The GEF/UNDP/ASEAN Project on Reducing Pollution and Preserving Environmental Flows in the East Asian Seas through the Implementation of Integrated River Basin Management (IRBM) in the ASEAN Countries

Restoring the Flow:

Imus–Ylang Ylang–Rio Grande Rivers

Photo by John Castillo/PEMSEA

Mr. Reynato Robles, a river ranger who has witnessed the river's journey from its former glory to its deterioration. *(Photo by John Castillo/PEMSEA)*

A River Remembered

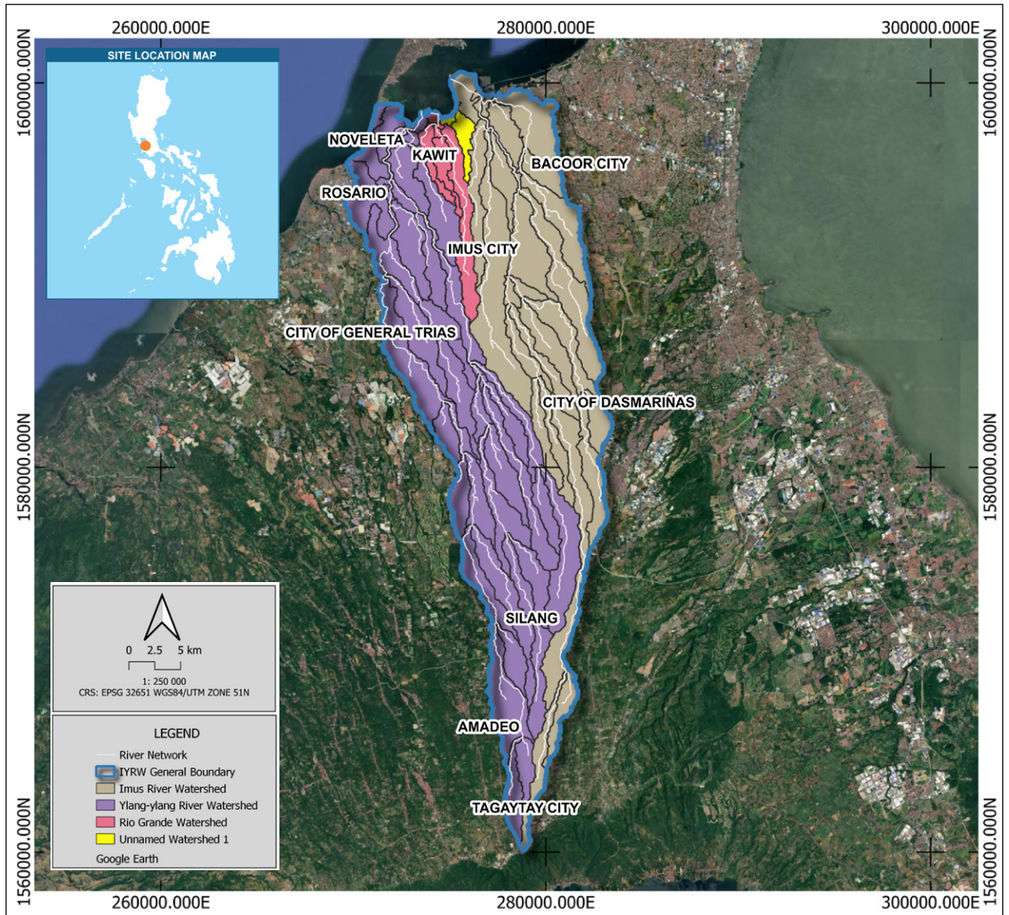
At 70, Mr. Reynato Robles, a river ranger, recalls the glory of the river he grew up with. He remembers a time as a young fisher, when the river teemed with fish and seashells, and families could earn a living without leaving the riverbanks.

"Back then, the river was clean and children could swim in it," he recalls of his youth in Libis sa Nayon during the 1960s. Today, pollution and flooding have made survival harder. Yet like many Caviteños, Reynato persists. His story reflects both the struggle and hope of communities bound to the Imus–Ylang Ylang–Rio Grande Rivers.

South of Metro Manila, the bustling capital of the Philippines, lies Cavite, a province balancing breezy highlands, rapid industrial growth, and crowded coastal towns. One of the province's major river systems is the Imus–Ylang Ylang–Rio Grande Rivers —a network of three rivers that once sustained ten cities and municipalities.

Flowing from the cool highlands of Tagaytay, Amadeo, and Silang, through the midstream centers of Dasmariñas, General Trias, and Imus, down to the coastal towns of Bacoor, Rosario, Noveleta, and Kawit before draining into Manila Bay, the rivers irrigated farmlands, nourished fishing communities, and served as natural drainage and transport routes.

