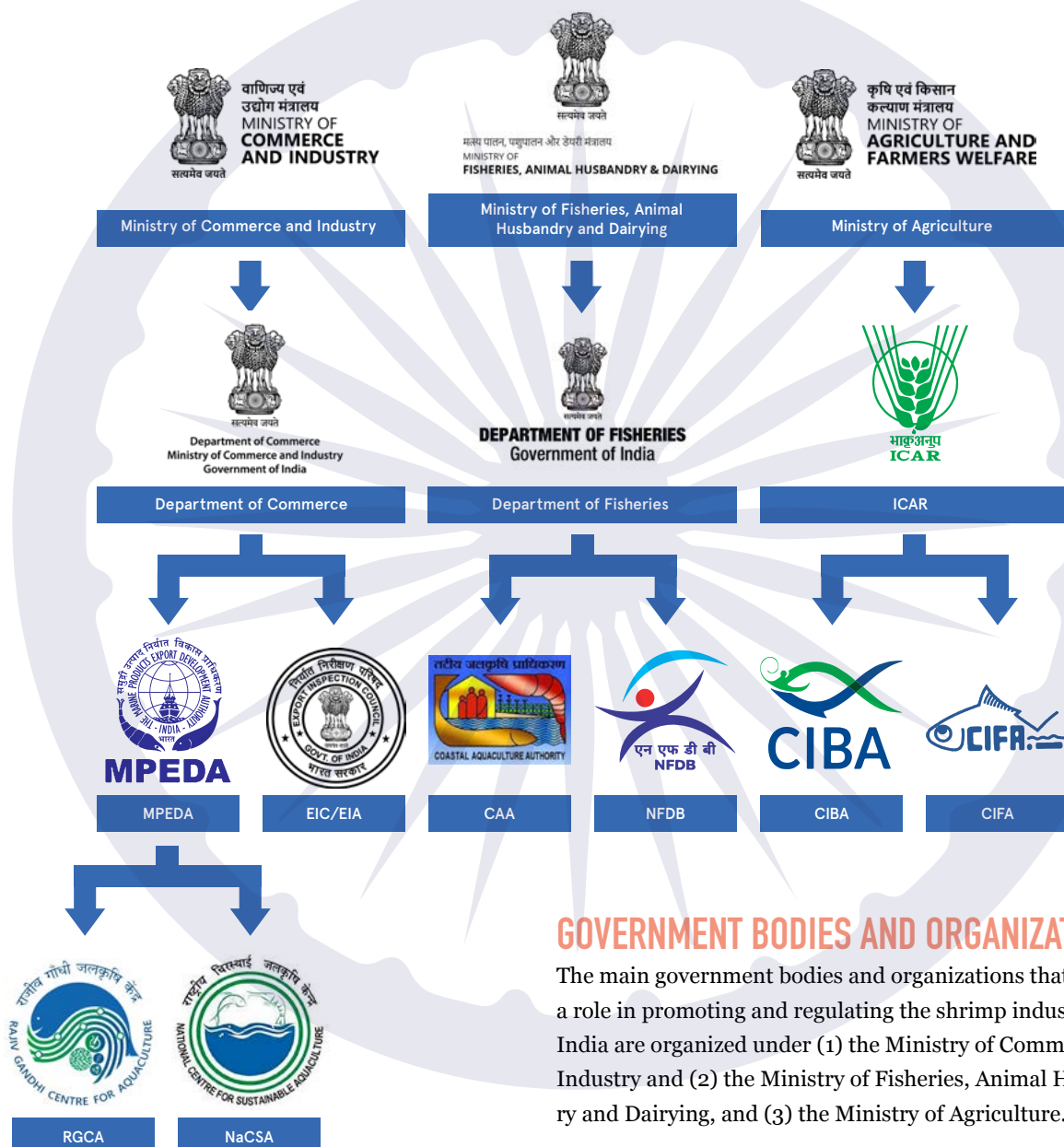
TCRS proposes to work with such apps to enroll small shrimp farmers in improver programs, link them with the market, increase their productivity, and collect sustainability data such as efficiency of feed, energy, and water use. This program would be limited to small farms, defined as less than 5 ha in pond surface area or with production below 20 MT a year. The ambition? Have these farms certified with a scheme such as BAP or ASC within three years from enrolment.

Want to get involved? Contact George Chamberlain, TCRS President, at george.chamberlain@globalseafood.org.

Institutional Environment

This chapter will give you a general overview of the government bodies and organizations, and private sector associations that play a role in India's shrimp industry. The specific roles of these organizations are touched upon in the relevant supply chain chapters.

FIGURE 1: THE MAIN GOVERNMENT BODIES AND ORGANIZATIONS THAT PROMOTE AND REGULATE THE SHRIMP INDUSTRY IN INDIA



GOVERNMENT BODIES AND ORGANIZATIONS

The main government bodies and organizations that play a role in promoting and regulating the shrimp industry in India are organized under (1) the Ministry of Commerce and Industry and (2) the Ministry of Fisheries, Animal Husbandry and Dairying, and (3) the Ministry of Agriculture.



वाणिज्य एवं
उद्योग मंत्रालय
MINISTRY OF
**COMMERCE
AND INDUSTRY**

सत्यमेव जयते

MINISTRY OF COMMERCE AND INDUSTRY

MARINE PRODUCTS EXPORT DEVELOPMENT AUTHORITY (MPEDA)



MPEDA

MPEDA was established in 1961 to promote India's exports of fishery and aquaculture products. Its activities include the active promotion of the country's exports during trade shows, but also the indirect promotion of India's exports through lobby and advocacy, and through ensuring that all stakeholders in India's aquaculture and fishery supply chain comply with international food safety standards. MPEDA registers shrimp farms, hatcheries, and processing establishments. It also facilitates pre-harvest testing for shrimp exports to the EU, and has set up its own shrimp farm and hatchery certification scheme SHAPHARI. MPEDA has regional offices throughout India and manages a network of its own labs to test shrimp products before harvest and shipment.

Two organizations operate under the mandate of MPEDA: (1) the Rajiv Gandhi Centre for Aquaculture (RGCA) and (2) the National Centre for Sustainable Aquaculture (NaCSA).

mpeda.gov.in



Rajiv Gandhi Centre for Aquaculture (RGCA)

The RGCA was established in 1996 as MPEDA's R&D arm and tasked to diversify India's aquaculture sector. Its main focus is to produce seeds for a variety of fish and other aquatic animal species that are not widely available in India. The RGCA produces seabass, tilapia, and mud crab seeds, among others. The organization is important for the shrimp sector because it manages the aquatic quarantine facility through which imported broodstock must be processed, and it runs the broodstock multiplication center in Andhra Pradesh. The RGCA is furthermore involved in establishing domestic breeding programs for various shrimp species. It manages the *P. monodon* breeding program in the Andaman and Nicobar Islands.

rgca.co.in

EXPORT INSPECTION COUNCIL (EIC) AND THE EXPORT INSPECTION AGENCY (EIA)



The EIC is India's official export certification body which ensures the quality and safety of products exported from India. While the EIC is primarily an advisory body to the government, it also controls the EIA, which is responsible for registering and auditing shrimp processing establishments. The EIC furthermore issues export certificates, health certificates, and certificates of origin. Most overseas governments have appointed the EIC as the competent authority for managing regulations for the export of shrimp products. The EIC delegates some of these tasks and responsibilities to MPEDA, which has a broader mandate than the EIC in terms of ensuring regulatory compliance throughout the shrimp value chain.

eicindia.gov.in



National Centre for Sustainable Aquaculture (NaCSA)

NaCSA was established in 2007 and is tasked to work with small and marginalized farmers. It encourages them to organize in clusters and manage connected ponds collectively to improve productivity and reduce the risk of disease transmission. NaCSA supports such clusters so that they can better access technical assistance, high-quality inputs, and markets. It also provides support to clusters that want to register as formal cooperatives, which will provide them with better access to subsidy schemes and financial institutions. NaCSA actively promotes best management practices within the clusters that it supports, including awareness with regard to the use of antibiotics. The organization has also established several Aqua One Centres where the clustered farmers can use sampling and testing services related to water, soil, and PL quality.

nacsampeda.org.in



मत्स्य पालन, पशुपालन और डेयरी मंत्रालय
MINISTRY OF
FISHERIES, ANIMAL HUSBANDRY & DAIRYING

MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DAIRYING

DEPARTMENT OF FISHERIES (DOF)



The DoF was founded as a standalone department in 2019 and is responsible for matters relating to the formulation of policies and schemes for the development of inland, marine, and coastal fisheries (including aquaculture). The establishment of the DoF was followed in May 2020 by the introduction of India's largest-ever investment scheme for the fishery and aquaculture sector: Pradhan Mantri Matsya Sampada Yojana (PMMSY). This \$200m scheme is managed by the DoF and aims to promote India's Blue Revolution—the objective of which is to increase the production and productivity of India's aquaculture—through

sustainable and responsible development of the fisheries sector. It provides subsidies to invest in (1) the enhancement of production and productivity, (2) infrastructure and post-harvest management, and (3) fisheries management and the regulatory framework around fisheries and aquaculture.

Two independent organizations function under the DoF: (1) the Coastal Aquaculture Authority (CAA) and (2) the National Fisheries Development Board (NFDB).

dof.gov.in



National Fisheries Development Board (NFDB)

The NFDB was established in 2006 as an autonomous organization under the administrative control of the DoF. It aims to enhance fish production and productivity in India and to coordinate fishery development in an integrated and holistic manner. The NFDB promotes the fishery and aquaculture sector domestically and assists it with the implementation of several subsidy schemes. For example, the NFDB plays a major role in implementing the PMMSY investment scheme.

nfdb.gov.in



Coastal Aquaculture Authority (CAA)

The CAA was established in 2005 as an independent organization under the Ministry of Fisheries, Animal Husbandry and Dairying. It's responsible for regulating aquaculture activities in India's coastal zone, which includes registering shrimp farms, hatcheries, and antibiotic-free inputs, and regulating the imports of broodstock. The CAA is authorized to close farms or hatcheries that don't comply with its regulations. In 2008, the CAA also became responsible for introducing *L. vannamei* into India. Its mandate is limited to the coastal zone, meaning that shrimp farming operations located more inland aren't managed by the CAA. The new bill that will define the future role of the CAA is currently under review and will strengthen its position. One of the means to realize this is by bolstering its leadership with a Member Secretary equivalent to the level of a Joint Secretary in the Government of India.

caa.gov.in



कृषि एवं किसान
कल्याण मंत्रालय
MINISTRY OF
**AGRICULTURE AND
FARMERS WELFARE**

MINISTRY OF AGRICULTURE AND FARMERS WELFARE



The Indian Council of Agricultural Research (ICAR)

The Indian Council of Agricultural Research (ICAR) is an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India.

ICAR established the Central Institute for Brackishwater Aquaculture (CIBA) in 1987. CIBA's objective is to support the

development of brackishwater aquaculture. Its headquarters are located in Chennai, with two experimental field stations in Tamil Nadu and research centers in Kakdwip (West Bengal) and Navsari (Gujarat). Within the shrimp industry, the organization is involved in the development of a domestic breeding program for Indian white shrimp (*P. indicus*). Also falling under ICAR is the Central Institute of Freshwater Aquaculture (CIFA), which is relevant for the shrimp industry as it runs several projects related to the promotion of *M. rosenbergii* production.

icar.org.in

SECTOR ASSOCIATIONS

Each segment of the shrimp value chain in India has its own sector association but not all of these associations function properly. Here you will find an overview of the most important associations.

SEAFOOD EXPORTERS ASSOCIATION OF INDIA (SEAI)



The SEAI was incorporated in 1970 with the main objective to protect and promote the interest of the companies engaged in the seafood business and to develop the international trade of seafood from India. The association has a national president and a secretary-general. The president is elected for a specific term, while the secretary-general has a long-term position and is responsible for the continuity of the SEAI's activities. The president and the secretary-general are both involved in dialogues with relevant domestic and overseas authorities and lobby for the interests of its members.

seai.org.in

ALL INDIA SHRIMP HATCHERIES ASSOCIATION (AISHA)



AISHA was established in 2004 and unites most of the country's shrimp hatchery operators. The association represents hatcheries in policy dialogues with relevant government bodies. It also acts as a lobbying body in the case of issues that affect all of India's hatcheries. AISHA for example played a crucial role in the government approving imports of shrimp broodstock from other Asian countries.

SHRIMP FEED MANUFACTURERS ASSOCIATION (SFMA)



Most of India's leading shrimp feed manufacturers are members of the SFMA. It facilitates dialogue between India's main shrimp feed manufacturers and stakeholders of the sector on all matters pertaining to the feed business.

stglobal.co.in/SFMA/index

PRAWN FARMERS FEDERATION OF INDIA (PFFI)

The PFFI is the national body of all shrimp farmers' associations. All shrimp farmers are associated with their local creek-level associations. These creek-level associations are members of district-level associations which in turn fall under state-level associations. In India, there are nine of such maritime state associations. Representatives of the state-level associations are members of the PFFI, which interacts with government officials and research institutions on policy matters and development programs.

SOCIETY OF AQUACULTURE PROFESSIONALS (SAP)



The SAP is a non-profit NGO established for and by a group of aquaculture professionals in India in 2003. Currently, the SAP membership counts over 500 aquaculture professionals. Biannually, the SAP organizes the Aqua India conference, which is attended by well over 500 aquaculture professionals from India and abroad. The SAP's mission is to help aquaculture professionals advance in the art, science, and practice of aquaculture by providing opportunities for continuous professional development and being the voice of professionals to the wider Indian aquaculture industry. Various SAP members are considered leaders in the shrimp industry and frequently represent the sector and country in national and international conferences and industry dialogues.

aquaprofessional.org

Company Profiles

Compiling a list of India's industry-leading companies and choosing which ones will feature in a company profile is not an easy task. While many people will agree on the country's most prominent players, there are smaller but influential players that also deserve to be presented. To include them all is beyond the scope of this guide—I've narrowed it down to 19 of India's leading shrimp companies.

The company profiles are arranged according to revenue and footprint in the Indian shrimp industry. For instance, while Sandhya Aqua boasts the highest revenue, it generates a significant portion of it outside India, hence its third position. Conversely, CP Group, despite not disclosing its revenues, is renowned for its footprint in the Indian shrimp industry, and thus earns a fourth place. Even smaller companies like Vaisakhi Bios and Vaishnavi Aquatech are featured as they dominate the country's *L. vannamei* and *P. monodon* hatchery segments.

