

INDIA'S SINKING ISLANDS

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India's islands are being rapidly devoured by the ocean. | Photo Credit: AI generated image

Earlier this month, a scientific paper came to a troubling conclusion: global warming and sea level rise could put two Indian cities — [Chennai and Kolkata](#) — at significant risk by 2100 if greenhouse gas emissions remain high. The study, published in the journal *Nature Climate Change*, added that this data was crucial to develop effective adaptation strategies.

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But this has been a stark reality for India's fragile network of 1,382 islands, which have, for years, been rapidly devoured by the ocean: one such island, the biodiverse and uninhabited Parali I in the [Lakshadweep](#) archipelago, has all but vanished off the map, it was recently discovered. The author of the 2017 study, which documented this loss, R.M. Hidayathulla, says 'urgent measures' are needed on each islet of the atoll such as planting mangroves and creating other physical barriers. "There could be several such islands in Lakshadweep that are similarly threatened by natural calamities and human intervention; we just do not know about them because they have not been studied," he tells *Magazine*.

Further north of India's western coast, the inhabited Divar island in Goa is threatened by damage to the ancient protective bunds. As a result, there has been an influx of saline water that has impacted agriculture and drinking water in the island, whose population is approximately 2,250.

We bring to you stories from islands across the country, where communities have to constantly rebuild their homes; where crops are routinely submerged by saline water; where waves of migration to the mainland are the norm; where roads and bridges are destroyed. But there is a story of hope from Tamil Nadu: the [Vaan island](#) in the Gulf of Mannar, which was brought back to life by science and human ingenuity.

[S. Anandan](#)

Minicoy Island, Lakshadweep. | Photo Credit: Getty Images/iStockphoto

A group of scientists had, in 2021, urged the Centre to rethink the water villa project steered by NITI Aayog, fearing it would destroy the lagoons

In his younger days, A. Misbah, 67, watched corals being extracted from the atolls of Lakshadweep to build houses.

“With almost total literacy, people have now grown environmentally aware and are grappling with the realities of global warming and sea level rise,” says Misbah, who lives in Chetlat, the northern-most inhabited island in Lakshadweep.

The tiny union territory (UT) of Lakshadweep has a land area of just 32 sq.km. and a population of 70,000; its lagoon area is 4,200 sq.km. It was, therefore, only natural that the Centre firmed up strategies to buttress and restore its vital coral reefs, says Misbah, formerly a member of the Union home minister’s advisory committee for the archipelago.

“But the plans remained on paper. When the present UT administrator took over, he discontinued the services of 200 marine watchers, whose job was to prevent poaching and protect the fragile ecosystem. While they harped on conservation, isn’t it contradictory that contracts have now been awarded to a corporate hotel chain for hundreds of beach and lagoon villas on Kadmat, a densely-populated island, and Suheli, an uninhabited one?” he asks.

Corals of Kavarati Island, Lakshadweep. | Photo Credit: Getty Images/iStockphoto

A group of scientists had, in 2021, urged the Centre to rethink the water villa project steered by NITI Aayog, fearing it would destroy the lagoons, the islands’ ‘vital insurance sites’ protecting their landmass. Their apprehensions stemmed from the realisation that the islands were facing severe erosion and the coral reefs offering shoreline protection were already under stress thanks to a combination of sea level rise induced by global warming and extreme weather events.

Coastal constructions and unseasonal cyclones, which have become more frequent lately, are causing soil erosion at some places and accretion elsewhere, says a resident and government employee, who does not want to be named, from the largest island of the group, Androth. He points to the submergence of Parali-I, an islet part of the Bangaram atoll, and the accelerated erosion of other uninhabited islands such as Thinnakara, Parali-II and Parali-III, citing research done by Hidayathulla.

The forecast isn’t encouraging for these islands characterised by low elevations, with the islanders living along the periphery, points out Prasad K. Bhaskaran, part of a group of scientists from IIT Kharagpur who made climate projections of sea level rise and coastal inundation for Lakshadweep.

The waters surrounding the archipelago are expected to rise by 0.78 mm each year in the 2080-2100 period, according to their paper, published in *Regional Studies in Marine Science* in 2021. This could result in smaller islands such as Chetlat, Kiltan, Amini and Bitra — the smallest of them with an area of just 0.105 sq. km. — experiencing loss of land along the coast. The larger islands of Kadmat and Kavaratti would also suffer land loss along the shoreline. Androth is expected to be impacted the least while Minicoy, the southernmost island, and Agatti, which houses the archipelago’s only airport, would face heavy flooding, the study suggests.

