

FLOOD-ACT: From Rainfall Warnings to Runoff Forecasts for Iligan

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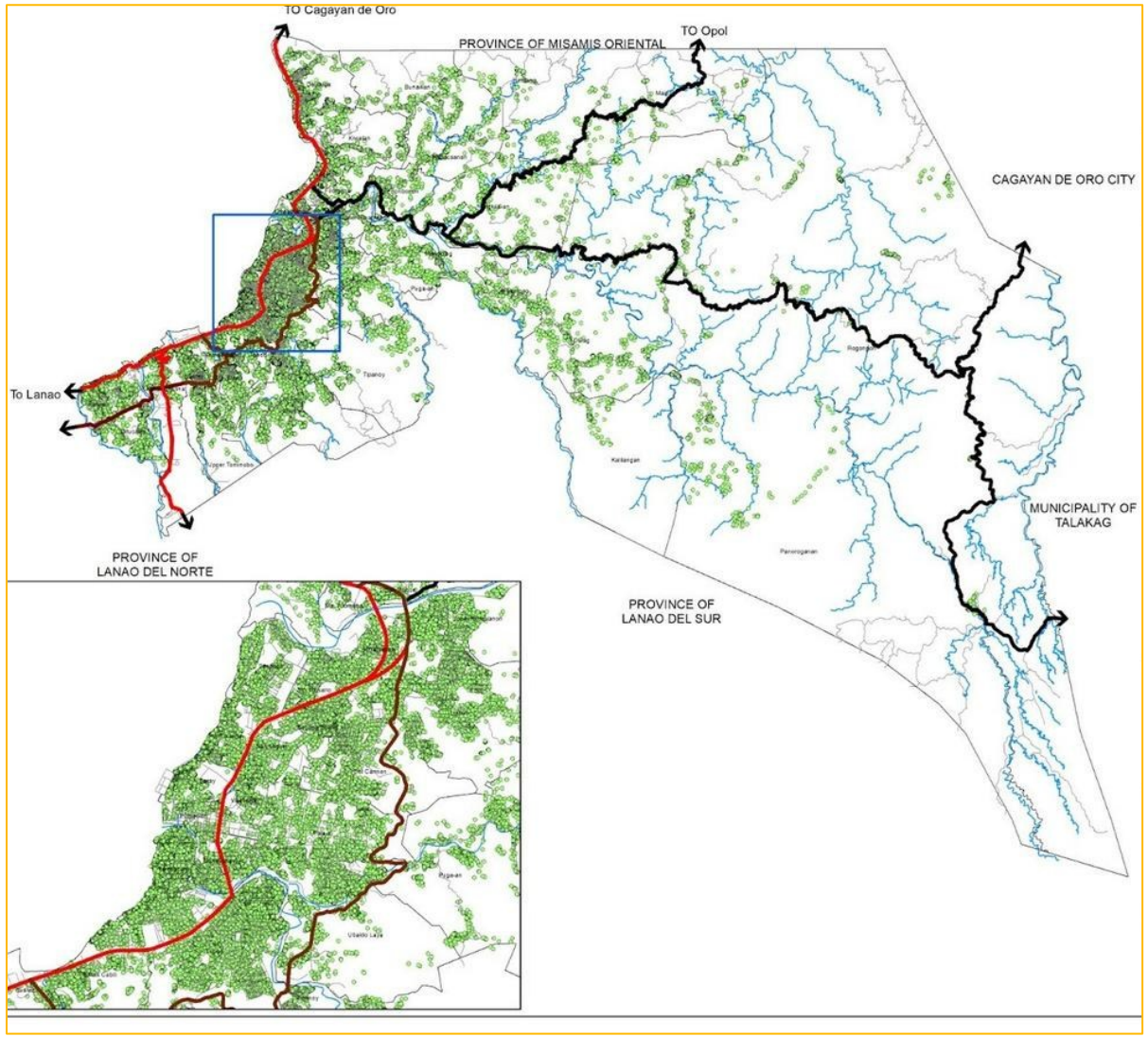
東京大学 THE UNIVERSITY OF TOKYO
名古屋大学 NAGOYA UNIVERSITY
JAXA 宇宙航空研究開発機構 Japan Aerospace Exploration Agency
DOST
DOST PAGASA The Weather and Climate Authority

