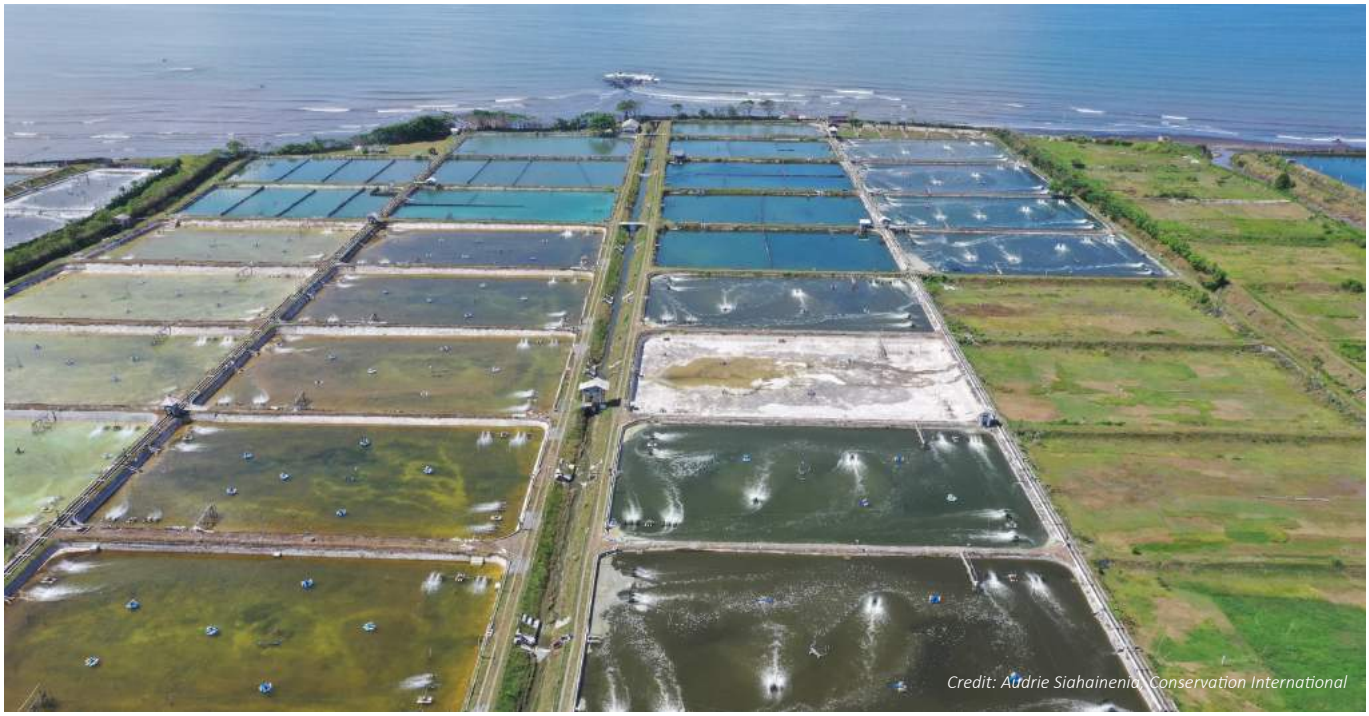
A JURISDICTIONAL APPROACH TO RESPONSIBLE SHRIMP AQUACULTURE

By Garrett M. Goto, Shantika Sastraprawira, Fani Faisol, Kenidas Lukman, Deddy Poerba, Anton Immink and Dane Klinger

Aquaculture has been championed as a sustainable source of protein and nutrition. However, significant environmental and socioeconomic challenges must be addressed for the sector to meet increasing demand while also minimising negative environmental impacts. A jurisdictional approach (JA) to aquaculture improvement can catalyse sustainability by aligning incentives amongst markets, governments, and producers. This article highlights a pioneer JA improvement programme for shrimp aquaculture in East Java, Indonesia.



Shrimp farms on the coastline of Banyuwangi, East Java, Indonesia

Shrimp aquaculture has seen substantial growth in recent decades, increasing by 10 000% from an estimated 74 000 tonnes in 1980 to 7.43 million tonnes in 2020. Most of this growth, 83% by volume, occurred in Asia, including Indonesia which has consistently been one of the top five producers over 10 years (2011-2020) (FAO, 2022).

The rapid expansion of shrimp aquaculture has often outpaced the utilisation of best management practices and the application of adequate regulation. The burden of unaccounted growth often falls on the environment through habitat loss and land conversion, impaired water quality from effluent, and disease outbreaks. Without adequate planning and guidance, the shrimp aquaculture industry is prone to boom-and-bust cycles, which reduce livelihoods benefits, resource efficiency, and supply chain resilience.

