Envisioning possible futures for fish production in Indonesia

About

This report summarizes the results of a systematic effort to explore possible futures for aquaculture and fisheries in Indonesia.

The work described here is part of a larger effort that seeks to develop a shared vision for the sectors that

- aligns public and private investments to foster growth and economic sustainability;
- reduces environmental impacts and improves efficiency;
- increases access by small and medium enterprises to the financial and technical assistance necessary to transition to more sustainable practices.

This document summarizes key drivers of change for the aquaculture and fisheries sectors and presents a resulting set of integrated scenarios.

Approach

Between July and December 2014, three workshops were held, one at national level and two at provincial level (Lombok and Makassar). At each workshop, participants from the government, the private sector, and the research and nongovernmental organization communities worked together through a structured process to arrive at a series of scenarios for the Indonesian fish food system in 2030.

Articulating these possible futures is the first step towards enabling decision-makers, land managers and communities to make informed choices concerning environmental tradeoffs among different growth options and to identify the public policies and investments needed to create economic opportunity for economically and environmentally sustainable growth for the Indonesian fisheries and aquaculture sectors.

The workshop process
- Identify key drivers for future fish food production and consumption in Indonesia.
- Categorize the drivers into major themes.
- Prioritize the two most critical drivers.
- Develop scenarios based around the two critical drivers.
- Develop an initial narrative about the future scenarios.

Drivers of change

From the workshops, eight drivers emerged as being especially important for shaping the future of the sectors.

Government, policy and regulation

A key driver of change concerns government, policy and regulation. Issues related to this driver fall into three broad categories: consistency of policies and plans (such as zoning policies or price standardization); harmonization of policies across central and local governments; and effectiveness of policy implementation.

Environment and climate change

Increasing environmental pressures, including those from climate change, were a commonly expressed concern. Climate change was also acknowledged as a key environmental driver with expected effects on salinity levels, sea temperature and the frequency of extreme weather events.

Markets

Concerns about how market characteristics will evolve included the capacity of the sectors to maintain the quality and quantity of products, the stability of domestic and international prices, and the efficiency and transparency of the value chain. The rise of certification and other market standards and the number of and access to international markets are also critical considerations.

Socioeconomic development

Closely related to markets, the future trajectory of change in the socioeconomic status of the region will have a large effect on both the volumes and the types of fish and fish products that are demanded.

Technology and research/development

Technology transfer and innovation has considerable potential to increase production and profitability. Success in developing genetic improvement programs, improving production practices, managing fish health and disease, and improving postharvest handling will all have impacts on the sectors.

Human resources and capacity

Success or otherwise in building the skills of people operating at all stages of fish value chains will be a key determinant for how the sectors evolve. The key element of this driver will be openness to new ideas and an ability to adopt and implement new technologies.

Infrastructure

Productivity and competitiveness are strongly shaped by the quality of infrastructure, and participants identified the trajectory of change in infrastructure as a key determinant of future success. For example, the efficiency and accessibility of the country's transportation, waste management services and processing plants will be critical for business growth and sustainability.

