







Traditional fishing village Tanjung Playu Laut, Batam



Fish market at Jurong Fishery Port, Singapore

益  
YAK ANN

業魚源向  
HONG GUAN FISHERY CO

有運  
HONG T

ALIAN  
ENBAU  
112



Vessel arriving at a fishery port, Batam

# GROWING OUT

Food Supply of Singapore

by  
Desirée Amport  
Caroline Schillinger



One of the last fishing villages in Seletar, Singapore

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## Agricultural Pathways

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## Outsourced Farming

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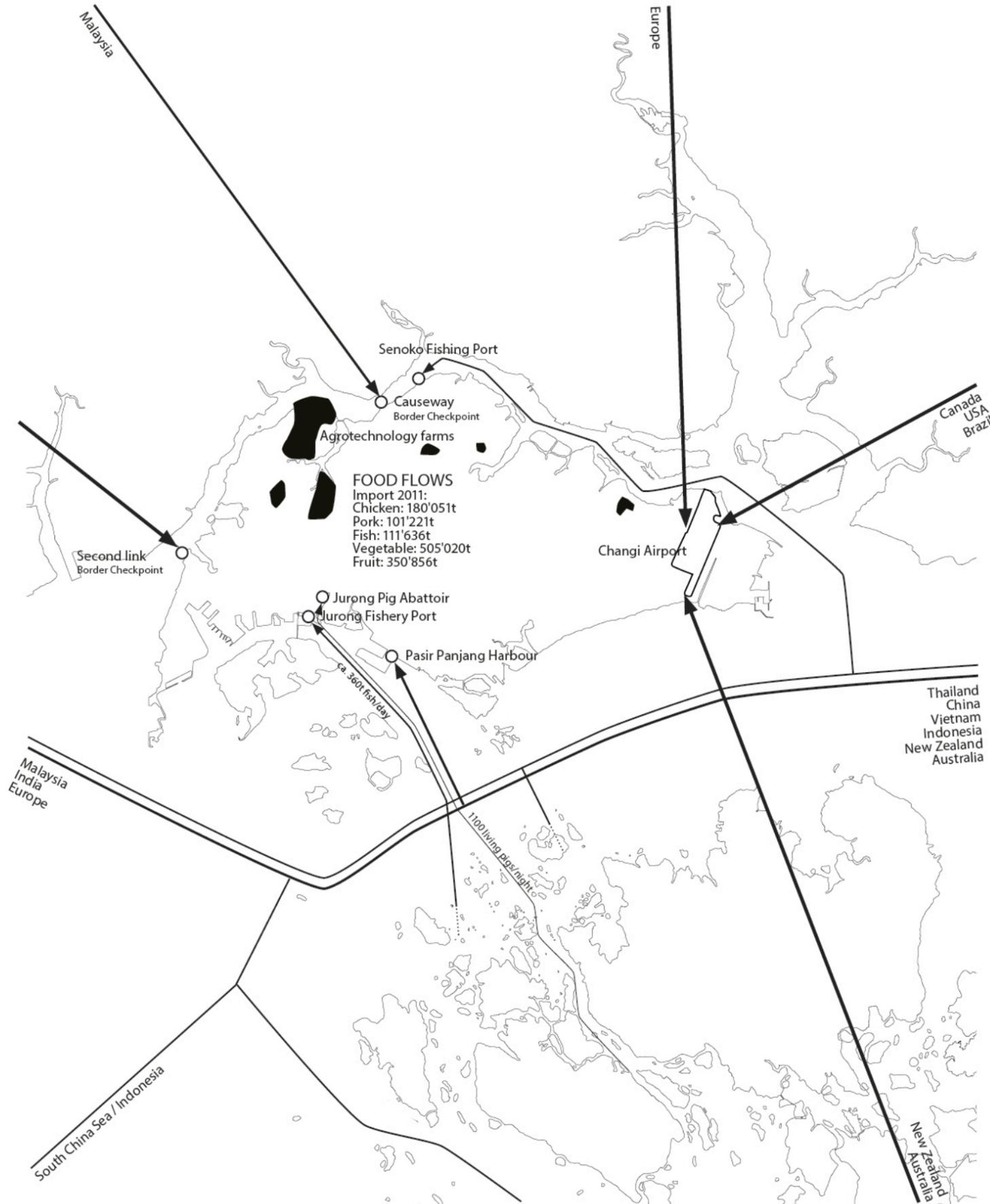
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## A Region of Fish and Fishermen

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## An Agriculture of Technology

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Once a nation with a lively farming sector, Singapore has reduced its agricultural land to only 1% of its total territory.

In the 1970 many farmers were displaced to provide land for housing and industry. Pig farmers were completely phased out, primarily for environmental reasons. With the urban renewal and industrial estate development, agricultural land became restricted to Agrotechnolgy Parks and Agro-Bio Parks where intensive farming is practiced, yet productions remain small as a result of the scale of the operations. Singapore is investing a lot in research and development, as it is pre-occupied for only producing a low amount of the food its growing population consumes; the land-scarce nation is highly dependent on its hinterlands.

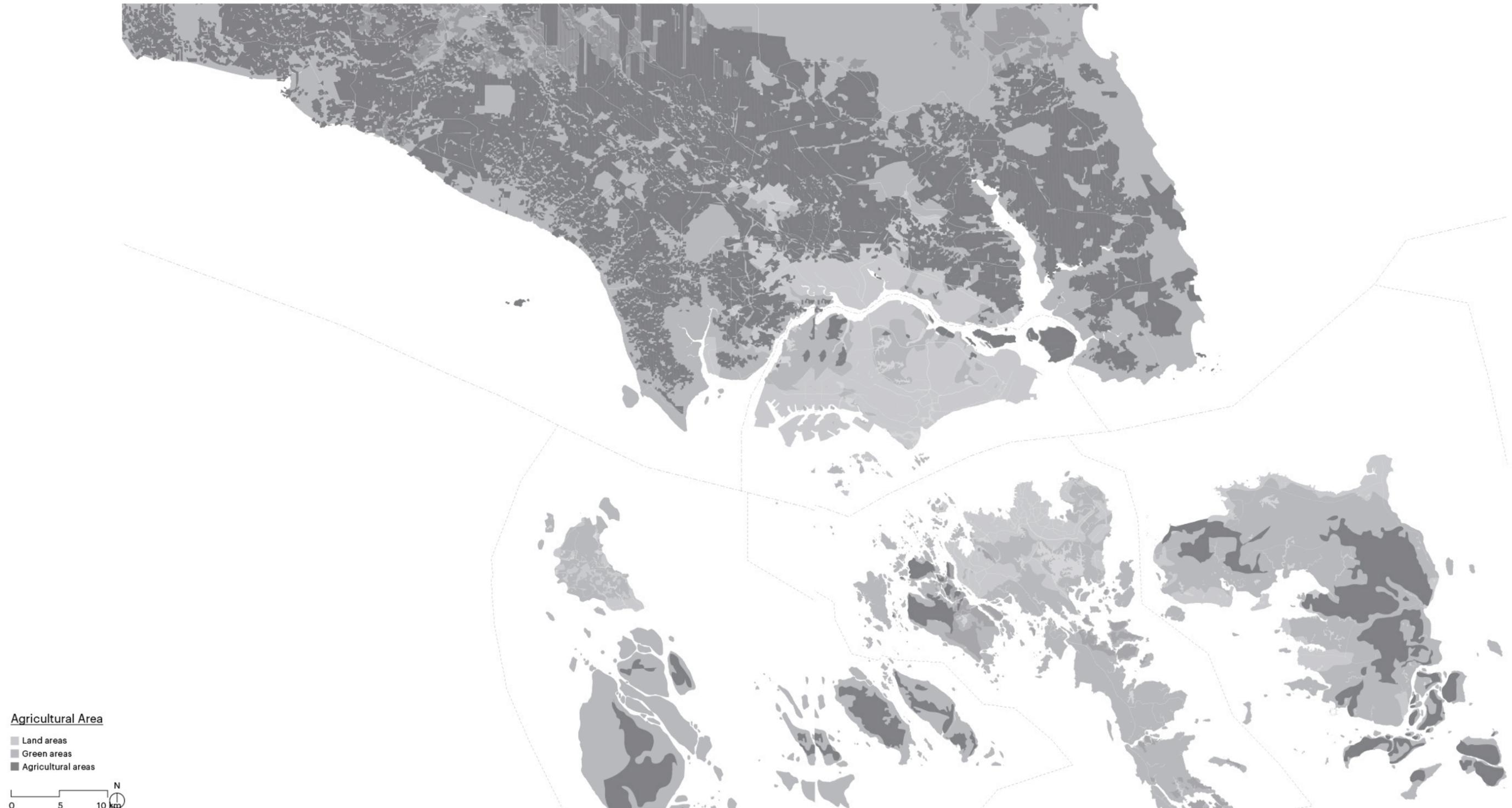
Singapore receives most of its food from five locations: two fishery ports (one in Senoko and one Jurong), the Malaysian Causeway and Second Link are transport routes for the trucks coming from Malaysia, Thailand and Vietnam. Changi Airport trades with world scale businesses.

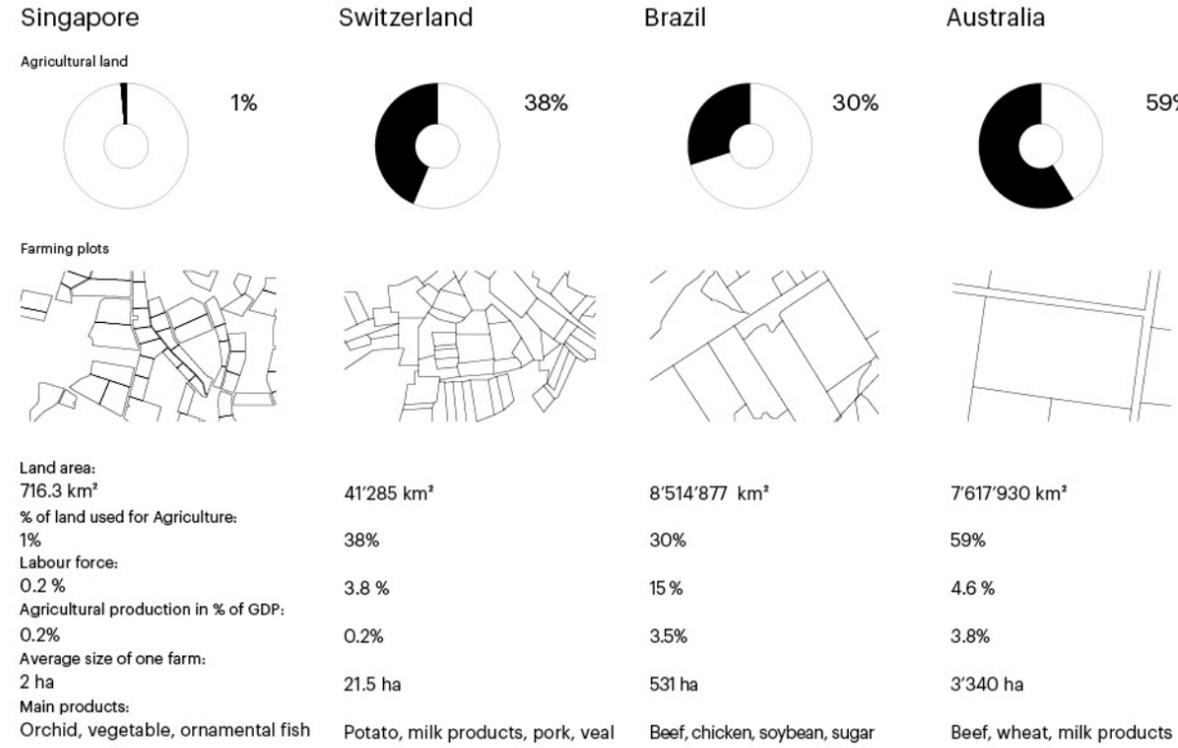
Malaysia and Indonesia are important agricultural regions and crucial trading partners for Singapore. In the 1980s, many entrepreneurs relocated their businesses to neighbouring countries where land prices are favourable and started with contract farming or just production abroad, while the output continues to be intended for the Singapore market.

# Agricultural Pathways

Surrounded by countries with a high quotient of agricultural area, Singapore stands out with its tiny arable territory. The limited land resources was a consequence of the industrialization, urbanization and water conservation strategies, which significantly increased the demand for land. Malaysia, Singapore's closest neighbour, has large areas of agricultural land. Divided only by the Singapore Causeway, the two countries are each other's primary trading part-

ners. Malaysia therefore plays an important role in providing Singapore with agricultural goods. Singapore is connected to its southern neighbour, Indonesia, mainly through the fishing trade.





### Limited Agriculture

The agricultural area of Singapore accounts for only 1% of its total land and falls under strict governmental regulations. These areas are mostly located in Agrotechnology Parks, where plot sizes and functions are regulated. As a result of this, this sector is negligible in Singapore and only represents 0.2% of the total GDP.

The small agriculture activities mainly include two types of production: flower cultivation, particularly orchids, and ornamental fish rearing. The highly productive farms in the Agrotechnology Parks provide Singapore with rare varieties of fresh leafy vegetables, too.



Ornamental flower cultivation at the Agrotechnology Park, Lim Chu Kang



Vegetable farm at the Agrotechnology Park, Lim Chu Kang

### Intensity and High Quality

The landscape is divided in several zones, which shows the range of agricultural activities regulated by the government. The ornamental flower and the vegetable farm are examples of efficient use of plots and the high cultivation standard on local farms. Cultivation under protective netting for high-quality production is widely practiced.

Food Import

	% Farm production	Tonnes	Dollars \$
Vegetable	4%	497'069	510'160
Fruit		350'856	519'340
Chicken	2%	180'051	536'311
Fish	3%	145'678	800'019
Pork		101'221	426'132
Beef		36'659	238'044
Duck		13'532	55'825
Mutton		9'260	74'689

Food Consumption

	Tonnes
Vegetable	505'020
Fruit	350'856
Chicken	175'428
Pork	101'004
Fish	111'636
Beef	26'580
Duck	15'948
Mutton	10'636

95% of Food is Imported

Singapore being a land-scarce nation imports 95% of its total food consumption. The huge foodstuff demand make Singapore highly dependent on its supplying countries. The Singaporean diet contains large amounts of fish and meat. Yet, vegetable and fruits are the most important products in terms of quantity.