A few other things:

- The company revenues are based on self-reported numbers. Where companies didn't provide these numbers, they are based on public credit rating reports from Indian service providers such as CRISIL and CARE Ratings (see Table 1). When revenues were provided in INR, the average exchange rate for the corresponding year was used to convert to USD.
- The listed companies have provided and verified all information in these profiles. If a company didn't respond to the request to provide information, its profile consists of publicly available information, as indicated in Table 1.
- When providing district and state locations of facilities, old district names are also used in the company profiles for consistency reasons.
- Although relevant food safety, sustainability, and social compliance certifications aren't part of the company profiles, almost all of these players have a wide range of certification schemes in place.



Looking for more in-depth information about these companies or companies not listed in this guide? Please contact me at willem@shrimpsights.com.

TABLE 1: 19 OF INDIA'S LEADING SHRIMP COMPANIES LISTED WITH A COMPANY PROFILE, THEIR REVENUES, AND THEIR CAPACITIES

	Company verified profile	Consolidated revenue 2022-2023 ¹		PL production		Capacity		Production	
		Self-reported	Credit rating reports	Million PL/year	Size ³	MT/year	Size ⁴	MT/year	Size ⁵
AVANTI FEEDS	Yes	615	-	600	M	775,000	XL	28,000	L
DEVI SEA FOODS	Yes	391	-	200	S	300,000	L	52,000	XL
SANDHYA AQUA ⁶	Yes	713	-	1,000	M	66,000	M	56,000	XL
CP GROUP ⁷	No	-	544	Unknown	XL	Unknown	XL	Unknown	S
DEVI FISHERIES	Yes	318	-	200	S	47,000	S	137,500	XL
SANDHYA MARINES ⁸	Yes	-	286	300	S	150,000	L	30,000	L
GROWEL GROUP	Yes	232	-	-	-	369,000	XL	28,000	L
FALCON MARINE	Yes	220	-	-	-	95,000	M	48,000	L
DEEPAK NEXGEN	Yes	217	-	220	S	520,000	XL	15,000	M
KADER EXPORTS	Yes	199	-	-	-	-	-	81,913	XL
ANANDA GROUP ⁹	Yes	-	161	2,500	L	140,000	M	39,600	L
NEKKANTI SEA FOODS	Yes	139	-	100	S	-	-	79,710	XL
APEX FROZEN FOODS	Yes	130	-	1,300	L	-	-	34,240	L
BMR GROUP	Yes	94	-	9,000	XL	150,000	L	20,000	M
ROYALE MARINE IMPEX	Yes	83	-	3,000	L	60,000	M	20,000	M
VAISHNAVI AQUATECH	Yes	44	-	1,500	L	25,000	S	-	-
THE WATERBASE	Yes	37	-	500	M	110,000	M	5,000	S
ABAD OVERSEAS ¹⁰	Yes	23	-	-	-	-	-	55,380	XL
VAISAKHI BIOS	Yes	22	-	6,000	XL	-	-	10,000	M

¹ Consolidated company revenues include those of all relevant seafood-related group companies.

² Feed manufacturing includes shrimp and fish feed manufacturing capacity to show the total size of the feed operation. In the profiles, the fish and shrimp feed capacity are split.

³ S = < 500, M = 500-1,000, L = 1,000-5,000, XL = > 5,000.

⁴ S = < 50,000, M = 50,000-150,000, L = 150,000-300,000, XL = > 300,000.

⁵ S = < 10,000, M = 10,000-20,000, L = 20,000-50,000, XL = > 50,000.

⁶ The numbers of Sandhya Aqua include the revenues generated by AZ Gems in the US and its subsidiaries in India.

⁷ The numbers of CP Group combine the reported revenues in CARE Ratings Public Credit Rating Reports for CPF (India) Pvt. Ltd. and CP Aquaculture India Pvt. Ltd. This includes revenues from its poultry business.

⁸ Revenue sourced from the ICRA public credit rating report of March 2023.

⁹ Revenue sourced from the CARE Ratings Public Credit Rating Reports of June 2022 and September 2023. The figures above combine the revenues of Ananda Aqua Exports, Ananda Foods, Ananda Enterprises India, and Godavari Mega Aqua Food Park Pvt. Ltd. The company claims that these revenues exclude \$18m-\$25m a year from the domestic sales of freshwater fish.

¹⁰ The self-reported numbers for Abad Overseas exclude the revenues of its parent company Abad Fisheries.



In 1993, the late Sri Alluri Venkateswara Rao established Avanti Feeds Ltd. and in 1994 the company was listed on the Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) under the ticker AVANTIFEED. Nowadays, Mr. Alluri Indra Kumar, Chairman and Managing Director, leads the company. Together with his sons, he expanded the business into a vertically integrated operation. In 2009, Thai Union Group invested in Avanti Feeds Ltd. In 2022, it held 24% of the company's shares.

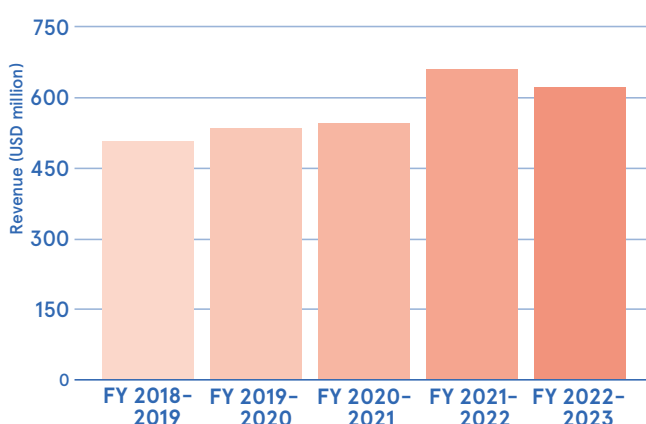
Avanti Feeds is India's largest shrimp feed manufacturer. It opened its first shrimp feed mill in 1994 and now operates six feed mills in Andhra Pradesh and one in Gujarat. Its total manufacturing capacity is 775,000 MT. In FY 2022-2023, Avanti Feeds' sales amounted to almost 500,000 MT and the company held a market share of more than 50% in the Indian feed market. It has contract farming arrangements for around 20,000 MT of raw materials from ASC and BAP certified farms. Additionally, Avanti has a corporate farm with a 1,500 MT output to demonstrate the latest technology to its farming network. In 2018, the company co-invested with Thai Union Group and an Indonesian partner in Thai Union Kharisma Lestari, an Indonesian shrimp feed manufacturer.

The company's processing arm was established in 1997. It became a subsidiary in 2015, named Avanti Frozen Foods. A year later, Thai Union acquired 40% of the subsidiary, with Avanti Feeds owning the remaining majority. Today, the company operates three processing plants that combined can produce 28,000 MT yearly.

Group Name Avanti Feeds Ltd.
Year of Establishment 1993
Company Headquarters
 Hyderabad, Telangana
Leadership Alluri Indra Kumar,
 Chairman and Managing Director

AVANTIFEEDS.COM
AVANTIHO@AVANTIFEEDS.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production
 Number of units 1
 600 million PL/year

M



Feed manufacturing
 Number of units 7
 775,000 MT/year

XL



Processing
 Number of units 3
 28,000 MT/year

L

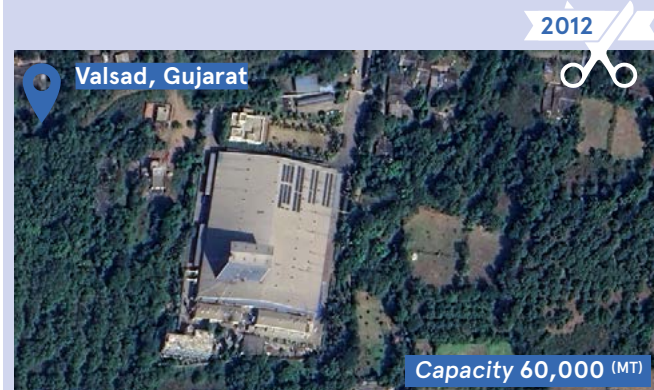
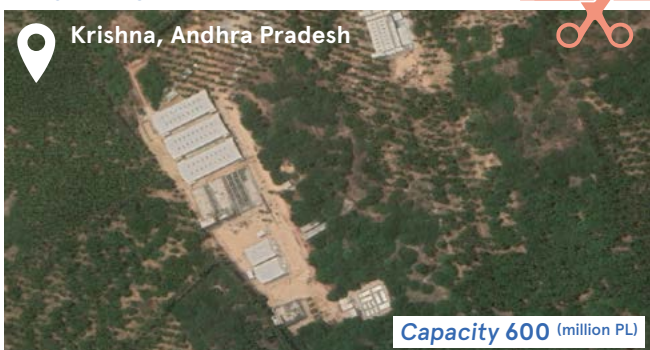
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	1	63	Prakasam, Andhra Pradesh
Contract	27	600	Visakhapatnam, East Godavari, West Godavari, Prakasam (all in Andhra Pradesh)

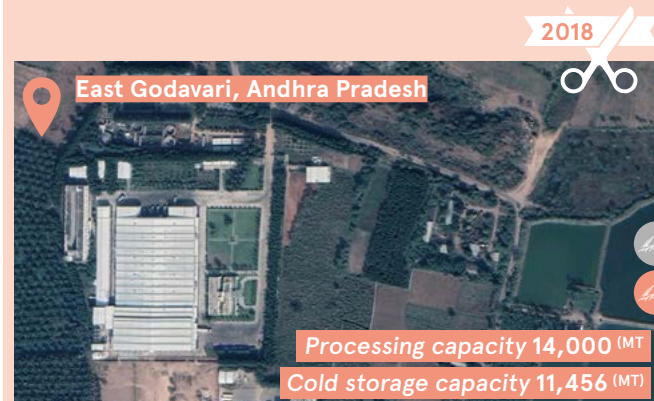
LEGEND

-  Value-added
-  Raw
-  Cooked

HATCHERIES



FEED MANUFACTURING



These are just examples. Due to the large number of facilities, we can only show some of the locations.



Devi Seafoods

Mr. Brahmanandanam Portu is the Chairman and Managing Director of Devi Sea Foods. He is a first-generation entrepreneur who founded the business and expanded it into a vertically integrated operation. The second generation is currently involved in the company's management, and they will eventually take over the leadership.

Mr. Brahmanandanam Portu is the Chairman and Managing Director of Devi Sea Foods. He is a first-generation entrepreneur who founded the business and expanded it into a vertically integrated operation. The second generation is currently involved in the company's management, and they will eventually take over the leadership.

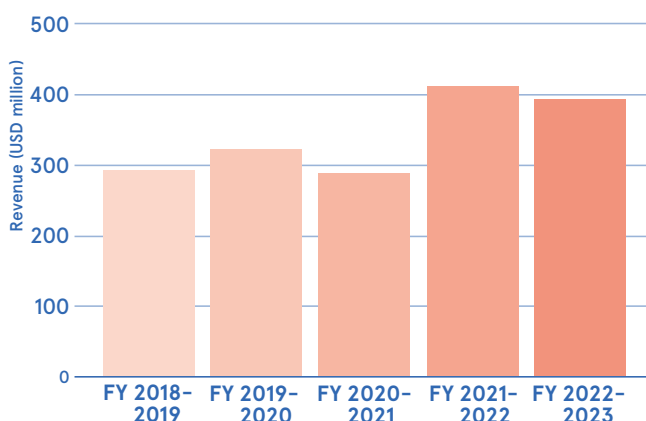
Devi Sea Foods started as a merchant exporter in 1992, established a hatchery in 1994, ventured into farming a year later, and established its first processing plant in 1997. Since then, the company has expanded and become one of India's top 3 exporters. The company runs four modern processing plants, and its newest plant is fully equipped to produce value-added breaded products. Its US import division, Devi Sea Foods Inc., is one of the US's largest shrimp suppliers.

More recently, the company ventured into shrimp feed manufacturing. Its first mill opened in 2016. Since then, the company has opened two more mills. Currently, Devi Sea Foods has an annual feed manufacturing capacity of 300,000 MT and is India's fourth largest shrimp feed manufacturer. The company sells *L. vannamei* and *P. monodon* feed as well as a small range of farm healthcare and pond management products.