Financial regulatory climate
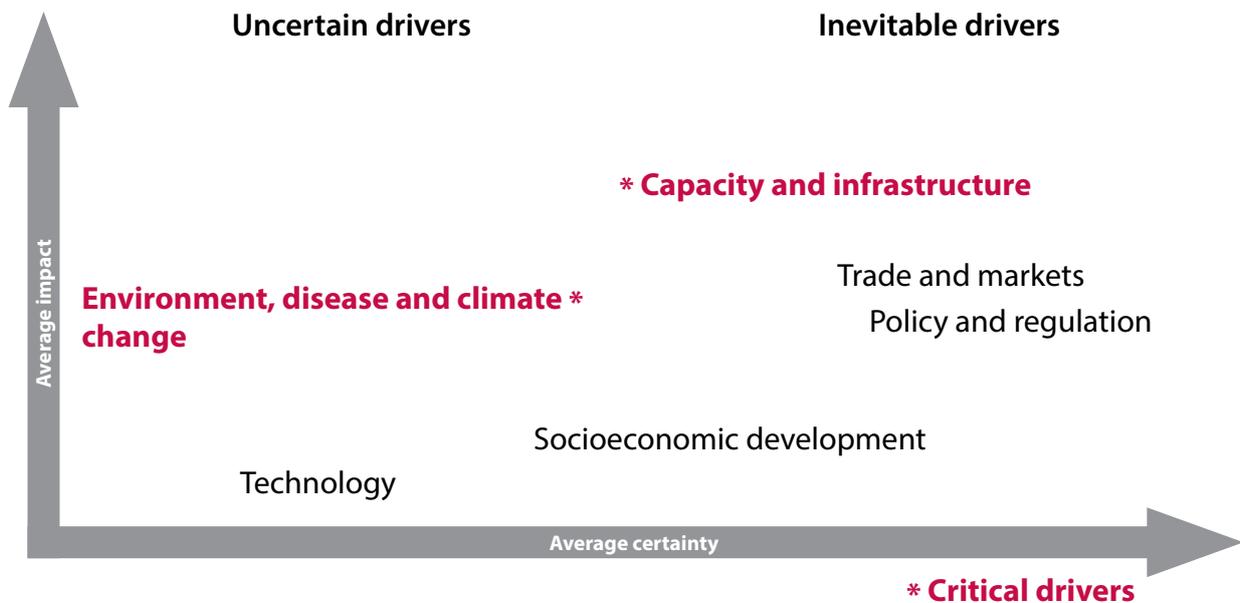
A regulatory climate that safeguards investors and promotes financing of small and medium enterprises in Indonesia is critical to attracting domestic and foreign private sector investment; legal rights, laws and contracts must be clear and enforceable. Success in establishing an attractive investment climate was identified as a particularly important factor at the provincial level in Makassar.

Developing scenarios

At each workshop, participants were asked to identify the two most critical drivers based on perception of their impact on the sectors and level of uncertainty about how they will evolve. Those drivers that ranked *high* in impact but *low* in certainty were considered the most critical.

At the national workshop in Jakarta, the critical drivers were identified as the natural environment and the combined category of capacity and infrastructure (Figure 1).

Uncertain drivers   **Inevitable drivers**

* Capacity and infrastructure

Trade and markets

Policy and regulation

Environment, disease and climate *
change

Socioeconomic development

Technology

Average impact

Average certainty

* Critical drivers

Figure 1. Categories of drivers of change identified in the national-level workshop, plotted using average impact and certainty.

In Lombok, participants identified the natural environment and policy and regulation as critical (Figure 2).

Uncertain drivers   **Inevitable drivers**

Market access and demand

Policy and regulation *

Environment *

Infrastructure   Human resources and capacity

Technology   Land use and carrying capacity

Average impact

Average certainty

* Critical drivers
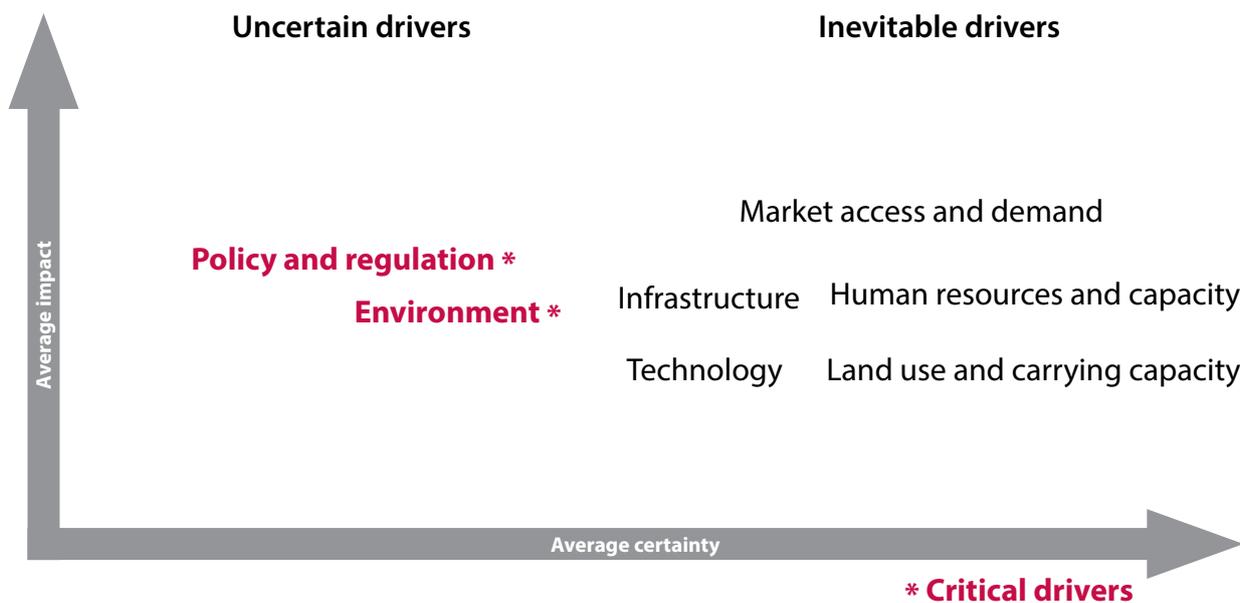
Figure 2. Categories of drivers of change identified in the workshop in Lombok, plotted using average impact and certainty.