Food Supply Countries

- fresh or chilled food
- frozen food

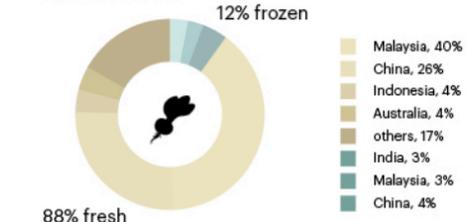
Food Sources

Most of the fresh products coming from neighbouring nations such as Malaysia, Indonesia and Thailand and are transported by truck or ship. Livestock imports come primarily from Malaysia and Indonesia. Singapore imports most of its live pigs from Indonesia. China is an important supplier of fresh and frozen vegetables and fruits for Singapore.

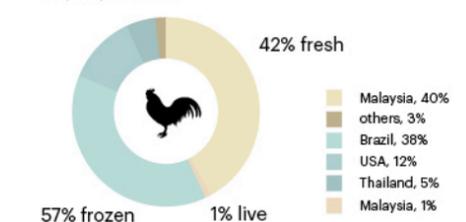
Since the transportation and the processing condition improved, it is favourable to import frozen food from China and countries even further out.

The frozen food sources expand the supply circle to a world scale. Large amounts of frozen pork and chicken are being imported from Brazil to Singapore.

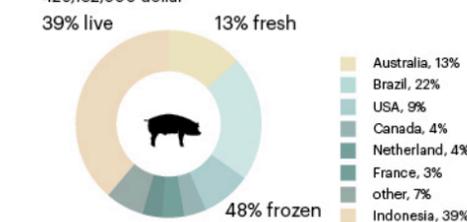
Vegetable  
497,069 tonnes  
510,160,000 dollar



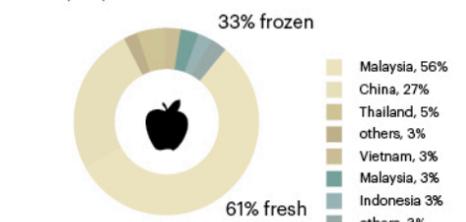
Poultry  
13,583 tonnes  
591,936,000 dollar



Pork  
101,221 tonnes  
426,132,000 dollar



Fruit  
369,277 tonnes  
519,340,000 dollar



# Agrarian Change

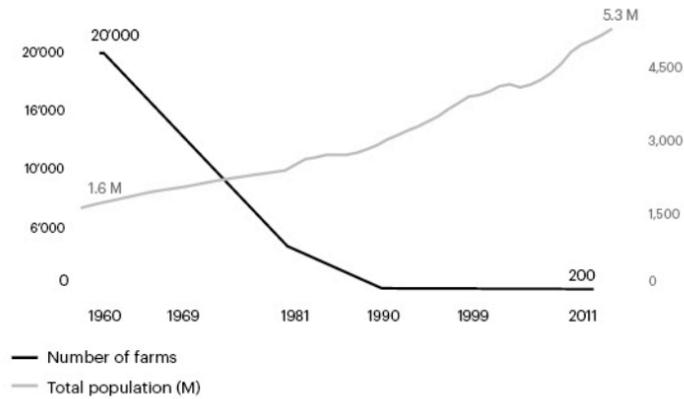
Singapore's agricultural sector has shown significant changes on the business front in the last century. After Singapore's independence, the population increased rapidly while the number of farms decreased.

Whereas in the beginning of the 20th century Singapore's agricultural sector was lively, farming has nearly been phased-out in recent years. In the 1980s the agricultural sector accounted for about 2.25% of the country's

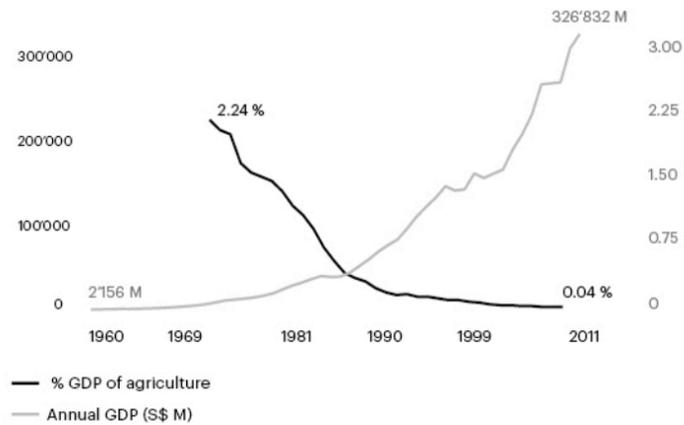
GDP. This has been reduced to 0.004% today. In contrast, the total national GDP increased from about 2 million to up to 326 million.

Singapore has limited the agricultural sector strict zoning regulations and through a shift in focus towards tertiary industries that have allowed for the impressive economic growth nationwide.

Population Growth Compared with Number of Farms in Singapore

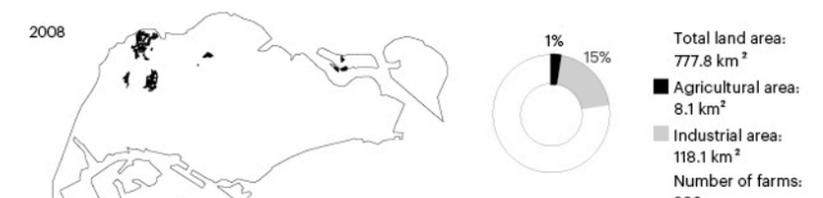
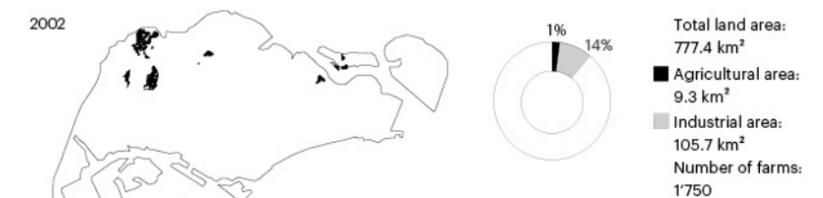
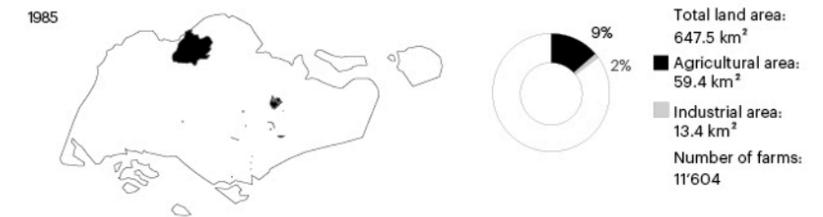
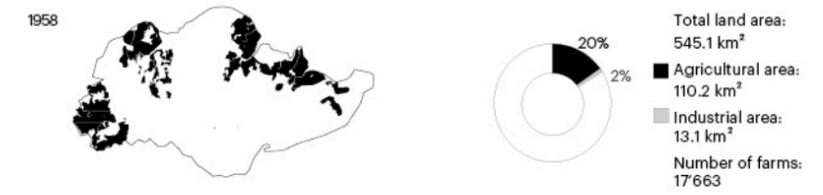


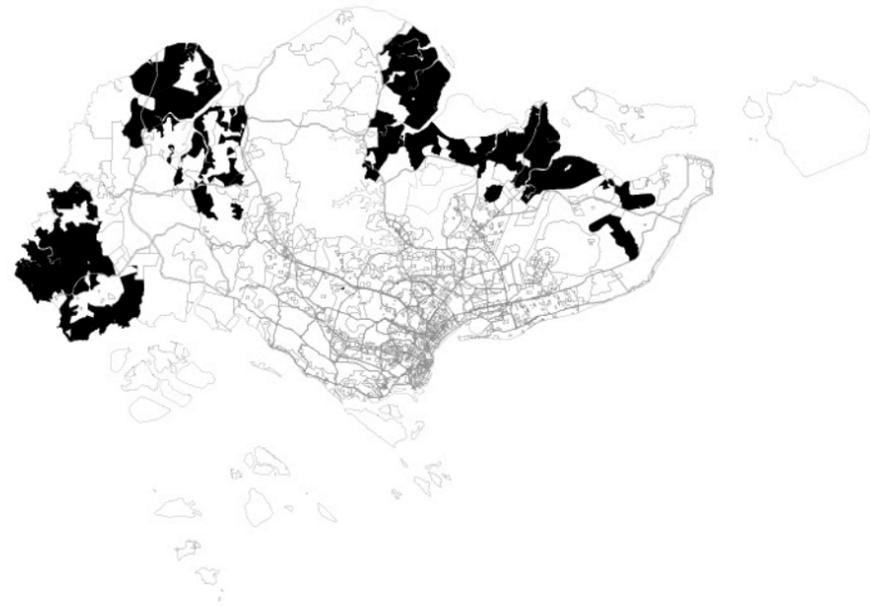
Singapore's GDP and its Agricultural Percentage



## Development of Singapore's Agriculture Sector

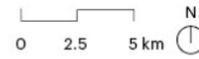
1959 Primary Production Department (PPD) was formed	Most farmers and fishermen were poorly educated and they used traditional farming methods
1965 Independence of Singapore	Provision of essential data allows the government to formulate policies and plans to further develop intensive farming to ensure optimal use of limited land resources
1968 Farm Licensing	Larger commercial farms subsistence type farms and laboratory techniques were upgrading
1972 Resettlement Policy	Resettlement of many farmers to provide land for housing and industry
1984 Phasing Out of Pig Farms	Self-sufficiency in the production of poultry, egg and pork
1998 Development of Agrotechnology Parks	Drastic decline in agricultural land is shown
1998 Pig Farm in Pulau Bulan established	There were 2'075 licensed farms occupying only 2'037 hectares of land total output of some S\$362 million worth of farm produce
2000 Agri-Food and Veterinary Authority (AVA) was formed	All pig- and duck farm activities were phased out
2008 Global Food Crisis	The Agrotechnology Park in Lim Chu Kang became fully operational.
2009 Contract Farming	Farming abroad now seen as new food supply strategy by import-dependent governments
	Beacause of the food insufficiency food import is more than 90% of the consumption
	FairPrice chain brings in 170 products under contract. A farmer agrees to provide a set amount of produce in accordance with the delivery schedule and standards set by the buyer





**1985 Masterplan with Agricultural Land Areas**

Total land area: 545.1 km<sup>2</sup>  
 Agricultural area: 110.2 km<sup>2</sup>  
 Industrial area: 13.1 km<sup>2</sup>  
 Number of farms: 17663



**Rural Singapore**

Nearly one quarter of the country's territory used to be reserved for agricultural activities. The country hosted as many as 17'663 farm when a great proportion of locals were involved in the agrarian trade. Singapore was almost self-sufficient for poultry and pork and produced about half of the vegetables it consumed. Most farmers and fishermen were poorly educated and they used traditional farming methods.

The farm areas were mainly located in Lim Chu Kang Farming Estate and Ponggol Farming Estate. Ponggol was intensively used as a pig farming area with large-scale practices on small plots of land.

The government planed to convert small farms into large ones concentrated mainly in Ponggol. Due the lack of land, these were located in close proximity to densely populated residential housing areas.



1.

1. A pig farm in Lim Chu Kang, 1955



2.

2. The vegetable farm in Potong Pasir, 1950



3.

3. The dairy farm in Kranji, 1951



Top:  
Dairy farm in Bukit  
Panjang, 1951

Bottom:  
The vegetable farm at  
Potong Pasir, 1951



Top:  
A vegetable farm in Jalan  
Kayu, 1950

Bottom:  
The vegetable farm in  
Jalan Kayu, 1950





**1985 Masterplan  
with Agricultural  
Land Areas**

Total land area:  
647.5 km<sup>2</sup>  
 ■ Agricultural area:  
59.4 km<sup>2</sup>  
 ■ Industrial area:  
13.4 km<sup>2</sup>  
 Number of farms:  
11'604



**Resettlement and Phasing-Out of Farmers**

The government began phasing-out pig farming in 1984 because of the odour and the pollution it caused. Farm owners were reallocated other land on the island through short-term leases and under strict conditions; they were only to take part in farming practices with minimal environmental after-effects, such as vegetable farming. The land zoned for agricultural practices was reduced drastically in the process. Many farmers were resettled to provide land for housing and industry. Because of the rapid urbanisation of Singapore, hundreds of villages were demolished and the land was made free for redevelopment. The agriculture production decreased rapidly and Singapore's dependence on imported foodstuff increased. At this point, the Primary Production Department (PPD) began to develop farmlands into Agrotechnology Parks to optimise the outputs of the few patches of agricultural lands remaining.



Top:  
The Ama Keng vegetable  
farming villages, 1986

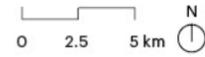


Bottom:  
Duck farm at Yew Tee  
village, 1986



**2008 Masterplan with Agricultural Land Areas**

Total land area:  
777.8 km<sup>2</sup>  
 ■ Agricultural area:  
8.1 km<sup>2</sup>  
 ■ Industrial area:  
118.1 km<sup>2</sup>  
 Number of farms:  
230



**High Technology**

Traditional ways of farming disappeared almost completely from Singapore. There remains a few fishing villages in the northeast part of Singapore. These, however, are no longer economically viable.

PPD began with the agro-technology programme in 1986. Agro-technology is defined as the application of biological science and technology to intensive farming systems. Agro-technology parks are intensive high-technology farms and were established to maximise the output from Singapore's limited agricultural land.

In 2002 the Agri-Food and Veterinary Authority of Singapore (AVA) was formed with the aim of providing safe food, healthy animals and plants for Singapore with highly regulated import and export conditions. Today, Singapore's remaining agricultural land makes out for 1% of its total territory.



Top:  
Ornamental flower breeder,  
Agrotechnology Park in  
Lim Chu Kang



Bottom:  
Goatfarm Hay Dairies,  
Agrotechnology Park Lim  
Chu Kang

# Outsourced Farming

Since the development of Agrotechnology Parks, the plot sizes have become highly regulated and the price of land has been rising rapidly. A growing number of farmers are subcontracting or investing in food production carried out in Malaysia or Indonesia. The output is still intended for Singapore's population. Contract farming and farming abroad is supported through governmental incentive, such as low import taxes. The Malaysian Investment Development Au-

thority (MIDA) even invited Singaporean farms to resettle their business on its territory.