GROWTH, OPPORTUNITY, TRANSFORMATION:

ILIGAN CITY



CHARTERED JUNE 16, 1950 (RA 525)

2nd FASTEST GROWING ECONOMY AMONG HIGHLY URBANIZED CITY IN 2024

368,132 PEOPLE · 81,337.37 HA

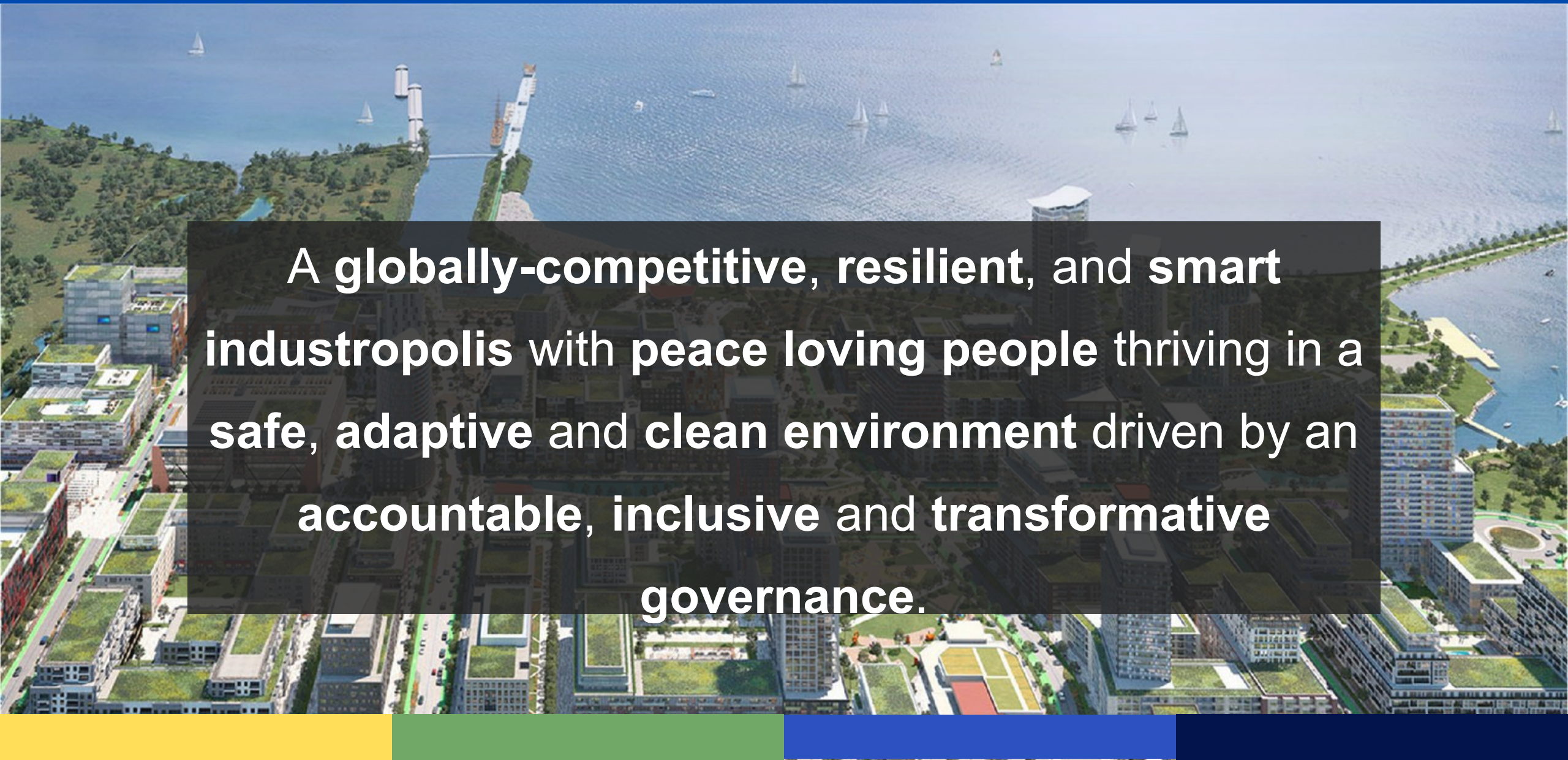
USD 1.44B LOCAL ECONOMY

LOCALIZED SDGs THROUGH THE 15 ILIGAN DEVELOPMENT GOALS

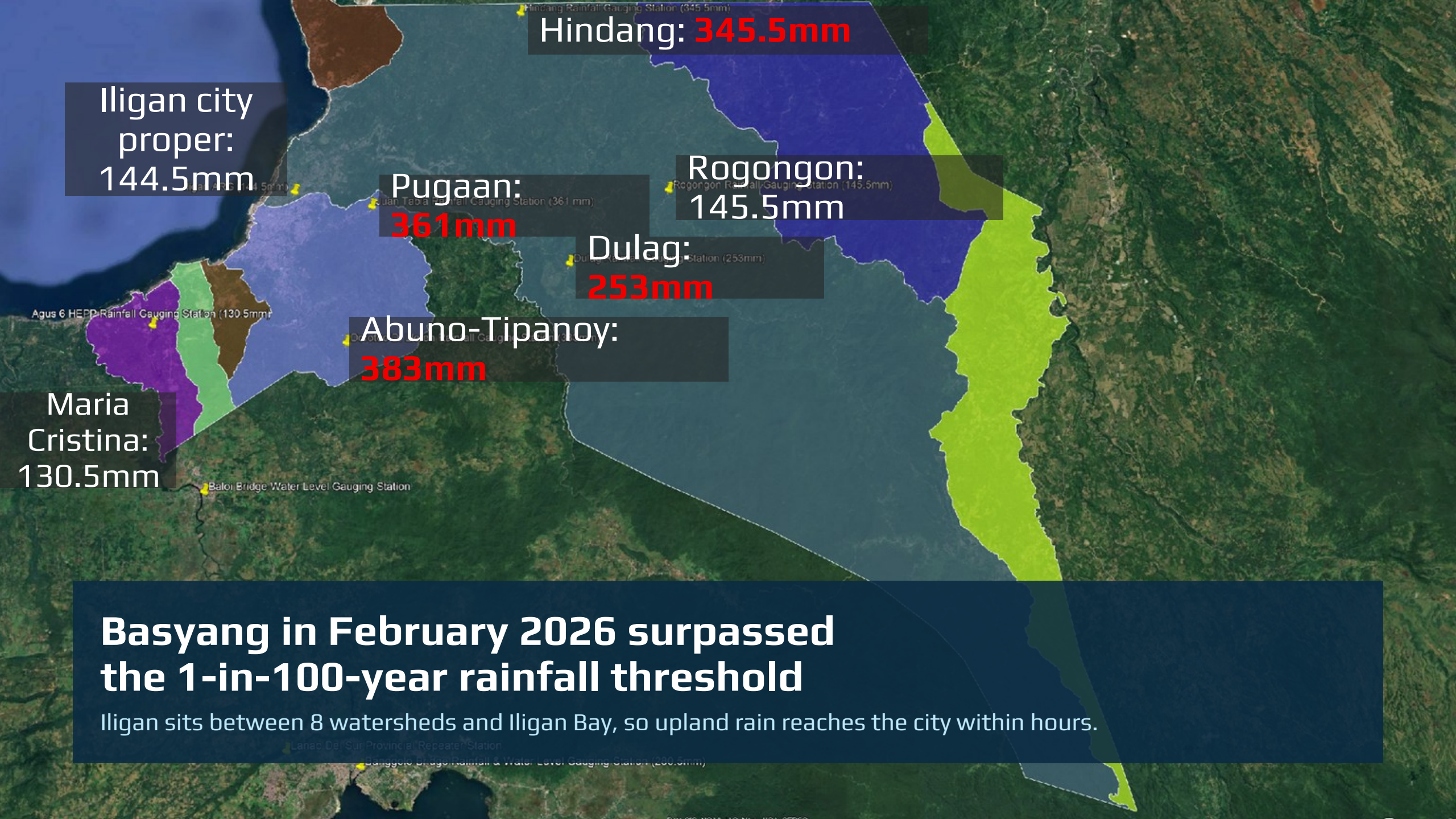
BARANGAYS (VILLAGES/DISTRICT): 44

COASTAL: 14
URBAN: 19
RURAL: 11

VISION OF THE CITY



A **globally-competitive**, **resilient**, and **smart industropolis** with **peace loving people** thriving in a **safe**, **adaptive** and **clean environment** driven by an **accountable**, **inclusive** and **transformative governance**.