Group Name *Devi Sea Foods Ltd.*
Year of Establishment *1992*
Company Headquarters
Visakhapatnam, Andhra Pradesh
Leadership *Brahmanandanam Portu,*
Chairman and Managing Director

DEVISEAFOODS.COM
INFO@DEVISEAFOODS.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production
 Number of units 1
 200 million PL/year



Feed manufacturing
 Number of units 3
 300,000 MT/year



Processing
 Number of units 4
 53,000 MT/year

S

L

XL

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	3	100	East Godavari (2), Prakasam (1)
Contract	130	2,000	East Godavari (30%), West Godavari (30%), Krishna (20%), Prakasam (10%), Nellore (10%)

LEGEND

-  Value-added
-  Raw
-  Cooked

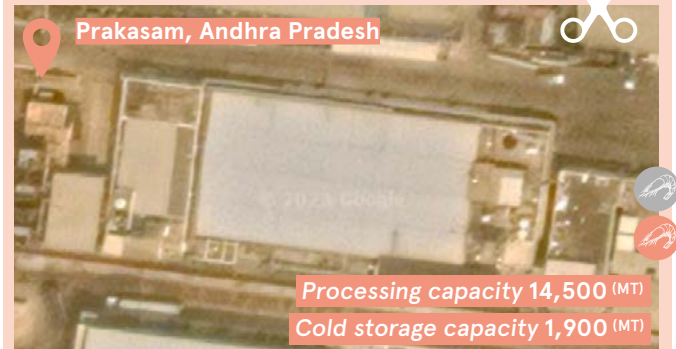
HATCHERIES

1994



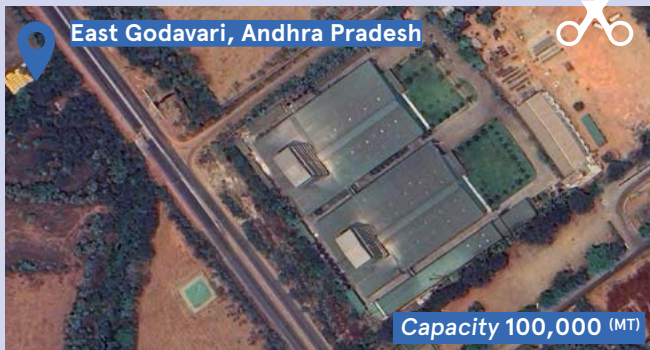
PROCESSING FACILITIES

1994

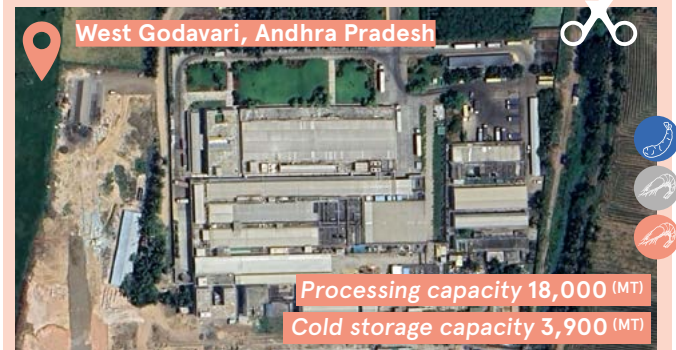


FEED MANUFACTURING

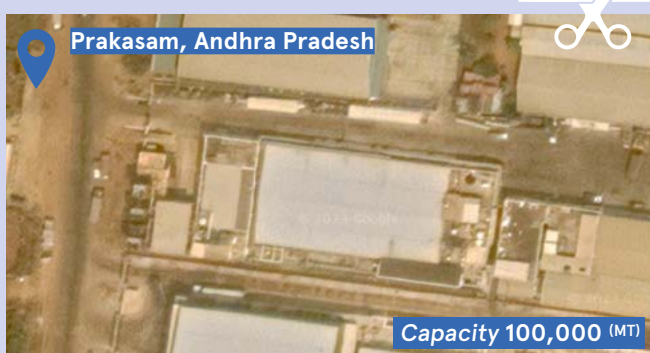
2016



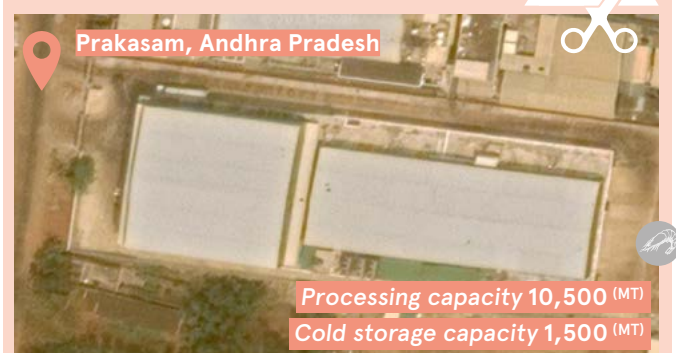
2000



2018



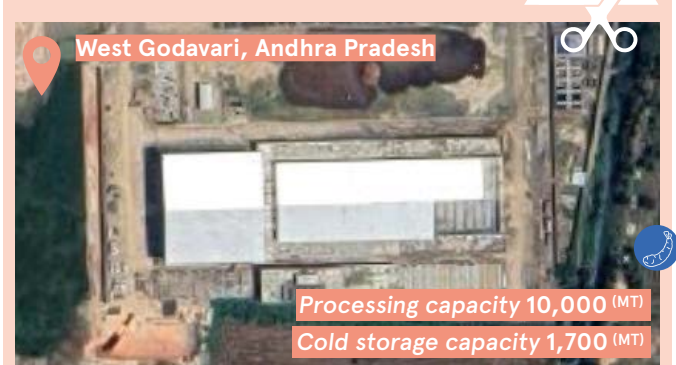
2022



2022



2023





Sandhya Aqua Exports Pvt. Ltd. was established in 2005 by Mr. Veerabhadra Rao Kunam after he left Sandhya Marines. Today, the company is led by Mr. Kotaiah Chowdary Kunam, the founder's son, who acts as CEO. Under his leadership, Sandhya Aqua has become India's fastest growing seafood conglomerate. While Sandhya Aqua and Sandhya Marines operate separately, the next generation of both parts of the family manages the companies and works closely together.

Sandhya Aqua operates four processing plants, including Kalyan Aqua. The same family owns Neeli Aqua, another processing company. Sandhya Aqua has started constructing another plant that can produce around 20,000 MT of raw, pre-fried, and tempura products. According to the company, in 2023, it exported close to 30,000 MT of shrimp, making it India's second largest exporter after Devi Fisheries. Having started the construction of a fish processing plant, soon it will also add fish to its product basket, adding another 20,000 MT of processed finfish to its capacity.

Sandhya Aqua has diversified vertically with investments in multiple shrimp hatcheries, farms, and feed manufacturing plants. More investments on both

fronts are expected as the company will add an additional production line to its feed manufacturing plant and plans to build a new hatchery with a production capacity of 1bn PL. Over the next few years, Sandhya Aqua aims to become a top player in both value-chain segments.

AZ Gems, Sandhya Aqua's wholly-owned US subsidiary, is a top 3 shrimp importer that supplies the US with a wide range of shrimp and seafood from around the world. The various companies that Sandhya Aqua owns in Canada and Europe all contribute to a growing global footprint. According to the company, the share of fish in its total sales is growing rapidly and reached \$135m in FY 2022-2023.

Group Name Sandhya Aqua Exports Pvt. Ltd.

Year of Establishment 2005

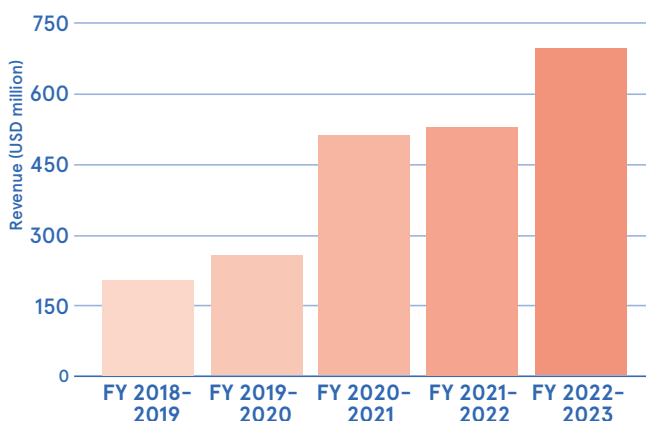
Company Headquarters Visakhapatnam, Andhra Pradesh

Leadership Kotaiah Chowdary Kunam, CEO

[SANDHYAAQUA.COM](https://www.sandhyaqua.com)

[INFO@SANDHYAAQUA.COM](mailto:info@sandhyaqua.com)

GROUP REVENUE



* These are consolidated numbers; they include AZ Gems, Kalyan Aqua, and Neeli Seafoods.

CAPACITY SUMMARY



PL production

Number of units 2

1,000 million PL/year



Feed manufacturing

Number of units 1

66,000 MT/year



Processing

Number of units 4

56,000 MT/year

M

M

XL

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	6	400	Prakasam (5), West Godavari (1)
Contract	Unknown	2,730	Krishna (78%), Prakasam (10%), West-Godavari (9%), Guntur (3%)

LEGEND

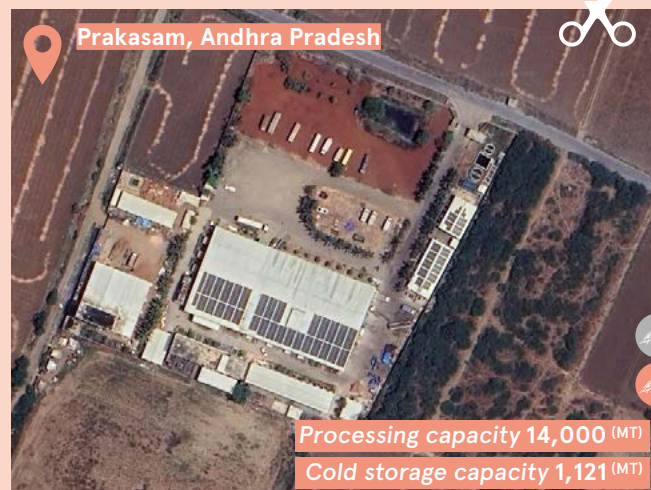
-  Value-added
-  Raw
-  Cooked

HATCHERIES

2020



2012



2013

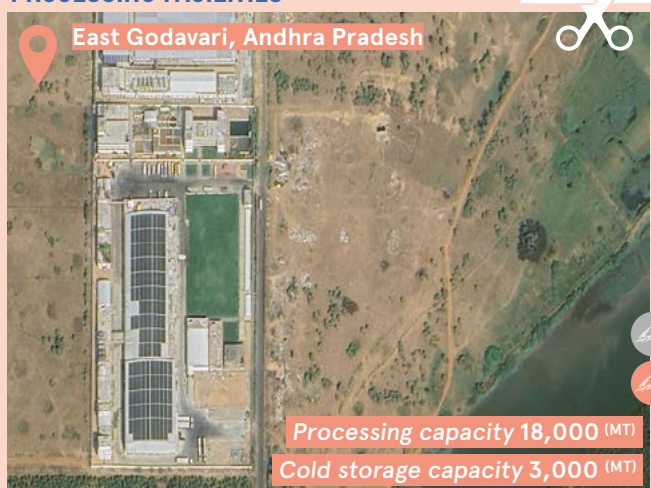


2008



PROCESSING FACILITIES

2021



2019



The recently built feed mill is not included here because it is not yet visible on Google Satellite View.



Charoen Pokphand Group (CP Group) is the world's largest shrimp feed producer. It is also involved in the farming, hatchery, and processing elements of the shrimp industry throughout Asia. Besides India, it works primarily in China, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. Mr. Sirapong Na Pongsa leads the company in India as its Acting President.

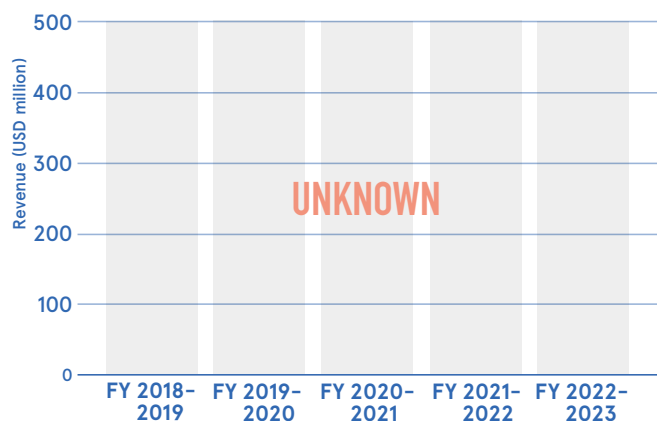
The company operates in India through two subsidiaries: CPF (India) Pvt. Ltd. and CP Aquaculture India Pvt. Ltd., both of which are active in the shrimp and poultry industries. CP Group entered India's aquaculture industry in 1992 and opened its first feed mill in Chennai, Tamil Nadu, four years later. Currently, the group operates six shrimp feed mills, nine shrimp hatcheries, and one processing plant. It is a top 3 shrimp feed manufacturer, a top 5 hatchery operator, and a small shrimp exporter. Together with Ananda Group, the company invested in the Andhra Pradesh Broodstock Multiplication Center, which it owns 75% of. Although CP Group did not respond to inquiries,

the CARE Ratings Public Credit Rating Reports suggest that the two companies in India had a combined revenue of around \$500m in FY 2022-2023. This number includes all activities they carried out in the poultry and aquaculture industry.

The feed business is the core of the Group's activities in India, but it also sells a range of health products. The company has a strong dealer network throughout the country. Although still a significant player, CP Group has faced fierce competition from new local players, who have gained a considerable market share in recent years.

Group Name Charoen Pokphand Group (CP Group)
Year of Establishment 1994
Company Headquarters Chennai, Tamil Nadu
Leadership Sirapong Na Pongsa,
 Acting President

GROUP REVENUE



CAPACITY SUMMARY



PL production
 Number of units 9
 Unknown PL/year



Feed manufacturing
 Number of units 6
 Unknown MT/year



Processing
 Number of units 1
 Unknown MT/year

XL

XL

S

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	Unknown	Unknown	Unknown
Contract	Unknown	Unknown	Unknown

LEGEND

-  Value-added
-  Raw
-  Cooked

BMC

2017



FEED MANUFACTURING

1996



HATCHERIES



These are just examples. Not all facilities could be located through Google Maps.



Devi Fisheries was incorporated in 1992. Since then, the company has experienced steady growth and is structurally one of India's top 5 shrimp processors and exporters. Mr. Y. Surya Rao, Managing Director and Mr. Ch. Rajagopal Choudary, Chairman, lead the company, but the second generation is slowly taking over.

With six processing plants, the company has a total processing capacity of over 100,000 MT. According to Devi Fisheries, in 2023, its plants processed around 46,000 MT of raw material. Its newest processing plant is fully equipped to produce highly value-added products, such as breaded, tempura, and marinated shrimp. Through its 16 purchase centers, the company has direct access to over 1,400 shrimp farmers. With its fleet of over 110 trucks and company-owned ice manufacturing facilities, the company is well known for ensuring that its products are bought directly from the farmers, ensuring optimum quality and traceability. Devi Fisheries Incorporated, which was established in 2017 and is based in Houston, Texas, serves its customers' distribution needs in the US.

Besides its processing plants, the company is fully vertically integrated. Though its operations are comparatively limited in feed and PL production, it has a considerable footprint in the farming sector. The company operates four corporate farms with a combined land of 120 ha, and it has an extensive network of 47 contract farmers with 700 ha of land.

