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Sarthak Pattanayak
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Dipsikha Paramjita
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Surya Narayan Mishra
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Sumita Acharya
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Ambika Prasad Nayak
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Bishnupada Giri
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Pranay Pradhan
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Amit Phonglasa
Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha, India

Prasannajit Mishra
Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha, India

Correspondence
Sarthak Pattanayak
Krishi Vigyan Kendra, OUAT, Puri, Odisha, India

Turning flood challenges into opportunities: The success story

Sarthak Pattanayak, Dipsikha Paramjita, Surya Narayan Mishra, Sumita Acharya, Ambika Prasad Nayak, Bishnupada Giri, Pranay Pradhan, Amit Phonglasa and Prasannajit Mishra

Abstract
Agriculture in the coastal districts of Odisha, India, is frequently constrained by climatic adversities such as floods and prolonged waterlogging, which adversely affect crop productivity and rural livelihoods. This case study documents the transformation of a climate-vulnerable farming system through the adoption of integrated rice–fish farming by Shri Prafulla Bhola of Jatipur village, Puri district, under the National Innovations in Climate Resilient Agriculture (NICRA) initiative. With technical support from the Krishi Vigyan Kendra (KVK), Puri, Shri Bhola implemented field modifications, integrated pest and nutrient management, and adopted improved crop varieties, enhancing both productivity and resilience. Comparative analysis before and after NICRA intervention revealed significant increases in rice and brinjal yields, additional fish harvest from previously fallow waterlogged fields, reduced chemical pesticide use, and improved net farm income by approximately ₹60,000 per hectare in normal years. The approach also promoted wider adoption among neighboring farmers, enhancing cropping intensity and land use efficiency. The results highlight the potential of integrated rice–fish farming as a climate-smart, sustainable livelihood strategy for flood-prone agro-ecosystems.

Keywords: Integrated rice–fish farming, climate resilience, coastal Odisha, NICRA, Krishi Vigyan Kendra, waterlogging, sustainable agriculture, farmer innovation, livelihood diversification, agro-ecological intensification

Introduction
Agriculture in coastal Odisha is often at the mercy of nature. Floods and prolonged waterlogging are recurring challenges that severely impact crop productivity and farm income. Shri Prafulla Bhola, a 50-year-old progressive farmer from Jatipur village in Puri district, once faced similar struggles. However, with guidance from the Krishi Vigyan Kendra (KVK), Puri under the NICRA (National Innovations in Climate Resilient Agriculture) project, he transformed these climatic adversities into a profitable opportunity through the adoption of integrated rice–fish farming.

Farming profile
Shri Bhola cultivates a variety of crops, combining agriculture with allied activities:

Crop/activity	Area (acres)	Productivity (kg/acre)
Rice	2.5	1850
Brinjal	0.1	14,000
Banana	0.3	19,000
Chilli	0.1	5,500

- **Custom hiring service:** ₹1,10,000/year (tractor and rotavator)
- **Livestock:** 2 cattle
- **Poultry:** 10 birds
- **Small ruminants:** 3
- **Farm machinery:** Pumpset, Tractor, Sprayer, Rotavator

Climatic challenge
The village's low-lying fields were prone to flooding and waterlogging for long periods, rendering the land unsuitable for many crops during the rainy season. These conditions reduced yields and often left large tracts of land fallow, limiting the family's annual income.

Innovation adopted-rice-fish farming

To overcome these challenges, Shri Bhola adopted rice–fish farming, a method in which rice and fish are cultivated together in the same field.

- **Field modification:** Trenches were dug around the rice plots to provide safe refuges for fish during dry spells or excessive rains.
- **Biological benefits:** Fish consumed harmful insects and weeds, reducing the need for chemical pesticides.
- **Nutrient recycling:** Fish waste enriched the soil with organic matter, improving rice growth.
- **Economic advantage:** The same plot generated dual income from both rice and fish.
- **Climate resilience:** The system utilized waterlogged fields productively, reducing the risk of total crop loss.

Process of adoption

KVK, Puri conducted demonstrations on sequential fish-cum-rice farming and rice-cum-fish farming in NICRA villages. With continuous guidance from KVK scientists, Shri Bhola learned the trench design, species selection (*Indian Major Carps*), feeding, and management practices. He also received training on integrated pest management, improved paddy varieties (*CR Dhan 412*, *Bina 11*), raised bed cultivation for brinjal, and mulching for chilli.

Impact on productivity and income

Table 1: Practical utility of the innovation/adoption of technology benefits-yield/income/resource conservation etc.

S. No.	Intervention	Crop	Variety	Normal year		Stress year	
				Productivity (q ha^{-1})	Net return (₹ ha^{-1})	Productivity (q ha^{-1})	Net return (₹ ha^{-1})
1.	**Before NICRA:** (Traditional)	Rice	Local	42	20,000	27	10,000
	After NICRA: (Mat nursery + improved variety)	Rice	Bina 11	53	35,000	40	25,000
2.	**Before NICRA:** (Traditional)	Brinjal	Local	180	30,000	120	18,000
	After NICRA: (Raised bed + IPM)	Brinjal	Improved Hybrid	220	50,000	170	35,000
3.	**Before NICRA:** (Mono cropping)	Fallow land	–	0	0	0	0
	After NICRA: (Fish cum rice farming)	Fish + Rice	IMC and CR Dhan 412	50 (Rice) + 400 kg fish	60,000	38 (Rice) + 300 kg fish	45,000
4.	**Before NICRA:** (Traditional)	Chilli	Local	45	15,000	25	5,000
	After NICRA: (Mulching)	Chilli	Improved variety	60	28,000	40	18,000

Wider adoption and influence

- **Direct adopters:** 4 farmers in neighbouring areas began rice–fish farming after seeing Shri Bhola's success.
- **Technology spread:** 8 farmers from nearby villages are now practicing rice–fish farming.
- **Land use enhancement:** Previously fallow kharif fields are now used for fish production, followed by rabi rice cultivation, increasing cropping intensity and income.

Benefits achieved

- Annual farm income increased by ₹60,000 per hectare in normal years.
- Reduced pesticide use due to natural pest control by fish.
- Improved soil fertility and organic matter content.
- Effective utilization of flood-prone land.
- Diversified income sources, reducing financial risk from crop failure.

Conclusion

The journey of Shri Prafulla Bhola proves that with the right knowledge and technology, even climate-vulnerable areas can become models of resilience and profitability. By integrating rice–fish farming, he not only increased his income but also inspired fellow farmers to adopt sustainable and climate-smart agricultural practices. Today, his farm stands as a living example of how traditional challenges can be turned into modern opportunities through innovation.

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