Hindang: 345.5mm
Iligan city proper: 144.5mm
Pugaan: 361mm
Rogongon: 145.5mm
Dulag: 253mm
Abuno-Tipanoy: 383mm
Maria Cristina: 130.5mm
Agus 6 HEPP Rainfall Gauging Station (130.5mm)
Balo-i Bridge Water Level Gauging Station
Basyang in February 2026 surpassed the 1-in-100-year rainfall threshold
Iligan sits between 8 watersheds and Iligan Bay, so upland rain reaches the city within hours.

Basyang Hit 39% of Iligan’s People in a Single Storm

Tropical Storm Basyang, February 2026: impacts recorded by the City Disaster Office damage assessment.

149,990
people affected, 39% of the city

29,998
families displaced

₱226M
infrastructure (₱94.5M) and farm (₱131.9M) losses

462
businesses disrupted

Where it hit
Mahayahay, Tambacan, Tubod, Tipanoy, Pala-o, Puga-an, Abuno, Saray and Poblacion, where flooding reached the business district of an ₱88.5B urban economy.

Why it will happen again
IPCC AR6: under 1.5°C of warming, today’s 1-in-100-year rain may become a 1-in-50-year event.

Source: City Disaster Office damage assessment, Tropical Storm Basyang 2026, as cited in the Project Daloy People’s Survival Fund proposal (2026); IPCC AR6.

The Problem: Less Than 6 Hours to Act

In tropical storms Sendong (Washi, 2011) and Basyang (2026), warnings came too late for orderly evacuation.

