Mobilizing Space Data for Sustainable Development

Philippine Space Agency

Philippine Space Agency

BAGONG PILIPINAS

Republic Act No. 11363 "The Philippine Space Act"

PhilSA

Republic Act No. 11363
or the **Philippine Space Act**, signed into law on **August 8, 2019,** establishing the **Philippine Space Policy** and **PhilSA**.
It is the **central government agency in the Philippines** addressing **all national issues** & **activities** in **space S&T applications (SSTA)**.

*"The Philippines is preparing for the future by laying the governance framework that will allow us to … pursue digital solutions towards a more modern economy, **and expand our presence in outer space** … we need to start by **defining the norms of responsible behavior in cyberspace and outer space**..."*

Pres. Ferdinand R. Marcos Jr.
77th UN General Assembly

Office of the President

Philippine Space Council

Philippine Space Agency (PhilSA)

PhilSA is an attached agency of the **Office of the President** for purposes of **policy and program coordination**, to ensure **alignment in national policies and priorities**

Key Development Areas

Value creation
is at the ***core*** of the **PhilSA mission**

We will promote and sustain a robust
Philippine space ecosystem that
adds and creates value in space
for and from Filipinos
and for the world.

PhilSA

The **PhilSA vision statement**

The PhilSA envisions a Filipino nation bridged, uplifted, and empowered through the peaceful uses of outer space.

*Space is the expanse above us, which can **bridge** our islands, communities and wherever Filipinos may go on Earth. Rockets and space travel **uplift** us in mind, spirit and body; products and services from space **uplift** the human condition. Faring in space, building sovereign capabilities in space, with its high vantage point, **empowers** us.*

PhilSA

How Do We Use Space Data?

We process satellite data to help people make smarter decisions for planning, environmental monitoring and protection, disaster management, and more.

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Mapping Disasters and Its Impact

Space Science and Technology (SST) can be used to monitor disasters, map extents and assess its impact.

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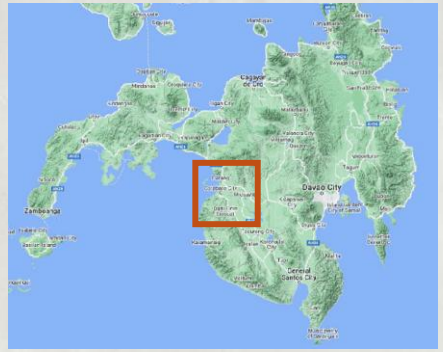
Mapping Disasters and Its Impact

Flood Extent Mapping



14 October2022

30 October 2022

Siltation and flooding on agricultural and built-up areas as seen on Landsat 9 imagery.

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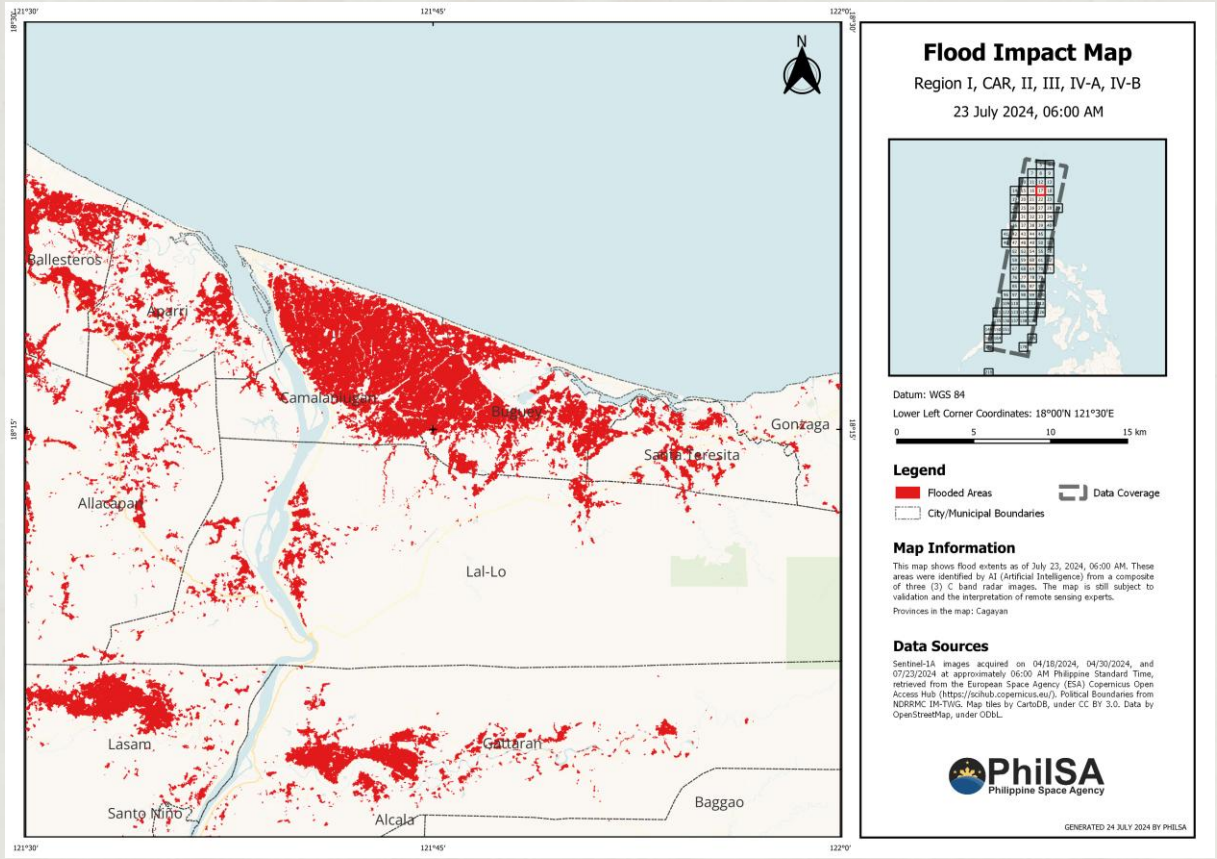
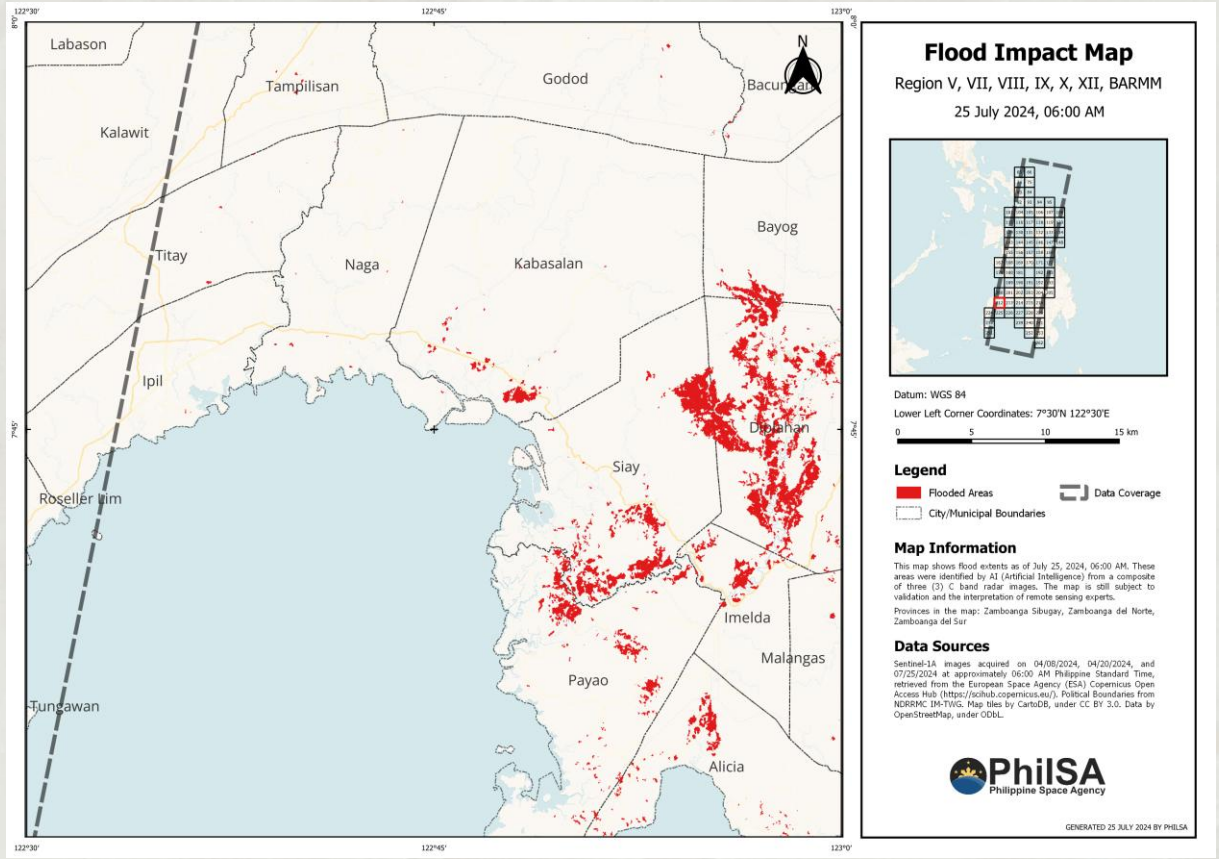
Mapping Disasters and Its Impact

