

PROJECT INFORMATION

Evaluating the performance of multispecies finfish culture in small low cost ponds for improving the livelihood of farmers in the salt-affected coastal saline region of Goa

PROJECT OVERVIEW

Funding Agency	Institute
Total Outlay	50, 10,000
Duration	3 years
Single / Multi-Institutional	Single
Principal Investigator	Shri Trivesh S. Mayekar
Co-Investigators	Dr. Sreekanth G.B.

RATIONALE

Goa has large, under-used brackishwater resources: 13,157 ha of estuaries across 8 estuaries, 3,500 ha of brackishwater area and about 18,000 ha of Khazan land. The state produces about 1.05 lakh tonnes of fish. Marine landings have stagnated at about 1 lakh tonnes, and inland output is only about 5,000 tonnes and declining. Fish is the staple food of Goa: about 90% of the population eats fish, and tourists add further demand. Khazan lands are a traditional, community-managed agro-aqua ecosystem made up of bunds, manas (sluice gates), rice fields and *poiem*. They are regulated by tidal and salinity cycles. Current fish rearing in *Khazans* is extensive, low-input and low-yield. It depends on natural tidal recruitment. Letting brackishwater into the fields without control causes salinisation of the traditional paddy areas. Farmers are moving from paddy to fish because fish fetches better prices, but they have no scientific package to guide them. Local species with market value are already present: mullets, pearl spot, milkfish, catfish, ladyfish and tilapia, along with prawns and crabs. Scientifically managed polyculture in small ponds could raise productivity, improve income and nutrition, and still protect the Khazan system.

RESEARCH GAPS

No scientific package: there is no standardised package of practices for fish culture in Khazan lands. Current practice is traditional and extensive. Species and stocking: the best species combination, ratios and stocking densities for Khazan brackishwater polyculture have not been established. Growth data: there is little information on how native brackishwater finfishes grow and use feed in small

managed ponds under Khazan salinity regimes. Low-cost design: low-cost, energy-efficient pond designs suited to tidal Khazan hydrology have not been developed. Economics: there are no economic or energy-budget assessments comparing Khazan fish culture with paddy or with integrated paddy-fish systems. Ecosystem function: the ecological network and trophic functioning of multispecies culture systems in Khazans are unstudied. Salinisation: the effect of pond-based aquaculture on salinisation of neighbouring paddy fields and on bund stability has not been assessed. Seed supply: reliable hatchery or nursery seed of local species is lacking, and farms still depend on wild seed from tidal ingress. Feeds: no locally sourced, cost-effective feeds have been developed for mixed-species culture. Sustainability: the social and ecological sustainability of shifting from paddy to aquaculture has not been evaluated, including farmer-fisher resource sharing and effects on the poiem as a nursery ground. Markets and scale-up: there is no data on market linkages, post-harvest handling or pathways for replicating the model across Goa's coastal belt.

OBJECTIVES

1. Study the growth, survival, length-weight relationship and feeding efficiency of finfishes in small low-cost ponds.
2. Assess the economics, energy budget and ecological network (trophic interactions) of multispecies finfish culture.

ACTIVITIES

Farmer identification: select 3–4 farmers at Mercas, North Goa, through field surveys and group discussions. Pond development: build or modify 3–4 ponds of about 300–400 m² each, within about 1 ha. Pond preparation: remove weeds, insects, unwanted fish and predators, then apply lime and fertiliser. Baseline analysis: test water quality and sediment before stocking. Species selection: choose the candidate species suite and work out stocking densities. Seed handling: rear seed in nursery, then stock the grow-out ponds. Culture operations: manage supplementary feeding over a 6–8 month culture period. Regular sampling: collect water, sediment and fish samples throughout the culture. Harvest: drain the ponds, harvest the stock and quantify production. Economic analysis: record costs and returns and assess profitability. Extension: run participatory, learning-by-doing demonstrations and use the site as an exposure unit for other farmers. Reporting: compile the data, prepare the final report and develop a standard package of practices.

EXPERIMENTAL DETAILS

Treatment:	NA
Fertilizer Doses	NA
Variety	Catla, Rohu, Pangas, Pacu
Replications:	NA
Observations:	Growth: length, weight, weight gain, specific growth rate and length-weight relationship (b value, condition factor). Survival and production: survival rate (%), species-wise and total yield, and productivity (kg/ha/crop). Feed:

feed consumed, FCR and feed efficiency. Water quality: temperature, salinity, pH, dissolved oxygen, alkalinity, ammonia, nitrite, nitrate, phosphate, turbidity and primary productivity. Sediment: pH, organic carbon, and available nitrogen and phosphorus. Fish health: disease incidence and mortality events. Economics: capital and operating costs, gross and net returns, benefit-cost ratio and incremental farm income. The target is 20–25% additional income.

GPS Coordinates:

NA

EXPECTED OUTPUT

Standard package of practices for Khazan fish culture Optimised species combination and stocking density Low-cost pond design (300–400 m²) for Khazan lands Feeding protocol with FCR benchmarks Growth, survival and length-weight data of native finfishes Water and sediment quality profiles Economics: cost, returns and benefit-cost ratio Energy budget and trophic network model 3–4 demonstration ponds (~1 ha) at Merces Research papers, extension bulletin and final report Trained farmers and project associate.

EXPECTED OUTCOME

20–25% additional income for Khazan farmers Higher fish productivity from Khazan lands Better use of fallow or under-used Khazan areas Nutritional security for 50–100 households Livelihood and skill development of farmers Reduced uncontrolled salinisation of paddy fields Sustainable use of native brackishwater species Stronger farmer-market linkages Replicable model for Goa and the Konkan coast Scientific inputs for state policy and planning.

FIELD INFORMATION

When the field was developed:	2025-26
What are crops being cultivated season-wise:	Annual
Soil type:	Acidic
Soil pH, EC, OC:	NA
Soil depth:	NA
Soil NPK and Micronutrient status:	NA
Common pests and diseases:	NA