Responsible production practices, sometimes called 'better management practices' can be adopted by producers to both improve profitability and resilience and reduce negative environmental impacts. In many cases, practices that are good for farm profitability – feed management, water quality management, disease management, etc. – will also reduce negative impacts on the local environment. However, producers often need incentives and adequate financing to bear the upfront costs of implementing best management practices.

Although farm certifications and rating schemes have set strong sustainability benchmarks, farm-by-farm certification has been slow to gain market share (less than 10% of shrimp produced are currently certified) and current standards do not account for cumulative environmental impacts. Meanwhile,

many small- and medium-sized enterprises cannot afford to get certified due to high infrastructure and audit costs. Purely market-based approaches to aquaculture improvement have struggled to realise positive impact, in part due to a lack of governance and policy to adequately regulate threats that occur beyond individual farms.

New approaches are needed to incentivise the adoption of environmentally and socially responsible production practices across whole jurisdictions.

Adapting a jurisdictional approach to aquaculture

A jurisdictional approach (JA) is defined as *"an integrated landscape (and seascape) approach that aims to reconcile competing social, economic, and environmental objectives through participation across stakeholders and sectors, implemented within governmental administrative boundaries, and with a form of government involvement"* (Conservation International, 2018). JA interventions aim to improve environmental, social, and economic outcomes for a specified commodity production geography, or "the jurisdiction".

Previous JA projects have focused on terrestrial commodities to address deforestation from agriculture and livestock production. Engagement on a farm-by-farm basis was too slow to address the issue at scale, and thus, it was necessary to align government, producers, and other stakeholders to combat widespread deforestation.

"Utilising a JA may not be appropriate for all jurisdictions, species, or production systems but this approach is an important tool in a portfolio of mechanisms available to improve production practices. "

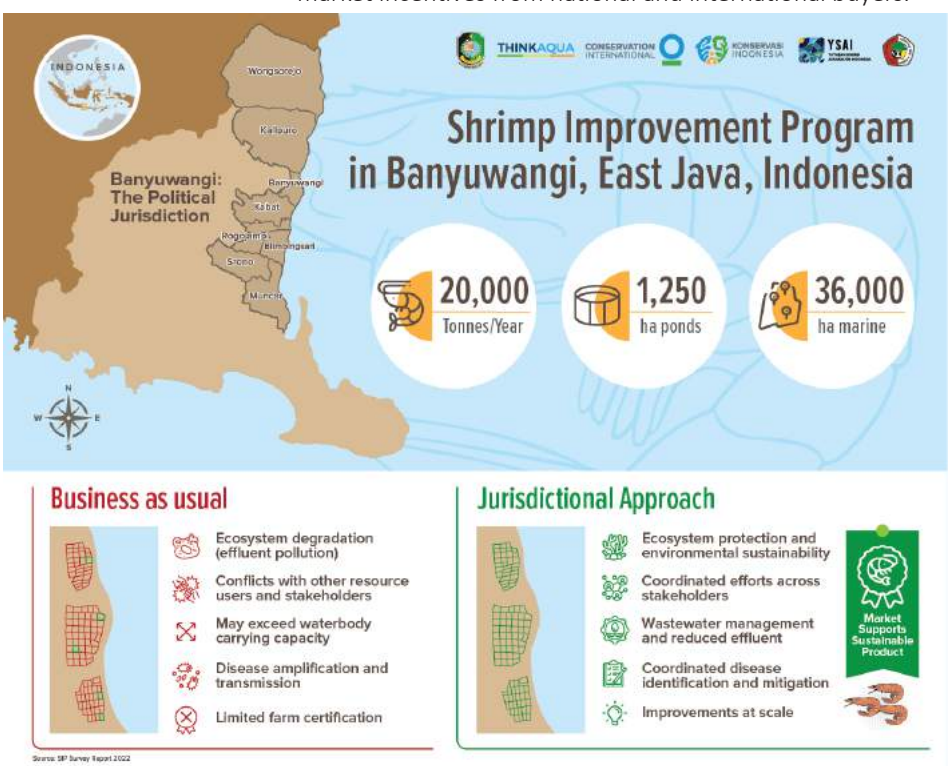
For example, JAs have been applied for large-scale agriculture and cattle ranching in Mato Grasso, Brazil; in Central Kalimantan, Indonesia, for large- and small-scale agriculture and forestry; and cattle farming in Acre, Brazil. Engagement across such diverse stakeholders requires significant time to build relationships, develop workplans, and execute implementation, which requires a multi-year timeline even with strong stakeholder support. While relatively new, there is little empirical evidence for the direct impacts that successful JAs can have, but initial outcomes are promising.