Flood Extent Mapping



23 July 2024



25 July 2024

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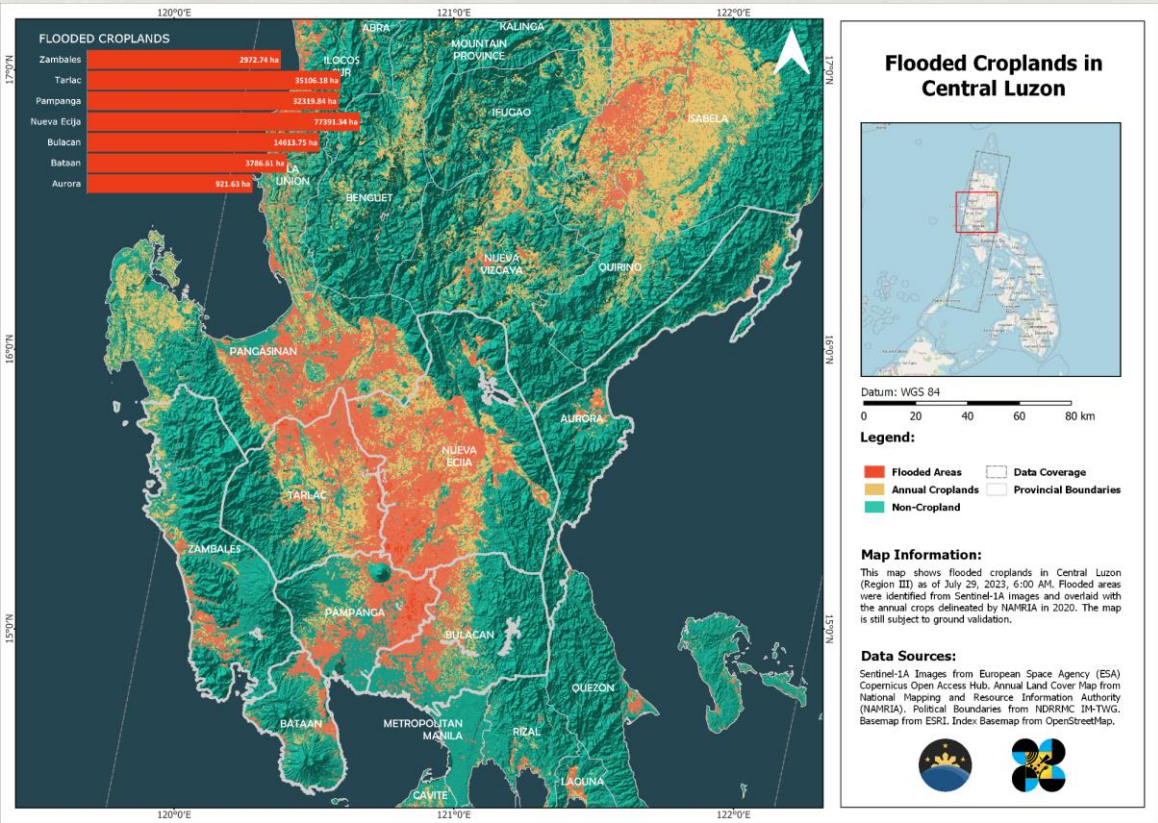
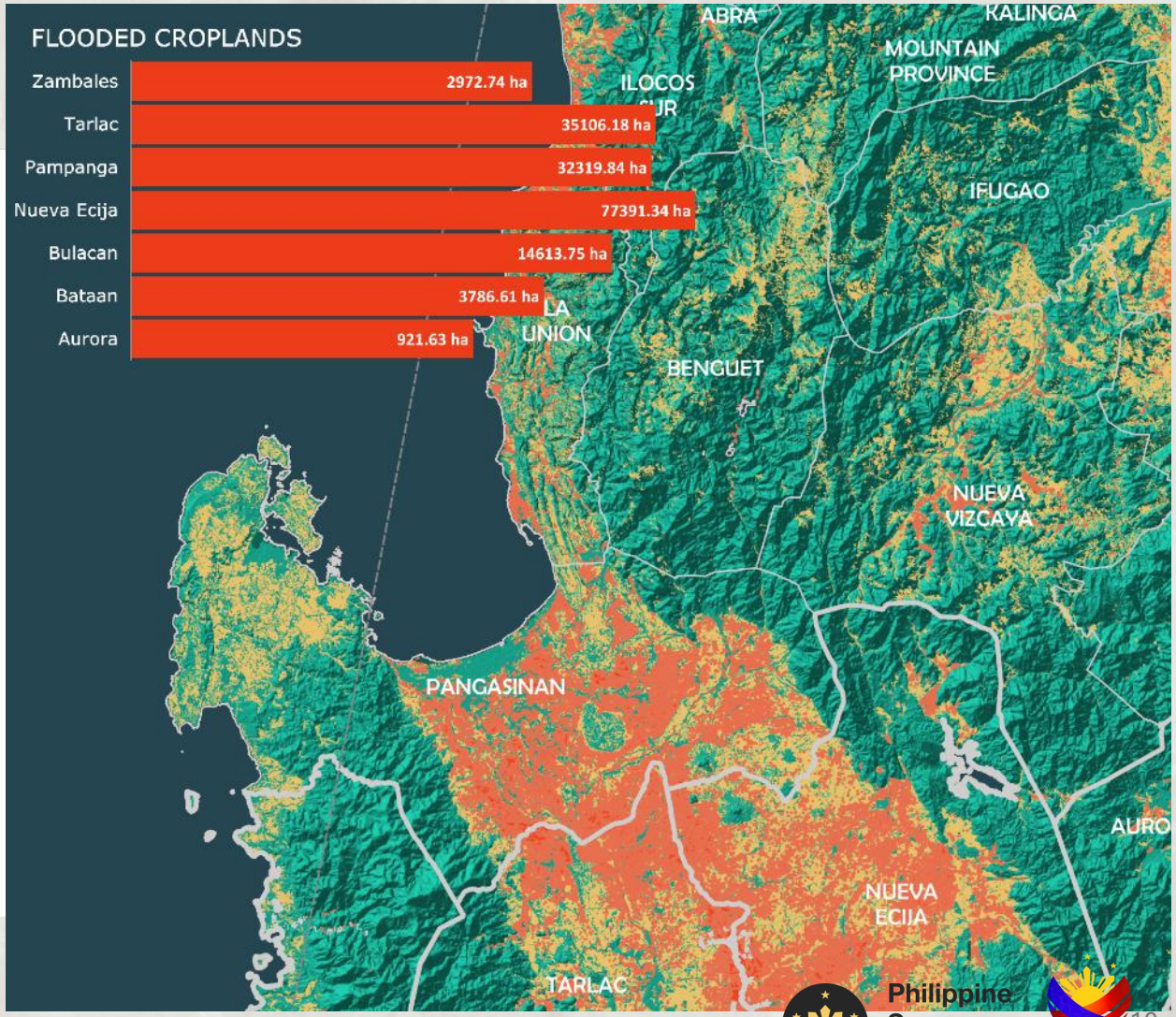
Mapping Disasters and Its Impact