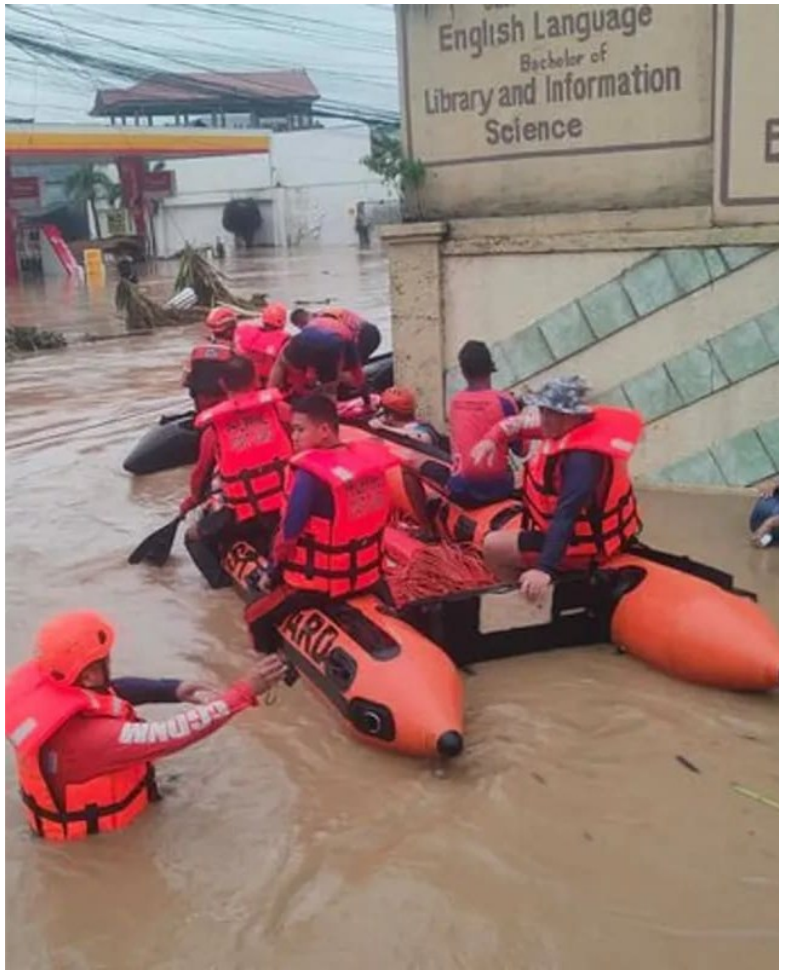
1. **Fast-flooding geography**
   44 barangays below 800 km² of steep, degraded uplands where the Mandulog, Iligan and Agus rivers meet.

2. **Rainfall already beyond design extremes**
   Recent 24-hour rainfall totals exceeded local 1-in-100-year thresholds at multiple gauges.

3. **Warnings describe the rain, not the flood**
   Color-coded warnings from PAGASA, the national weather agency, are set by rain per hour for whole areas, not by how each river and barangay will respond.

4. **More data, unclear decisions**
   Japan Science and Technology Agency study of 504 municipalities: forecasts are valued but rarely trigger evacuation on their own.

5. **What Iligan needs**
   Runoff and flood forecasts from space data, linked to actions the city has already approved.



Five Users Need the Same Forecast for Different Decisions

Co-designed with Iligan's City Disaster Office, which co-leads the project, so each output answers a real decision.

User	Decision they must make	What FLOOD-ACT gives them
City Disaster Office and City disaster Council	When to pre-position teams and order pre-emptive evacuation	Up to 5-day flood forecasts with uncertainty, tied to city disaster plan triggers
Barangay disaster committees (44)	Which households move first, and where they go	Flood maps matched to household survey records, vulnerable groups and evacuation centers
City planners and ICENRO	Where to build, zone, drain and restore	Runoff hot spots and flood history for the land-use plan and Project Daloy
Residents most at risk	Whether and when to leave	Barangay alerts by SMS and mobile through the Smart Command Center
PAGASA	How to localize official warnings	A runoff layer that complements its rainfall warnings, not replaces them

Highest-risk barangays: Hinaplanon, Mandulog, Puga-an, Santiago, Tibanga and Saray.

Without Space Data, Iligan Cannot Forecast Its Floods

Four gaps on the ground that only satellites can fill today.

ON THE GROUND TODAY	WHAT SPACE PROVIDES
Few gauges for 8 watersheds; uplands are hard to reach	**GSMaP** measures rain every hour over every watershed, gauged or not
Typhoon cloud hides floods from cameras and drones	**ALOS-2 SAR** maps flood extent through cloud, day or night
Gauges show that rain fell, not where the water goes	**Today's Earth** turns satellite rain into runoff and river forecasts up to 5 days out
Upland forest loss goes unseen until floods get worse	**Optical and SAR imagery** track land-cover change across the whole basin

Fused with city data: household survey records, LiDAR terrain and the city disaster plan. No new gauges needed, so the method travels to any ASEAN city.

From Rainfall Advisories to Runoff Forecasts

PAGASA, the national weather agency, forecasts rain; FLOOD-ACT forecasts where that rain goes.