However, JAs have yet to be applied in the aquaculture sector. Building upon other landscape or zonal approaches, the interventions and activities that define a JA could have significant benefits for clustered production geographies.

The Shrimp Improvement Program (SIP)

Conservation International and ThinkAqua have developed the Shrimp Improvement Programme (SIP) applying JA improvement principles. This Programme is currently being pioneered in Banyuwangi, East Java, Indonesia through CI's main partner, Konservasi Indonesia (KI) and in collaboration with a local NGO called Yayasan Sinergi Akuakultur Indonesia (YSAI). The SIP implementation activities are in collaboration with local government and key stakeholders.

This coordinated effort aims to transition the entire shrimp aquaculture sector in the region (i.e. small, medium, and large producers) towards responsible production through effective governance, alignment with international certification standards, adequate capacity among the producers and supply chain actors to implement best practices, as well as market incentives from national and international buyers.



This new approach to an aquaculture improvement programme has been underway in Banyuwangi since 2019 and adopts a place-based focus on incentivising environmental and social improvements across Banyuwangi. The SIP recently achieved a critical milestone, where the government and other stakeholders agreed to the Banyuwangi Shrimp Sustainability Roadmap, a document that outlines common goals, activities, and evaluation metrics for improvement of the sector over the next five years. Momentum is building amongst stakeholders to transition from business-as-usual to a more coordinated, holistic approach to responsible shrimp production.

There are approximately 500 shrimp farms in Banyuwangi over an estimated 1 250 hectares of ponds that are producing about 26 000 tonnes per year. The regency is a major shrimp-producing hub within East Java, which is in turn the largest shrimp-producing province in Indonesia. The shrimp sector in Banyuwangi has been on the forefront of achieving international certifications, applying innovative feeding and management approaches, and working with technology start-up companies to pilot new tools and protocols. Banyuwangi is a well-established centre for shrimp production and a pioneer in the industry – the region even has an annual festival dedicated to shrimp aquaculture.

Shrimp farms next to mangrove forests in the Muncar region of Banyuwangi.

Following stakeholder development and endorsement of the Banyuwangi Shrimp Sustainability Roadmap, the SIP recently convened local government, universities, supply chain actors, and producers to align incentives towards implementing the 19 goals outlined in the roadmap.

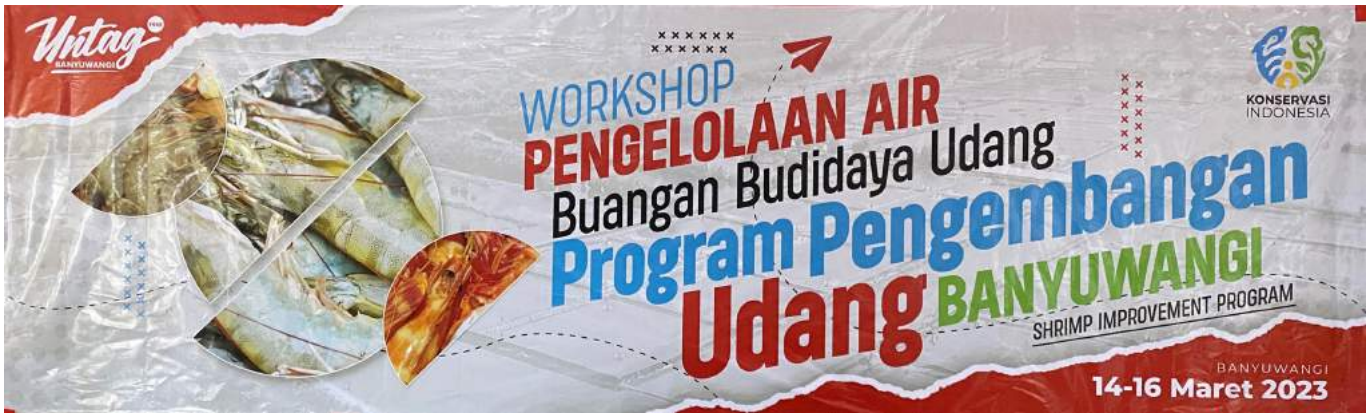
Hosted by Universitas 17 Augustus 1945 (UNTAG) on 13 March 2023, over 40 participants from across the shrimp aquaculture sector attended the meeting to provide input and guidance on how the process and outcomes of the roadmap activities could best support the sector, while aligning towards environmental outcomes.