Flood Impact Mapping





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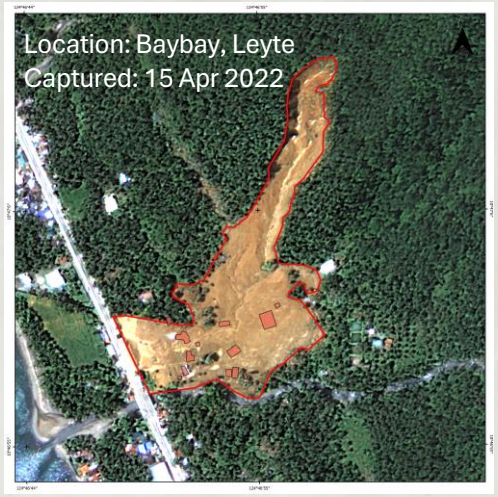
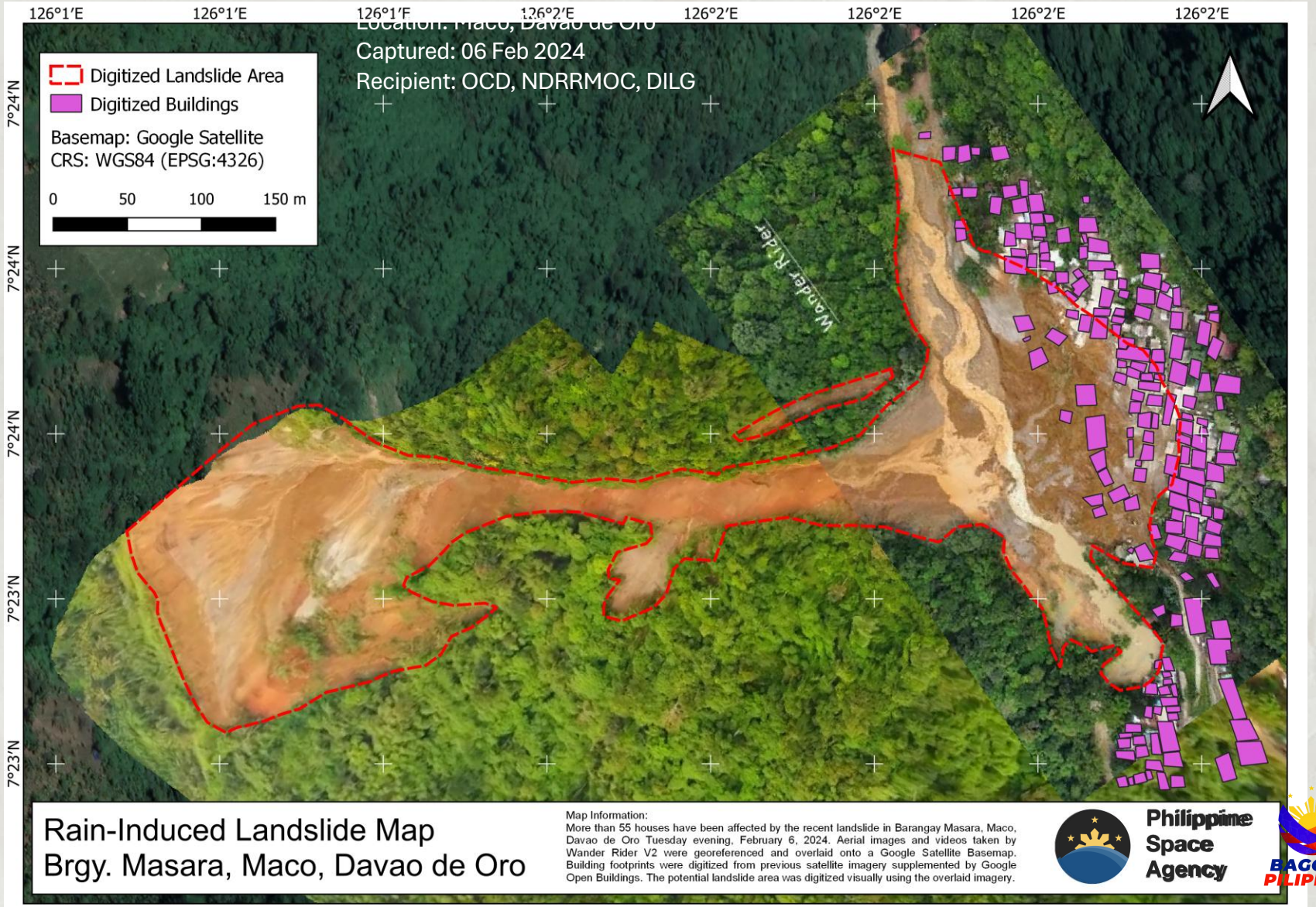
Mapping Disasters and Its Impact

