

# Clustering shrimp farms in Bangladesh

## A novel effort with mixed outcomes

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Organizing smallholder farmers in clusters has been widely promoted as a way to boost agricultural productivity, streamline delivery of extension services, and improve access to markets. In Bangladesh, where shrimp is an important export crop produced largely by smallholders, government and industry view clustering as key to preventing Bangladesh being left behind in an increasingly competitive global market. Bangladesh's shrimp exports are highly dependent on the hotel, restaurant, and catering (HoReCa) sector in Europe—a small and relatively low value market segment. Gaining access to the much larger and potentially more lucrative retail market segment in Europe and North America requires high quality, traceable, and - increasingly - certified, shrimp, posing a challenging for Bangladesh.

To this end, several recent initiatives in Bangladesh have attempted to organize shrimp farmers into clusters with a view to addressing a suite of issues around productivity, product aggregation and quality control. These parallel efforts - led by the Department of Fisheries (DoF), a shrimp processing company, and an industry body, the Bangladesh Shrimp and Fish Foundation (BSFF) - have focused on forming groups of 20-25 farmers to deliver training on best management practices, supply inputs, and encourage coordination. Group members were encouraged to follow a suite of farm management prescriptions aimed at reducing raising farm productivity, reducing the incidence of shrimp disease, and increasing the supply of raw material for processors. These measures included farming *bagda* shrimp (*P. monodon*)—Bangladesh's main export species—in monoculture, raising shrimp stocking densities, stocking disease-free shrimp larvae and factory-made feeds, deepening ponds and erect biosecurity fencing, and coordinating stocking and harvesting activities with other group members.

An IFPRI-led evaluation of 1,222 farmers and 68 shrimp clusters in southern Bangladesh provides insights on the effectiveness of these initiatives identifying a number of important benefits as well as significant challenges and limitations.

### Methods

IFPRI's evaluation employed a canonical Difference-in-Differences (DID) design, which allowed the estimation of causal impacts by comparing changes over time between cluster farmers and a carefully

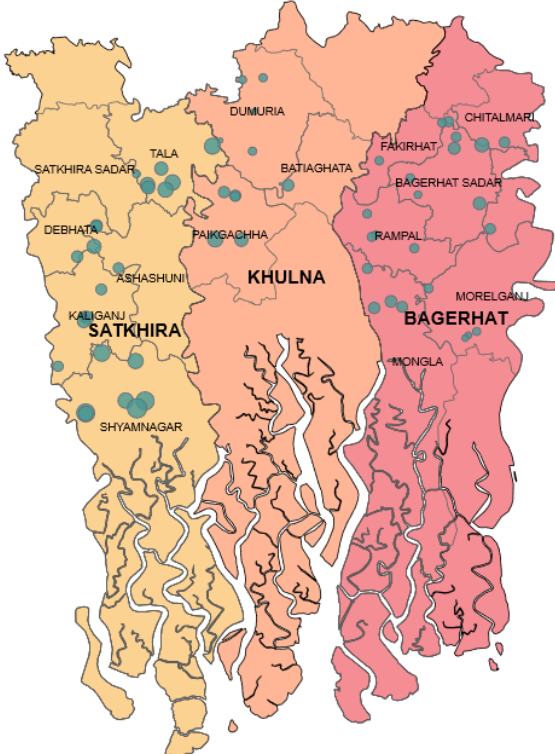
chosen control group of non-cluster farmers. The research team conducted a baseline survey in 2023—collecting detailed recall information on farm management practices, input use, productivity, costs, revenues, and household food security for the 2022 production season, and an endline in early 2024, capturing the same information for 2023.

To check for potential selection bias, the research team:

- ▶ Conducted pre-treatment comparisons that showed no major differences in the characteristics of cluster and non-cluster farmers.
- ▶ Controlled for village-level characteristics such as infrastructure.
- ▶ Confirmed the validity of the assumption that both groups would have evolved similarly without intervention, using recall data from the pre-intervention (2021-2022) period.

The study further analyzed heterogeneity of treatment, looking at the effects on “**graduated**” clusters (a term that distinguishes clusters that were able to implement most of the recommended practices) relative to others, conducted pathway analysis tracking intermediate outcomes such as pond productivity, and performed dominance analysis to explore how different components of the cluster interventions contributed to final outcomes.