Group Name *Devi Fisheries Ltd.*

Year of Establishment *1992*

Company Headquarters

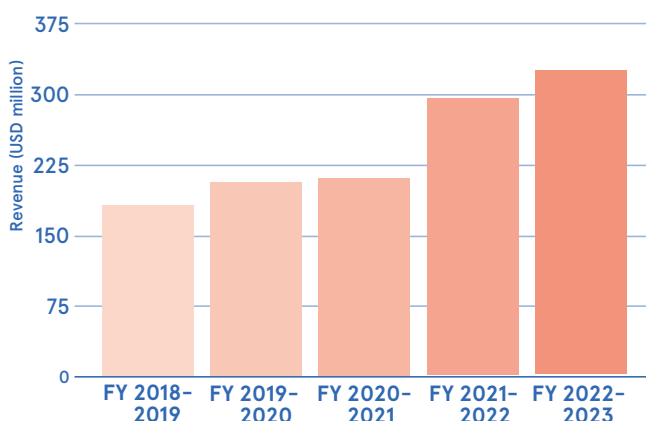
Visakhapatnam, Andhra Pradesh

Leadership *Y. Surya Rao, Managing Director
and Ch. Rajagopal Choudary, Chairman*

DEVIFISHERIES.COM

MAIL@DEVIFISHERIES.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 1
200 million PL/year



Feed manufacturing

Number of units 1
47,000 MT/year



Processing

Number of units 6
137,500 MT/year

S

S

XL

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	4	120	East Godavari, Prakasam, Bapatla
Contract	47	700	East Godavari, Prakasam, West Godavari, Srikakulam

LEGEND

-  Value-added
-  Raw
-  Cooked

HATCHERIES

1994



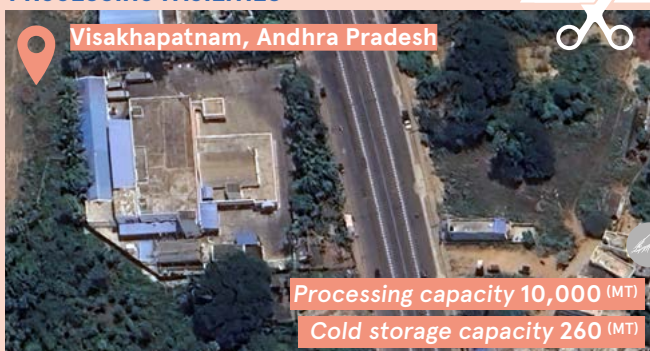
FEED MANUFACTURING

2019

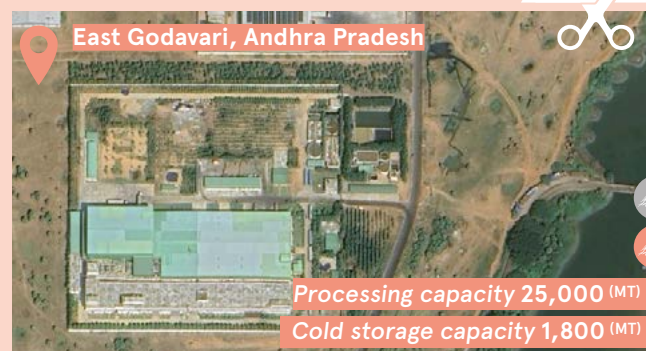


PROCESSING FACILITIES

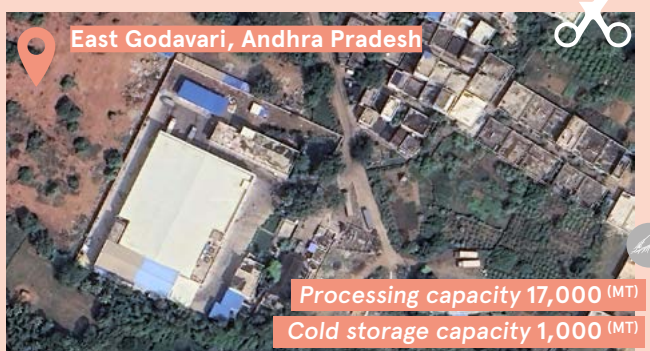
1992



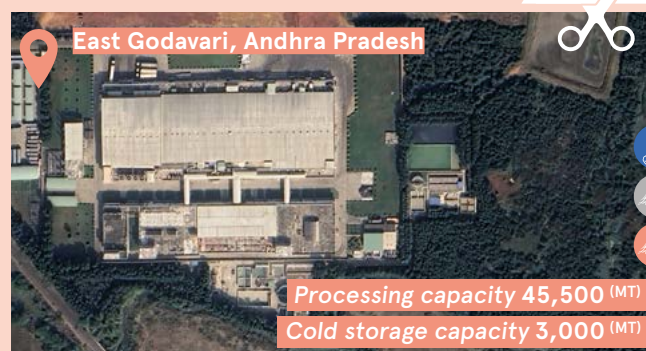
2021



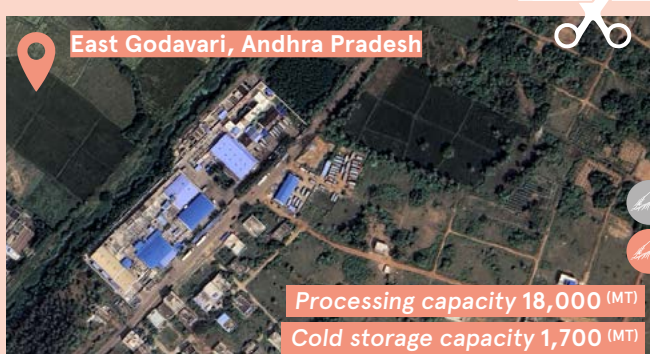
1995



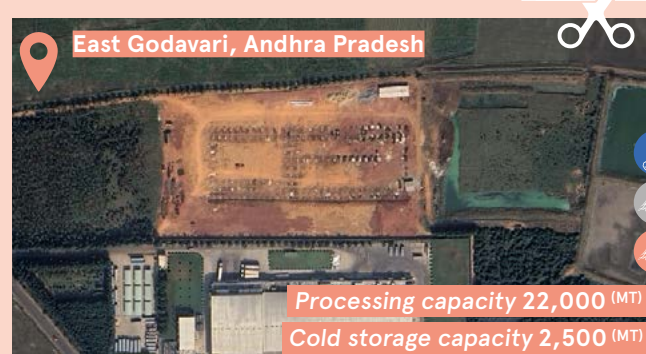
2018



2003



2024



The newest processing plant is almost finished, but not yet visible on Google Satellite View.

SANDHYA MARINES



Sandhya Marines was established in 1987 when it started as a merchant exporter. In 1992, the company opened its first processing plant in West Godavari. Dr. K.V. Prasad, Chairman and Managing Director, leads the company. In 2005, co-founder and family member Mr. Veerabhadra Rao Kunam left the company and founded Sandhya Aqua. Today, the next generation of both parts of the family manages the companies and works closely together.

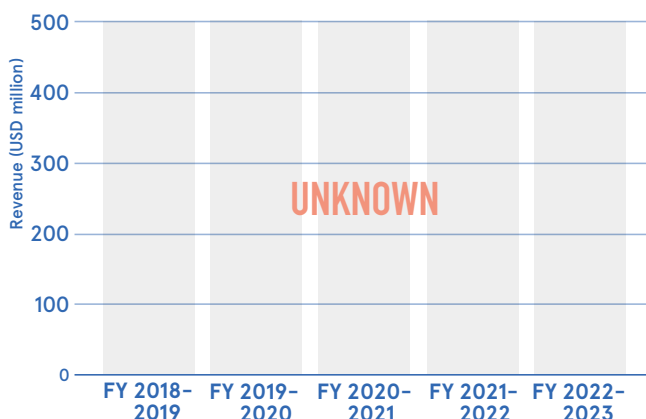
The company operates two processing plants, two under Sandhya Marines and one under its subsidiary Aquatica Frozen Foods. Combined, the three plants have a capacity of around 30,000 MT for raw and cooked products. Sandhya Marines operates a strong procurement network and a large truck fleet to collect raw materials and feed from its processing plants. A new plant under construction will add a capacity of 20,000 MT, mainly for value-added products. The company has been one of India's top 10 shrimp exporters for many years.

In 2019, Sandhya Marines ventured into shrimp feed manufacturing as it opened its first feed mill. It has since opened a second unit at the exact same location. The company's total capacity has increased to 150,000 MT. Sandhya Marines' market entry has been successful and the company is believed to be India's fifth largest shrimp feed producer.

Group Name Sandhya Marines Pvt. Ltd.
Year of Establishment 1987
Company Headquarters Visakhapatnam, Andhra Pradesh
Leadership K.V. Prasad, Chairman and Managing Director

SANDHYAMARINES.COM
EMAIL@SANDHYAMARINES.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 1
 300 million PL/year



Feed manufacturing

Number of units 2
 150,000 MT/year



Processing

Number of units 2
 30,000 MT/year

S

L

L

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	Unknown	Unknown	Unknown
Contract	Unknown	Unknown	Unknown

LEGEND

-  Value-added
-  Raw
-  Cooked

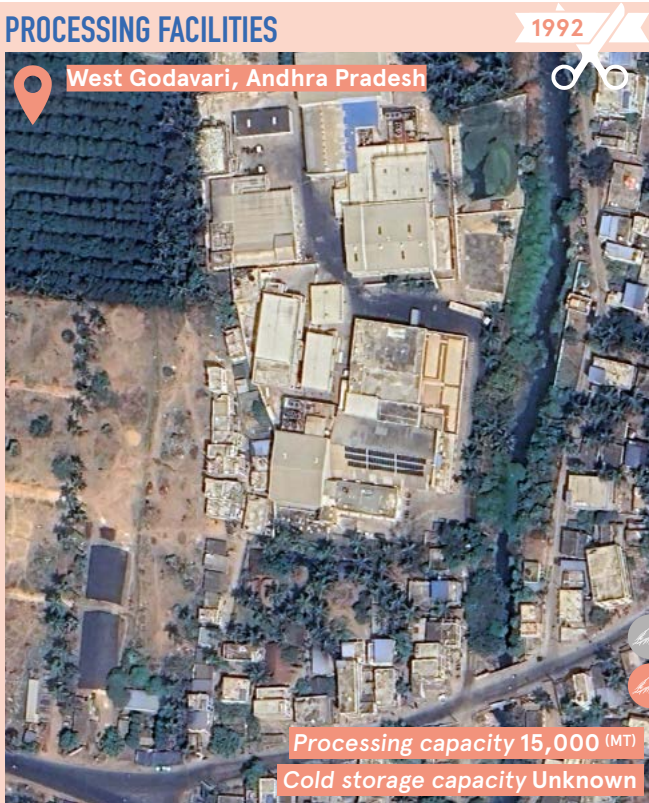
HATCHERIES



FEED MANUFACTURING



PROCESSING FACILITIES



GROWEL GROUP



The Growel Group started with Growel Formulations (an aquaculture healthcare product provider) in 1994. In 2008, Growel Feeds was established. Later, the group expanded to Growel Aqua Labs (2014), Growel Processors (2015), and Growel Hatcheries (2019). The group is led by Mr. M.V.N. Sessa Chary, Mr. P.S. Narendra, Mr. C.H. Sudheer, and Mr. P. Srinivas, who serve as Executive Directors of the group's various companies.

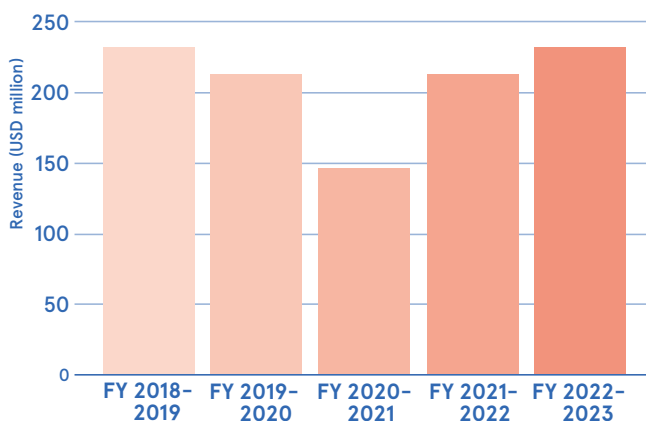
The company's feed operation is the core of its business. Growel Group opened its first feed manufacturing unit in 2010, and expanded with three more units at the exact same location in 2014. The first unit is dedicated to fish feed production, while the second, third, and fourth units produce shrimp feed and starter fish feed. All units combined can produce 369,000 MT of feed a year; 169,000 for fish and 200,000 for shrimp. In 2023, the company started construction on a new feed mill in Odisha. Growel Group sells feed in India and exports to more than 16 markets overseas. The company recently ventured into specialty feed; Intan for ornamental fish and Origin for shrimp hatcheries and pet food.

Besides owning a network of labs where farmers can test water quality and shrimp health, Growel Group operates an R&S farm, a shrimp processing plant, and a fish hatchery. Growel Formulation sells a wide range of health products. In addition to all these divisions, Growel has established a JV with Licious, India's leading online retailer, to process fish and shrimp products for the domestic market.

Group Name Growel Group
Year of Establishment 1994
Company Headquarters Vijayawada, Andhra Pradesh
Leadership Executive Directors M.V.N. Sessa Chary and P.S. Narendra (Feeds); Executive Directors C.H. Sudheer and P. Srinivas (Processing)

GROWELGROUP.COM
CUSTOMERCARE@GROWELFEEDS.COM

GROUP REVENUE

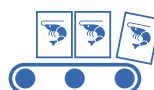


CAPACITY SUMMARY



Feed manufacturing

Number of units 4
 200,000 MT/year for shrimp,
 169,000 MT/year for fish



Processing

Number of units 1
 28,000 MT/year

XL

L

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	0	0	-
Contract	0	0	-

LEGEND

-  Value-added
-  Raw
-  Cooked

FEED MANUFACTURING

2010



PROCESSING FACILITIES

2015





Falcon Marine Exports is Odisha's largest seafood company. It is led by Mr. Tara Ranjan Patnaik, a first-generation entrepreneur who founded the company in 1986 and has since developed it into one of India's largest shrimp conglomerates. The second generation is slowly taking over the leadership. Falcon Marine Exports is also involved in the steel industry and real estate, and it operates a network of fresh seafood shops throughout Odisha.

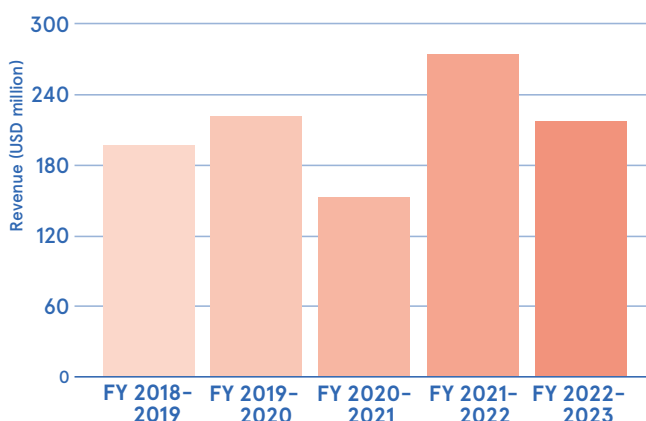
Falcon Marine Exports is primarily a shrimp processing company. It owns four shrimp processing plants and has recently commissioned two new plants. Once the new plants commence operations, the combined capacity of the company's facilities will be able to produce around 75,000 MT of shrimp annually. Falcon Marine Exports is structurally one of India's top 10 shrimp exporters, with long-term clients in the US, Europe, Japan, and other overseas markets.