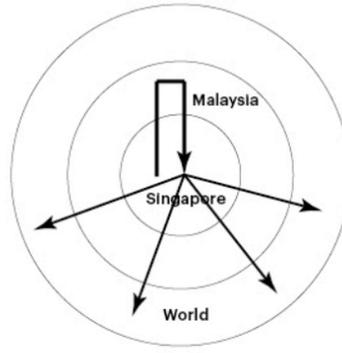


Orchid plantation in Johor,  
Malaysia

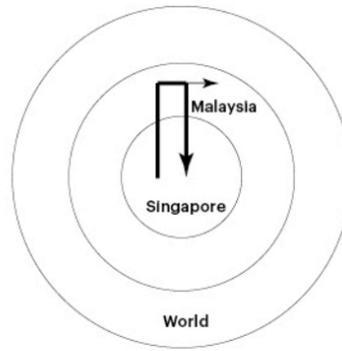


Mr. Lee Chee Hock and Mr. Lee Chee Wee  
Chinese brothers, living in Singapore

**Case 1: Ornamental Farming**  
**Hock Wee Nurseries Sdn Bhd**  
 The Orchid farm started in 1979 and is located in Malaysia since 1988.  
 "There was no possibility to continue the orchid business only with the fathers farm in Singapore therefore we ventured into Malaysia. Our farm in Singapore is sedimentally important for us because our family business started there. We do research in vertical farming to follow the High Technology standard of orchid industry to remain competitive."



**Case 2: Contract Farming**  
**Bright Floriculture Sdn Bhd**  
 The vegetable farm started in 1979 and is located in Malaysia since 1989.  
 "Malaysia invited us in the 1986 for resettlement of the farm business. We wanted to keep the farm in Singapore but we couldn't resist against the government. They took our land in 1989. Since we are staying in contract business with FairPrice we have to deliver a certain amount per month direct to Singapore."



Mr. Ong Hock Beng  
Singaporean, living in Singapore

**Two Cases**

The orchid farm Hock Wee Nurseries and the vegetable farm Bright Floriculture are both owned by entrepreneurs who started their businesses in Singapore before relocating to Malaysia in the late 1980s. Both are now Malaysian-based companies and continue to operate in Singapore.

Almost all of the production of the Hock Wee Nurseries is being transported from Malaysia to Singapore's Changi international airport before being dispatched to a range of overseas markets. They are exempt from import taxes into Singapore. Bright Floriculture is under contract with the supermarket chain FairPrice. Every month the company needs to deliver a fixed amount of their production to this steady buyer. Most of the leafy vegetables are being transported over the border to one of the 230 FairPrice supermarket stores. These products taxed at a rate of 7 percent.



Top:  
The orchid farm of Hock Wee Nurseries, Malaysia



Bottom:  
The vegetable farm Bright Floriculture, Malaysia

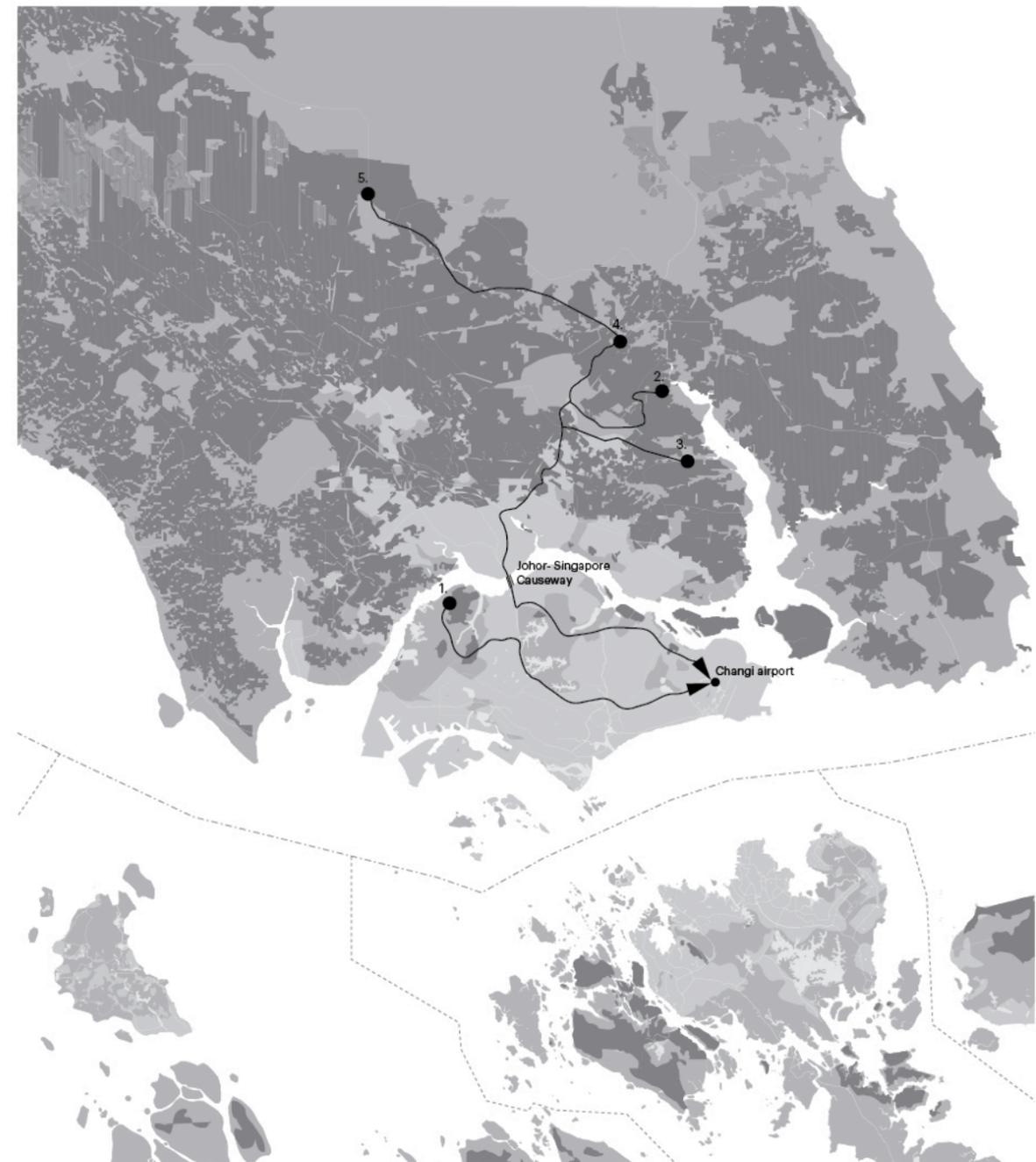
# Case 1: Ornamental Farming

Hock Wee Nurseries Sdn Bhd is managed by two Chinese brothers, Lee Chee Hock and Lee Chee Wee. After inheriting the family business founded by their father in 1979, they ventured to Malaysia in 1988 where Hock Wee Nurseries was founded. They have since established four more farms in Malaysia. They continue to live with their family in Singa-

pore near Zion Orchids, the original family farm. The orchid industry is a flourishing business in Malaysia and through the use of new inventive technologies, the two brothers manage to maintain a competitive place in the market.



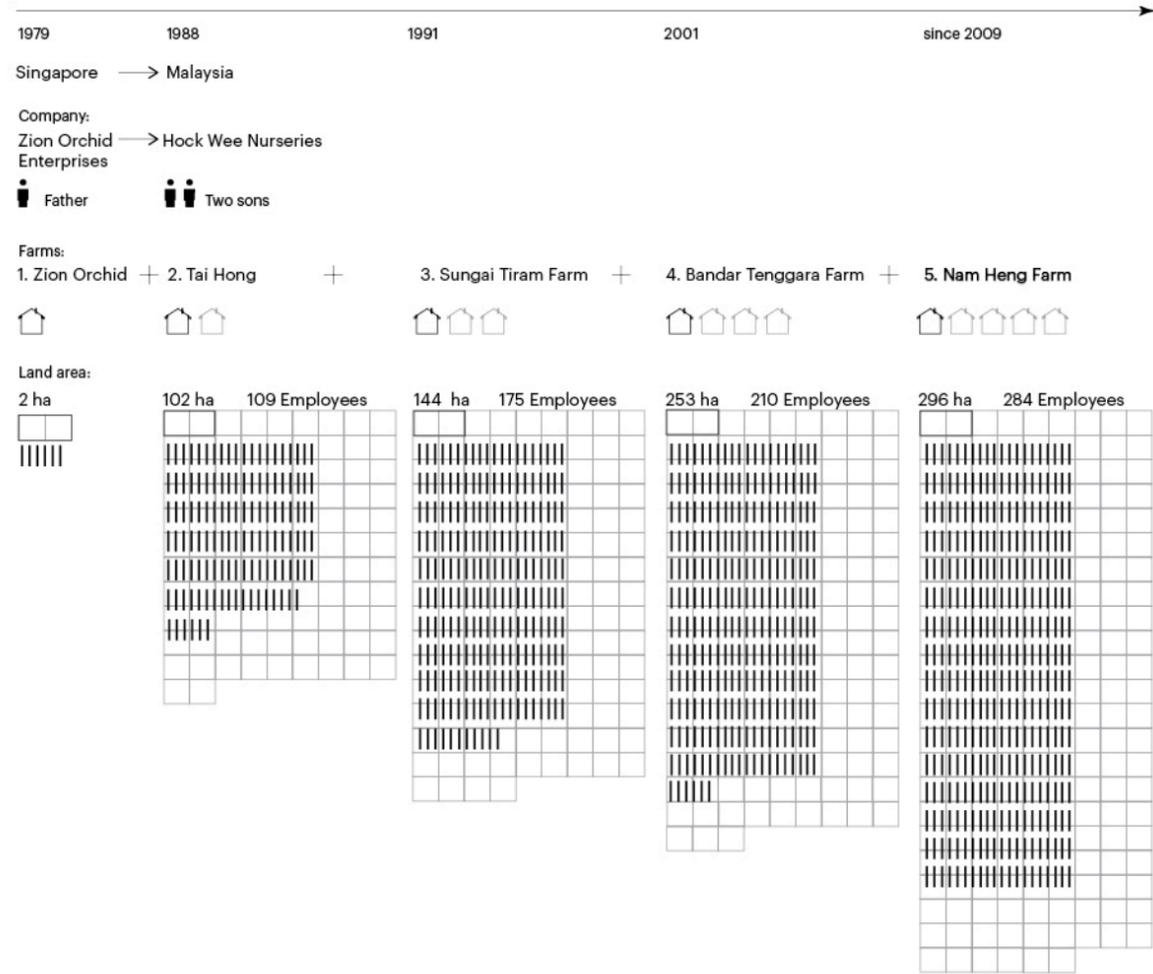
Tai Hong  
The main farm of Hock Wee Nurserie in Johor, Malaysia



From Hock Wee Nurseries to Changi Airport

- 1. Zion Orchids
- 2. Tai Hong farm
- 3. Sungai Tiram farm
- 4. Bandar Tenggara farm
- 5. Nam Heng farm

Company Development

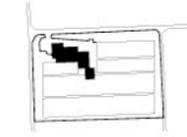


Singapore Roots

In 1979, father Lee Teng Koon founded the Zion Orchid Enterprise; a Singapore-based farm in Lim Chu Kang with 2 hectares of land leased from the government. With the start of Hock Wee Nursery in Tai Hong they could expand their land areas to 102 hectares. Now Malaysian based company, the farm continues to extend and improve its facilities. The farm in Sungai Tiram started operation in 1991 where they already had about 140 employees. Bandar Tenggara and finally Nam Heng meant the extension of their practices by 62 hectares. They continue to keep the farm in Singapore where the production pales in comparison to their Malaysian ventures. The family continues to be emotionally involved with their first farm.

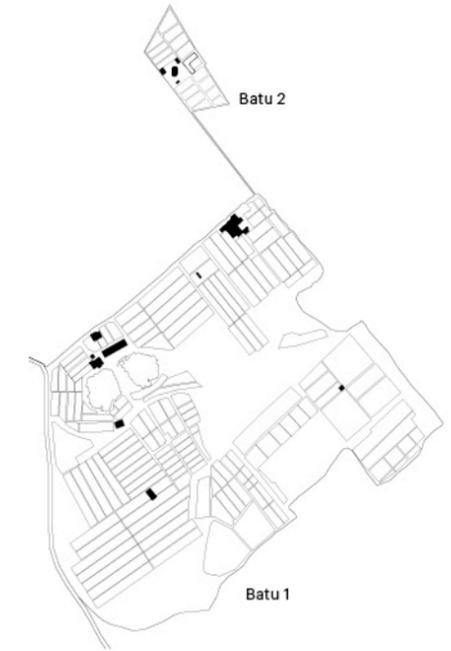
1. Zion Orchid Enterprises

Lim Chu Kang, Singapore  
Since 1979  
2 ha  
Founded farm of the father and living place of Hock Wee family



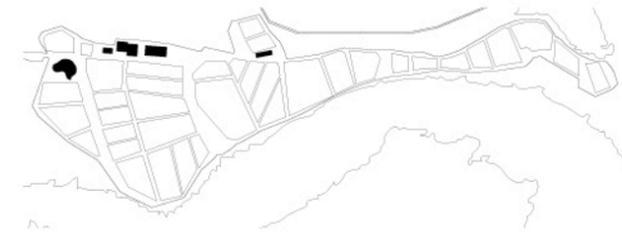
2. Tai Hong

Johor, Malaysia  
Since 1988  
100 ha  
Main farm



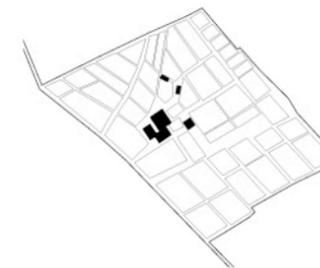
3. Sungai Tiram Farm

Johor, Malaysia  
Since 1991  
43 ha



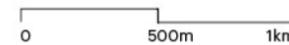
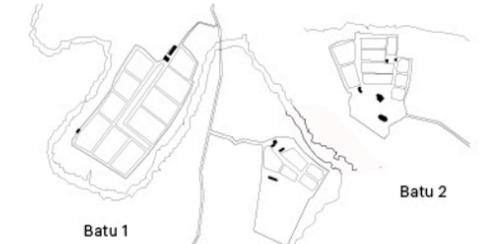
4. Bandar Tenggara