Landslide Monitoring





Mapping Disasters and Its Impact

Enabling Timely Disaster Response

Rapid disaster response in Maco, Davao de Oro landslide (9 February 2024)

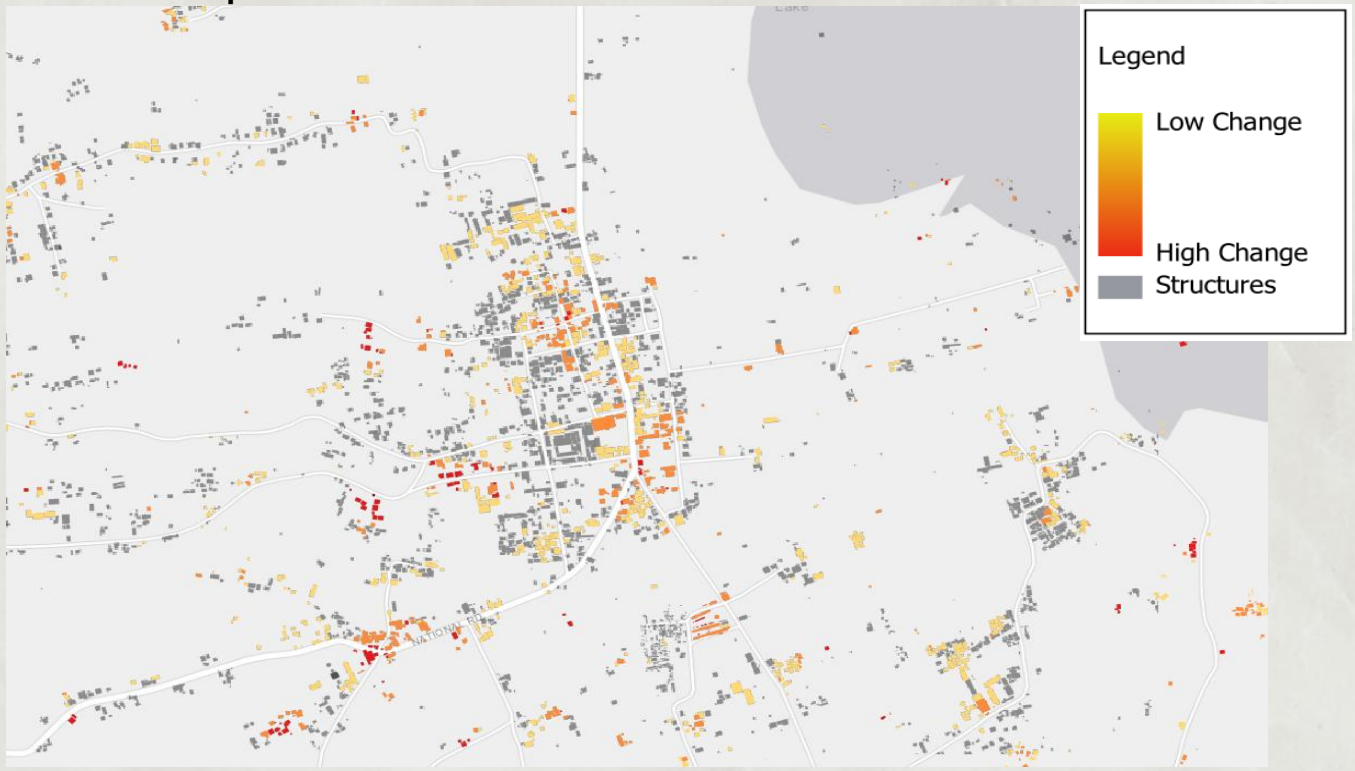
The Philippine Space Agency (PhilSA) generated a rain-induced landslide map of an area near a mining site in Barangay Masara, Maco, Davao de Oro. More than 55 houses were affected by the landslide, which occurred on the evening of 06 February 2024.

It enabled rescuers to prioritize areas for search and rescue.