The company has also diversified vertically. Since 2017, it has operated a feed mill with a current capacity of 95,000 MT. Additionally, it has planned a hatchery operation capable of producing two billion PL a year. The company operates its farms on over 400 ha of land in Odisha and West Bengal.

Group Name Falcon Marine Exports Ltd.
Year of Establishment 1986
Company Headquarters
 Bhubaneswar, Odisha
Leadership Tara Ranjan Patnaik, Chairman

FALCONMARINE.CO.IN
INFO@FALCONMARINE.CO.IN

GROUP REVENUE



CAPACITY SUMMARY



Feed manufacturing
 Number of units 1
 95,000 MT/year



Processing
 Number of units 4
 48,000 MT/year

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	1	200	Odisha
Contract	5,000	4,000	Odisha, West Bengal, Andhra Pradesh

LEGEND

-  Value-added
-  Raw
-  Cooked

FEED MANUFACTURING

2017

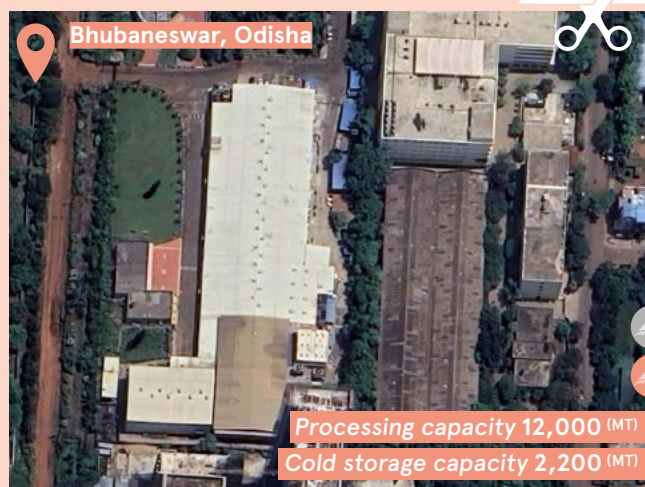


PROCESSING FACILITIES

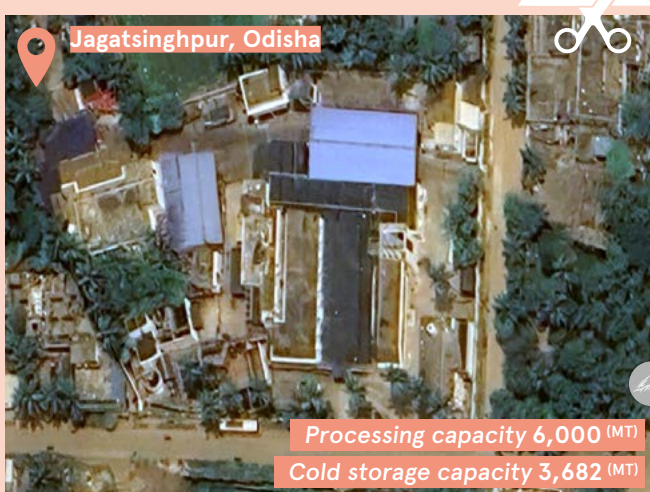
1992



2004



1993



2017



DEEPAK NEXGEN



Deepak Nexgen was established in 2010 and started operations two years later. The entities initially included Deepak Nexgen Foods and Feeds Pvt. Ltd and Deepak Nexgen Feeds Pvt. Ltd. In early 2024, these two companies merged and became Deepak Nexgen Feeds Pvt. Ltd. The group was founded by ten members with an engineering, fish farming and technocratic background. Today, Mr. A. V. Subramanyan, the company's managing director, leads the company. Mr. Seshu Akkina, Chief Operating Officer, leads the shrimp feed division and Mr. Srinivas Tetall leads the fish feed division.

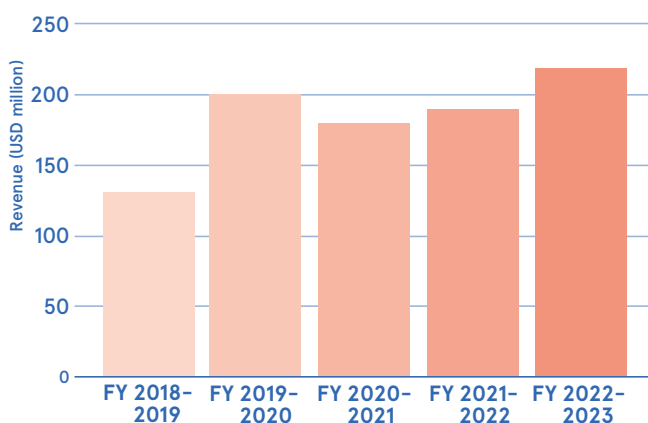
Deepak Nexgen started producing fish feed in 2012. Its feed is sold under the Kingfish brand. Since 2017, the company has become India's largest seller of floating fish feed. In 2017, it also began producing and selling shrimp feed, which is known under the iFeed brand. The company operates one location with three feed mills that combined can produce 300,000 MT of shrimp feed and 250,000 MT of fish feed a year. According to Deepak Nexgen, its sales reached 150,000 MT of shrimp and 175,000 of fish feed in FY 2022-2023. This would make it India's second largest aquafeed producer, the largest floating fish feed producer, and the third largest shrimp feed producer.

In recent years, the company has also started diversifying its operations. It has co-invested in a 15,000 MT shrimp processing operation and a 225m PL hatchery operation. While Deepak Nexgen is one of India's largest feed manufacturers, it's a small player in other parts of the supply chain.

Group Name Deepak Nexgen
Year of Establishment 2010
Company Headquarters Vijayawada, Andhra Pradesh
Leadership A.V. Subramanyam, Managing Director

DEEPAKNEXGENBIOTECH@GMAIL.COM

GROUP REVENUE



*Based on CARE Ratings Public Credit Rating Reports: careratings.com.

CAPACITY SUMMARY



PL production
 Number of units 1
 225 million PL/year

S



Feed manufacturing
 Number of units 3
 300,000 MT/year for shrimp
 and 250,000 MT/year for fish

XL



Processing
 Number of units 1
 15,000 MT/year

M

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	0	0	-
Contract	0	0	-

LEGEND

-  Value-added
-  Raw
-  Cooked

FEED MANUFACTURING

2012



HATCHERIES

2023



PROCESSING FACILITIES

2023



KADER EXPORTS



Kader Exports, previously known as the Liberty Group, is based in Mumbai, Maharashtra, and is led by Mr. Afzal Esmail Kader and Mr. Zaid Afzal Kader, who jointly own it. The Liberty Group was founded in 1978 and the company ventured into seafood four years later.

When starting out, the company focused on processing and exporting wild-caught fish and seafood. Once production increased, the Liberty Group was one of the earliest players to venture into processing farmed shrimp and played an instrumental role in promoting semi-intensive shrimp farming practices in the 1990s, especially in the south of Andhra Pradesh. Today, it still exports both farmed and wild-caught seafood. The company started with a processing plant in Chennai, Tamil Nadu, and, over time, expanded to five processing plants along the East Coast: two in Tamil Nadu (Mandapam and Tuticorin) and three in Andhra Pradesh (two in Bhimavaram and one in Visakhapatnam). While the factories operated under various names, in 2019, the company started a corporate restructuring. It brought all the companies together under the name Kader Exports Pvt. Ltd.

Nowadays, the total capacity of the five processing plants is 81,913 MT a year for raw and cooked products combined. Kader Exports is structurally in the top 10 of Indian shrimp exporters. It primarily focuses on exports to the US but is also active in other markets. There is no information available on whether the company is planning future investments in more types of value-added shrimp processing. Contrary to most other major players, Kader Exports is not vertically integrated into other parts of the supply chain, but focuses on processing and exports only.

Group Name Kader Exports Pvt. Ltd.

Year of Establishment 1978

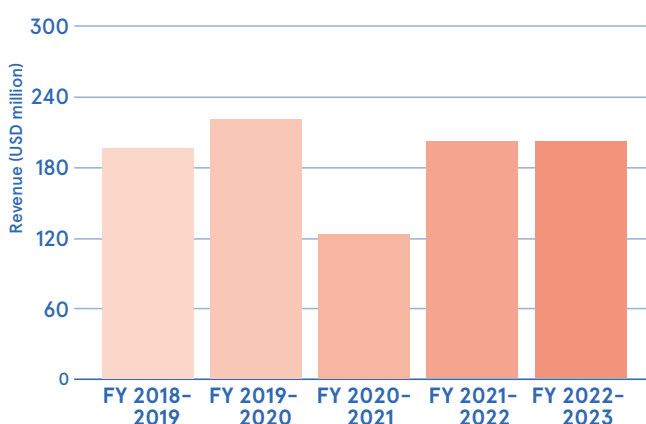
Company Headquarters Mumbai, Maharashtra

Leadership Afzal Esmail Kader and Zaid Afzal Kader

LIBERTYFOODS.NET

INFO@LIBERTYFOODS.IN

GROUP REVENUE



CAPACITY SUMMARY



Processing

Number of units 5

81,913 MT/year

XL

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	Unavailable	Unavailable	Unavailable
Contract	73	1,054	East Godavari, West Godavari, Krishna, Srikakulam, Errepalli, Visakhapatnam

LEGEND

-  Value-added
-  Raw
-  Cooked

PROCESSING FACILITIES

2015



1994



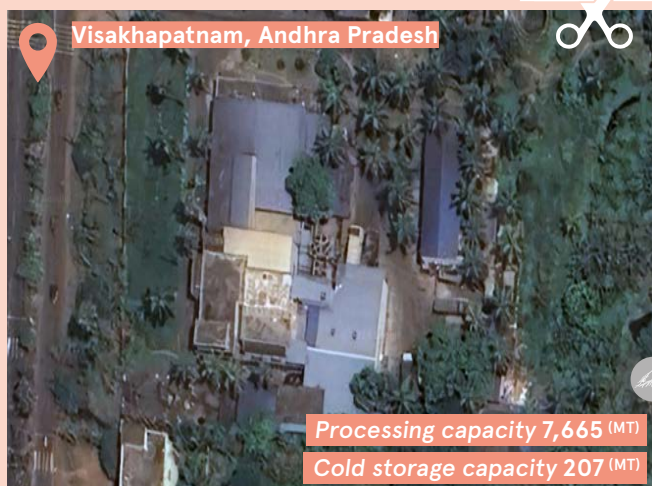
2015



2001



2001





Ananda Group was established in 1939 through a rice milling operation, but it did not diversify into aquaculture until 1980. Four years later, it was the first company in India to start a corporate shrimp farm in Andhra Pradesh. The company is led by Mr. Kasi Viswanandha Raju, the group's Chairman.

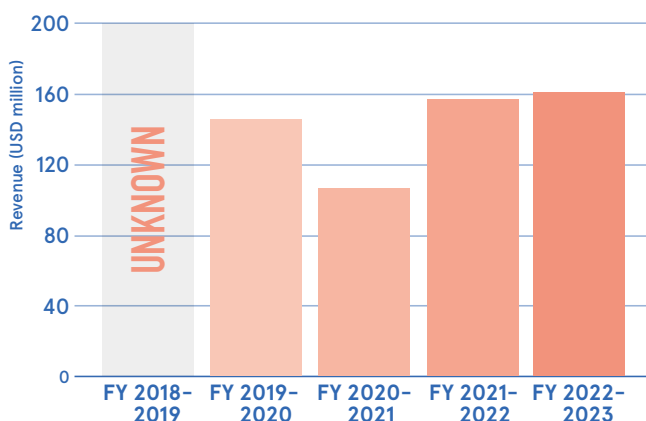
Since it started shrimp farming in 1984, Ananda Group has rapidly expanded its footprint. It invested in shrimp hatcheries, feed manufacturing, farms, processing plants, and a BMC. Its fish and shrimp activities are organized into three subsidiaries: (1) Ananda Foods, (2) Ananda Enterprises India, and (3) Ananda Fisheries. CP Group and Ananda Group jointly invested in the Andhra Pradesh Broodstock Multiplication Center. The company's feed mill produces fish and shrimp feed. According to its website, Ananda Group is one of CP Group's largest shrimp feed dealers in India.

Ananda Group's investments have extended beyond shrimp. Since 2008, Ananda Enterprises has invested in a vertically integrated Pangasius operation, has been engaged in the production and processing of other freshwater fish, and has invested in a mega food park where merchant exporters can process seafood products.