**Figure 1. Sampled clusters in Satkhira, Khulna, and Bagerhat districts, southern Bangladesh**



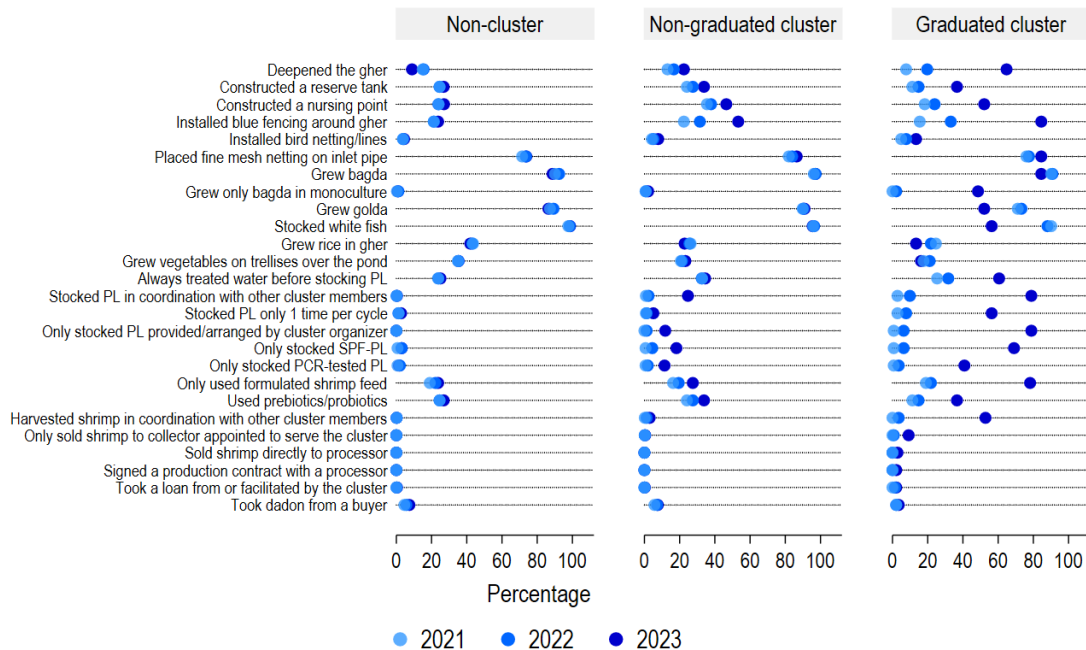
**Source:** Authors

**Note:** Sampled clusters are shown as circles, with size proportional to their overall annual *bagda* shrimp production.

## Strong adoption of recommended practices

Farmer participation in clusters resulted in large increases in the uptake of farm management practices promoted by cluster organizers. These included producing *bagda* shrimp in monoculture, stocking disease free shrimp larvae, adoption of biosecurity measures such as pond fencing and bird netting, and coordinated stocking and harvesting. Graduated clusters—those where farmer members were deemed by DoF to have successfully adopted most of the recommended practices and were given matching grants for inputs— had the highest levels of adoption.