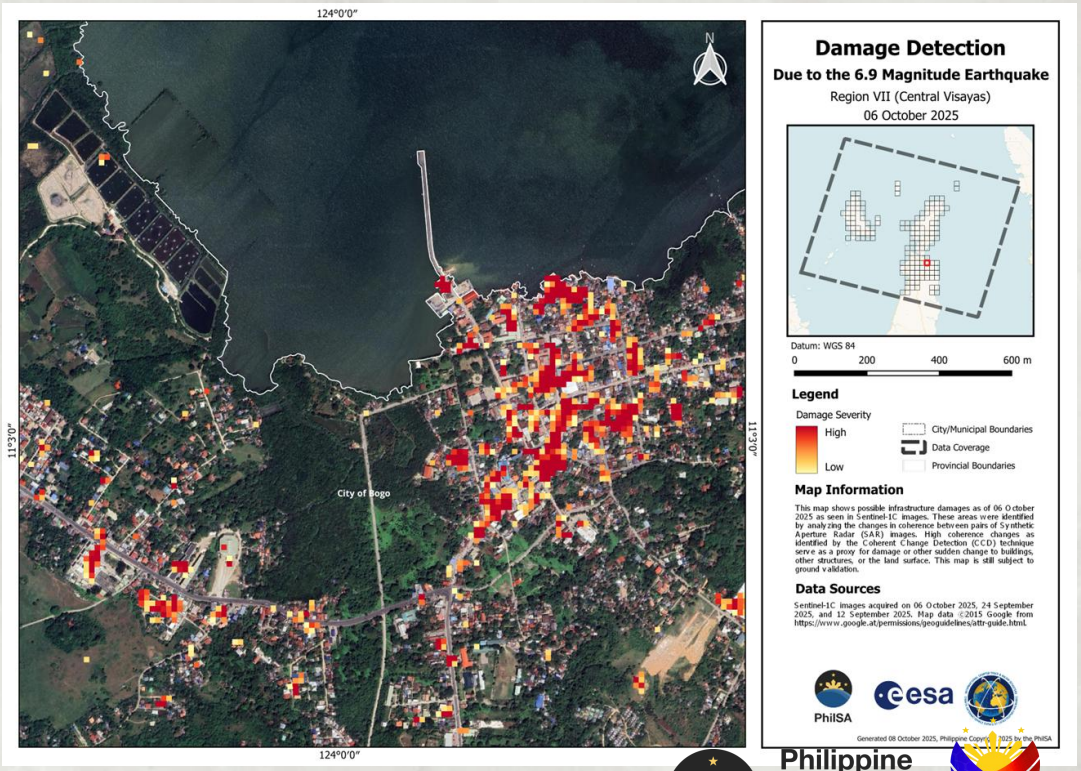
Mapping Disasters and Its Impact

Damage Mapping

Damage estimation using Sentinel-1 images to complement optical imaging during typhoons and earthquakes