Group Name Ananda Group
Year of Establishment 1939
Company Headquarters
 Bhimavaram, Andhra Pradesh
Leadership Kasi Viswanadha Raju, Chairman

ANANDAGROUP.COM
INFO@ANANDAGROUP.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production
 Number of units 4
 2,500 million PL/year



Feed manufacturing
 Number of units 1
 35,000 MT/year for shrimp,
 115,000 MT/year for fish



Processing
 Number of units 3
 39,600 MT/year



FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	Unavailable	177	West and East Godavari, Andhra Pradesh
Contract	Unknown	Unknown	Unknown

LEGEND

-  Value-added
-  Raw
-  Cooked

BMC

2017



FEED MANUFACTURING

2008



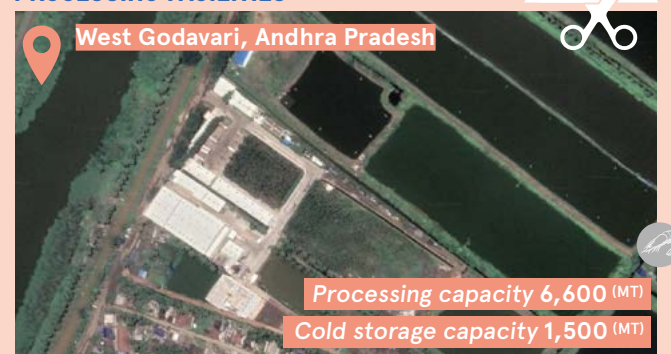
HATCHERIES

1995



PROCESSING FACILITIES

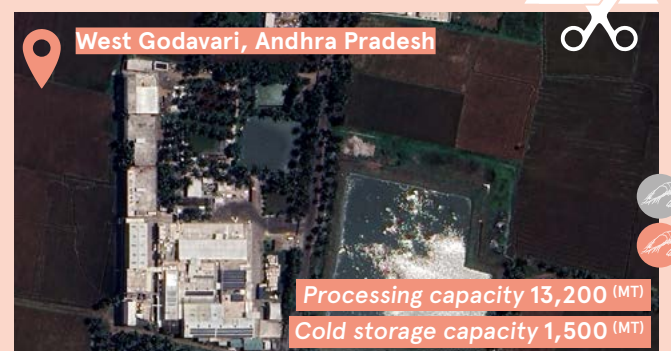
1994



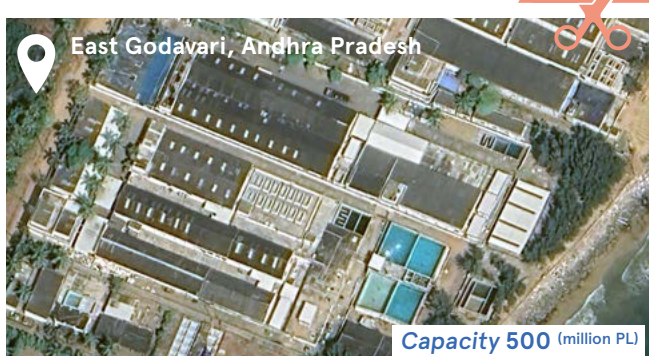
2012



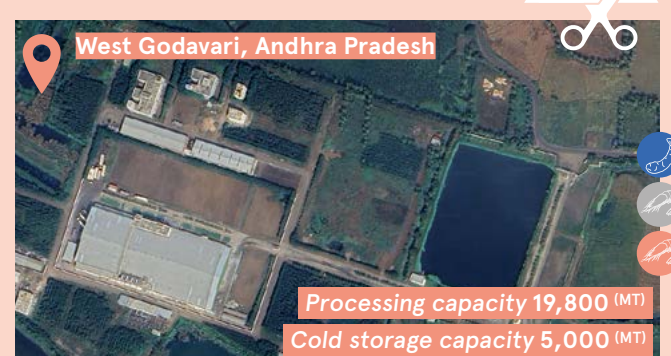
2009



2006



2019



These are just examples. Due to the large number of facilities, we can only show some of the locations.



Nekkanti Sea Foods Ltd. was incorporated in 1983 by Mr. N.S.R. Murty as a merchant exporter. The company built its first factory in 1989. In 1992, it invested in shrimp trawlers and started farming shrimp two years later. Venkat Rao and Mahesh Nekkanti, the second generation, have recently taken over the company's leadership.

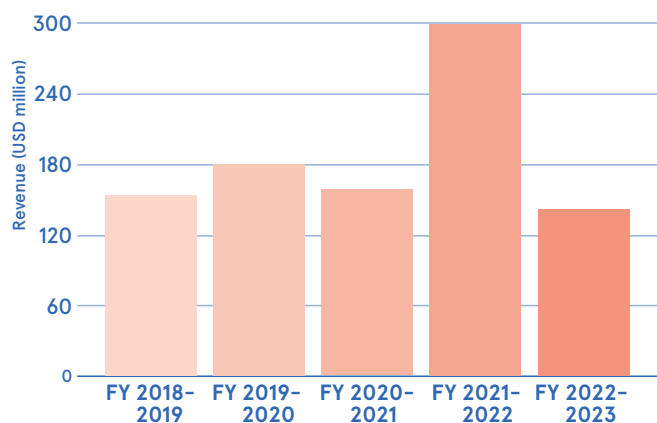
Nekkanti is one of India's top ten exporters. According to the company, in 2023, it exported 17,743 MT of finished products. It operates three processing plants in the East Godavari district of Andhra Pradesh and a fourth plant commenced operations in Nellore, southern Andhra Pradesh, in 2018. Since 2022, the company operates a separate facility for processing breaded and fried products in Nellore.

Besides its processing activities, the company operates 200 acres of corporate farms as well as a hatchery. Nekkanti Sea Foods has recently been in the news as an investor in Captain Fresh. Through this partnership and recent acquisitions, Nekkanti is broadening its presence and access to some of the largest shrimp markets in the world.

Group Name Nekkanti Sea Foods Limited
Year of Establishment 1983
Company Headquarters Visakhapatnam, Andhra Pradesh
Leadership Venkat Rao Nekkanti, Managing Director and CEO

NEKKANTISEAFOODS.COM
INFO@NEKKANTI.NET

GROUP REVENUE

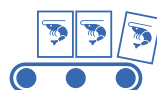


CAPACITY SUMMARY



PL Production

Number of units 1
 150 million PL/year



Processing

Number of units 5
 79,710 MT/year

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	2	80	East Godavari
Contract	Unknown	Unknown	Unknown

LEGEND

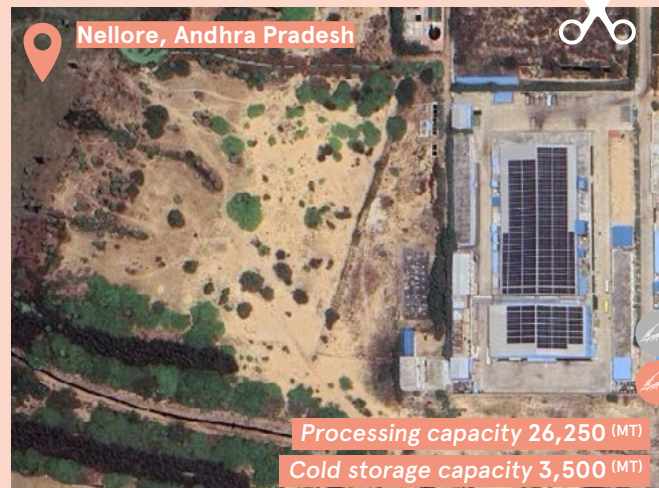
-  Value-added
-  Raw
-  Cooked

HATCHERIES

2021



2018

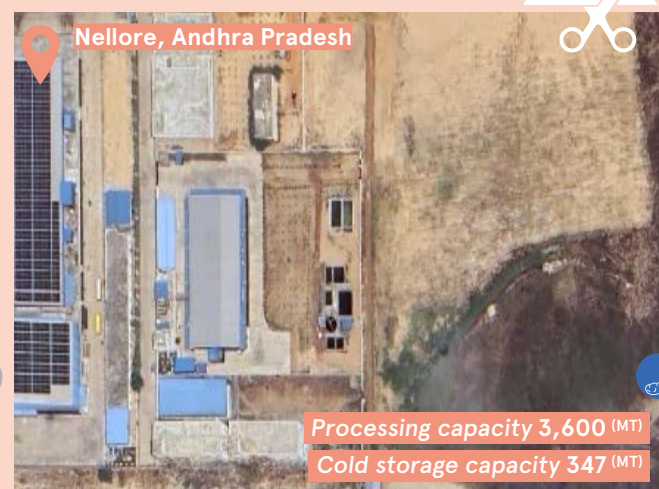


PROCESSING FACILITIES

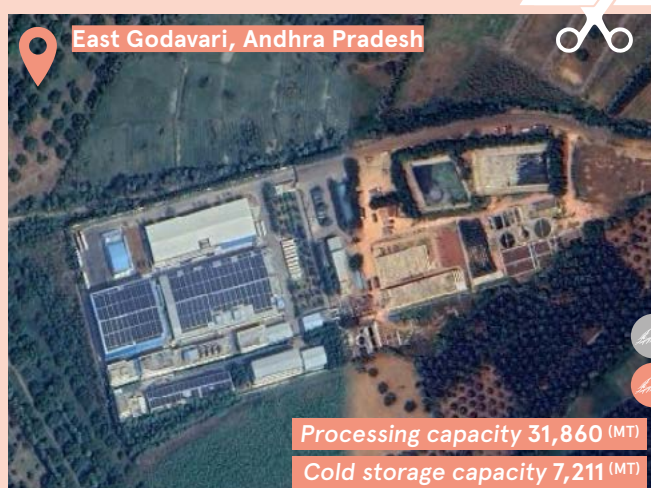
2000



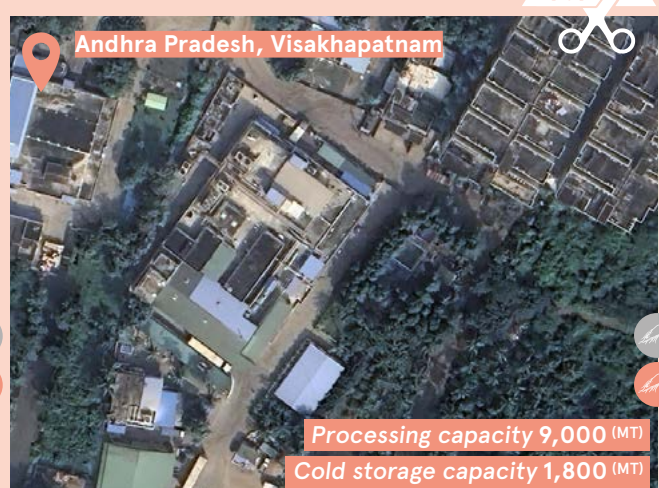
2022



2016



1989





Apex Frozen Foods was established in 1995 as a merchant exporter. It built its first processing plant in 2004. In 2017, to finance future expansion, the company was listed on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) as APEX. Currently, the company is headed by Mr. K. Satyanarayana Murthy, the Executive Chairman, and Mr. K. Subrahmanya Chowdary, the Managing Director.

Apex Frozen Foods operates two processing plants in Andhra Pradesh with a total capacity of 34,240 MT. The newest processing plant has a 10,000 MT capacity for cooked and other value-added products. Structurally, the company is a top 5-15 shrimp exporter with an annual export volume of 10,000-15,000 MT.

As to vertical integration, the company has only additionally invested in the hatchery segment. With its recent investments in two new hatcheries, Apex Frozen Foods has become a medium-sized player. Although the company previously operated more than 1,000 acres of shrimp farms, it has divested from its farming operations.

Group Name Apex Frozen Foods Ltd.

Year of Establishment 1995

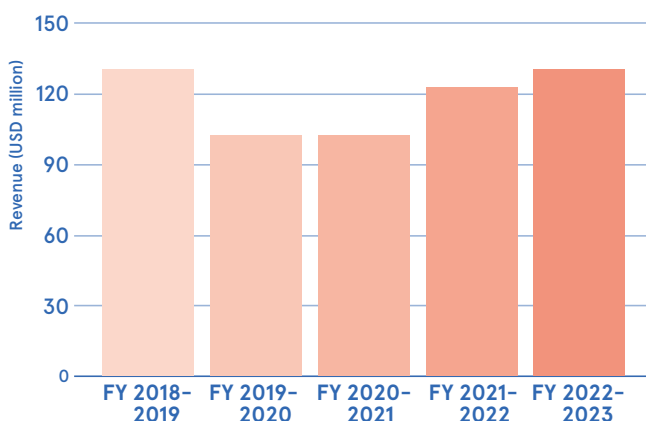
Company Headquarters Kakinada, East Godavari, Andhra Pradesh

Leadership K. Satyanarayana Murthy, Executive Chairman and K. Subrahmanya Chowdary, Managing Director

APEXFROZENFOODS.COM

SALES@APEXFROZENFOODS.COM

GROUP REVENUE



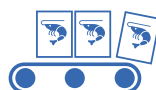
CAPACITY SUMMARY



PL production

Number of units 4

1,300 million PL/year



Processing

Number of units 3

34,240 MT/year

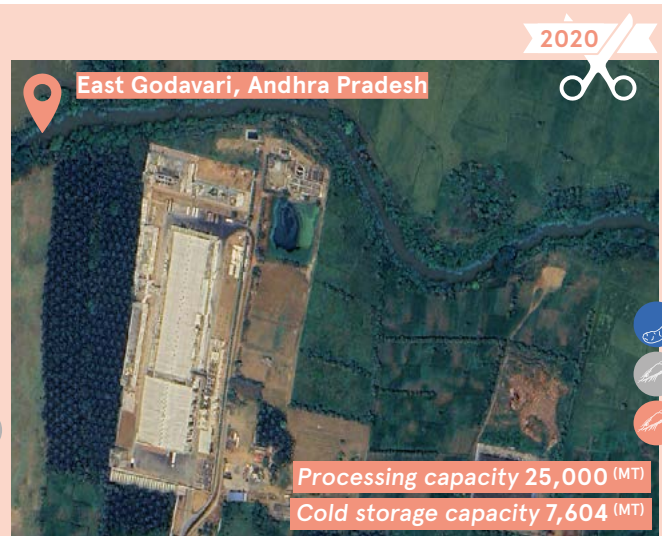
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in	LEGEND
Owned	0	0	-	Value-added
Contract	0	0	-	Raw
				Cooked

HATCHERIES



PROCESSING FACILITIES



BMR GROUP



BMR Group was established in 1992. The company's owner and Chairman, Mr. B. Mashtan Rao, played an instrumental role in introducing *L. vannamei* into the Indian shrimp industry. BMR Group was one of the first companies permitted to perform farming trials with the new species. Besides heading the company, Mr. Mashtan Rao has also been a member of the upper house of India's parliament since 2022.

BMR Group started as a shrimp farming company and still operates over 600 ha of corporate farms. Since opening its first hatchery in 1991, the company has grown into one of India's top 5 hatchery operators, with 12 hatcheries under its management today. In 2019, the company set up India's first privately run BMC, BMR Blue Genetics. This company forms a JV with Blue Genetics, a Mexican broodstock supplier. The BMC and hatchery division are the core of the group's operations.

In 2013, the company opened its own shrimp processing plant, which can produce around 20,000 MT a year. BMR Group concentrates its exports on the US market and operates a US-based seafood trading arm known as Claswin Seafoods LLC.

In 2016, BMR Group ventured into shrimp feed manufacturing. Its two feed manufacturing plants are built on the same site and, combined, can produce 150,000 MT of shrimp feed yearly. The company also provides a range of farm healthcare products.

