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Plankton Bloom: Keeping Fish Farms Sustainable

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Synopsis

Can Singapore really attain more self-sufficiency in fish supplies? The recent plankton bloom causing massive fish deaths in local farms suggests a need to rethink and refocus the strategy.

Commentary

SINGAPORE AIMS to be partly self-sufficient in three food items as part of an overall strategy to safeguard food security - 30 per cent for egg, 15 per cent for fish and 10 per cent for vegetable supplies. Producing food locally has the additional benefit of mitigating climate change through reduced food miles.

Unlike egg and vegetable production - where layers are kept in shelters and vegetables are grown under controlled conditions - fish farms are highly dependent on water and environmental conditions. If it wants to be self-sufficient for 15 per cent of fish supply, Singapore needs a more sustained effort to make fish farms less subject to environmental damage. This calls for changes in fish farming techniques, and substantial investments in capital - both financial and technological.

Recurring plankton bloom

The plankton bloom now hitting Singapore's fish farms has caused at least 600 tonnes of fish losses, more than 10 per cent of annual production. More than 55 out of 117 floating fish farms have been affected, with losses estimated at between S$15,000 and S$300,000 per farm. A similar amount of fish loss occurred last year. While the numbers are small compared to fish consumption in Singapore, fish farmers have been hit hard by the recurring events.

Plankton bloom is caused by a combination of higher concentrations of nutrients, high temperatures and sunlight, as well as poor water exchange. Warm temperatures and high solar irradiance during the dry season can encourage growth of phytoplankton through better photosynthesis. Poor water circulation in the Johor Strait enhances their rapid multiplication. Plankton bloom results in lower oxygen levels in the water and this can cause fish deaths.

To provide support during massive fish deaths due to plankton bloom, the Agri-Food and Veterinary Authority (AVA) introduced assistance packages to the fish farmers who were affected. To prevent the deaths, AVA implemented round-the-clock real-time monitoring and early warning systems to provide information on increase in plankton levels to farmers via SMS.

Yet, even with these policies in place, the recent damage to fish stocks suggests that risk mitigation measures must go beyond monitoring and financial support for recovery. While AVA had alerted farmers to elevated plankton levels, some could not take action as they lacked the tools or financial resources to do so. The real question, then, is whether the present approach is sufficient to ensure local fish production, and at what cost?

Self-sufficiency

Singapore has been using three key strategies to ensure food resilience. The first strategy is to ensure diversification of food import sources. The second is to increase local production to achieve a certain degree of self-sufficiency, and the third is to ensure that there are buffer stocks.

Currently, Singapore imports fish from 46 countries. More than 70 per cent of the fish imports are from Southeast Asia and about 10 per cent of its fish is from Norway. Local fish production accounted for about 8 per cent (4,200 tonnes) of total consumption in 2013.

To support the local fish farming industry, AVA has rolled out various policies such as the Food Fund, technical support and infrastructural support like the construction of the Lorong Halus jetty. Some $8.2 million has been set aside for fish farmers to upgrade farm infrastructure. However, the vulnerability of the fish farming model to plankton bloom warrants evaluation of the present approach.

Rethinking fish farm model

Some methods can help reduce the risks of fish farming. For example, Singapore can explore the option of lining net cages with canvas and installing filtering and aeration systems in sea farms. However, the challenge is how farmers can be incentivised to adopt these measures voluntarily. Given that fish farms span an area of 100.5ha, the scale of investment required is huge and co-financing may be needed.

Alternatively, the government can provide 100 per cent of equipment and infrastructure to fish farms to reduce external environmental impacts and factor the investment costs into a new leasing price in consultation with farmers on the most beneficial option with rational public spending.

The government is also currently encouraging indoor "vertical" fish farming, a tank-based fish farming technique which can be installed in any available space where water and environmental conditions can be better controlled. This is a good realignment of policy priority towards mitigating risks of fish farming. Unfortunately, this practice is still nascent and can be expensive, and therefore requires financial support from the government.

Diversify or self-produce

At a more strategic level, there might be a need to examine the feasibility and costs of achieving 15 per cent self-sufficiency. Boosting food security by building up self-sufficiency rates at any cost can be inefficient and economically unsustainable. Diversifying import sources can successfully secure supply of stocks at a more reasonable cost. Singapore needs to weigh the costs of diversifying sources of fish imports against the costs of food self-sufficiency.

With greater climate variability and change such as expected increases in temperature and ocean acidification in the coming decades, volatility in fish production is expected to worsen.

The Intergovernmental Panel on Climate Change recently projected that ocean fish catch potential in the Southeast Asian tropics may be reduced by 40 to 60 per cent due to fish migration. Consequently, fish populations in neighbouring countries such as Indonesia and the Philippines are likely be affected by ocean acidification by 2050. In the light of Singapore's dependence on fish from Southeast Asia, it is necessary to look for fish beyond its immediate shores.

For now it makes sense to continue the strategy to diversify fish import sources and increase fish buffer stocks. But if the state is serious about targeting 15 per cent self-sufficiency, more focused incentives are needed to build a resilient and efficient fish farming sector.

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