Laurel, Batangas
27 October 2024



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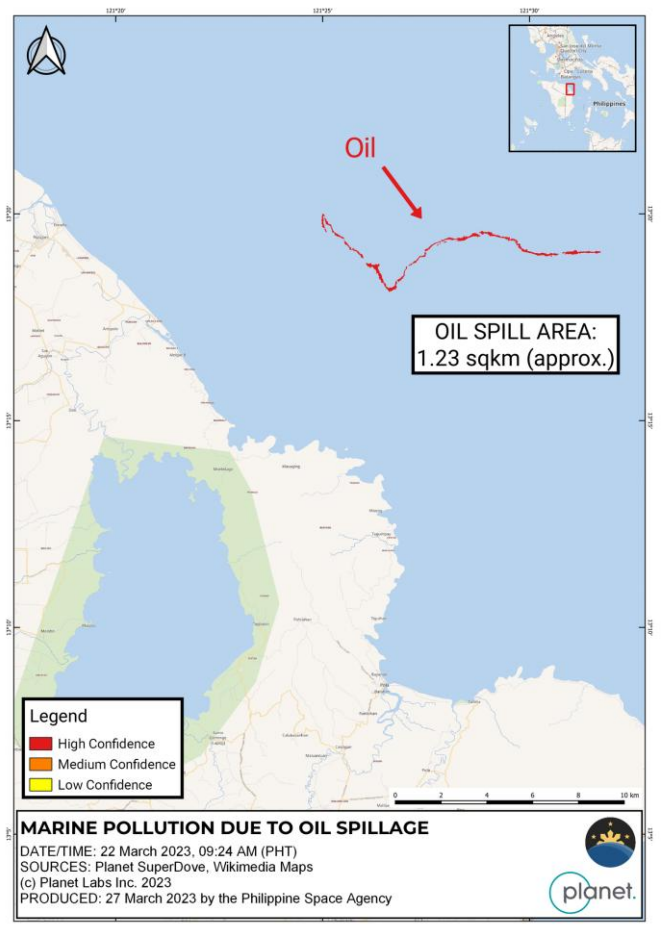
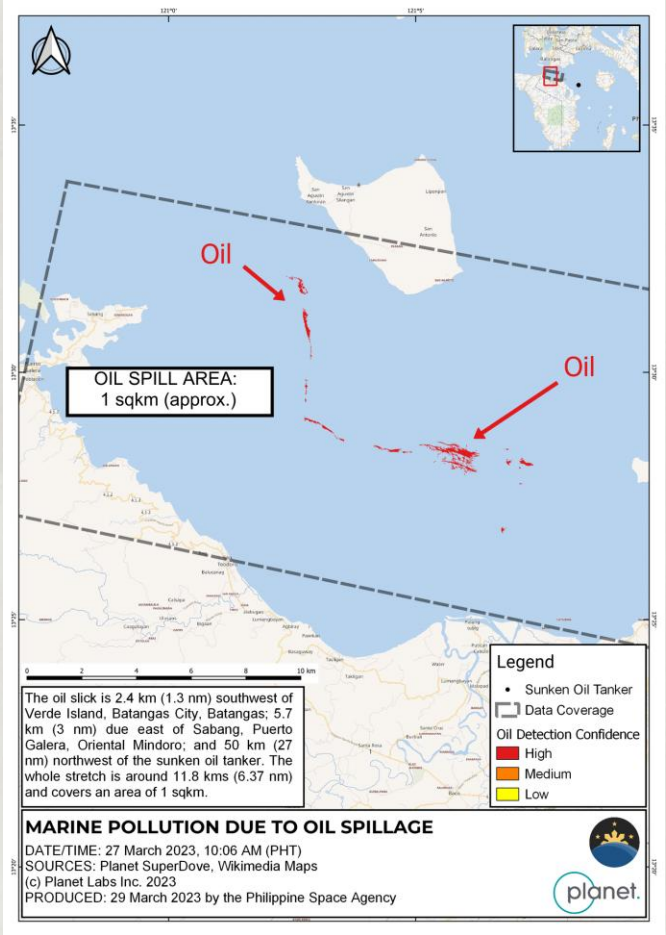
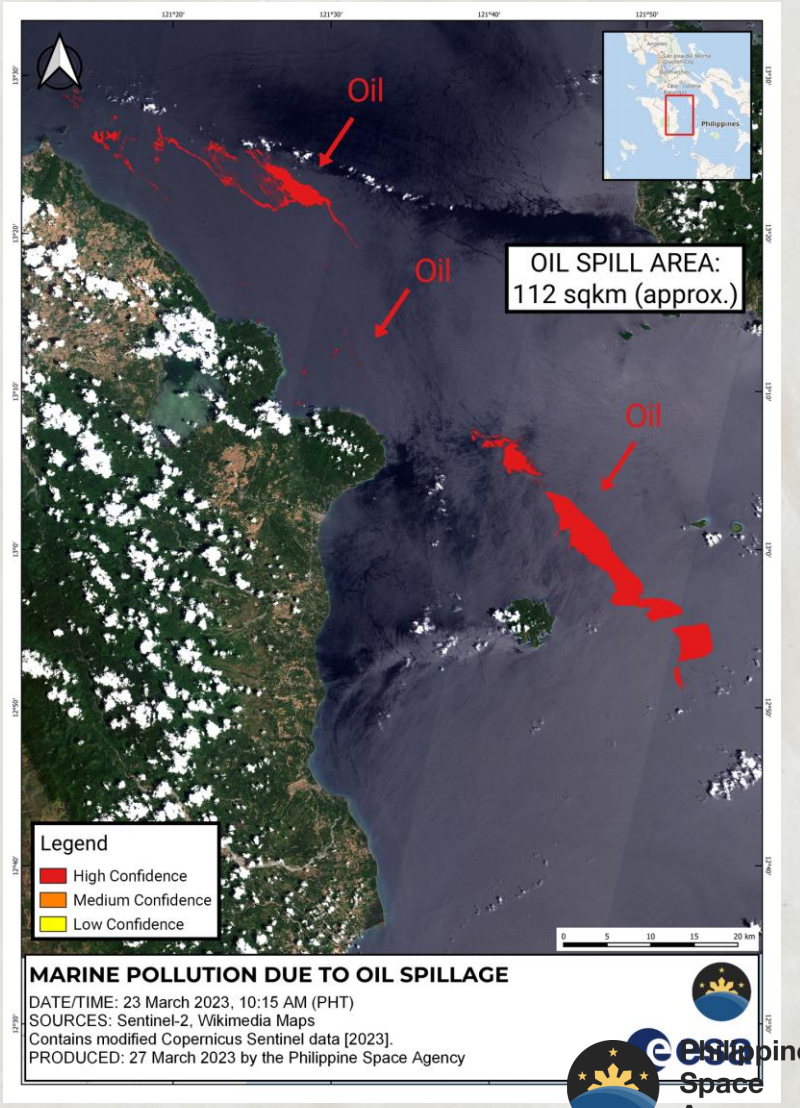
Mapping Disasters and Its Impact