Group Name BMR Group

Year of Establishment 1991

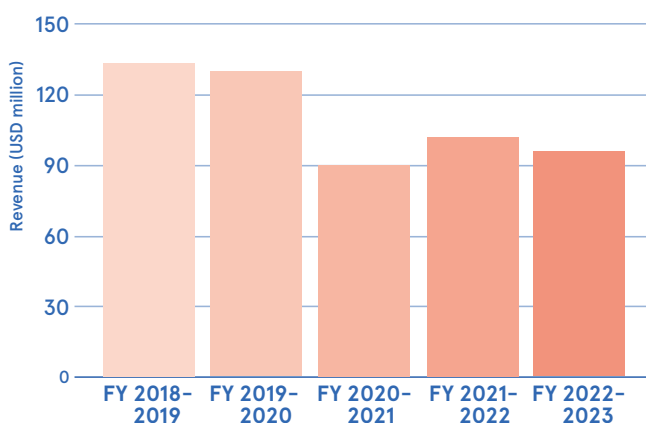
Company Headquarters Nellore, Andhra Pradesh

Leadership B. Mashtan Rao, Chairman

BMRGROUPS.COM

CUSTOMERCARE@BMRGROUPS.ORG

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 12

9,000 million PL/year



Feed manufacturing

Number of units 2

150,000 MT/year



Processing

Number of units 1

20,000 MT/year

XL

L

M

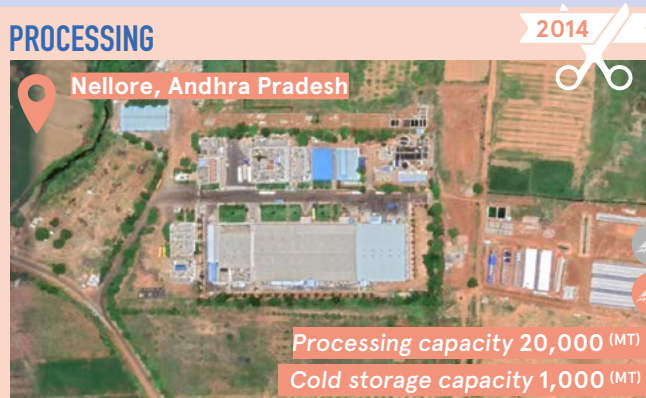
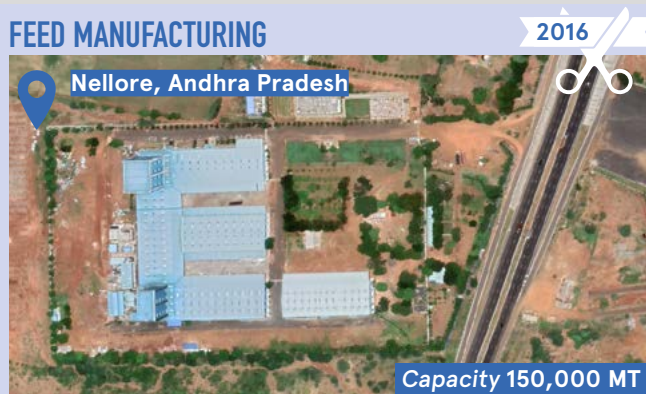
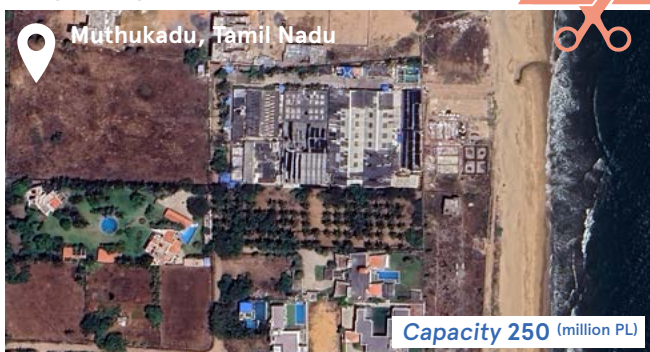
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	4	600	Nellore, Andhra Pradesh
Contract	Unknown	Unknown	Unknown

LEGEND

-  Value-added
-  Raw
-  Cooked

HATCHERIES



These are just examples. Due to the large number of facilities, we can only show some of the locations.



ROYALE MARINE IMPEX PVT. LTD.

Royale Marine Impex Pvt. Ltd. was incorporated in 2011 as the processing and export operation of a larger group of companies led by Mr. Vegesana Narendra Varma Raju. Through various group companies, Royale Marine Impex is engaged in shrimp farming (Mahadeva Fisheries, Gayathri Bio-Systems, and R.K. Shrimp Farms), hatcheries (Gayathri Hatcheries and Gayathri Biomarine), and feed manufacturing (Royals Marine Foods). The hatchery and farming division companies were established in the late 1990s.

The group operates two *L. vannamei* hatcheries and one *P. monodon* hatchery. It is one of the top ten *L. vannamei* PL suppliers in India and one of the few that can also supply *P. monodon*. Its *P. monodon* operation was established in 2022 as a JV with Unibio (India) Hatcheries, the subsidiary of Aqualma (Madagascar). The company started importing *P. monodon* broodstock from Madagascar in 2022 and has supplied *P. monodon* PL to the Indian market since then. At full capacity, the company's network of corporate and contract farms can produce around 12,000 MT of *L. vannamei* and 4,000 MT of *P. monodon*. Its processing plant can produce 20,000 MT of finished products. In addition to its individual quick freezing (IQF) and

cooking lines, the company is installing a brine freezing line with a capacity of 5,000 MT, which primarily aims to process high-quality HOSO *P. monodon* products.

In 2019, the group expanded into feed manufacturing when it set up Royals Marine Foods Pvt. Ltd. The feed mill started with a capacity of 30,000 MT, but this doubled in 2021. Royals Marine Foods—along with Deepak Nexgen, Devi Sea Foods, and Sandhya Marines—are considered successful new entrants to India's shrimp feed market. Royals sells its feed under the Royals Marine brand.

Group Name Royale Marine Impex Pvt. Ltd.

Year of Establishment 2011

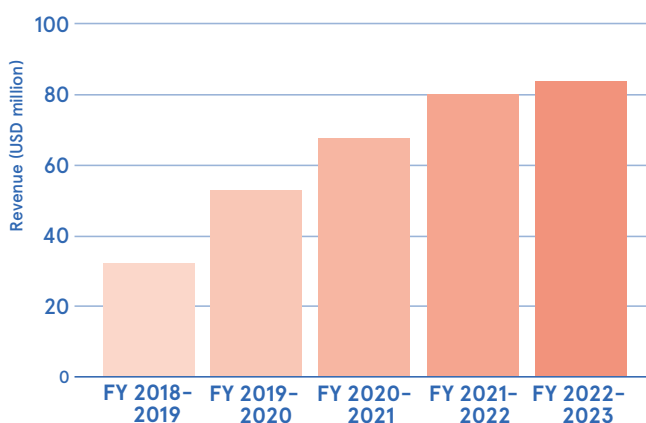
Company Headquarters Prakasam, Andhra Pradesh

Leadership Vegesana Narendra Varma Raju, Chairman and Managing Director

ROYALEMARINEIMPEX.COM

INFO@ROYALEMARINEIMPEX.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 3
3,000 million PL/year



Feed manufacturing

Number of units 1
60,000 MT/year



Processing

Number of units 1
20,000 MT/year

L

M

M

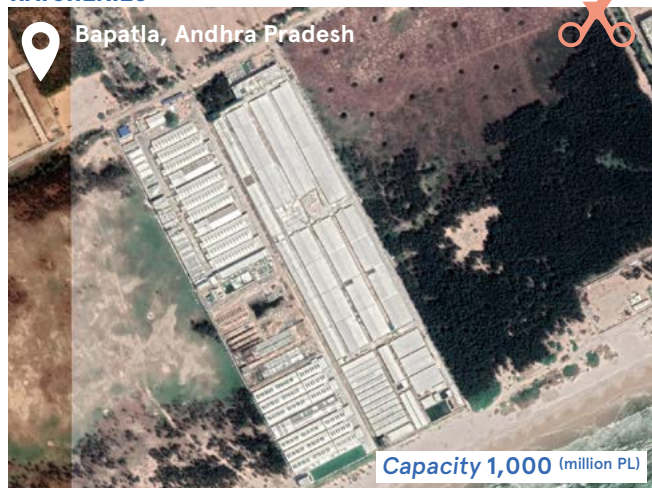
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	11	700	Bapatla, Andhra Pradesh
Contract	24	850	Bapatla (50%), Guntur (20%), Prakasam (20%), Krishna (10%) (all in Andhra Pradesh)

LEGEND

-  Value-added
-  Raw
-  Cooked

HATCHERIES



FEED MANUFACTURING



PROCESSING FACILITIES





Vaishnavi Aquatech is one of four aquaculture companies operated by the brothers Vaibhav, Jignesh, and Dhaval Contractor, first-generation aquaculture entrepreneurs from Gujarat. The company became active in 2001 and comprises a farming, breeding, feed, and IT division. Vaishnavi is entirely focused on *P. monodon* and is one of the drivers of the surge in *P. monodon* production in India.

The breeding operation falls under Vaishnavi Aquatech and is managed by Jignesh Contractor. After years of intensive lobbying for the import approval of Moana broodstock from Hawaii, the company received it in 2020. Subsequently, in 2023, Vaishnavi opened its own BMC in Gujarat—the only privately-operated BMC for *P. monodon* in India. From there, it supplies broodstock to its network of hatcheries in the south of Andhra Pradesh. The company can produce 1.5bn PL (to illustrate: India's total market for *P. monodon* PL is 2–2.5bn).

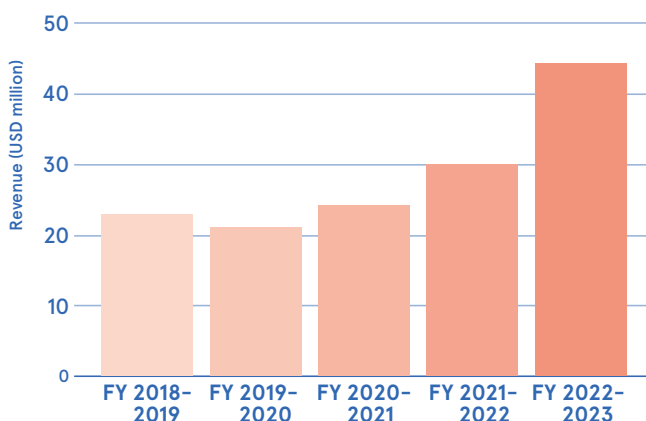
The company's farming operation falls under Sree Sai Krupa Aquaculture Pvt. Ltd., managed by Vaibhav Contractor. The company operates 400 ha of ponds in the Navsari District in Gujarat and can produce 1,500 MT with one crop annually.

The youngest brother, Dhaval Contractor, manages the feed division, Ishi Marine Technologies. The company's feed mill started in 2019 with a 25,000 MT capacity and is operated in partnership with US animal nutrition company Zeigler Bros. Dhaval Contractor also manages Nucon Technology Solutions, a traceability software provider which enables companies to manage traceability all the way from PL to finished product.

Group Name Vaishnavi Aquatech
Year of Establishment 2001
Company Headquarters Surat, Gujarat
Leadership Vaibhav Contractor, Jignesh Contractor, and Dhaval Contractor, Executive Directors

[VAISHNAVIAQUATECH.COM](https://vaishnaviaquatech.com)
[INFO@VAISHNAVIAQUATECH.COM](mailto:info@vaishnaviaquatech.com)

GROUP REVENUE



CAPACITY SUMMARY



PL production
 Number of units 5
 1,500 Million PL/year



Feed manufacturing
 Number of units 1
 25,000 MT/year

FARMING NETWORK

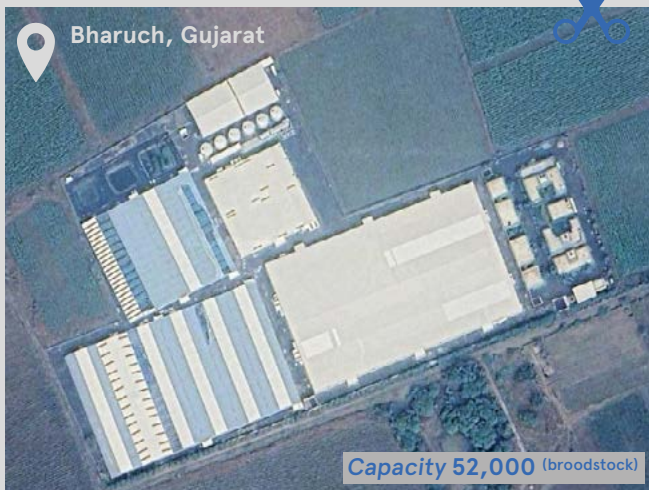
Type of farm	# of farms	Land (ha)	Located in
Owned	8	400	Navsari (4), Surat (2), Bharuch (2)
Contract	0	0	-

LEGEND

-  Value-added
-  Raw
-  Cooked

BMC

2023

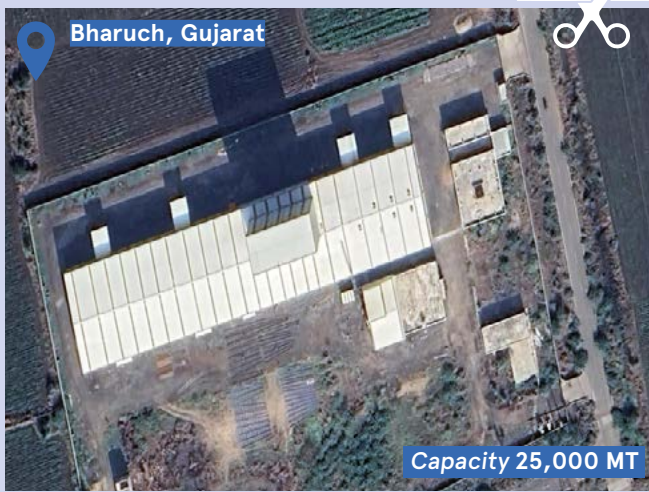


2019

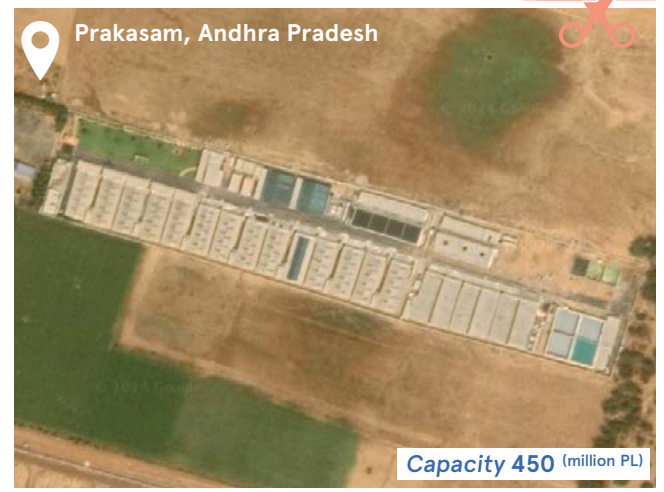


FEED MANUFACTURING

2019



2021



HATCHERIES

2022



2022



These are just examples. Due to the large number of facilities, we can only show some of the locations.