But Vikrant Raja, district collector of Lakshadweep, argues that development activities in the island group are undertaken in accordance with the Integrated Island Management Plan. “As for the water villas, NITI Aayog considered all scientific aspects and the process took over four years to complete. It complies with all environmental norms and coastal zone regulation rules,” he contends.

[B. Aravind Kumar](#)

Vaan Island. | Photo Credit: Rajesh N.

It is pre-dawn and the sea, though calm, murmurs. We stand at the jetty of the traditional fishermen along the Thoothukudi coast in southern Tamil Nadu. To the right, two thermal power plants puff out dirty-grey smoke.

Vaan Island, 6 km away, is visible to the naked eye. In a jiffy, the weather changes. The wind blows hard. It starts to rain. The island disappears. Alangaram, a 58-year-old fisherman, returns to the shore soaked with his catch of prawns and is not surprised by the sudden rains. “She [sea] has many moods now,” he says. The rain stops. The sun is a sliver. The island is back in sight.

A decade ago, Vaan Island in the Gulf of Mannar in southern Tamil Nadu almost vanished from the map. Now it has had a rebirth.

Edward Patterson and his team of underwater researchers at the Suganthi Devadason Marine Research Institute (SDMRI) have been working in the Gulf of Mannar for 25 years. He says large scale coral mining till the 1990s in these parts accounts for most of the damage. “They had even used explosives. They built houses and lime industries flourished [corals are pure carbonates],” he recalls.

In 2013, Vaan Island split into two. The northern part submerged as the waves hit the islet directly in the absence of corals, causing rapid erosion. The State government took stock of the situation and brainstormed. The Centre and State governments announced funds to the tune of 18 crore.

A view of Vaan Island. | Photo Credit: Special arrangement

The National Adaptation Fund for Climate Change helped with funds. The SDMRI had already developed an underwater structure to create artificial reefs for biodiversity enhancement. Improving on its design, IIT Madras scientists came up with a new module. In phases, over 10,600 such modules of reinforced concrete structures, carried into the sea by barges, were lowered along a contour, with the help of cranes and scuba divers.

With this submerged artificial barrier in place on the seaward side, the sand started accruing again in the island. Erosion has reduced, biodiversity has been enhanced and 39 coral species have been recorded now. Importantly, the northern part of the island that vanished completely is resurfacing.

“There are many reasons for the diminishing area of islands such as wave action, sea level rise and industrial activities,” says Jagdish S. Bakan, wildlife warden, Gulf of Mannar Marine National Park.

Fishermen, the scientists, and forest officers all think that climate change has had its impact on marine ecology here. Funding to fight it will be critical in future. “We are trying to get support from multiple agencies for the restoration of coral,” says Bakan.

According to an SDRMI survey (2017-18) of the 21 islands in the Gulf of Mannar, two have already submerged in the past 50 years, 15 islands have reduced in size and four have grown in size. “Two islands — Kasuwari and Kariyachalli, adjoining Vaan — could be gone by 2035,” says Gladwin Gnana Asir, a geologist at the institute.

[S. Anandan](#)

Neil island in the Andaman and Nicobar archipelago. | Photo Credit: Getty Images/iStockphoto

The sea level rise here is estimated to be 5mm per year, which is way higher than the global average.

The light house at Indira Point, the southern-most tip of India in Great Nicobar, in the Andaman and Nicobar (A&N) group of islands in the Bay of Bengal, sank about four metres during the tsunami of 2004.

Thousands of people lost their lives. The killer waves also altered the morphology of the islands. A 2018 paper on the post-tsunami subsidence scenario put the loss of mangrove cover in the entire Nicobar islands at 97%. Located in the seismically most active Zone-V, the region witnessed some 450-plus earthquakes in the last 10 years. Frequently battered by cyclonic storms, the Union Territory, home to pristine forests and primitive tribal groups, will lose 130 sq. km. of forests in Great Nicobar if the Centre's 72,000 crore infrastructure plan to have a trans-shipment port, an airport, a power plant and a greenfield township becomes a reality.

"Going by the Intergovernmental Panel on Climate Change's [IPCC] 'Special Report on the Ocean and Cryosphere' in a changing climate and the latest Assessment Report, the low-lying islands are going to bear the brunt of it. And in the Bay of Bengal, there's already the problem of severe cyclones," says Anjal Prakash, research director of Bharti Institute of Public Policy, Indian School of Business and co-author of the reports. He says among the adaptation measures is climate-resilient infrastructure. "The A&N islands group is doubtless a strategic location for the country, but science should guide any policy in this critical zone, which is not the case unfortunately," he adds.