Oil Spill Monitoring







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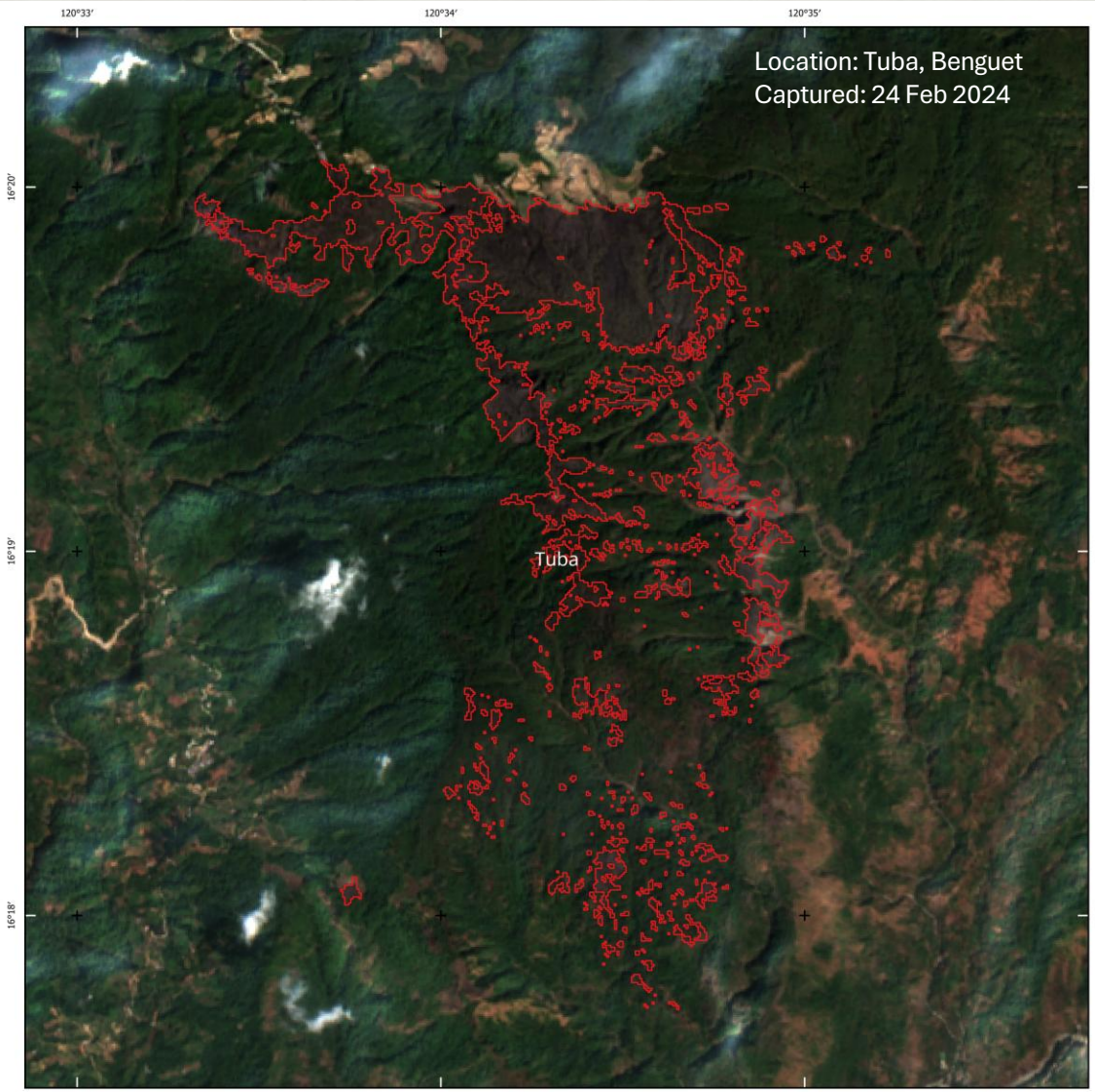
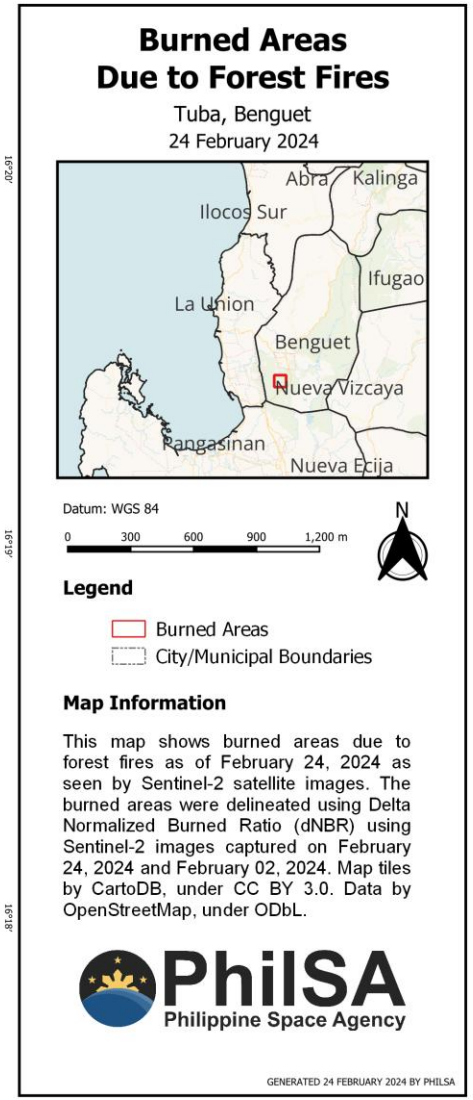
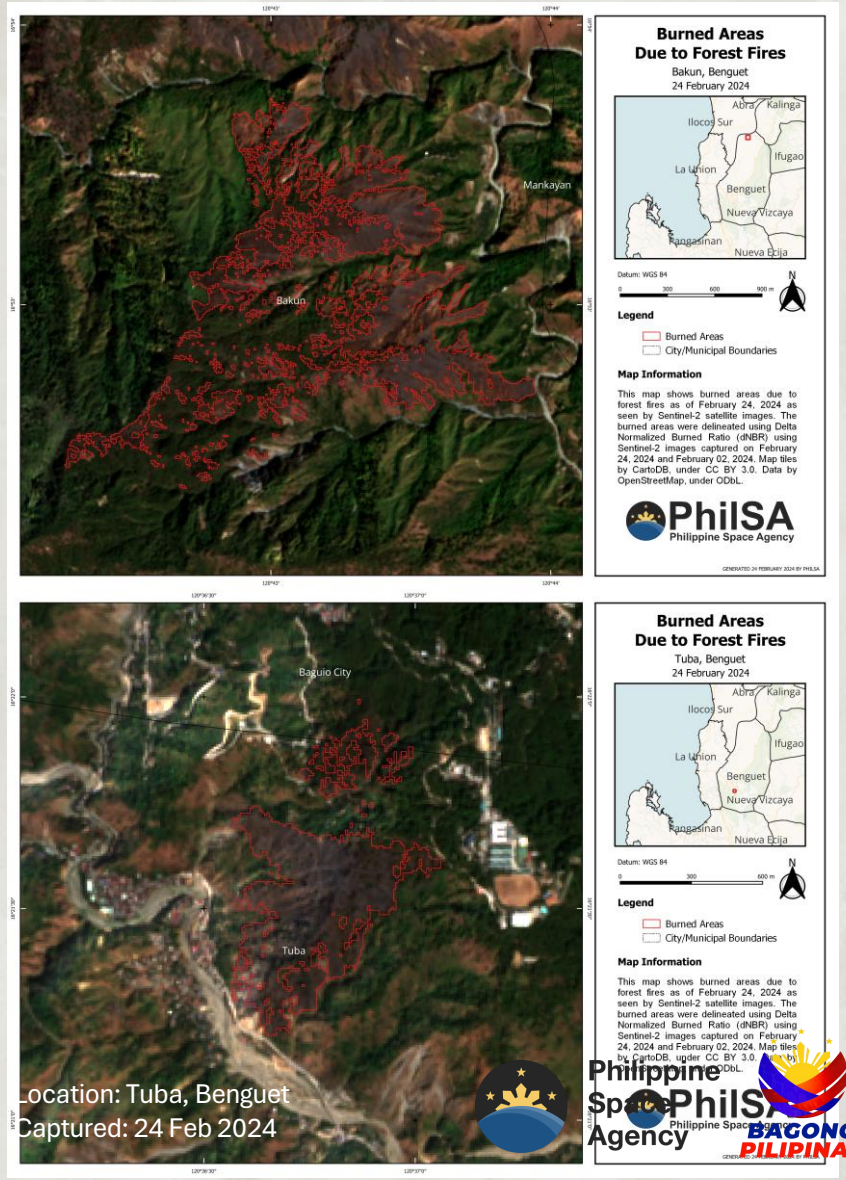
Mapping Disasters and Its Impact