Johor, Malaysia  
Since 2001  
19 ha

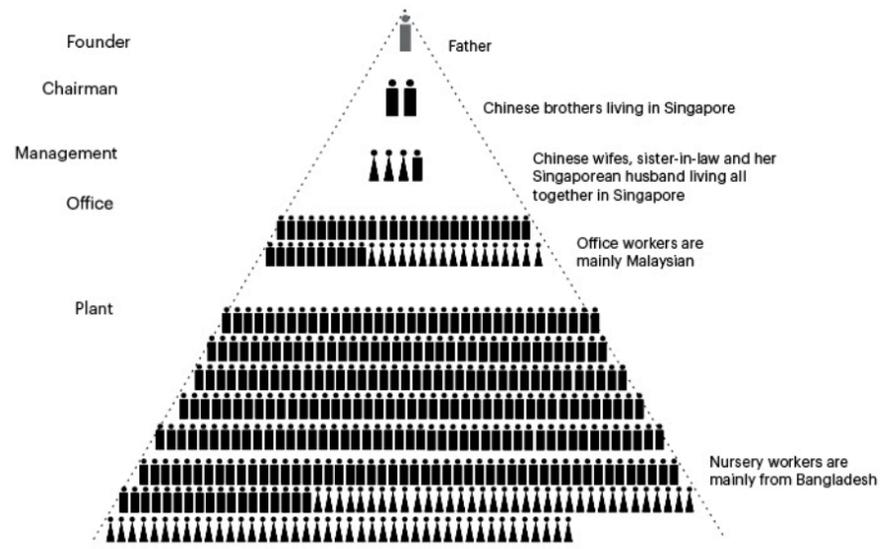


5. Nam Heng Farm

Johor, Malaysia  
Since 2009  
42 ha



Labour Composition of Hock Wee Nurseries



Family Business

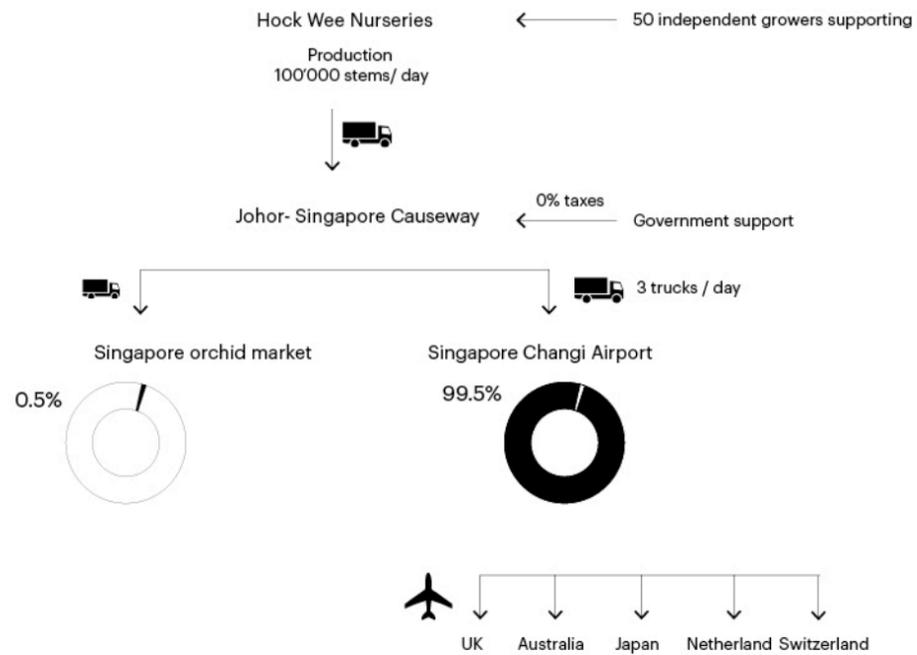
The two brothers are being supported by their wives and employees. They work 6 days a week on the farms in Malaysia whereas their wives are responsible for the administration side of the business. Around 16 per cent of the staff works from the office, most of which are originally from Singapore. In contrast, the majority of the workforce in the field come from Bangladesh.

Farm facilities in Tai Hong



Worldwide Demand

The farm is able to bundle up to 1'000'000 stems each day, seven days per week. They have over 45 independent growers supporting them. From Tai Hong they are delivering 3 trucks per day to Changi Airport in Singapore, all tax-free. From there, the products are redistributed across the globe to various markets.





**Thai Hong Farm**  
 Thai Hong is the main farm and located in Kota Tinggi is occupying about 100 ha and is herewith the biggest farm of the company. The chairmen have their office next to the working center and are mostly operating in this farm. But each evening they return back to Singapore.

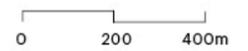


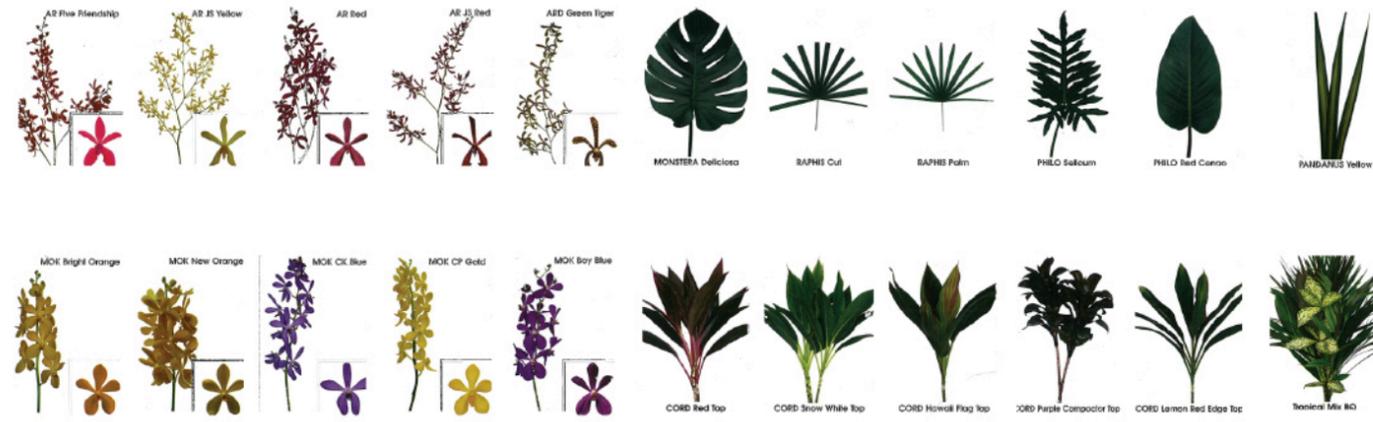
Top:  
Viewpoint A  
  
Bottom:  
Viewpoint B



**Sitemap Tai Hong Farm**

- Orchid plants
  - Palm oil plants
1. Office  
Packing rooms  
Chemical store room  
Spray Tank  
Worker quarter  
Truck loader station
  2. Store rooms  
Truck loader station
  3. Reservoir
  4. Utility shed
  5. Dormitories
  6. Accommodation road to Jalan Johor





Top:  
Some orchids and  
greeneries produced by  
the company

Left:  
Workers are bundling the  
fresh cut orchids

**Supply**  
The firm produces fresh cut orchids as well as several other types of flowers and foliage. The products fall under the quality-control audited by the AVA.



1.



2.



3.



4.



5.

1.  
Office Mr. Lee Chee Wee in  
his office with his secretary

2. - 5.  
Packaging

# Case 2: Contract Farming

The first farm of Bright Floriculture started in Singapore. They have been contracted by Singapore's FairPrice Supermarket from the very beginning of their operations. In contrast to Hock Wee Nurseries, the government took their land in 1989 and the company now only has farms in Malaysia.

Still, the great majority of production is destined to Singapore's market. They are also supported by the Singaporean government by means of tax exemption and must comply with the AVA license for its imports.



Farming area of the vegetable farm in Ulut Tiram

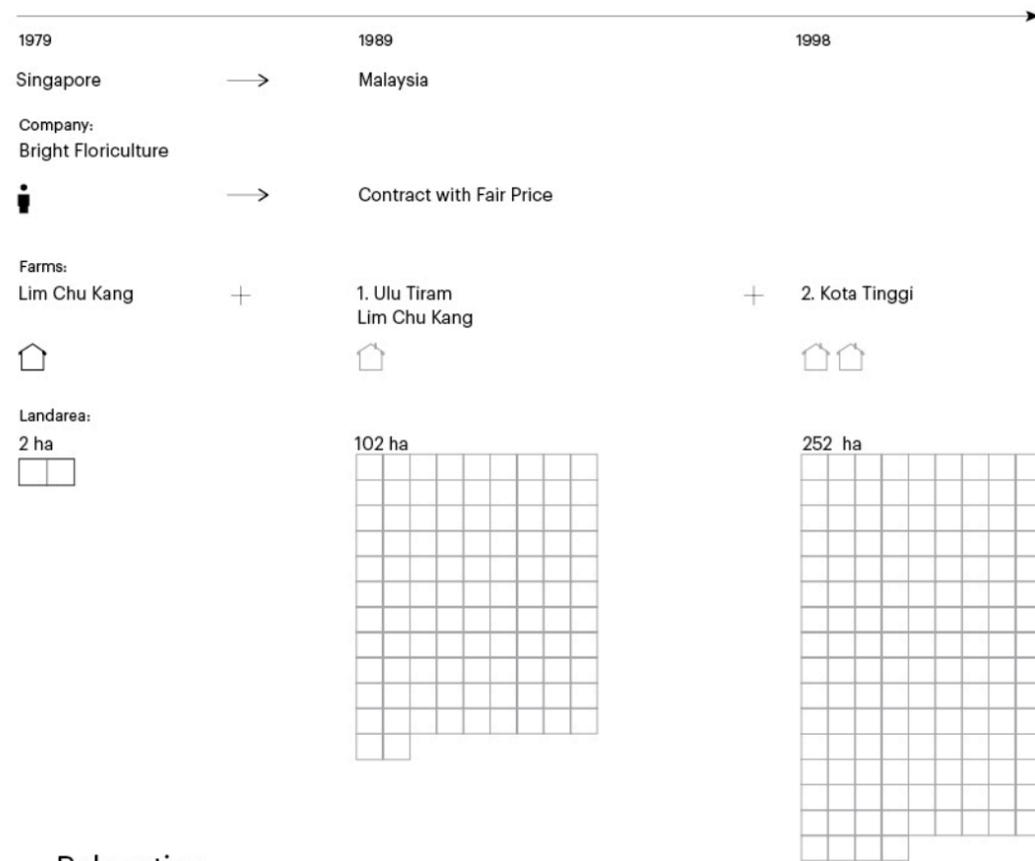


From Bright Floriculture Farms to Fair Price Stores

- 1. Ulu Tiram
- 2. Kota Tinggi
- Fair Price Supermarkets



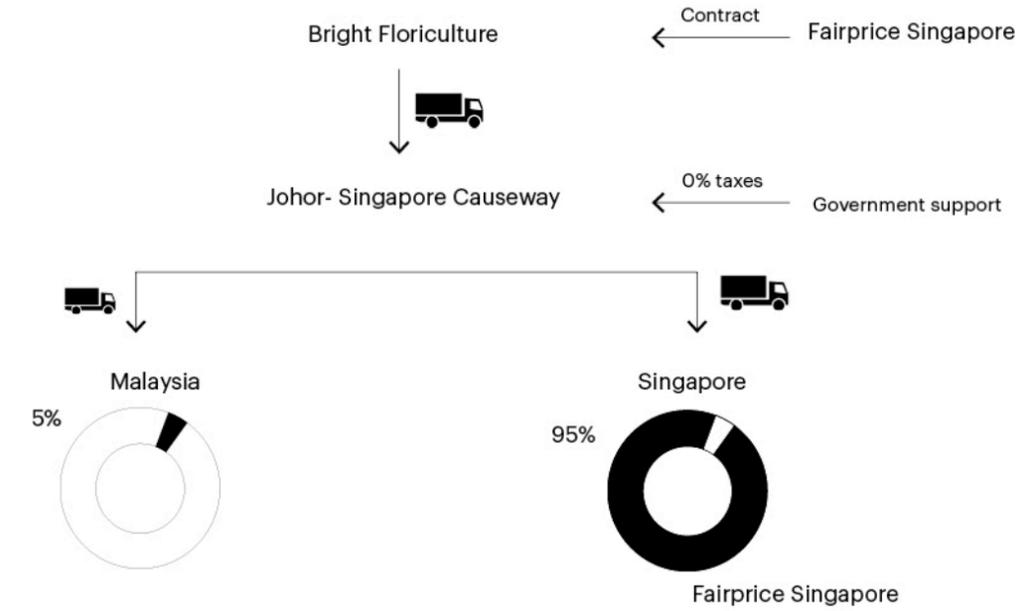
Company Development



Relocation

The first farm located in Lim Chu Kang was moved to Malaysia after the lease expired in Singapore. Bright Floriculture was invited by the Malaysian Investment Development Authority (MIDA) to relocate its farm on its territory, where it could continue to supply FairPrice. Their first farm in Malaysia opened in Ulu Tiram. They expanded further with the opening of their second farm, which opened in Kota Tinggi in 1989. Their contract with FairPrice assures them steady prices as well as a reliable buyer.

Bright Floriculture Distribution Structure



# A Region of Fish and Fishermen

Fishing occupies an important role in the local economy in the Riau Archipelago. It is the main activity for a large part of the population.

Fishing has for long been the main source of income in the region. The soil on the islands of Batam, Rempang, Galang and the smaller islands surrounding them is unsuited for cultivation. In fact, agriculture has not been at all present on the islands of Batam until 1970. Nowadays

the production is small in size and includes mainly fruits and vegetables.

Today's fishing industry is divided between deep-water and traditional practices. Deep-water fishing requires larger vessels, ports, cold storages and it implies a bureaucratic dimension concerned with things such as taxation. On the other hand, traditional fishing uses the simplest of technologies and exists outside the world of international

trades. It exists in parallel to modern reality and manages to interact in a subtle, self-governed and sometimes invisible way.