PAGASA TODAY

ADDED BY FLOOD-ACT FROM SPACE DATA: WHERE THE WATER GOES



Rainfall

mm per hour by area: yellow, orange or red



Runoff

How much rain leaves the slopes, from GSMaP rain, terrain, land cover and soil moisture



River flow

When the watershed and rivers rise and peak



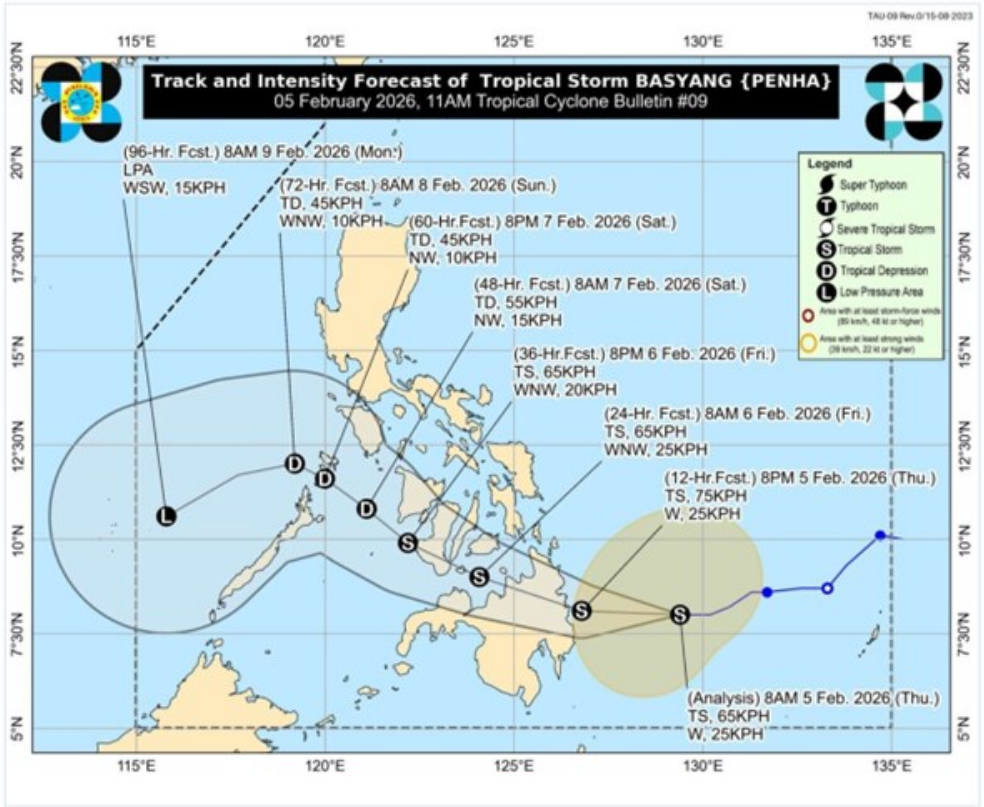
Flooded areas

Which barangays, roads and evacuation centers, up to 5 days ahead

Same rain, different flood: soaked soil and cleared slopes turn more rain into runoff. Past floods calibrate the model; PAGASA warnings stay official and feed it.

