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KHAZANS IN PERIL: GOA'S ANCIENT WETLANDS FACING A SLOW DEATH

Despite government promises, pollution, climate change, neglect and urbanisation threaten the 2,000-year-old coastal heritage as traditional knowledge disappears. KARSTEN MIRANDA reports

A millennia-old ecological marvel that has sustained Goa's coastal communities since before recorded history is facing extinction. The khazan lands – sophisticated networks of reclaimed wetlands and mangrove areas with ingenious water management systems – are crumbling under the assault of modern threats while preservation efforts lag behind the pace of destruction.

Despite a flurry of government announcements and initiatives in recent months, the situation on the ground remains dire, with experts warning that more than 60% of these unique ecosystems are already in various stages of decay.

"Around 60% of the bundhs are in varying stages of breaking or collapse," said khazan farmer Domingo Ferrao. "Many have already breached, others are crumbling, and some don't have enough height to prevent water flowing over them into fields. They need immediate attention due to climate change considerations."

What are khazans? Understanding the living heritage

The khazans, which once covered approximately 17,500 hectares across eight of Goa's eleven talukas, represent a remarkable feat of traditional ecological engineering. These interconnected estuarine networks serve as vital agro-aquatic landscapes, featuring intricate systems of bunds (dykes), sluice gates called 'manos,' water bodies known as 'poiems,' and cultivable land.

"Khazans testify to the intimate knowledge that ancient Goans had of climate, tidal cycles, soil, fish species, and coastal flora," states a recent study.

It was titled 'A Study of Traditionally Managed Khazan Ecosystems of Ponda Taluka, Goa' and was conducted by researchers Ranjita Sawaiker, Suraj Gaude, Samiksha Naik, Simran Chari, Tima Gaude, and Nischya Padwalkar. It documented the fragility and productivity of these systems and warned of threats from pollution, declining traditional skills, and youth disengagement.

The research highlights how these sophisticated systems have evolved over 2,000 years to create sustainable agricultural and aquaculture environments in saline conditions.

The sophisticated khazan system has deep historical roots, with archaeological evidence suggesting they date back to at least the 6th century.

At a recent workshop, Dr Pradip Sarmokadam, Member Secretary of the Goa State Biodiversity Board (GSBB), emphasised their ecological significance: "Khazan land is not just one ecosystem. It's where marshy land meets the estuarine ecosystem, creating one of the most productive ecological combinations possible after coral reefs."

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> – **Pradip Sarmokadam,** *Member Secretary of the Goa State Biodiversity Board (GSBB)*

Economic and ecological value

Khazans support various economic activities, including:

- Paddy and legume cultivation
- Horticulture (coconut, mango, cashew, vegetables, tubers, fruits, and flowers)
- Traditional fisheries, including sluice gate-based marginal and backwater fishing

This comprehensive range of activities has earned khazans the title of "food bowls of Goa," underscoring their critical importance to local food security.

The khazans blend harmoniously with the local people, animals, plants, land, and water. The intricate system provides nesting, feeding, and breeding grounds to a wide variety of fauna, both resident and migratory. Beyond their agricultural value, they serve as natural defenses against sea-level rise, flooding, and other climate-related threats.

Traditional management systems and their decline

Originally maintained by Comunidades, these traditional institutions maintained the delicate balance required for khazan sustainability. The management changed following the Goa Agricultural Tenancy Act of 1964, shifting responsibility to tenant associations supervised by government officials.

Some experts felt that in certain areas, fishing is seen as the more lucrative option and that this shift toward commercial fishing over traditional agriculture has undermined the integrated approach that made khazans sustainable. It was also pointed out that this is not the case everywhere, as there are many villages where agriculture and pisciculture still work well together. However, the damage to khazan fields due to damaged bundhs has been a big concern in many villages, like in Neura, Tiswadi, where there have been multiple inspections to assess the damage.