View of Barelang

Households Active in the Sector,  
Batam Regency 2010



Production per Sector (tons),  
Batam Regency, 2010



Fish Production per District (tons),  
Batam Regency, 2010



A Society of Fishermen

As much as 99 percent of The Riau Archipelago consists of water. The soil is not fertile. This explains the discrepancy between agricultural establishments and households involved in the fishing sector.

Depending on the districts, the fishing production varies. There is a big production on the northeast coast, in the area of Barel-ang. In fact, the majority of the kampungs are located in those areas. The quantity of fish production close to the islands of Bulan and Belakang Padang are especially impressive. This is due to good fishing possibilities in the waters at Barel-ang and to an informal trade being exercised in the underground, which sees Belakang Padang as main base.



Top:  
Island of the Riau Archipelago

Bottom:  
Map of the Riau Archipelago

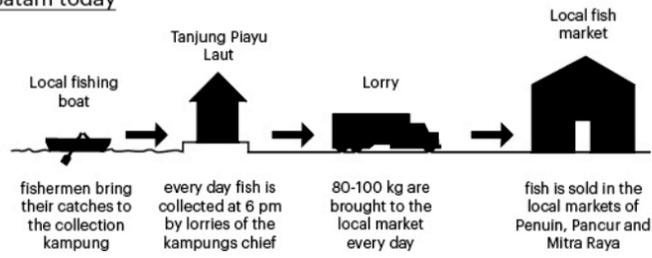
The Landscape of an Archipelago

The Riau Archipelago has an innumerable quantity of small islands. The municipality of Batam alone counts 400 islands, 270 of those are named. Many islands are too small for practicing any sort of long-term activity. Batam's planning authority considers renting some of these islands to Singapore to be used as cemeteries.

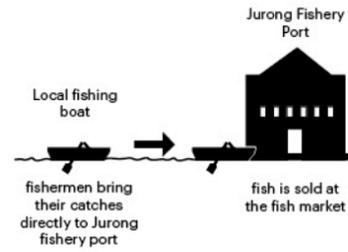
In contrast, it is not unusual to find small islands completely settled and covered by traditional houses with wooden stages and jetties.



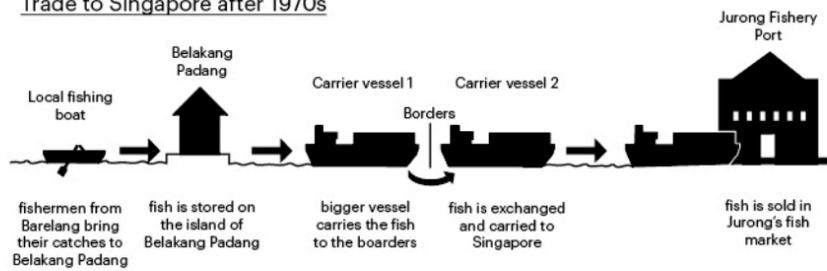
Local Trade on Batam today



Trade to Singapore before 1970s



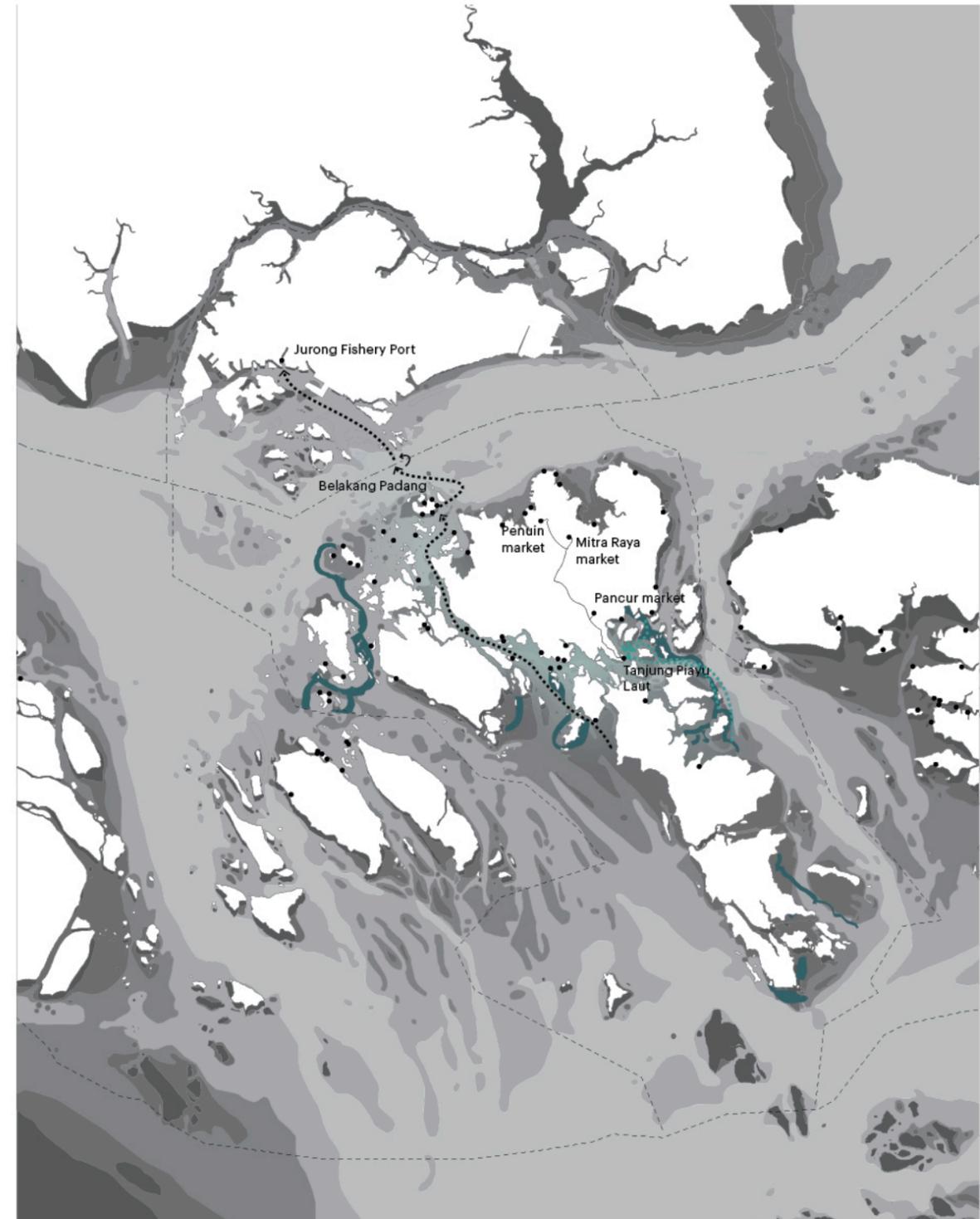
Trade to Singapore after 1970s



(Trans-)National Trade of Local Fish

Local fishermen are part of a network, which has a very simple structure. For fish destined to local markets, the economic network rotates around collection kampungs. Fishermen bring their catches once or twice a week to one of the collection kampungs, from where the fish is then carried by lorries to the local markets of Mitra Raya, Pancur and Penuin.

Before the 1970s it was allowed for fishermen from Indonesia to bring their catches directly to the fish market in Singapore. These exchange routes remained tax-free for some years. After the 1970s the situation changed. Fishermen cannot afford to pay the taxes imposed for crossing into Singapore. It is more profitable for them to let their catches be collected by a ship from Belakang Padang. The fish is stored somewhere on the island and then brought to the borders of Singapore where an exchange happens with another vessel which carries the fish to the Jurong fishery port under a false declaration. A similar case was happening with vessels from Hong Kong collecting fish in Bareleng from local fishermen and taking them to the Chinese city.



Traditional Fishing

- Kampungs
- Traditional fishing areas Batam
- ⋯ Belakang Padang trade
- Tanjung Playu Laut trade





Tanjung Piayu Laut

Tanjung Piayu Laut is a kampung of relative importance. It is the place where fish is collected everyday and brought to the market. The fishermen of the surrounding area bring their catches to the village once they have accumulated a certain amount of fish. The kampung chief runs the business of buying the fish from the local fishermen and selling them to merchants at the local markets of Pancur, Mitra Raya and Penuin. The collector arrives either by lorry or by motorbike. Every day the collector manages to carry around 80 to 100 kilograms of fish to the market. A small fisherman can usually bring 10 to 15 kilograms one or twice a week while a fisherman with employees manages to catch around 80 to 100 kilograms.

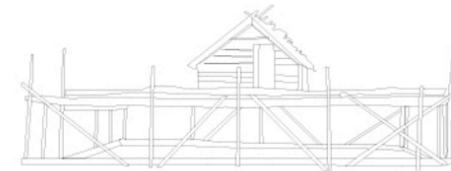
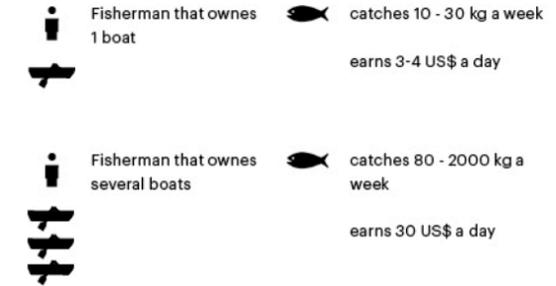
Kampung Structure



A Customary Hierarchy

A kampung counts on average 60 dwellers. The chief of the village runs the collection. He buys the fish from local fishermen. If for 1 kilogram of crabs he pays 30,000 Rupiah to the fisherman, he then sells it for 40,000 Rupiah to the merchants. Even among the fishermen there is a distribution of wealth. There are fishermen that can afford having more boats and employees in order to catch bigger quantities of fish.

Relation between Boat and Income



Kelong



Traditional fishing boat

A Customary World

Fishermen in Batam regency use traditional fishing methods. The Kelongs are small platforms built on the water without any use of nails and are still a common fishing infrastructure in the kampungs. Also, the boats used are very simple even if nowadays most of the fishermen have motorboats. Fishermen have the possibility to store fish on ice at their houses before bringing them to the collection kampungs.



**Barelang**  
 Barelang is an area South of Batam Island. With six bridges, those islands are connected between them and to Batam. A big road crosses them. Driving down those islands, it is easy to observe many kampongs in this area. Many have a small restaurants where locally caught fish is served.



1.



2.



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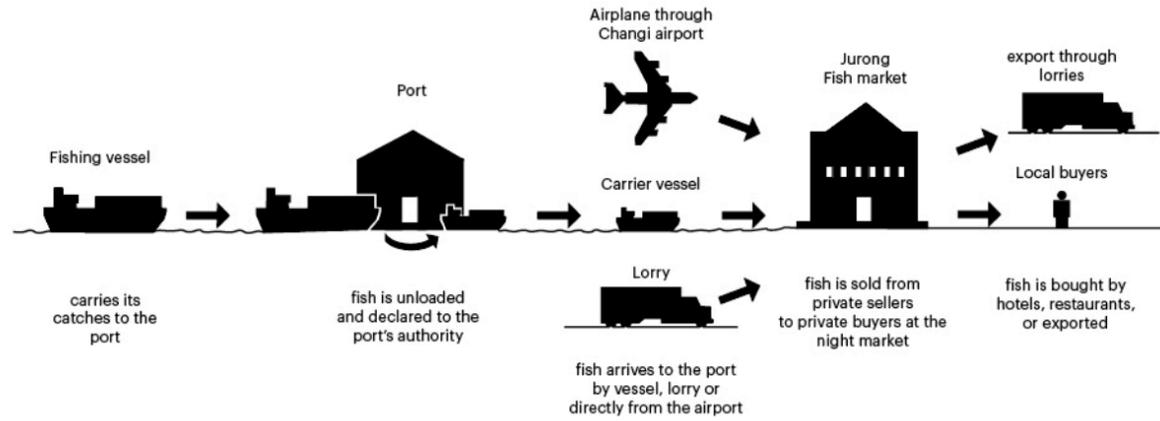
4.



5.

- 1. Kampung on the island of Rempang
- 2. Fisherman catching a fish from a net on a Kelong
- 3. & 4. Kampung Impressions
- 5. Boat waiting for the high tide