Large stretches of the river basin are now degraded, unable to support aquatic life. Domestic wastewater and solid waste, siltation, flooding, and water scarcity are among its pressing challenges. But the story is not only about decline. Local and national governments, communities, non-government organizations, and private companies are exploring solutions - from river rangers and flood basins to mangrove restoration. Slowly, the river's story is shifting: from deterioration to renewal and restoration.



CATCHMENT MAP OF IMUS-YLANG YLANG-RIO GRANDE RIVERS

View of the Ylang Ylang River along Eastwest Road in Amadeo, Cavite. (*Photo courtesy of Axel Sarte/PIO Cavite)*

From Green Highlands to Growing Towns

The river begins in the uplands of Tagaytay, winding past Amadeo and into Silang, where cool breezes and green banks conceal an undercurrent of vulnerability. The soil here is prone to erosion and landslides. Tourism has flourished nonetheless, with homestays, cafés, and resorts drawing visitors to Tagaytay's wide vistas.

But Mr. Maynard Ambion of Amadeo Municipal Environment and Natural Resources Office (MENRO), warns of tourism's ecological costs. "*The growing number of private resorts is one of the contributors of water issues we closely monitor,*" he says, noting that any new development must secure permits and clearances from the Local Water District and the National Water Resources Board.

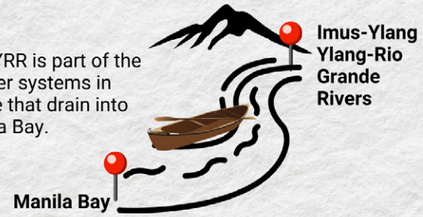
In Amadeo and Silang, the Ylang Ylang River still flows – narrow, shaded, and partly hidden by dense greenery. Informal settlements line its banks, with residents using the river to wash clothes. The water, however, is far from clean. Improper waste disposal persists despite regular garbage collection.

At a Glance

Imus-Ylang Ylang-Rio Grande Rivers

The Imus-Ylang Ylang-Rio Grande Rivers has a total land area of **28,584 hectares** and has a total length of **329 km** of river network which passes through ten cities– **Tagaytay, Amadeo, Silang, Dasmarinas City, General Trias City, Imus City, Bacoor City, Kawit, Noveleta, Rosario.**

The IYRR is part of the 17 river systems in Cavite that drain into Manila Bay.

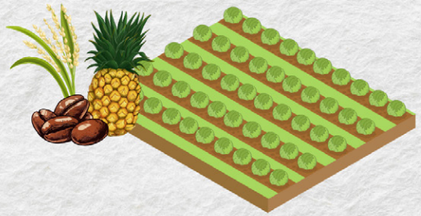


The rivers support over **2,419,797 people** (2020).

About **18,140 ha** of the IYRR area are planted with crops such as coconut, coffee, pineapple, mango, cutflowers and ornamental plants. These crops are mostly planted in the upland areas. In the lowland areas, rice production is predominant occupying about **4,133 ha**.

Source: IRBM Project Document

95.47% of households has access to basic water supply and **94.02%** has access to basic sanitation facility (2021).



In 2024, the solid waste generation in IYRR is approximately **2,138 tons a day.**

Source: IYRR SORB Report 2025 unless otherwise indicated

A view of the Ylang Ylang riverbanks from the boundary bridge of Amadeo and Silang in Cavite. (*Photo courtesy of Axel Sarte/PIO Cavite)*

To address the problem, the local government of Amadeo transports residual waste to a sanitary landfill in a neighboring province, while biodegradable waste is composted and used as organic fertilizer in farms. Plans are underway for the establishment of a materials recovery facility and installation of trash traps that intercept waste before it drifts downstream.

Recent storms have only deepened the strain. *"The tropical storm Crising (international name: Wipha) in July 2025 caused heavy erosion along the riverbanks,"* explains Mr. Ron Adarlo of Amadeo MENRO. To reduce risks, the province is reinforcing river setbacks by establishing buffer zones along riverbanks to protect residents.

Erosion along the Ylang Ylang riverbanks in the upland areas, caused by the tropical storm Crising in July 2025. *(Photo by Orange Omengan/PEMSEA)*

River rangers clear the clogged section of the Imus River in General Trias to help restore its flow. *(Photo by Orange Omengan/PEMSEA)*

Midstream: Where the River Meets the City

As the river reaches Dasmariñas and General Trias, green banks give way to concrete, crowded homes, and floodwalls. Here, at the center of Cavite's most populated areas, untreated sewage, domestic waste, and encroaching settlements place immense pressure on the waterways.