While opinions and preferences on how to implement the roadmap by the shrimp aquaculture sector vary amongst stakeholder groups, this convening was a major step towards implementing key improvement activities for the region. Only through open, inclusive stakeholder forums can challenges be identified and viable solutions developed.

Water quality in and around shrimp farms is a priority issue within the roadmap. Mr. Yanuar from Shrimp Club Indonesia said, “Currently, the process of checking and validating water quality takes more than two weeks, which is outpaced by the spread of shrimp disease. Therefore, we hope there will be co-management for shrimp disease through RT-PCR analyses to inform disease management.” Additionally, Mr. Haidar from JALA Tech suggested that, “in order to fully support the management of disease, JALA will contribute shrimp water quality data of its affiliates, merging the data from other stakeholders, in order to prepare shrimp water quality standards in Banyuwangi”.

In an effort to address historic and future potential ecosystem degradation, SIP partners hosted a wastewater treatment training and workshop for 60 local farm technicians and owners between 14-16 March. Spanning topics ranging from aquaculture wastewater treatment in general, technical

Paddlewheels used for intensive shrimp production ponds in Banyuwangi.



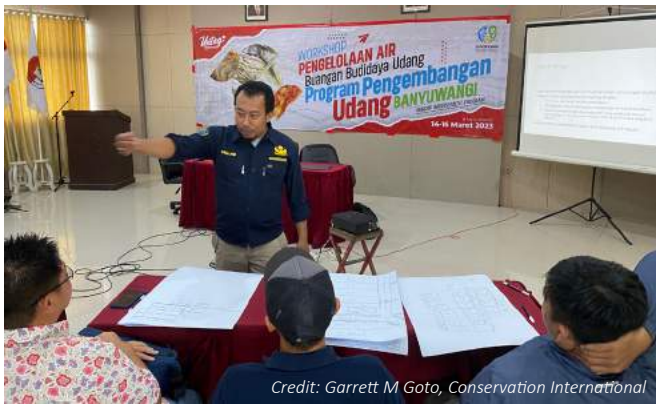
Workshop on Shrimp Wastewater Treatment, Shrimp Improvement Program, Banyuwangi 14-16 March 2023

aspects of aquaculture water effluent, and efforts on reducing the amount of aquaculture effluent (e.g., co-utilisation of sedimentation ponds and mangroves), the training was conducted by Dr. Sinar Pagi Sektiana and Suharyadi, both from Jakarta Technical Fisheries University. They said, "It is sensitive, yet critical, to address wastewater treatment with shrimp farmers. Farmers think that wastewater treatment in shrimp farms is cumbersome. Our approach is invigorating them to implement wastewater treatment using a basic and efficient method, because we believe if they have experienced the benefits of wastewater treatment, they will be more likely to implement it". The one-day training was repeated back-to-back and reached a total of 60 participants, which then culminated in a field workshop where trainees were able to see production farm layouts and practice designing wastewater treatment ponds within the existing infrastructure and physical constraints in the Muncar subdistrict of Banyuwangi.

Trainings are critical because farmers may be aware about the importance of wastewater treatment, and regulations outline specific requirements, but they are often left to implement them on their own. This practical workshop guided farmers on how they could design and implement such systems on their own farms with minimal infrastructure improvements and additional costs.

While farmers have often acknowledged the importance of wastewater treatment and effluent management, few have had the time or resources to implement them on their farms. This lesson provided a step-by-step process to transition existing infrastructure into wastewater treatment while achieving minimal impact to the total productive farm area.

SIP project partners will continue coordinating activities, such as the multi-stakeholder meeting and practical workshop, to make progress on the breadth of the environmental, economic, and social goals outlined in the Bayuwangi Shrimp Sustainability Roadmap. While activities are coordinated by KI and YSAI partners, the anticipated benefits of implementing such activities can only be realised when local stakeholders take ownership of the project's activities and outcomes.



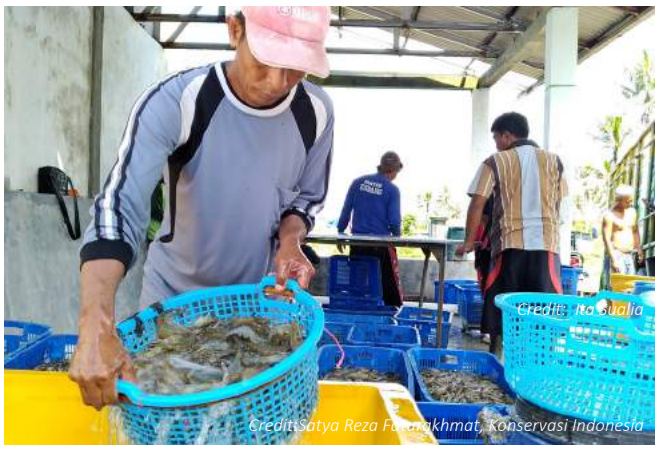
Credit: Garrett M Goto, Conservation International

Dr. Sinar Pagi Sektiana from Jakarta Technical Fisheries University works with farm owners and technicians to design wastewater treatment ponds on their farms within their existing infrastructure.