In Makassar, the focus was on market systems and policy and regulation (Figure 3).

Uncertain drivers　　　　　　　　**Inevitable drivers**

Average impact ↑

Government policy * and regulation

* Market

Social factors and capacity

Environment

Technology

Investment climate

Cost and access to finance

Average certainty →

* Critical drivers
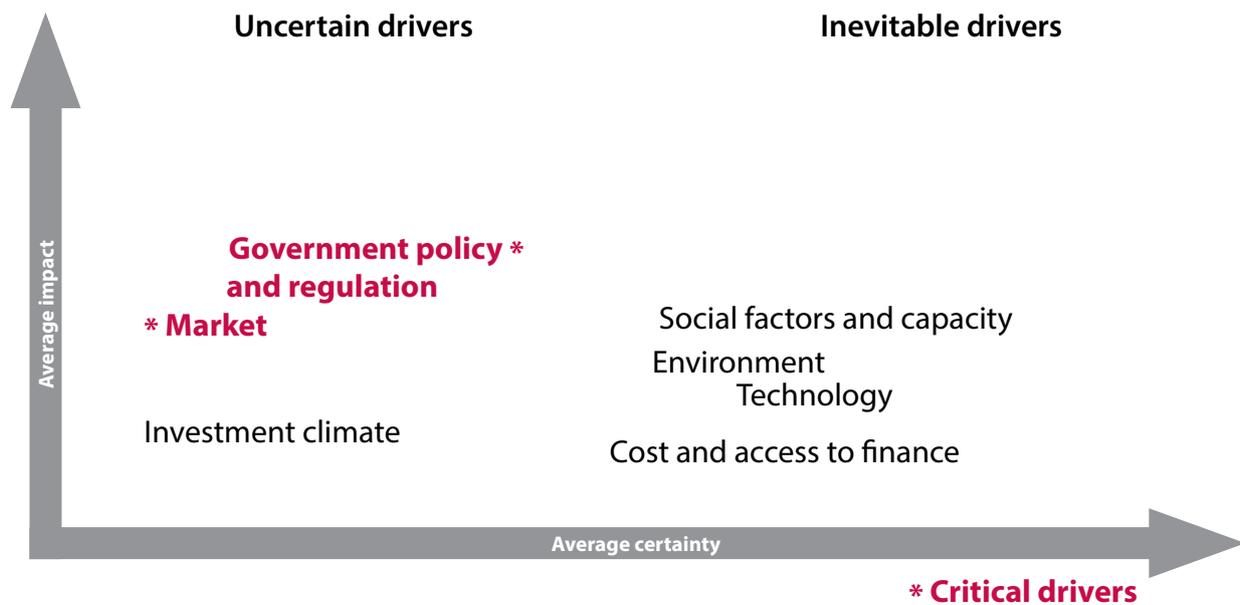
Figure 3.　Categories of drivers of change identified in the workshop in Makassar, plotted using average impact and certainty.

Drawing on the conclusions from the three workshops, an integrated scenario frame emerges based on two key uncertainties: the natural environment and the socioeconomic enabling environment.

The environmental uncertainties include the extent to which society controls pollution and other aspects of environmental quality and the resultant effects on water quality and environmental services. They also concern the degree to which climate change will increase the frequency and scale of extreme weather events.

Uncertainties in the socioeconomic enabling environment include how market conditions, policies and regulations will evolve. They also include the extent to which the financial regulatory climate is supportive for the growth of the sectors directly, as well as whether broad infrastructure investment takes place.

Based on these uncertainties, four scenarios emerge for the Indonesian fisheries and aquaculture sectors in 2030:

Missed opportunity

By 2030, Indonesian aquaculture and fisheries products have become significantly less competitive in global markets. Domestically, demand for fish products has increased, supply has remained low and prices have begun to rise dramatically.