River Rangers on the Frontline

In General Trias, Mr. Winston Santillan leads a team of river rangers trained by the Department of Environment and Natural Resources (DENR) and employed by the General Trias local government. Every weekday, they wade through floating debris and vegetation along the river, a relentless and strenuous task.

Mr. Winston Santillan, a river ranger with the General Trias local government, leads a team that conducts daily clean-ups along the Imus–Ylang Ylang–Rio Grande Rivers. *(Photo by John Castillo/PEMSEA)*

"*The most common waste we recover is plastic packaging and Styrofoam,*" shares one of the river rangers.

But plastic is not the only problem. Without proper sewage systems in nearby neighborhoods and businesses, fecal contamination worsens, with fecal coliform levels in the midstream areas of the river reaching 16,000,000 most probable number (MPN) per 100 milliliters[1]– far exceeding the standard limit of 200 MPN per 100 milliliters. Untreated wastewater discharges from industrial and commercial establishments further degrade water quality.

[1] Source: IYRR SORB Report 2025

To address this, Mr. Kenneth Castillo of General Trias City Environment and Natural Resources Office says that the city government is working to install sewage treatment plants in all 33 barangays and amend its septage policy. Plans include incorporating septage fees into household water bills to ensure compliance. Partnerships with private companies and NGOs are also helping rehabilitate the river through programs like Adopt-an-Estero, where these partners sponsor clean-up efforts in designated areas.

Sorting Out Cavite's Trash

At the provincial level, the Office of the Provincial Environment and Natural Resources Officer (OPENRO), headed by Ms. Anabelle Cayabyab, has been strengthening solid waste management systems across Cavite. Their initiatives cover household waste disposal, sanitation services, and stricter enforcement of environmental regulations.

Cavite's Provincial Ordinance No. 2013-021 promotes eco-friendly alternatives, such as reusable bags, and sets guidelines for proper waste segregation, recycling, and disposal.

Plastic waste remains one of the river's major pollutants, clogging waterways and worsening floods. *(Photo by Orange Omengan/PEMSEA)*

Trash along the concrete walls of the Bacoor Retarding Basin marks the water level during heavy rains. *(Photo by Orange Omengan/PEMSEA)*

Flood Management Measures

The Imus–Ylang Ylang–Rio Grande Rivers is also prone to flooding, particularly in the low-lying areas of Bacoor, Imus, and Noveleta. To reduce these risks, the national government through the Department of Public Works and Highways (DPWH) with support from Japan International Cooperation Agency (JICA) has implemented the Cavite Industrial Area Flood Risk Management Project.

Completed in 2021, the Imus Retarding Basin is the country's first facility of its kind. Spanning 35 hectares, it is designed to temporarily store excess rainwater and river overflow, helping to minimize flooding downstream. Nearby, the Bacoor Retarding Basin covers nine hectares and is divided into two storage ponds connected by a sluiceway, a channel fitted with gates that regulate the controlled release of water from one section to another.

"During the tropical storm Crising in July 2025, flooding in nearby communities was lessened thanks to the basin," says Engr. Sevino Cabral of DPWH Flood Control Management Division. *"The debris line shows just how high the water rose,"* he adds.

The Imus Retarding Basin in Barangay Anabu 1-A in Imus City, Cavite. (*Photo courtesy of the Provincial Government of Cavite)*

The two storage ponds of the Bacoor Retarding Basin in Barangay Buhay na Tubig, Imus City, Cavite. (*Photo courtesy of the Provincial Government of Cavite)*

Three more retarding basins are currently under construction in General Trias and other industrial areas of Cavite, further strengthening the province's flood defenses.

The river in Rosario, Cavite, visibly darkened by industrial discharge, untreated household waste, and siltation. *(Photo courtesy of Axel Sarte/PIO Cavite)*

Downstream at a Crossroads

As the river nears Rosario, Kawit, Noveleta, and Bacoor, challenges multiply. Quarrying contributes to siltation, while urban sprawl adds layers of solid waste. To keep the waterways navigable, the DPWH conducts annual dredging.

In Rosario, industrial discharge mixes with household waste, similar to what is observed in other highly urbanized areas. Informal settlements press against the riverbanks, often ignoring buffer-zone regulations, such as the Water Code of the Philippines (Presidential Decree 1067), which mandates easements of three meters in urban areas.