Fish Landing and Trade to Singapore

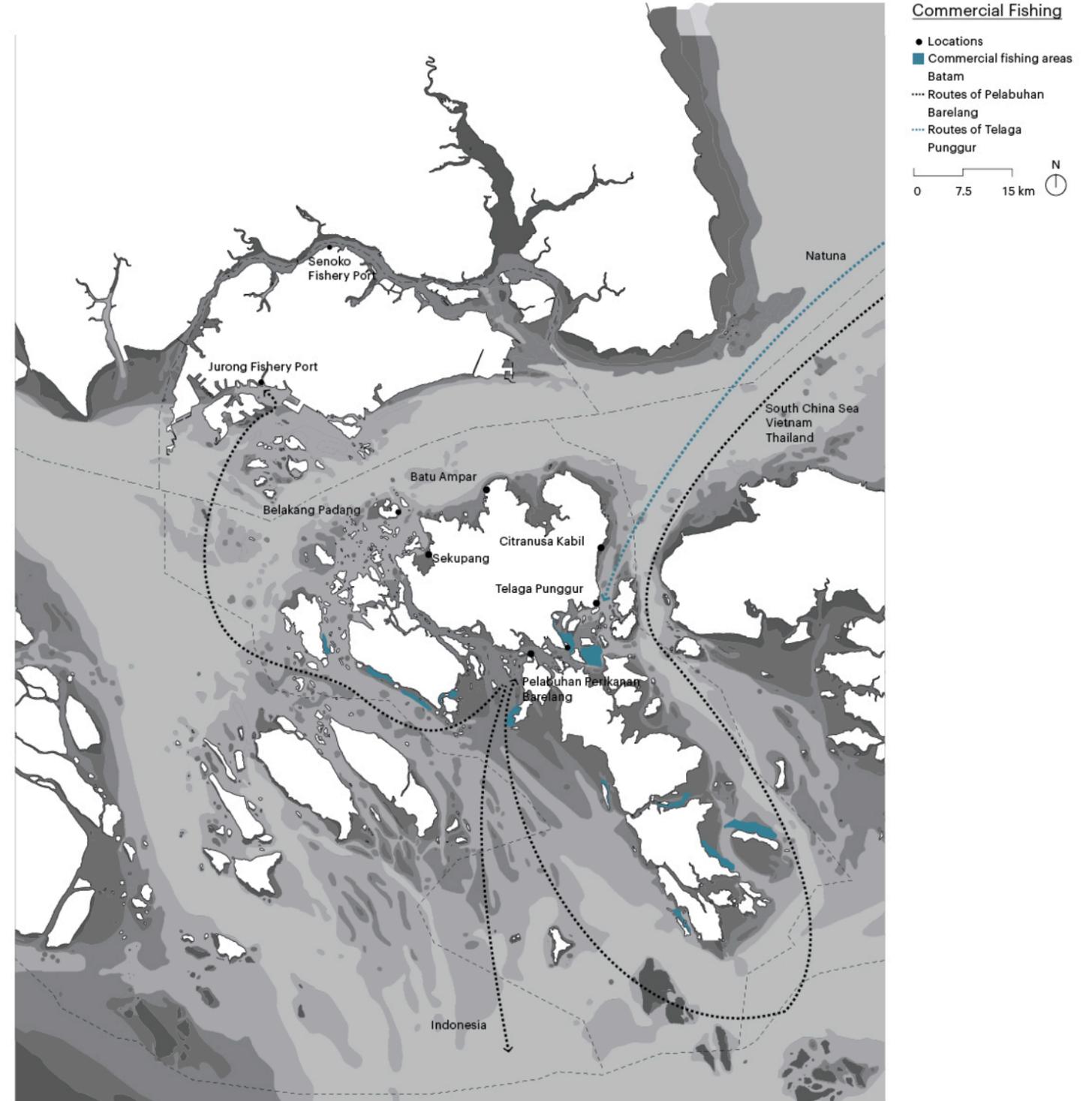


About Landing and Declaring

The bureaucracy of the ports consists in the act of landing the catches. The expression 'landing' refers to declaring the quantities caught. A fishing vessel needs the permission to fish. Every fishing vessel is allowed to fish in the waters of its country. The catches have to be landed on the territory of that country. This means that the first time that the fish touches the land has to happen in that country. The practise of landing is comparable to a declaration of taxes.

The fishing vessel can also be allowed to fish in foreign waters. In this case the fish has to be landed on the territory of the foreign country that owns the waters where the vessel fished. In both cases, once the fish has been landed it can be brought to any destination in order to be sold. Fishermen often sell the catches to traders directly in the port. Those traders inform themselves about the prices of fish and the demand in different ports in order to decide where to sell the fish.

It also often happens that the fishing vessels fish in international waters where no permission is required. In these cases, the fishermen can bring his catches to any port within reach.



Commercial Fishing

- Locations
  - Commercial fishing areas
  - Batam
  - ..... Routes of Pelabuhan Barelang
  - ..... Routes of Telaga Punggur
- 0 7.5 15 km N

Telaga Punggur Fishing Port

Pelabuhan Perikanan Swasta Telaga Punggur

	first private port in Batam
Since	1981
	13 own vessels
	Port: 50
	Crew: 400-500
Trade	- Local market

Barelang Fishing Port

Pelabuhan Perikanan Batam

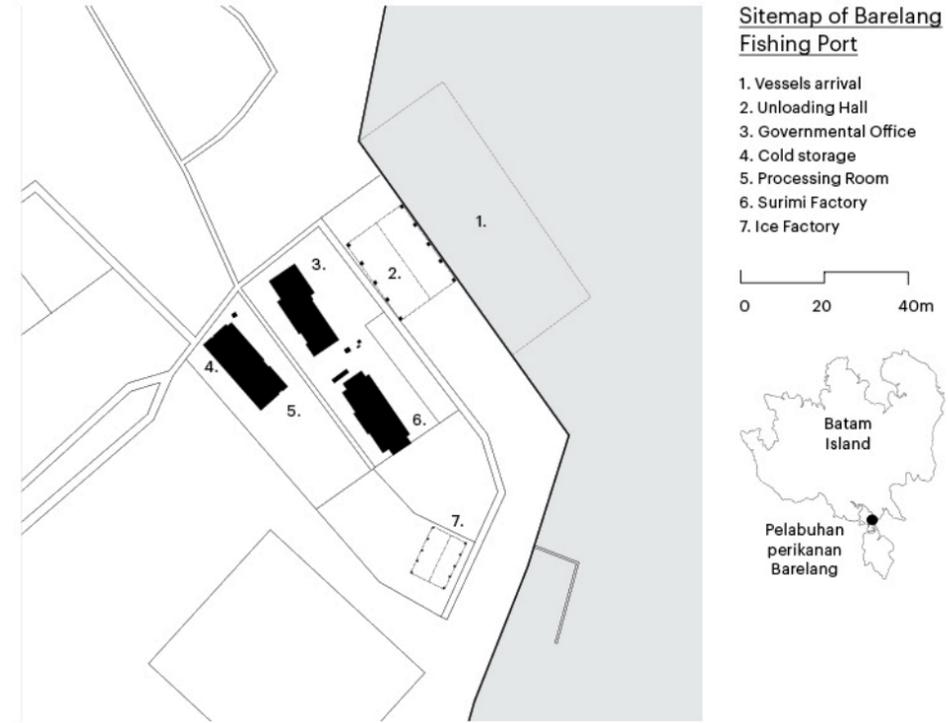
	biggest private port in Indonesia
Since	2007
	100 own vessels
	Port: 150
	Crew: 3,000
Trade	- Singapore - Indonesia (Java and others) - Local market (processed fish)

Two Private Ports

The first private ports in Batam were set up in the 1980s. The first private fishery port on the island of Batam is the Pelabuhan Perikanan Swasta Telaga Punggur founded in 1981. It is now a small port with only thirteen vessels. Fishing is not possible in the waters of Batam regency, even if it is the only place where the port is actually allowed to fish. This is due to the fact that the port catches mainly mackerels and cannot find this fish in the local waters. Therefore the port fishes in the waters close to the island of Natuna

where control from the authorities is not frequent because of Natuna's proximity to international waters.

A port on a bigger scale for what concerns the dimensions and especially the international importance is to find on the island of Nipah. Many infrastructures are set up across an area of 30 hectares. Aside from local vessels, others using this port come from Thailand, Vietnam and other parts of Indonesia. They fish in international waters and are therefore allowed to land their catches in a foreign country.



Pelabuhan Perikanan Barelang

The port is an attractive destination for foreign vessels since it provides all the needed infrastructures: fuel stations, ice factory, cold storage, and governmental office for landing. It was established out of a private initiative welcomed by the government since it covers an area where there was no

such port before. Fresh fish is brought directly to Singapore's fish market in Jurong or processed. The processing can be of different kinds: packaging, freezing, extracting the bones and freezing, making surimi. Fish bones are used as animal food. The quantity of fish brought to Singapore is around 60 tons per week.



1. Port's hall
2. Vessel from Thailand docking at the port
3. Weighting of the catches
4. Unloaded fish is put into baskets and then into ice containers
5. Ice containers



1. Unloading the catches in the port's hall
2. Packaging room
3. Packaging infrastructure
4. Cold storage
5. Ice factory

**Barelang Fishing Port**

Landing means unloading the catches from the vessel and putting them in smaller baskets. Every basket has to be weighed at 30 kilograms. Weighing happens in front of two officers that mark the number of baskets in order to get the total amount of kilograms. The baskets that are already weighed are carried to ice containers and brought to storage or reloaded on the vessel.

The fish that is not brought to the markets is processed. It is packaged in smaller quantities and frozen. In the cold storage the fish is stored in packages of 100 kilograms each. Normally it is tuna or baby tuna that is brought to the port and sold fresh or frozen. With mixed fish the port produces surimi in the factory situated on the plot.



2.



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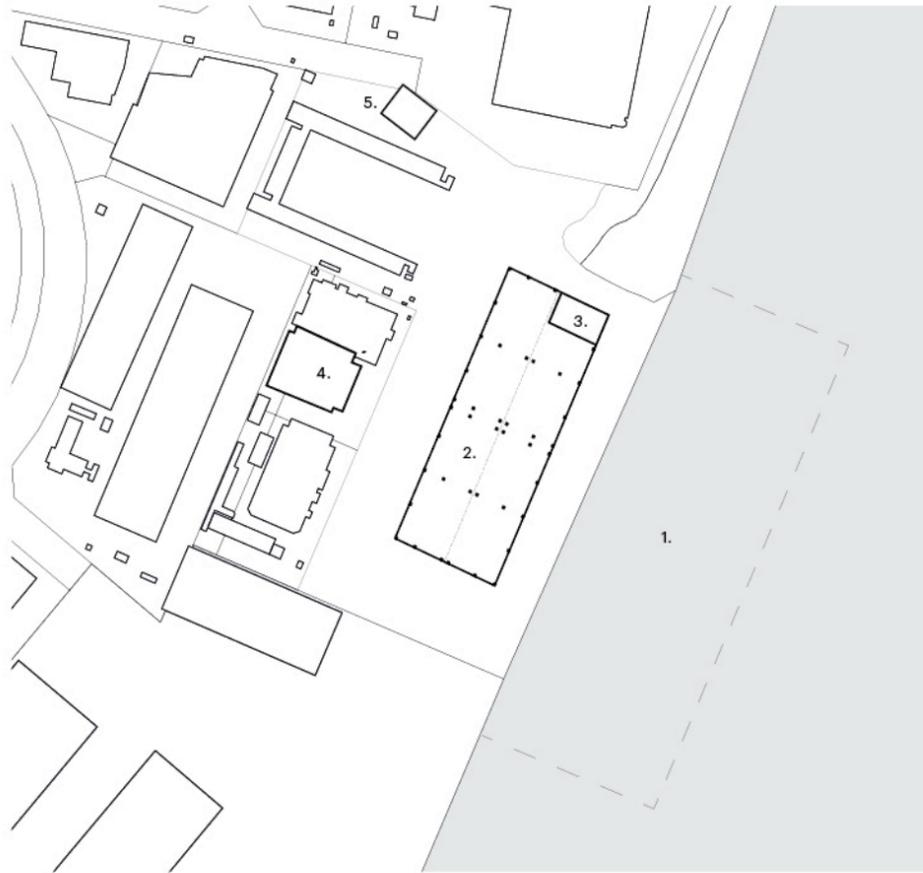
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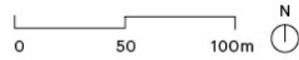


5.



**Jurong Fishery Port**

1. Vessels Arrival
2. Market Hall
3. AVA Office
4. Cold Storage
5. Entrance



transit of 50% of Singapore's fish consumption

103 sellers

2'000-3'000 buyers every night

13 vessels belonging to the port

12 vessels arriving per day carrying 30 tons each

250 tons sold per night

**Fish Imports through Jurong Fishery Port**



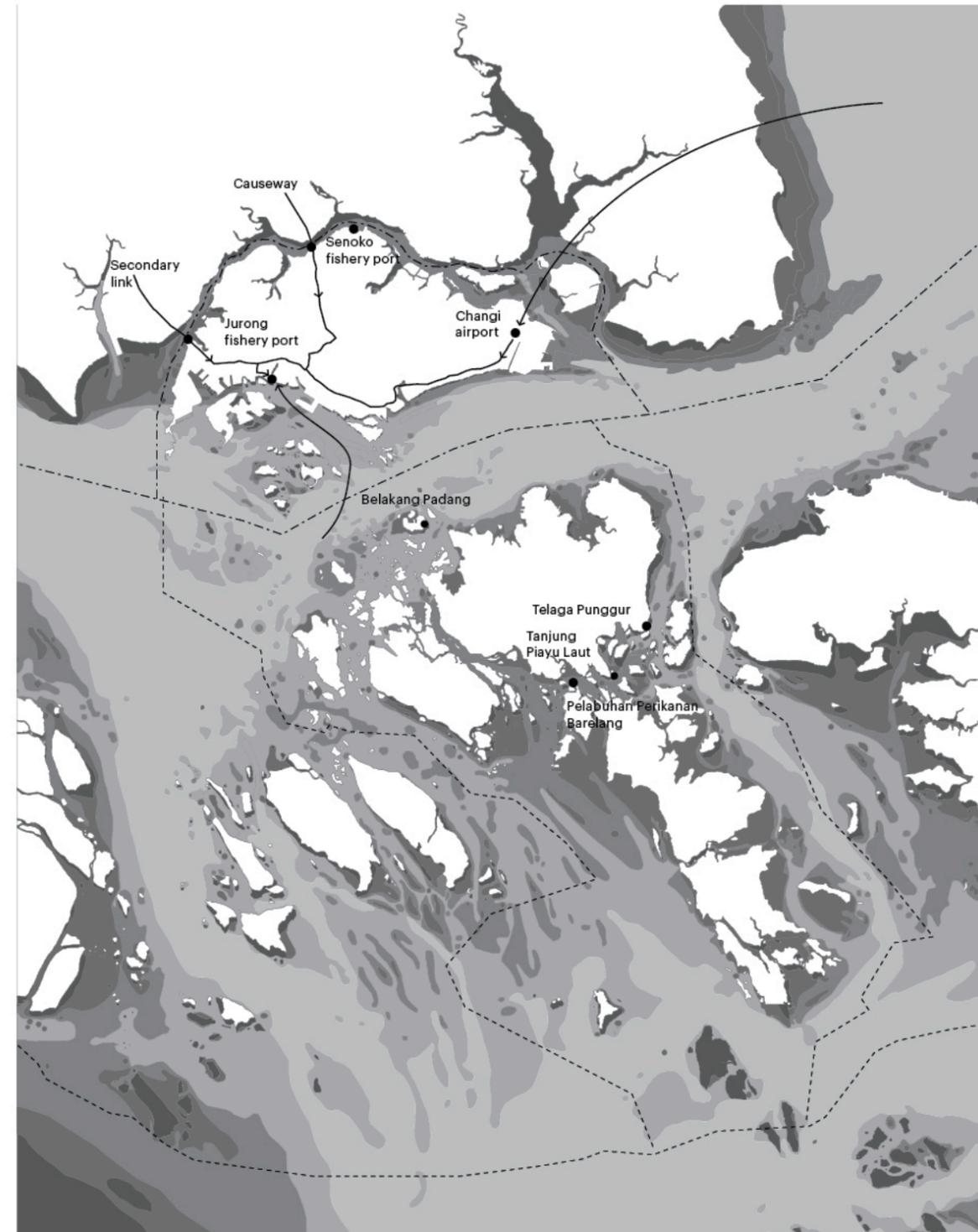
**An Urban Port**

Jurong Fishery Port is integrated in the urban structure. Its proximity to the highway makes it ideal for lorries to arrive or to depart with fish ready for export.