Credit: Anton Immink, ThinkAqua

Dr. Sinar Pagi Sektiana from Jakarta Technical Fisheries University explains the benefits of wastewater treatment and how to implement treatment systems in the subdistrict of Muncar in Banyuwangi.

The execution of the roadmap is ongoing, and Banyuwangi is well-positioned to deliver on pioneering the first jurisdictional approach aquaculture improvement project.



Shrimp farmers packing a recent harvest to be sent for further processing and cold storage.

Implications for shrimp aquaculture

While habitat conversion was a primary environmental concern for the mostly extensive (low input-low productivity) farms in previous decades, the global shrimp sector is slowly moving towards more intensive production practices, which is creating new environmental risks, such as nutrient-rich effluent. Compound feeds are added to more intensive ponds to meet the metabolic needs of shrimp that are stocked at higher densities per square metre of production pond. Excess nutrients that are not incorporated into shrimp biomass are typically discharged into open waterways in the form of uneaten feed, excreted faeces, or other nutrient compounds.

The potential impact on surrounding water bodies is a function of the carrying capacity of that water body, as well as the nutrient inputs from urban runoff, agriculture, industry, and all aquaculture farms. As the industry intensifies, areas of dense aquaculture production will need to coordinate beyond the farm level to reduce the risk of exceeding water body carrying capacity and polluting the very intake water they rely upon.

In recognition of the rapid growth of aquaculture, and its connectivity with other resource users, the Food and Agriculture Organization of the United Nations (FAO) and aquaculture experts convened in 2007 to develop the Ecosystem Approach to Aquaculture (EAA).

The EAA is defined as *"a strategy or the integration of the activity (aquaculture) within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems"* (FAO, 2010). The EAA's principles outline that the delivery of ecosystem function and services should not be threatened by aquaculture development; that aquaculture should improve the well-being and equity of relevant stakeholders; and should be developed by taking into account other sectors and policies. While the application of the EAA has taken many forms since its inception, its guiding principles provide the foundation for the development of JAs.

Aquaculture development in high density areas, such as many coastal shrimp farms in Asia, and in areas with lower water body carrying capacities like lakes and reservoirs, need to consider cumulative impacts from direct aquaculture activities, as well as all other industry, agriculture, and municipal inputs.

Conclusion

Shrimp aquaculture has expanded at incredible rates over the last few decades and is anticipated to keep growing to meet rising global demand. While international certification standards provide a strong market incentive for producers that can afford to take that path, current certifications alone are unlikely to address the environmental and social risks of the remaining 90% of shrimp production. Innovative strategies need to be employed that can raise the environmental and social responsibility of small-, medium-, and large-sized farms as the shrimp sector continues to intensify and grow.

Utilising a JA may not be appropriate for all jurisdictions, species, or production systems but this approach is an important tool in a portfolio of mechanisms available to improve production practices.

JA interventions may take more time and resources before benefits to farmers, communities, and the environment are realised, compared to individual farm certification, but the potential long-term gains stand to be much larger.

Many challenges are likely to emerge as the Shrimp Improvement Programme in Banyuwangi continues to develop and conform in its local context – lessons learned will be shared so that others can build upon the project and continue the march towards a more productive, resilient, and responsible aquaculture sector.

From left to right: ***Deddy Poerba*** *(Industry Engagement Officer, YSAI, with several years' direct experience on shrimp farms in Banyuwangi);* ***Garrett Goto*** *(Aquaculture Senior Manager, CI, with experience of aquaculture around the world);* ***Fani Faisol*** *(Aquaculture Program Field Officer, KI, with local finance and governance experience);* ***Shantika Sastraprawira*** *(Fisheries and Aquaculture Coordinator, KI, with international experience of marine conservation); and* ***Anton Immink*** *(CEO, ThinkAqua, with global experience in aquaculture improvement). Missing from the photo are* ***Kenidas Luckman*** *(CEO, YSAI, with extensive experience in Indonesian aquaculture) and* ***Dane Klinger*** *(Aquaculture Director, CI, with global aquaculture management experience).*