A portion of the mangrove area in Kawit, Cavite, which serves as a sanctuary for waterbirds and adds greenery to the urban landscape.
(Photo by Orange Omengan/PEMSEA)

Piles of waste along the riverbanks of Barangay Samala-Marquez in Kawit, Cavite.
(Photo by Orange Omengan/PEMSEA)

In Kawit, road expansions once claimed swaths of mangroves. Today, 50 hectares are managed by the local government to restore lost cover and strengthen coastal defenses. Heavy rains, however, continue to carry garbage downstream, threatening the mangrove ecosystems.

Residential settlements along the riverbanks of Kawit, Cavite. *(Photo by Orange Omengan/PEMSEA)*

In Barangay San Rafael, Noveleta, members of the Mangrove Farmers Association sustain their livelihoods by selling seedlings to companies sponsoring tree-planting drives. Supported by the DENR and the Philippine Coast Guard, this small-scale, biodiversity-friendly enterprise shows how communities link conservation with livelihood.

But waste is relentless.

"Most of the trash here comes from upstream," says Ms. Melody Gaguit of the Mangrove Farmers Association. *"Last July 2025, even a refrigerator was washed into our mangroves after typhoon Crising hit our area."*

After heavy rains, solid waste accumulates along the riverbanks where mangroves thrive threatening the ecosystem.

Ms. Melody Gaguit of the Mangrove Farmers Association in Barangay San Rafael, Noveleta.

Remnants of a refrigerator lodged in the mangrove area in Barangay San Rafael, Noveleta, Cavite.

Despite the odds, the association continues its work, replanting and selling seedlings, as part of efforts to restore the river and sustain the members' livelihoods.

Ms. Glenda Alcantara sells seashells harvested from the brackish waters of Manila Bay along the roadside in Kawit, Cavite.

Harvesting a Living

Downstream, along Marulas Road in Kawit, seashell vendors line the roadside with harvests from the brackish waters of Manila Bay. According to the locals, their trade is affected by the bay's water quality.

"Poor water quality affects our shellfish," says Ms. Glenda Alcantara, who has sold along the roadside for 20 years. *"Sometimes the brackish water turns milky, murky, and smells of chemicals. It's better now since a big commercial polluter was shut down in 2024."*

For vendors like Glenda, the health of the river and bay directly determines daily earnings, with each storm and every influx of trash threatening their livelihoods.

A seashell vendor sells seafood harvested from Manila Bay along Marulas Road in Kawit, Cavite.

Photos by Orange Omengan/PEMSEA

Imus River in Barangay Kaingen in Kawit, Cavite.

Integrated River Basin Management and the Path Forward

Plastic and solid waste remain as the river's most stubborn pollutants, clogging waterways from upland creeks to coastal areas. In addition, untreated domestic and industrial wastewater, recurring flooding, and water scarcity are other pressing issues along the river basin.

Currently, the river basin is experiencing a water deficit of 106.053 million cubic meters per year, which is projected to increase to 382.640 million cubic meters per year by 2040.[2] To address this, the local government has implemented measures such as imposing a moratorium on land conversion in upstream areas, reforestation, and other water conservation initiatives.

[2] Source: IYRR SORB Report 2025

The Imus–Ylang-Ylang–Rio Grande (IYRR) Rivers was designated as a Water Quality Management Area (WQMA) through DENR Administrative Order No. 2 in 2013 as part of the implementation of the Philippine Clean Water Act. An IYRR WQMA Action Plan covering the period 2016-2025 outlining strategies and actions to address pollution from domestic, institutional, commercial, industrial, and recreational sources provides opportunities for the IRBM Project to build on and contribute to its implementation and in the preparation of the Action Plan for 2026-2035.

The implementation of the Action Plan is overseen by a Governing Board, co-chaired by DENR-EMB Region IV-A and the Provincial Government of Cavite. Members of the Governing Board include representatives from relevant national government agencies, provincial and city or municipal governments, non-government organizations, the private sector, civil society organizations, and the academe.

Board Resolution No. 2024-01 was passed on March 26, 2024 adopting the implementation of the IRBM Project with the Governing Board serving as coordinating mechanism for the project.

Ylang Ylang riverbank in Amadeo, Cavite.

Photos by Orange Omengan/PEMSEA

Integrated River Basin Management Project

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) implements the IRBM Project, with support from the United Nations Development Programme and the Global Environment Facility, and in collaboration with the ASEAN.

Project Components

- Baseline Assessment of Source to Sea Management Continuum
- Improved Governance and Management in Imus-Ylang Ylang-Rio Grande Rivers
- Knowledge Management and Capacity Development
- Monitoring and Evaluation

Priority Issues in Imus-Ylang Ylang-Rio Grande Rivers

Rapid Increase in Population and Urban Development
Rapid urbanization increases water demand and water pollution, especially from domestic, industrial, and commercial establishments.