Laxmanpur beach in Neil Island. | Photo Credit: Getty Images/iStockphoto

The sea level rise here is estimated to be 5mm per year, which is way higher than the global average. It results from multiple factors occurring together: cyclonic storm surges combined with sea level rise and high-tide flooding, says Roxy Mathew Koll, climate scientist at the Indian Institute of Tropical Meteorology and co-author of the IPCC Special Report.

And water ingress will certainly impact the coastal people's life and livelihood, says Manish Chandi, cultural anthropologist who has worked in the archipelago for 20 years. "Saltwater incursion will bring about a number of changes but not many are dependent on coastal agriculture on these islands, and the level of salt tolerance of coconut crop here is high. Further, unlike the Andamans, there aren't many creeks in the Nicobars and the main crops there are areca nut and coconut, not paddy or vegetables," he says. By this he means that farmland is essentially in the upper reaches and there isn't much climate-induced crop loss.

N. Mohan, the third-generation descendant of a pre-1942 government servant who survived the Japanese period in the Andamans, says coastal erosion, which began when the tsunami struck, has been ongoing, forcing people to relocate inland.

[Shiv Sahay Singh](#)

Sujit Mondal, a resident of Ghoramara, stands next to his house that has been eroded by the rising sea. | Photo Credit: Debasish Bhaduri

Unlike other parts of West Bengal where blooms of the palash tree set the landscape on fire,

spring on the sinking island of Ghoramara located at the southernmost part of the State is marked by rounds of erosion that chip away at its land. The tall palm trees on the edge of the island, with roots exposed, struggle to hold on to the depleting soil.

The boat I take on a recent visit accommodates 40 and all they talk about is rebuilding their homes, and migration.

“I was in Kerala for two years and did not want to return,” says a young man in his twenties. Rabi Bhuniya, 41, says he migrated 23 years ago and works at a conveyor belt factory in Odisha.

Sanjib Sagar, the village head, talks of May 26, 2021, the day cyclone Yaas made landfall: “The entire island was flooded within 15 to 20 minutes. Waters rose from all sides and thousands took shelter in schools and flood centres.”

One of the sources of income was betel leaf cultivation. Before Yaas, there were about 550 units of betel leaf plantations. The ingress of sea water during Yaas destroyed all these plantations along with standing crops. “This resulted in huge livelihood loss and has further triggered seasonal and permanent migration of people,” says the village head.

Erosion continues on the north and northeast areas of the island, and there are growing fears among villagers that the island will sink altogether in the next few years.

Sujit Mondal lives on the northern edge. In 2019, he had set up a betel leaf plantation but has given up the idea of any kind of farming on the island. Pointing at the severely eroded landscape, he says the entire administrative district of Khashimara has been affected. “The banyan tree, the primary school I took you to last time in 2021, are all under water now,” Mondal rues.

Meanwhile, the Sagar Island in the Sundarbans, which acted as a refuge to climate refugees, is itself under siege from sea level rise, which has claimed vast swathes of land.

A reason to cheer

School girls return to Ghoramara on new cycles provided by the State government. | Photo Credit: Debasish Bhaduri

Today, the biggest challenge the Ghoramara panchayat is facing is to reduce the dropout rate of school-going children. Shahadat Hossain, a teacher in charge of Ghoramara Milan Vidyapith, the largest school on the island with 350 students, has noticed that in the past two years 35 students have dropped out.

The gram panchayat has now started giving special classes to children under an initiative called ‘Panchayat Pathshala’. The other initiatives to keep children in school include setting up a ‘Kanyashree Brigade’, a volunteer group of girls to prevent early marriage, and libraries for children including a mobile one on e-rickshaw. This year the West Bengal government nominated Ghoramara panchayat for the most child- friendly panchayat award in the State.

By afternoon, a group of 57 students of the Ghoramara Milan Vidyapith, mostly girls, arrives by boat with brand new cycles provided free by the State government as incentive for girls to keep coming to school.

[Rahul Karmakar](#)

Majuli island, Assam. | Photo Credit: Getty Images

The Tuni River is drier than it was five years ago as are most wetlands in Majuli, which the Assam government says became India's first island district in 2016. This is unusual because the island used to flood, says Ananda Hazarika, who retired as a geography teacher from Majuli College.