**Figure 2. Uptake of pond management practices among cluster and non-cluster farmers**



Source: Authors

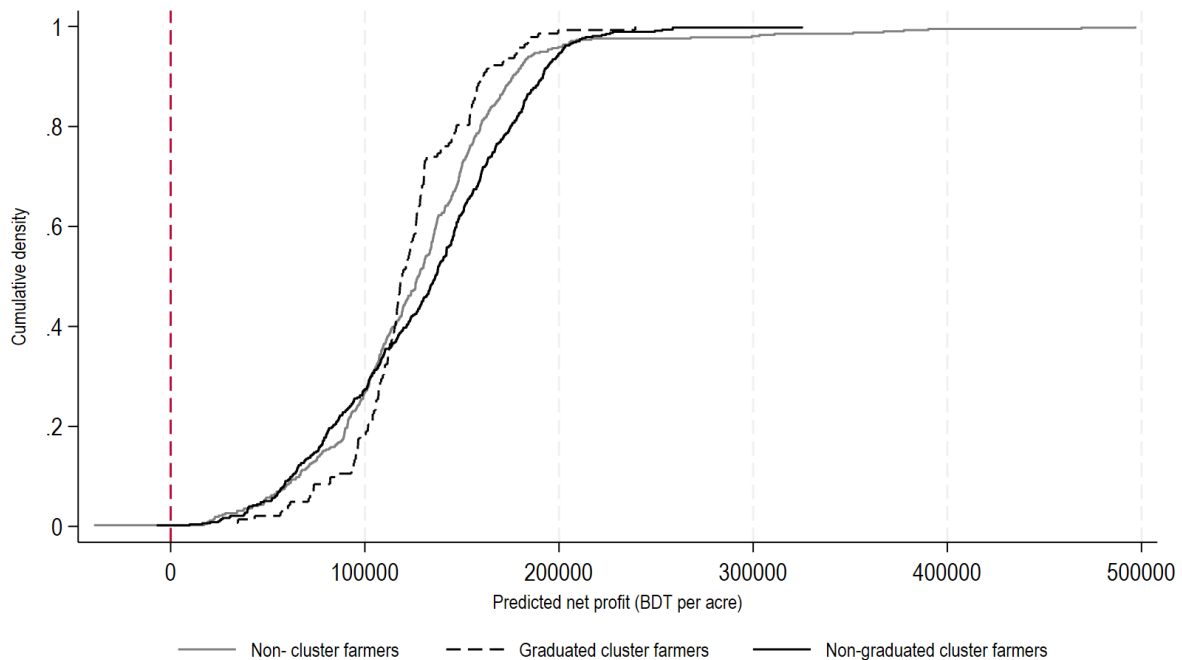
## Minimal effects on profitability

Despite the adoption of these improved practices, there was no statistically significant improvement in profits per acre for cluster farmers compared to non-cluster farmers. On average, cluster farmers had a net profit that was around USD 197 higher per acre, but the distribution of profits across farms was highly variable, so these differences were not statistically significant. These modest gains were driven by very limited improvements in productivity—crucially, shrimp mortality rates remained high, even among cluster farmers who stocked disease-free shrimp larvae, suggesting quality control issues in the supply chain and/or poor biosecurity on farm. Graduated cluster farmers, despite having received the most support in the form of input subsidies and grants, did not outperform their non-cluster counterparts significantly in terms of profit. In addition, none of the cluster implementers were able to establish direct market linkages to processors as intended, so farmers, across the board, continued sales through existing marketing channels and traceability did not improve.

## Food security and income diversification trade-offs

Cluster organizers strongly encouraged member farmers to specialize in shrimp monoculture. This practice caused a sharp reduction in fish and vegetable production and sales among farmers who followed the prescription - particularly those in graduated clusters - that was not compensated for by increases in shrimp income. As a result, household food security (as measured by the Household Food Insecurity and Access Scale) and dietary diversity (measured by the Household Dietary Diversity Scale) both declined among cluster farmers relative to non-cluster farmers.

**Figure 3. Predicted net profits for graduated, non-graduated cluster farmers, and non-cluster farmers at Endline**



**Source:** Authors

**Note:** Predicted net profits (BDT/acre) computed for Endline, based on regression model.

## Negligible spillover effects

The study found no significant spillover effects from cluster farmers to non-cluster farmers located in the same villages. This suggests that although some aspects of the cluster interventions may have been beneficial for participating members, the practices promoted did not diffuse to the broader community within the short timeframe of the study.

## Policy implications

- ▶ **Farmers found training on improved practices beneficial:** Cluster farmers readily adopted many recommended practices that they found useful without receiving large financial incentives.
- ▶ **Consider benefits to farm household as a whole:** Future interventions should better balance objectives such as maximizing productivity (such as specialization in shrimp monoculture) with maintaining diversified farm incomes and dietary diversity, and minimizing risks to smallholders.
- ▶ **Recognize existing resource constraints:** Farming systems and marketing channels have evolved in the context of specific sets of local resource constraints. Efforts to modify them should recognize and adapt to these realities, and avoid over-prescriptive technical solutions.
- ▶ **Profitability needs more than just ‘best’ practices:** Addressing both the quality of inputs provided under cluster interventions (especially SPF-PL) and the timeliness of their delivery is critical to success.
- ▶ **A wait and see approach:** We caveat our findings by noting that these are short-term results—they reveal important positive early impacts on practice uptake but indicate the need for careful design and implementation of cluster interventions to realize deeper gains and reduce the risk of unintended negative consequences.

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## ACKNOWLEDGMENTS

This work was carried out under the CGIAR Science Program on Policy Innovations.

We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund ([www.cgiar.org/funders](http://www.cgiar.org/funders)).

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## REFERENCES

Below are some related works that contributed to the development of this policy note:

Narayanan, Sudha; Belton, Ben; Kabir, Razin; Sakil, Abdul Zabbar; Khan, Asraul Hoque; and Hernandez, Ricardo. 2024. The cluster panacea? An evaluation of three interventions in shrimp value chains in Bangladesh. CGIAR Initiative on Rethinking Food Markets Technical Report. Washington, DC: International Food Policy Research Institute. <https://hdl.handle.net/10568/172964>.

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Funding for this work was provided by the [CGIAR Trust Fund](#). This publication has been prepared as an output of CGIAR Science Program on Policy Innovations and has not been independently peer reviewed. Any opinions expressed here belong to the authors and are not necessarily representative of or endorsed by IFPRI, CGIAR and/or the institutions that any of the authors belong to.

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