The port is surrounded by the Jurong Harbour and occupies only a small area compared to the remaining Jurong port facilities that deal with other goods than fish and seafood.

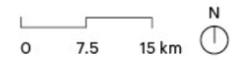
Fish does not only arrive by vessel to the Jurong Fishery Port. There are other ways for fish to be transported to the Jurong fishery port: fish from Indonesia arrives by carrier vessels, from Malaysia and Thailand it sometimes comes by lorries. From countries further out such as Norway, the fish arrives by plane directly from the airport to the port without being distributed. Singapore itself has thirteen vessels with which it fishes.

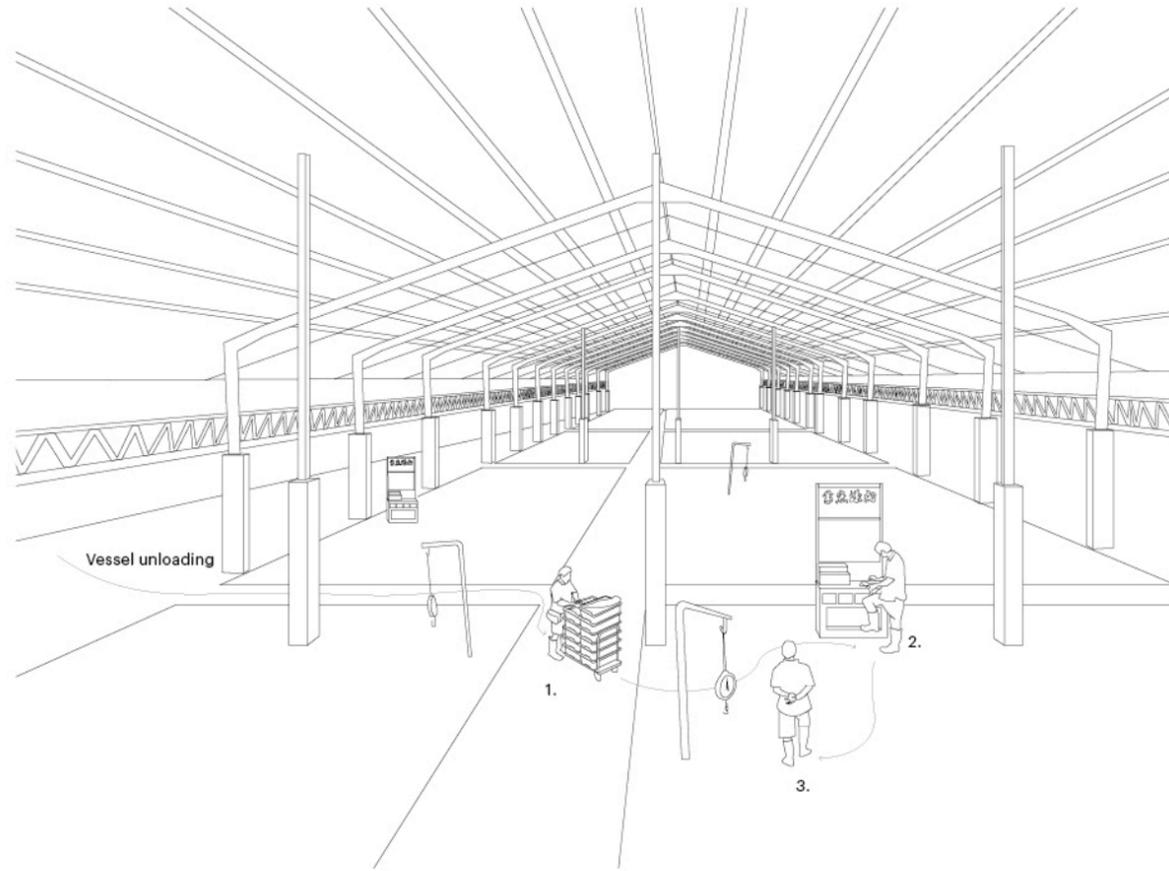
The market hall of Jurong Fishery Port is 900 square meters. In this area there are around 100 sellers. Each of them has an area of 50 square meters where he can sell fishes. The site also includes a cold storage and the AVA office. The vessels arriving are mainly carrier vessels. They unload the fish and leave again. The fish might not all be exposed on the 50 square meters but kept in container with ice right outside the hall and brought when needed. There is no infrastructure for processing the fish on the site, apart from a cold storage. Despite that, processing happens in Singapore, even if in small scale. In the market only fresh fish is sold, yet, frozen fish is also imported and arrives to Jurong on vessels that process the catches directly on-board.



**Fish Routes to Jurong Fishery Port**

- Locations
- Routes





### Jurong Market Hall

1. Fish from the carrier vessel
2. Seller
3. Buyer

### The Night Market

From 2 am until 6 am it is rush hour in the market hall of Jurong Fishery Port. The fish that was unloaded from the vessels or lorries are carried into the hall and exposed on the single areas of the merchants. Carriers usually have agreements with buyers, selling to one taker his entire stock. The buyers include hotels, restaurants or private individuals. There are also buyers that have the assignment from third parties to buy fish for them at the market. Expert buyers are able to recognize how many days before a fish was caught and can consequently select fish carefully.





The Market Hall



1.



2.



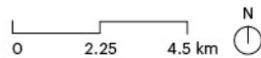
3.

- 1. Buyers choosing their fish
- 2. Fish exposed on the 50 sqm of a merchant
- 3. Outside the hall: containers to store and transport the fish

# Agriculture of Technology

The drastic resettlement and outsourcing of Singapore's farms that took place in the last fifty years changed the agricultural panorama on the island. Nowadays, agricultural land is integrated in the urban structure. Even though farming areas are in the north of Singapore, they are in proximity to industrial, residential and even military zones. The appearance of agricultural areas is also urban. The six existing sites where agricultural activities are settled are the so-

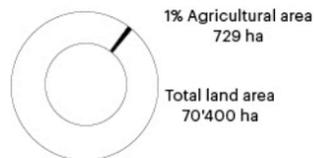
called 'Agrotechnology Parks'. The plot sizes are incredibly small for the function they have: on average, each plot is of 2 to 3 hectares. The use of the space is completely optimized. As one might guess from the name, the focus is on technology. This is Singapore's solution for assuring maximal agricultural production on only very few hectares of land. The focus on technology increased significantly after the 2008 food crises.



### Agro-Technology Parks

- 1. Lim Chu Kang
- 2. Murai
- 3. Sungei Tengah
- 4. Mandai
- 5. Nee Soon
- 6. Seletar West Farmway
- 7. Loyang

### Farmable Land in Singapore





**No Production for Sustenance**

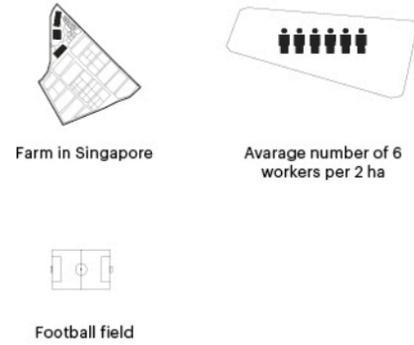
The production in the agro-technology parks is varied and overall, it pales in comparison to Singapore's foodstuff needs. The amount produced covers an insignificant part of the local consumption. Furthermore, in some cases the production does not stay in the country but is instead exported.

The landscape of Singapore's agricultural land is characterized by fragmentation. It is a landscape of industrial agriculture ruled by efficient use of the land. There are around 250 farms on the island spread between six agro-technology parks and one more area called the Seletar West Farmway. All farming land is rented from the government. The leasing contracts range between 2 and 20 years.

**Singaporean Farm Production**



Lim Chu Kang, excerpt



**Two Hectares**

Plots are generally small. Historical developments and shifts in priority led to the division of agricultural plot of about 2 hectare per farm. Actually the length of the large agrotechnology park, Lim Chu Kang, measures a bit more than half of the length of Changi airport. Singapore's strategy uses many small-scale farms instead of a smaller number of large farms. The reasons for this include the will to keep a wide variety of products and producers and allowing a certain economical freedom and competition.

A glance on a satellite picture reveals that the sizes of Singaporean farms are relatively balanced: the contrast between the largest and the smallest farm is not of great significance.

Looking towards Malaysia, it becomes immediately obvious that plot sizes in Singapore are much smaller than in most other agricultural settings. A Singaporean farm might be as small as three football fields only, and maybe forty times smaller than a Malaysian farm.

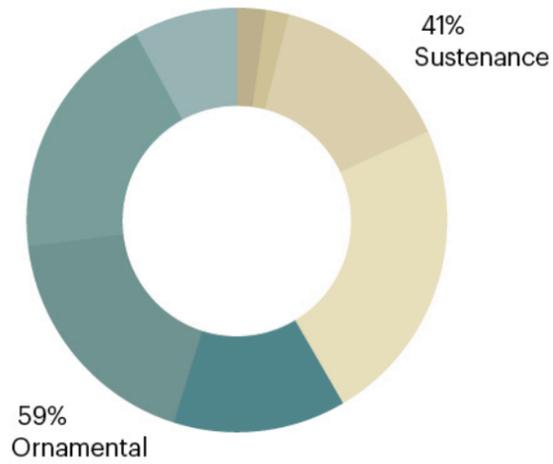


### An Ornamental Output

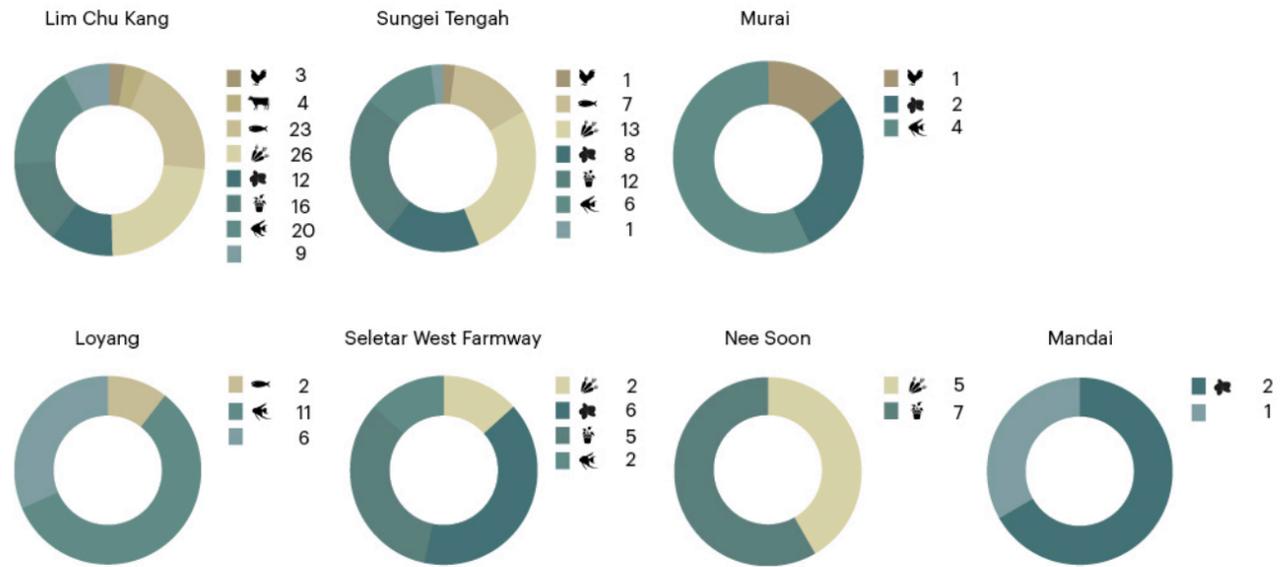
The farm production in Singapore focuses mainly on 'ornamental' agricultural production. More than half of what is produced on Singaporean farms is not edible. Such products include orchids and aquarium fishes.

Out of a total of around 250 farms, sixty percent of them are involved in the production of ornamental goods.

Percentage of Ornamental and Sustenance Production



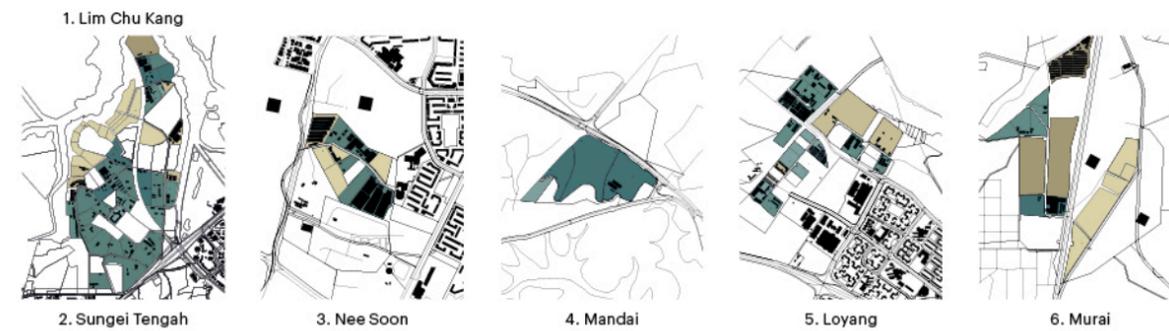
Farm Output by Agro Technology Park



### Export-Oriented Production

Singapore is not the main consumer of those ornamental products, which are the main agricultural production of the island. Orchids or aquarium fishes are exported all over the world. Small plants, orchids or decorative fishes arrive to Singapore in an advanced growth state. They are fed and grown on Singaporean land for some weeks before they

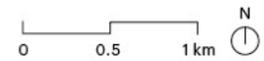
leave the farm towards the open market as Singaporean products, which confers upon them a plus value in international market. This is also the case of ornamental plants, although many of them are actually dedicated to the Singaporean market.