Much like the Kaziranga National Park downstream of the Brahmaputra river, annual floods are essential for Majuli's ecosystem. But the island has not experienced the kind of floods it needs for half a decade now and the cycle of erosion of soil and sedimentation has almost cut off the Tuni from the Brahmaputra and choked some waterbodies. "Paddy and mustard cultivation has suffered and so has fishing, once a major source of income for many in Majuli. Today, the local markets sell frozen fish," he says.

Erosion has been a regular feature for Majuli since it was created at least 800 years ago. Local narratives say the place was called Mojali or Majali, a landmass on the southern bank of the Brahmaputra. A geological event made the Brahmaputra cut a channel through this landmass, separating Majuli from the mainland.

A fisherman and his young son work from a small dugout boat laying prawn traps in a lagoon in Majuli. | Photo Credit: Getty Images

The official district website says Majuli, inhabited by 1,67,304 people (2011 census), has a geographical area of 483 sq. km. The area used to be 1,250 sq. km. before 1950. The reasons for this reduction are riverine erosion and embankments built on the southern bank of the Brahmaputra.

"We are taking a slew of anti-erosion measures to reduce the rate of loss of land in Majuli. These include a pilot project entailing bio-engineering solutions by Indian Institute of Technology Guwahati and the Brahmaputra Board," Majuli's deputy commissioner, Cauvery B. Sharma says.

Hazarika contests the theory of loss of land. "The area of Majuli has remained almost the same, but it is no longer a large swathe of unbroken land as it might have been 500-600 years ago. The erosion-siltation process has dispersed the island, creating 33 saporis [islets] where people live, cultivate and raise livestock," he says.

Experts say the annual rate of erosion by an unpredictable river has been normal, except decades ago when embankments built to protect southern bank towns such as Dibrugarh and Jorhat prevented the Brahmaputra from flowing naturally into the mainland during floods and made it hit Majuli harder, changing its shape. The island continues to get eroded, especially during the monsoon.

Hazarika also says Majuli no longer fits the geographical definition of an island, as the shifting soils have more or less connected it to the northern bank. "But Majuli remains an island emotionally, as it is the spiritual and cultural hub of Assam," he says.

[Navamy Sudhish](#)

A flooded home in Munroe Thuruthu island. | Photo Credit: Santhosh Kumar S.

Kanakamma, 76, has spent her entire life in Munroe Thuruthu island in Kerala, witnessing its steady deterioration. She has seen water routinely displacing homes and she is uncertain about the fate of her small house by the water's edge. Yet, relocation is a distant dream as selling

prospects are zero in this sinking island.

Munroe Thuruthu is ravaged by constant tidal flooding, ground subsidence and decreased agricultural output. “It’s no longer the idyllic village it used to be and the changes started after the tsunami,” she says. Her son, Sunil, adds the residents are not eligible for any financial assistance from the government as they are not victims of a natural calamity.

This map generated by Coastal Risk Screening Tool of Climate Central shows Munroe Thuruthu in the year 2030.

The once-fertile island now resembles a saline swamp and agriculture has become a fading memory. When inland fishing and aquaculture took a severe hit following the 2018 floods, tourism became the only option for many islanders. At present, the island is struggling to spring back from the losses brought on by COVID-19. In 2022, the Munroe Thuruthu panchayat president Mini Suryakumar approached the Kerala State Human Rights Commission as the local body was facing severe financial crisis .

“The floods had damaged most panchayat roads and two bridges. We get minimal fund allocations due to the low population and we were not even able to pay power charges or honorarium for people’s representatives,” says Suryakumar. Following her plea the commission had directed the chief secretary to provide immediate assistance to the local body mostly inhabited by economically and socially backward communities.

This map generated by Coastal Risk Screening Tool of Climate Central shows Munroe Thuruthu in the year 2100.

Research published by the National Centre for Earth Science Studies in January revealed that anthropogenic factors, including the construction of Thenmala dam and uncontrolled sand mining, are the key factors that have contributed to the environmental degradation of Munroe Thuruthu. Almost 39% of its area of has been lost in the last 30 years and more than 500 households have been forced to vacate their homes due to land subsidence and flooding.

The researchers say that the lack of freshwater, sediment from the Kallada river, and the presence of several saline pools have been affecting both soil fertility and groundwater quality. The report adds that though it’s not easy to reverse the environmental degradation, it can be controlled with the regulation of sand extraction from Ashtamudi Lake and the Kallada River.

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