> "In the past, farmers knew about khavte (breaking of bunds) by the mere sound, and thus they were repaired in time. But now, that is not the case as there is no common ownership
> – **Sandeep Nadkarni,** *former chief engineer, Water Resources Department*

At the Miramar Dialogues organised by WWF-India's Goa State Office in January 2025, former chief engineer of the Water Resources Department (WRD) and author of 'Khazans of Goa', Sandeep Nadkarni, elaborated that the former Chief Minister (late) Manohar Parrikar had considered establishing a cooperative system, but this initiative didn't materialise.

Loss of traditional knowledge

Perhaps the most insidious threat comes from within – the breakdown of traditional management systems and the loss of specialised knowledge. The Ponda Taluka study documents how elderly community members revealed a concerning trend: youth lack interest in managing these traditional ecosystems through rice cultivation, fishing, and horticulture. This generational disconnect threatens the transmission of crucial knowledge about khazan maintenance.

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Climate change and environmental pressures

Climate change has emerged as another formidable threat. Rising sea levels, changing rainfall patterns, and increasingly extreme weather events are stressing these delicate systems beyond their capacity to adapt.

Rajya Sabha MP Sadanand Shet Tanavade recently highlighted these concerns in Parliament: "These lands are facing threats from extreme weather events driven by climate change, leading to permanent loss of land, erosion of riverbanks, pollution of groundwater due to salinity ingress, and flooding of nearby villages."

Pollution and modern waste

Both the Ponda study and broader research point to plastic and water pollution as serious threats, particularly to aquaculture activities that have sustained local communities for generations.

"Plastic waste clogs fishing nets, resulting in lower catches," notes the Ponda study. "The shift to nylon nets and fiber boats has compounded the solid waste problem due to their non-biodegradable nature."

Deliberate sabotage and poor maintenance

More troubling are documented cases of intentional damage to the system. In proceedings before the High Court of Bombay at Goa, even the State's advocate general acknowledged incidents of deliberate destruction of bundhs and sluice gates, typically aimed at facilitating illegal fishing activities without proper auctions.

The court has been explicit about this problem, stating in one order: "It is not as if these breaches are caused due to natural disasters or due to wear and tear that was not preventable," while directing tenant associations to maintain strict vigilance against such sabotage.

Traditional maintenance techniques have been abandoned as well. The ancient practice of using estuarine soil for bundh repairs has been replaced with lateritic red mud, which lacks durability and washes away quickly. During the Miramar Dialogues, architect and educator Tallulah D'Silva specifically highlighted this issue, noting how modern bunds constructed with lateritic soil give rise to different vegetation patterns that disrupt the ecosystem's balance.

At this same dialogue, Sangeeta Sonak, Director of the Centre for Environment and Natural Resource Management, highlighted another critical issue: the lack of comprehensive data about khazan land in Goa. She noted that the often-cited figure of 18,951 hectares dates back to JC Almeida's book published in 1967, with no recent comprehensive assessment conducted. This data deficiency extends to other ecological aspects of Goa, including its rivers and water bodies. Without accurate, current data, effective conservation planning remains challenging.

Research and revival efforts

ICAR's involvement extends beyond just studying the problem. In April 2025, ICAR-Goa convened a significant meeting at its Merces experimental farm, bringing together farmers, scientists, and policymakers for a focused dialogue on the future of khazan lands.

The meeting was conducted under two NABARD-funded projects: 'Land Shaping Methods and Integrated Farming Systems Approach for Improving Livelihood Security of Farmers under Khazan Lands of Goa', and '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'.

These projects are being implemented by ICAR-Goa in collaboration with the Goa Chamber of Commerce and Industry (GCCI) and the State Directorate of Agriculture.

Some other positive developments have emerged from research institutions. The Goa College of Agriculture and ICAR-Goa have been studying traditionally cultivated salt-tolerant rice varieties native to khazan lands, including Korgut and Assgo. Research published by the Department of Botany at Goa University documents these varieties' unique morphological characteristics and promising grain quality.