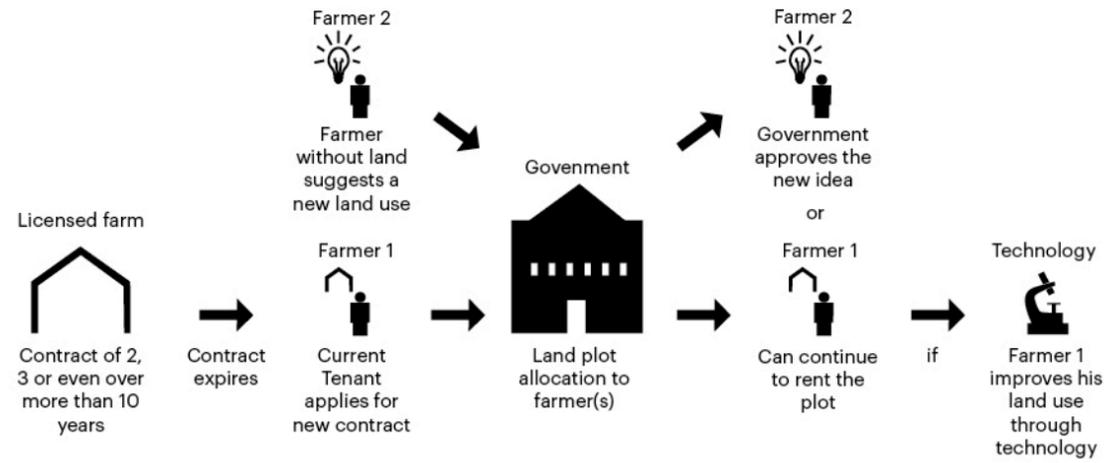
### Farm's Production

- Substance
  - Chicken Eggs
  - Dairy
  - Fishes
  - Vegetables

- Ornamental
  - Orchids
  - Ornamental Plants
  - Ornamental Fishes
  - Others
- Vacant Land



Rental Renewal and Competition for Technological Renewal



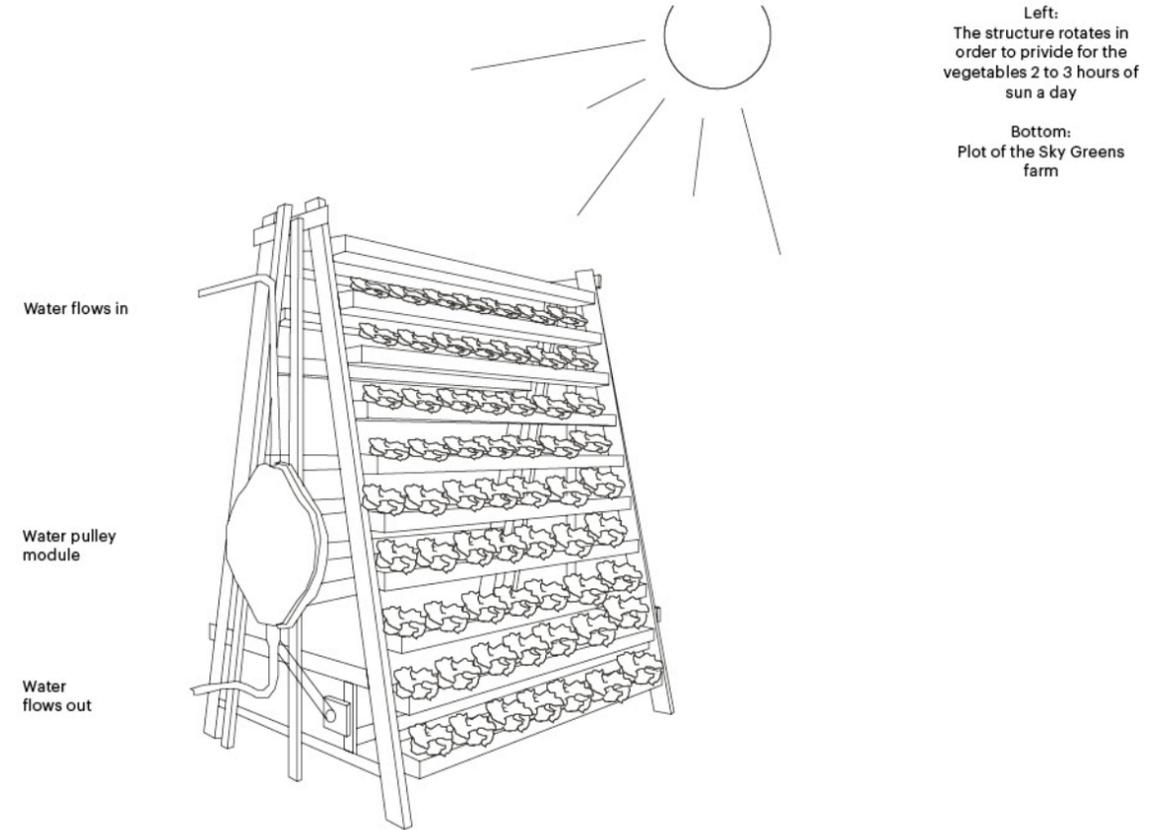
Promoting Technology

The impossibility to dedicate more space to agriculture is the cause of an agricultural development towards technology. This corresponds also to the aim of the government, which looks for help in the part of the population involved in the sector. As a matter of fact the government prefers a technological land-use and tends to promote development processes that align with such ideals. When a rental contract expires the old tenant is often afraid that a competitor might overtake him by using superior technologies allowing for a more efficient land-use. The old tenant is likely to lose the rented land to the competition if he fails to adapt to evolving technologies.

This is a problem for many farmers since their leasing contracts are short. The time is not sufficient for them to see the results of an investment in research in order for the government to see the potential of their land-use.

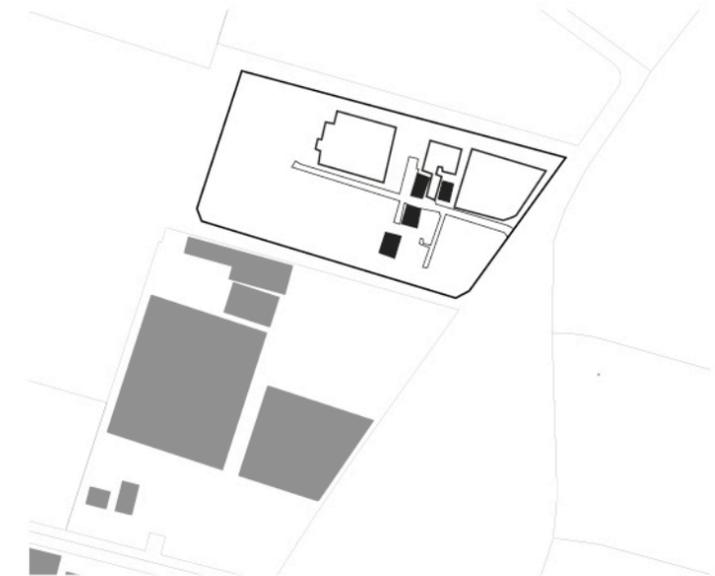
Singapore itself practices research and it is possible for the farmers to have informative visits at the research and development centres in order to get a glance into the possibilities of investments for them.

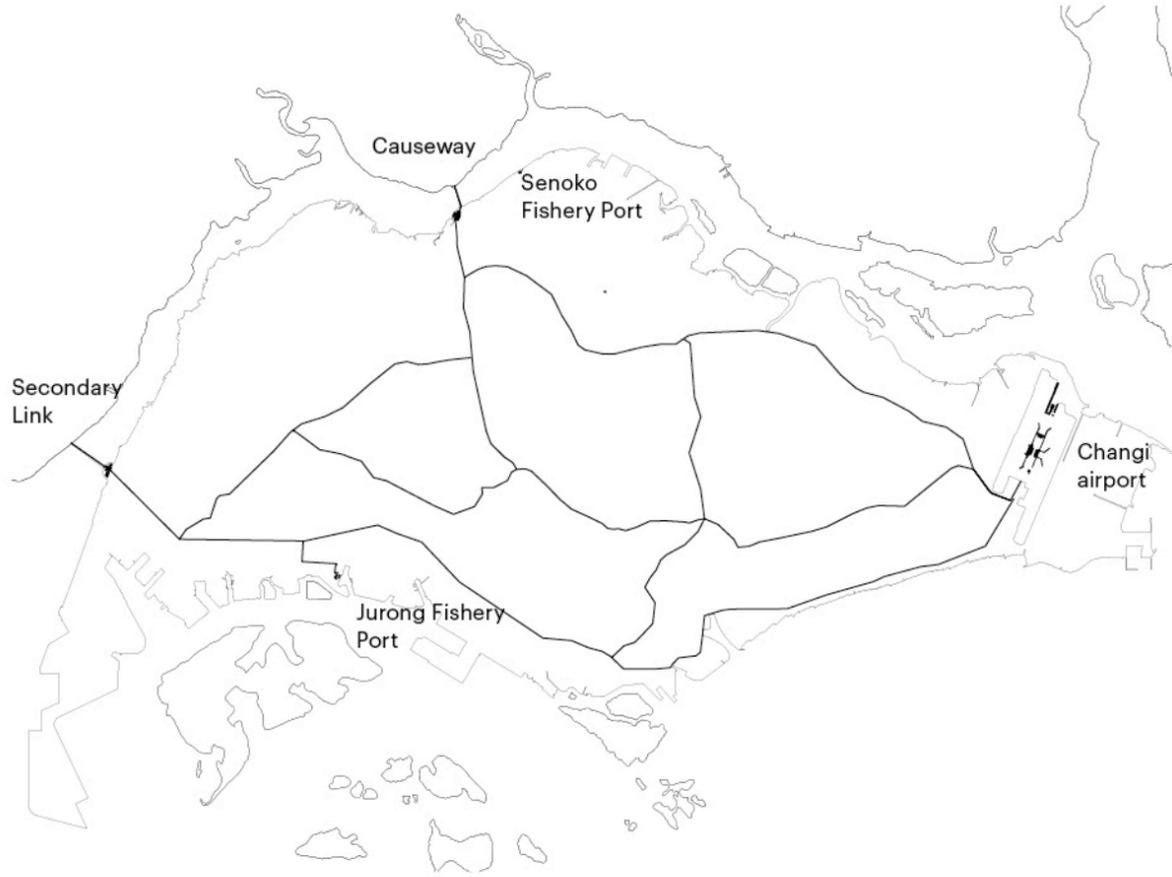
The research concerns mainly vacuum packaging and matters such as seeding and the use of so-called non-soil.



Vertical Farming

Sky Greens is the name of the farm that adapted the technology of vertical farming. This technology was developed by a Singaporean researcher and tested in the Research and Development centre. The first vertical farm opened its doors. The invention consists in pyramid shelves where vegetables are grown; a pipe system waters them at intervals; the structure rotates in order for all the vegetables to get the right amount of sun exposure. Such farm is marketed as being 5 to 10 times more efficient than its conventional counterpart.





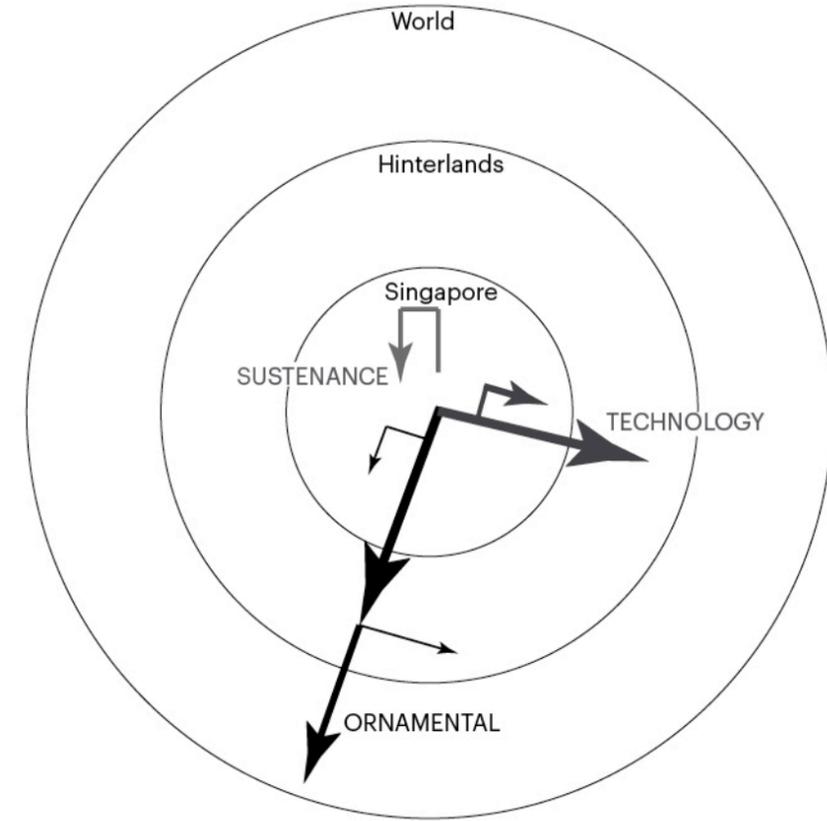
Food Gates

### Technological Agriculture

Singapore's reliance on neighbouring countries also extends to food supplies. Agriculture was a victim of Singapore's success as a nation with a rapidly expanding population and a rising tertiary sector; the downscaling of its agricultural sector was inevitable. Due to Singapore's limited dimensions, the surrounding countries became the periphery of a metropolitan island, a periphery with one important feature: borders. As much as 99 percent of the food consumed in Singapore must pass through these borders. The denial of food production on Singaporean land reaches an incredible extent and results in issues such as the maintenance of steady supplies and its inability to assure the quality and methods of production of the food it imports. Furthermore since the food crisis of 2008, Singapore is

more and more aware of the danger of such an acute dependence. New strategies are developed, which focus on technology in a context where land is in short supply. The agriculture that Singapore aims at is far from the conventional idea of farming. Efficiency is certainly improved. In the past there have been many transformation in the agrarian world and Singapore is definitely building on these advances. Considering that land is a limited and extremely profitable resource, agriculture is the casualty of economically more advantageous activities. It seems as if outsourcing agricultural production might be a symbol of the will for growth.

The example of Singapore shows a tendency in the primary sector towards a technological agriculture and opens the discussion of progress, environment and ethic.



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