- New legislation to control pollution and ensure good land use has been implemented and enforced, leading to the expansion of aquaculture operations throughout the country, especially seaweed farming.
- Post-2020, the performance of the Indonesian economy has deteriorated, and further investments in infrastructure, research and development, and extension services have been curtailed.
- Opportunities and more favorable tax regimes in Vietnam and Malaysia have led to reduced foreign direct investment in feed and seed supply, limiting productivity of existing operations.
- High domestic prices for fish make it unaffordable for resource-poor and lower-middle-class consumers.

Blue growth

By 2030, Indonesia has emerged as a new powerhouse in the global fish food system. The demand for fish for both rich and resource-poor domestic consumers is being met, and the export market is thriving.

- Fisheries and aquaculture sectors are thriving.
- Environmental regulations set clear expectations for environmental performance for aquaculture.
- Fisheries reforms set clear limits to fisheries exploitation.
- Compliance with fisheries and aquaculture regulations is monitored and enforced.
- Arrangements for providing technical advice and services to aquaculture operators function well.
- Biosecurity has improved, with fish and shrimp disease outbreaks being dealt with quickly.
- Finance reforms improve access of fish farmers to finance.
- Government invests in infrastructure.

Environment

Socioeconomic enabling environment

Natural

Heavy weather

By 2030, the inability to meet environmental and food safety standards has decreased Indonesia's competitiveness in the global fish trade. Perceived as too high risk by investors, export-oriented fish production has collapsed, and the fish that is produced is of low quality and limited to local consumption.

- Between 2015 and 2020, ineffective aquaculture policy coordination and planning between the local, provincial and national levels stopped aquaculture growth.
- Poor water quality and increased outbreak of disease pose challenges for human consumption and the productivity of finfish and shellfish.
- Unclear permit systems and outdated regulations for fisheries reduced capture fisheries productivity by 2025.
- Reduction of government revenue has hampered the ability of local and provincial governments to provide technical and extension services.
- Increasing financial costs of production and declining productivity have led to a rise in substandard production practices that result in food safety, labor law and environmental violations.

Fighting the tide

By 2030, Indonesia's efforts to build a reputation as a provider of safe, high-quality seafood have been questioned and export markets have collapsed.

- Several major infrastructure projects have been completed.
- Availability of capital has stimulated growth in a wide range of industry sectors.
- Legislation to control environmental pollution and ensure good land-use practice has been enacted, but the investments needed to ensure appropriate monitoring and compliance have failed to materialize.
- High nutrient loading in coastal waters has increased the incidence of toxic algal blooms.
- The frequency of aquatic animal disease outbreaks has increased.
- Many parts of the aquaculture industry have suffered declines in production and profitability.

Since 2015, Indonesia has made great strides in creating an environment in which the fisheries and aquaculture sectors thrive. Landmark environmental regulations were enacted in 2018 that set clear expectations for environmental performance for the aquaculture sector and for all other industries whose operations affect the aquatic environment. Similarly, fisheries reforms were established that set clear limits to fisheries exploitation within a framework that distributed benefits fairly. A key to success was a significant upgrade in the approach to monitoring and enforcement of both fisheries and aquaculture regulations, which led to high levels of compliance and confidence that there was a level playing field for all.

By 2020, the aquaculture sector was well on the path to significant growth. Harmonized policies for land use planning were adopted, and well-functioning arrangements for providing technical advice and services to operators were leading to increased adoption of best management practices. This effort also led to improved biosecurity, and fish and shrimp disease outbreaks were being dealt with quickly. Sector growth was also supported by reforms in finance regulations that made access to capital easier and by government investment in infrastructure, including roads, power and water. Infrastructure investments and resilience planning were also important in minimizing damage from extreme weather events resulting from climate change.

By 2030, as a result of these changes, Indonesia had emerged as a new powerhouse in the global fish food system. The demand for fish for both rich and resource-poor domestic consumers was being met, and the export market was thriving. Fish value chains were functioning well and contributing significantly to rural economies in terms of both income and employment.

A roadside fish stall in Aceh, Indonesia.

Photo credit: Mike Lusmore/Duckrabbit

Fighting the tide

In 2017, the international community began emphasizing the critical importance of infrastructure investment and access to finance as the keys to growth. Like many other governments, Indonesia focused its efforts in this area. By 2020, several major infrastructure projects had been completed and these, combined with the availability of capital, stimulated growth in a wide range of industry sectors, from mining to agriculture and forestry. Aquaculture benefited from this trend and production increased markedly.