THE WATERBASE



The
Waterbase
Limited

The Waterbase Ltd. is part of the Karam Chand Thapar (KCT) Group, a diversified Indian conglomerate with business interests in sectors ranging from coal and infrastructure to real estate and aquaculture. The company was incorporated in 1987 and commissioned its first feed mill in 1993. The mill was funded by a public offering after the company listed itself on the Bombay Stock Exchange (BSE) in 1992. Mr. Varun Aditya Mohan Thapar, the Chairman, leads the company.

With the funding from the public offering, besides the feed mill, the company invested in a hatchery, an R&D and demonstration farm, and a processing plant. However, over the years, The Waterbase has become increasingly concentrated and dependent on its feed business. Today, the company operates two shrimp feed mills. The older mill has a capacity of 35,000 MT, and the newest feed mill, which opened in 2014, has a capacity of 75,000 MT. The company owns well-known feed brands, including Bay White Advanced and Tiger XL. The Waterbase is one of the smaller but more consistent players in the Indian shrimp feed market.

Due to increased competition, The Waterbase has diversified its activities by expanding its hatchery business, farm healthcare product portfolio, and seafood processing business. According to its latest annual report, the relative share of the group's revenues from these sources has increased. In particular, the importance of its processing business may significantly increase over the next few years. After leasing out its processing facility for many years, the company renovated it in 2022-2023 with the aim of expanding its frozen shrimp export business. Its facility can produce 5,000 MT of finished product.

Group Name The Waterbase Ltd.

Year of Establishment 1987

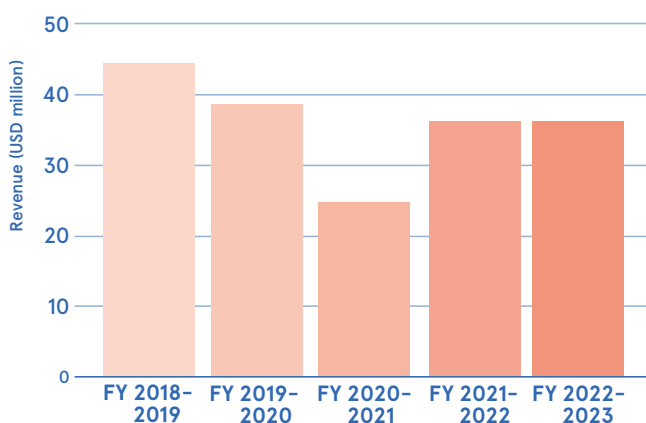
Company Headquarters Chennai, Tamil Nadu

Leadership Varun Aditya Mohan Thapar, Chairman

WATERBASEINDIA.COM

INFO@WATERBASEINDIA.COM

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 1
250 million PL/year



Feed manufacturing

Number of units 2
110,000 MT/year



Processing

Number of units 1
5,000 MT/year

M

M

S

FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	0	0	-
Contract	0	0	-

LEGEND

-  Value-added
-  Raw
-  Cooked
-  Frozen

HATCHERIES

2017



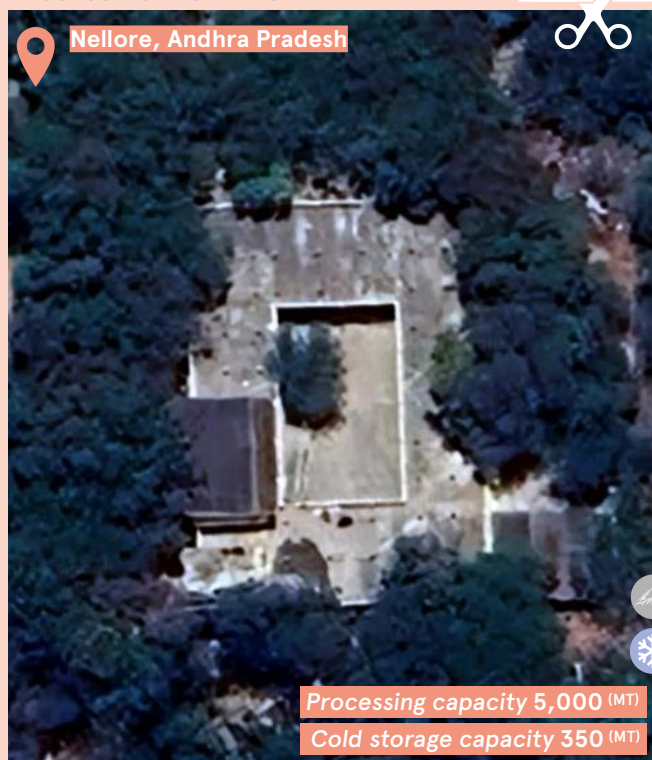
FEED MANUFACTURING

1993



PROCESSING FACILITIES

1998



2014



ABAD OVERSEAS



Abad Overseas is a subsidiary of Abad Group, one of India's oldest seafood companies based in Kochi. Abad Group entered the seafood industry in the early 1930s. Together with its subsidiaries, it operates 13 fish and seafood processing plants. Mr. Anwar Sheraz leads Abad Overseas, and the company currently runs three shrimp processing plants on India's East Coast. A fourth plant is near completion in Nellore, southern Andhra Pradesh. Since 2007, Nueva Pescanova has been an investor in Abad; in 2019, it signed a deal with Abad Overseas to include Indian-farmed shrimp in its product portfolio.

Abad Overseas distinguishes itself by focusing on HOSO products. The company operates processing plants strategically located in Andhra Pradesh. Its two newest plants are located directly in the middle of the shrimp ponds in Guntur and Nellore in southern Andhra Pradesh. It recruited experienced staff from Central America to establish a live-harvesting logistics supply chain, ensuring the delivery of products from pond to factory in the freshest possible condition. Abad Overseas has invested in brine-freezing equipment in its processing facilities. This infrastructure has enabled the company to carve out markets in China, Southern Europe, and

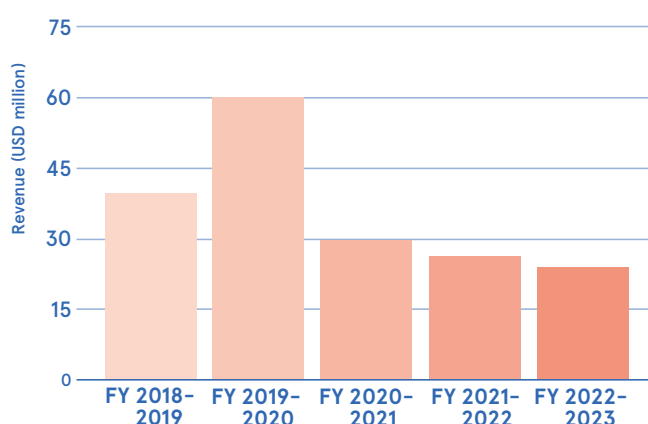
the Middle East. Following the surge in *P. monodon* production, Abad Overseas has begun developing a market for HOSO *P. monodon* products, particularly in Asia.

Abad's newest processing plant, set to open in May 2024, will also process peeled and cooked products. Abad Overseas intends to continue producing high-quality products, leveraging its unique supply chain setup. The company is ambitious about entering the markets for these products in the US and Europe.

Group Name Abad Overseas
Year of Establishment 1995
Company Headquarters Kochi, Kerala
Leadership Anwar Sheraz

ABADSUPERSHRIMP.COM
SUPERSHRIMP@ABAD.IN

GROUP REVENUE



CAPACITY SUMMARY



Processing
Number of units 4
55,380 MT/year

XL

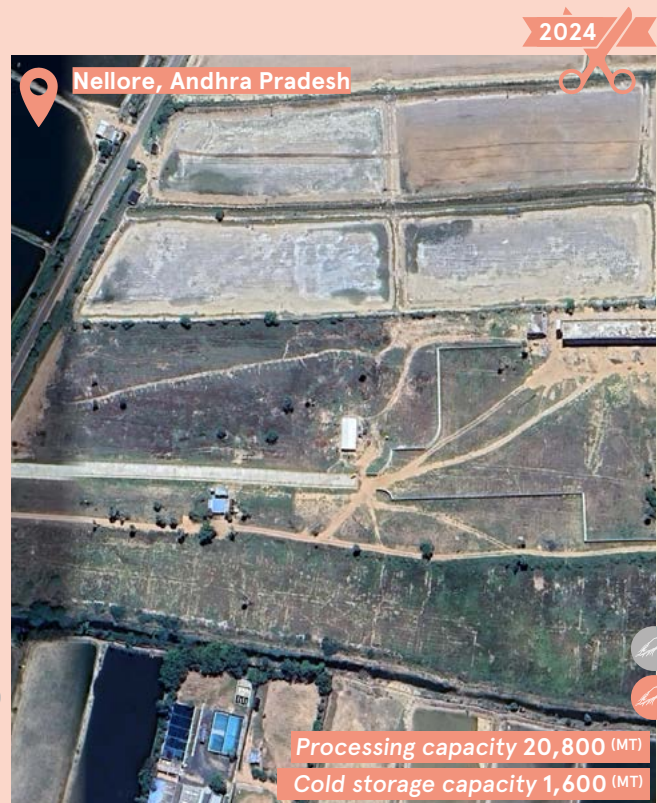
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	0	0	-
Contract	14,000	5,000	Bapatla, Krishna, Nellore, Prakasam, Tirupati (all in Andhra Pradesh)

LEGEND

-  Value-added
-  Raw
-  Cooked

PROCESSING FACILITIES



The newest processing plant is almost finished, but not yet visible on Google Satellite View.



Vaisakhi Bios consists of two companies: Vaisakhi Bio-Resources, established in 2001, and Vaisakhi Bio-Marine, established in 2005. The two companies are led by a team of three co-founders with engineering and biology backgrounds, all first-generation entrepreneurs. Mr. Ravi Kumar Yellanki is one of these founders and serves as Managing Director to both companies. He is a well-known figure in the Indian shrimp industry. As the previous president of the Society of Aquaculture Professionals (SAP) and the current president of the All India Shrimp Hatchery Association, he's a regular spokesperson representing the Indian industry at several international conferences and domestic policy dialogues.

Vaisakhi Bios has structurally been one of India's top three hatchery operators. The company imports broodstock from a variety of overseas suppliers. It produces around 5.5bn PL yearly in its eight hatcheries in Andhra Pradesh and Tamil Nadu, which have a maximum capacity of 6bn PL. Its hatcheries in Andhra Pradesh primarily sell to the local market and the neighboring state of Odisha. Those in Tamil Nadu sell to the local market as well as to several other markets, among which Gujarat, West Bengal, and other parts of the country. The company positions itself as a premium PL supplier. Contrary to many leading hatcheries that

only do business with one or two genetics suppliers, Vaisakhi Bios offers a wide range of PL from broodstock suppliers with different traits.

Besides its presence in the hatchery segment, Vaisakhi Bios also operates two large corporate farms that together can produce around 1,500 MT of raw material each year. In 2021, the company started a trial in processing and exporting in a leased facility in West Bengal. This year, Vaisakhi Bios will be opening its own processing plant in Andhra Pradesh with a planned capacity of 10,000 MT a year.

Group Name Vaisakhi Bios

Year of Establishment 2001

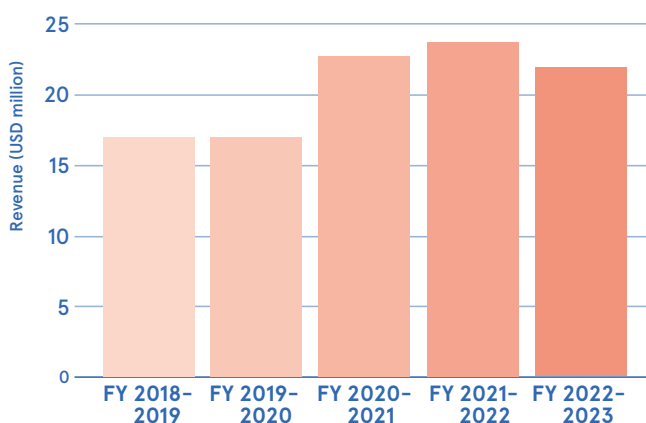
Company Headquarters Visakhapatnam, Andhra Pradesh

Leadership Ravi Kumar Yellanki, Co-Founder and Managing Director

BIOMARINES@REDIFFMAIL.COM

VAISAKHIBIORESOURCES@YAHOO.CO.IN

GROUP REVENUE



CAPACITY SUMMARY



PL production

Number of units 8
6,000 Million PL/year



Processing

Number of units 1
10,000 MT/year

XL

M

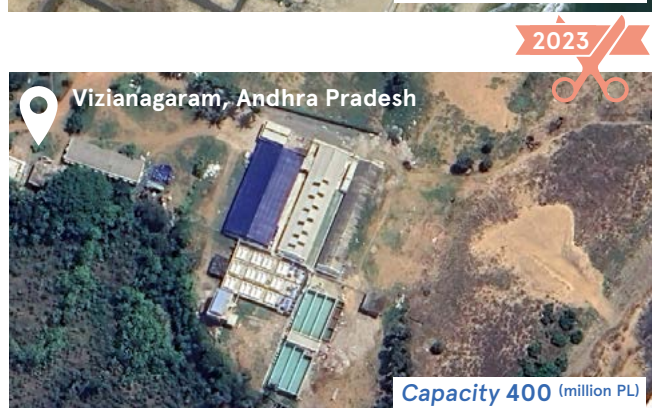
FARMING NETWORK

Type of farm	# of farms	Land (ha)	Located in
Owned	2	120	Visakhapatnam and Krishna, Andhra Pradesh
Contract	0	0	-

LEGEND

-  Value-added
-  Raw
-  Cooked

HATCHERIES



Due to poor image quality on Google Satellite View, we cannot show one of the hatcheries and the new processing plant.



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