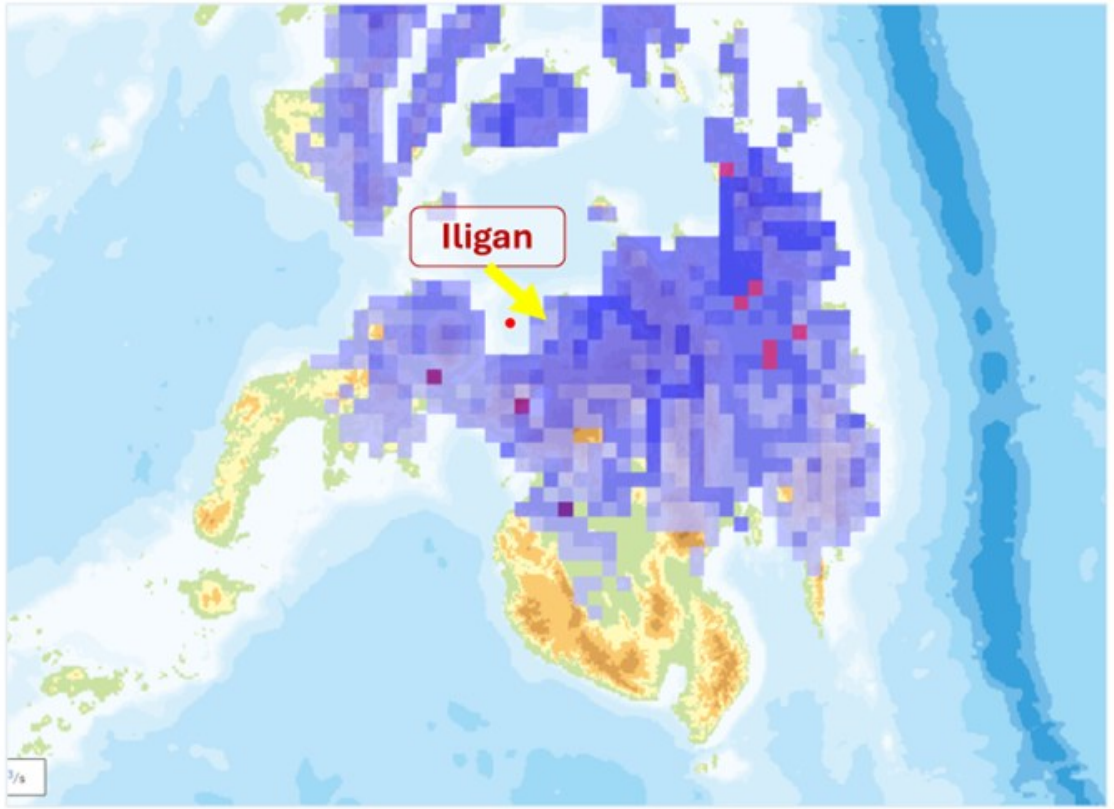
Satellite-based hydrological forecasting can turn PAGASA's storm track into a flood map

PAGASA TODAY: WHERE THE STORM GOES



Storm track, intensity and wind, 4 days out: no sign of which areas will flood

WITH FLOOD-ACT: WHERE THE WATER GOES



Water depth from Basyang's rain, mapped across Mindanao: what Iligan's DRRMO could have seen days ahead

Left: PAGASA Tropical Cyclone Bulletin #09, TS Basyang (Penha), 5 Feb 2026. Right: illustrative FLOOD-ACT output.

FLOOD-ACT Will Run From Iligan’s Incident Command Center

The command center will house FLOOD-ACT as part of the city’s resilience innovation hub.



WHAT THE HUB ADDS

- Runoff and flood forecasts on the video wall, beside live weather and camera feeds
- FLOOD-ACT AI answers at operator desks, with every source shown
- City Disaster Office keeps every warning and evacuation decision

Photo: Iligan City Incident Command Center.

A Pilot City for ASEAN’s Fast-Growing Urban Centers

A fast-growing, highly urbanized city with limited resources proves a model others can copy.

FOR ILIGAN

- Barangay flood forecasts up to 5 days ahead
- Risk mapped to household survey records and facilities
- Targets Iligan’s Ecosystem-based approach to urban resilience targets: which uplands to restore, which homes to resettle
- A city disaster plan protocol that outlasts the project

FOR ASEAN CITIES

- Potential to be the first operational Today’s Earth city in the Philippines, and in ASEAN
- Tested in steep, gauge-sparse tropical basins
- Next: other Philippine highly urbanized cities
- Then ASEAN partners seeking climate-resilient development



Our cities are not isolated from the ecosystems that sustain them

Forests, watersheds, rivers, coastlines and settlements are connected in ways the ground cannot show. Satellites can.