Unfortunately, although legislation to control environmental pollution and ensure good land use practice was enacted, the investments needed to ensure appropriate monitoring and compliance failed to materialize. As a result, water quality degraded in many areas. Despite the adoption of good management practices by producers, coping with the increasing degradation of the environment became an increasing challenge. In many areas, high nutrient loading in coastal waters increased the incidence of toxic algal blooms that led to significant loss of finfish and shellfish. The frequency of large-scale disease outbreaks also increased due to the increased environmental stress on farmed fish. With no way to stem the degradation of water quality, many parts of the aquaculture industry suffered declines in production and profitability.

As a result of these difficulties, investment in the sector became increasingly unattractive. A final blow came in 2025 when, within a few weeks of one another, three incidences of hazardous contaminants in fish products received high-profile coverage in the international media. As a result, Indonesia's efforts to build a reputation as a provider of safe, high-quality seafood suffered and export markets collapsed.

West coast, Banda Aceh, Indonesia.

Photo Credit: Jharendu Pant/WorldFish

With the help of increased environmental awareness by local governments and communities, along with new legislation to control pollution and ensure good land use, environmental conditions in Indonesia steadily improved between 2015 and 2020. The improved conditions led to the expansion of aquaculture operations throughout the country, especially seaweed farming.

After 2020, however, the performance of the Indonesian economy began to deteriorate and further investments in infrastructure, research and development, and extension services were limited. Attractive opportunities and more favorable tax regimes in Vietnam, Malaysia and other neighboring countries also led to reduced foreign direct investment in feed and seed supply. As a result, productivity of existing operations remained low.

By 2025, Indonesian fisheries products had become significantly less competitive in global markets. As domestic market demand for fish products increased and supply remained low, prices began to rise dramatically. These increased prices often made fish an unaffordable choice for resource-poor and lower-middle-class consumers, who increasingly switched to alternatives such as poultry.

Fishing in shrimp ponds, Aceh, Indonesia.

Photo Credit: Mike Lusmore/Duckrabbit

Heavy weather

A 5-year period of ineffective aquaculture policy coordination and planning between the local, provincial and national levels between 2015 and 2020 put a significant brake on aquaculture growth. Confusion led to inconsistent monitoring and enforcement of aquaculture zoning policies and biosecurity protocols, which in turn left aquaculture operations in local water bodies and coastal areas highly vulnerable to serious diseases and toxic algal blooms. The runoff of industrial effluents, coupled with extreme flooding in the rainy season of 2018, caused water quality to decline, posing challenges both for human consumption and the productivity of finfish and shellfish.

Unclear permit systems and outdated regulations for fisheries that failed to take environmental sustainability into account meant that capture fisheries productivity was stagnant by 2020 and declining by 2025. The decreased productivity of both fisheries and aquaculture resulted in a significant reduction of government revenue, further hampering the ability of local and provincial governments to provide technical and extension services to manage the rapid rate of environmental degradation.

Increasing financial costs of production and declining productivity constrained producers, leading to a rise in substandard production practices that resulted in food safety, labor law and environmental violations. This context prevented widespread industry certifications, which had grown increasingly important to global markets. The inability to meet these standards further decreased Indonesia's competitiveness in the global fish trade. Perceived as too high risk by investors, export-oriented fish production collapsed, and the fish that is produced is of low quality and limited to local consumption.

Tsunami aftermath in Aceh, Indonesia.

Using these scenarios

Scenarios are plausible descriptions of how the future might evolve. In essence, the scenarios offered here provide a series of lenses through which to examine the Indonesian fish food system and the future its stakeholders aspire to.

The next step in this effort will be to explore these scenarios in a more quantitative way by scrutinizing the economic, social and environmental trajectories they imply. This exploration will be achieved through a combination of econometric modeling using the WorldFish AsiaFish model and life-cycle analyses. These analyses will be used to inform discussion and debate about the most desirable development pathways, technology options, business innovations, and relevant policy and investments for the development of aquaculture and fisheries in Indonesia.

Shrimp farmer in Aceh, Indonesia.

GORDON AND BETTY
MOORE
FOUNDATION

CGIAR

RESEARCH
PROGRAM ON
Policies,
Institutions,
and Markets

WorldFish

100%
RECYCLED

Paper made from
recycled material

www.worldfishcenter.org

Photo credit: Front cover, Mike Lusmore/Duckrabbit

Harnessing research that makes a difference