Improper Solid and Liquid Waste Disposal
This results to environmental pollution and poor water quality.

Depletion of Ground Water Resources
Cavite relies on groundwater as source of domestic and industrial supply, putting pressure on already limited reserves.

Flooding
Flooding is exacerbated by inadequate drainage infrastructure, clogged waterways due to improper waste disposal, and siltation.

IRBM Governance
Lack of conscious coordination and integration of programs and projects.

Coordination Mechanism

Regional Steering Committee

National Level:
National Steering Committee and Inter-agency Technical Working Group

DENR-EMB and NWRB as co-lead implementing agencies

River Basin Level:
Imus-Ylang Ylang-Rio Grande Rivers Water Quality Management Area Governing Board

The Integrated River Basin Management (IRBM) Project is funded by the Global Environment Facility, implemented by the United Nations Development Programme in partnership with ASEAN, and executed by the PEMSEA Resource Facility. This collaboration supports Cavite's local governments in applying a "Source-to-Sea" approach -- linking upstream, midstream, and downstream cities and municipalities under one integrated management system.

A State of River Basin (SORB) Reporting System is being established for IYRR with the preparation of the baseline SORB Report consolidating information on the governance and management practices in the river basins and identifying gaps and priority issues requiring management interventions.

Artwork made of driftwood forming the image of Diwata, a mythical being believed among Filipinos as guardian of forests.
(Photo by Orange Omengan/PEMSEA)

Culture, Tourism, and Conservation

In Cavite, there are efforts of communities along other rivers aside from the Imus–Ylang Ylang–Rio Grande Rivers that could be replicated and considered as good practices. For instance, some communities are proving that stewardship and livelihood can thrive together. In Amadeo, along the Cañas River, the Alitaptap Artist Community transforms environmental care into art. Crafting pieces from driftwood and discarded nets, planting native trees, and hosting quarterly river clean-ups that recover up to 50 sacks of waste each time are just some of their initiatives.

Mr. Henry Ankanan, a native of Amadeo and founder of the Alitaptap Artist Community.

Founded in 2017 by Mr. Henry "Bokeng" Ankanan, the 12-hectare sanctuary is home to over 35 families and serves as a creative refuge for artists from all over the country. Each household is required to have separate tanks for wastewater and sewage, ensuring neither flows into the nearby river.

"We mobilize different sectors -- law enforcement, civil society, the local and national government -- and we do river clean-ups every quarter," Bokeng says. *"We also plant trees, often using seedlings from the Department of Agriculture or donations from visitors."*

Artworks displayed in the Alitaptap Café. "Alitaptap" is the Filipino term for firefly, which can be seen in the vicinity of the 12-hectare land.

Nearby, Balite Falls demonstrates eco-tourism managed with care, where entrance fees help maintain river cleanliness. *"We don't allow overnight stays or food near the falls,"* says Ms. Merlita Tumandag, co-manager of a family resort near the springs. *"That way, waste doesn't end up in the river,"* she adds.

These initiatives demonstrate that conservation can work through collaboration among communities, businesses, and government.

Ms. Merlita Tumandag one of the resort owners, her family have been co-managing the cleanliness of the Balite Falls since 2016.

The water from the Balite Falls comes from a bukal or spring and drains to Cañas River, one of the major river basins in Cavite.

Photos by Orange Omengan/PEMSEA

The Flow Towards Revival

The Imus–Ylang Ylang–Rio Grande Rivers may no longer teem with the abundance that Reynato once knew, but its story is far from over. Across Cavite, river rangers, mangrove stewards, fisherfolk, artists, and local officials are restoring the river's vitality by removing debris, nurturing mangroves, and promoting cleaner, sustainable livelihoods.

With sustained partnership, coordinated planning, and strengthened governance, the river can once again sustain farms, fisheries, and families. As Cavite grows, the river's journey offers hope that progress and conservation can coexist, and that its waters will continue to flow as one of the province's vital rivers for Caviteños now and in the future.

A view of the Imus River near the retarding basin, filled with vegetation, in Barangay Anabu 1-A, Imus City, Cavite. *(Photo courtesy of the Provincial Government of Cavite)*

About the Integrated River Basin Management (IRBM) Project

Supported by the Global Environment Facility, the Integrated River Basin Management (IRBM) Project is working to set-up functional management mechanisms in priority river basins of six ASEAN countries to reduce pollution and sustain freshwater environmental flows as well as adapt to climate change vulnerabilities. The regional Project is being implemented by the United Nations Development Programme Bangkok Regional Hub, and executed by Partnerships in Environmental Management for the Seas of East Asia, in collaboration with ASEAN.

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Learn more about the IRBM Project