Burned Areas Mapping

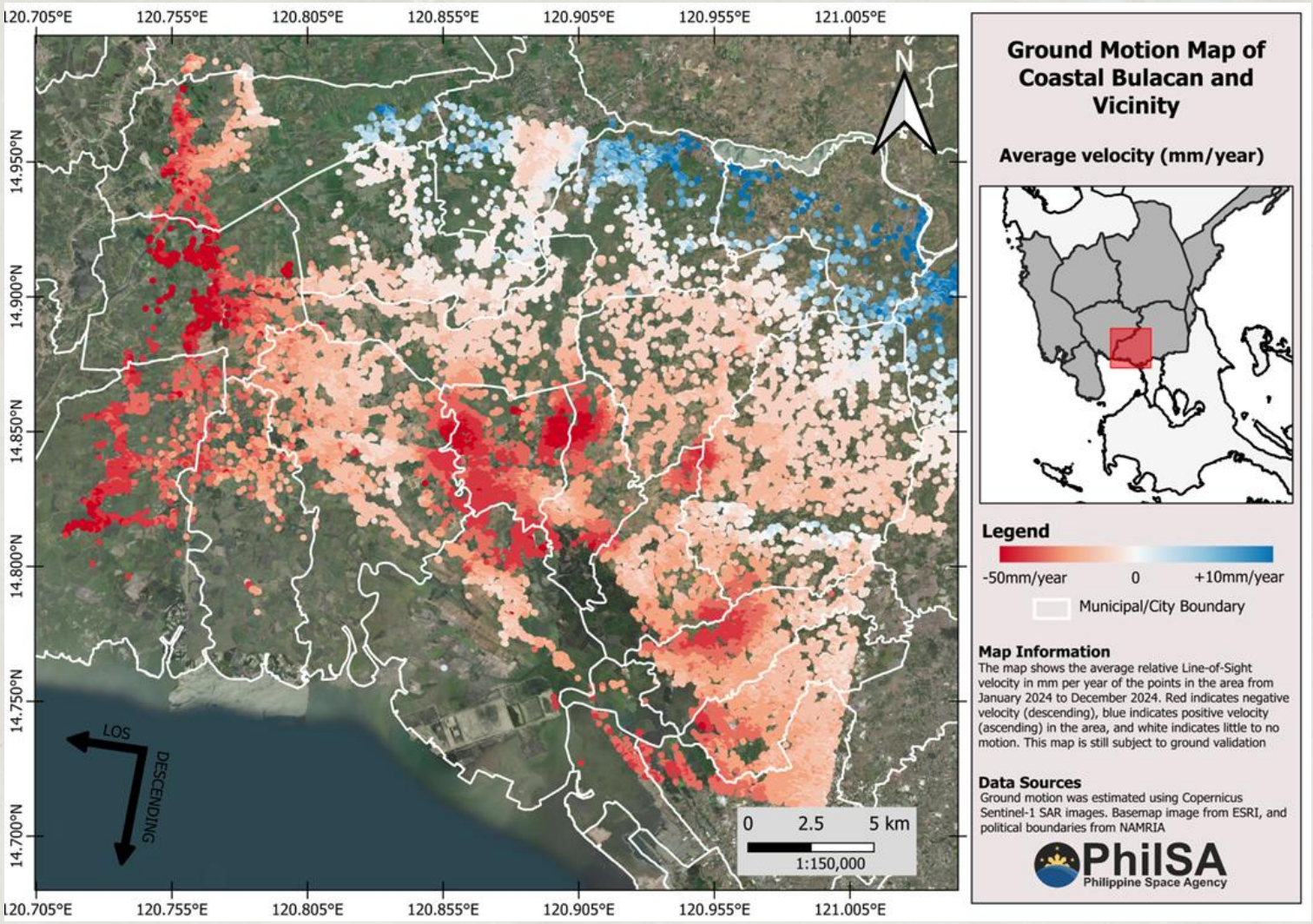






Mapping Disasters and Its Impact

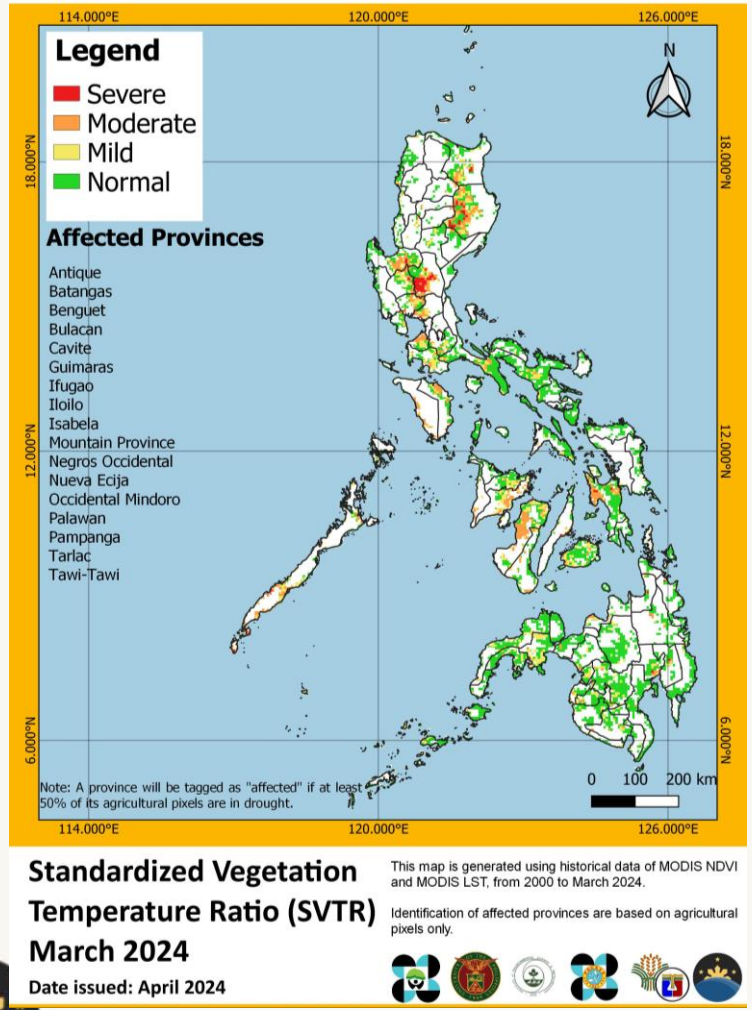
Ground Subsidence Monitoring

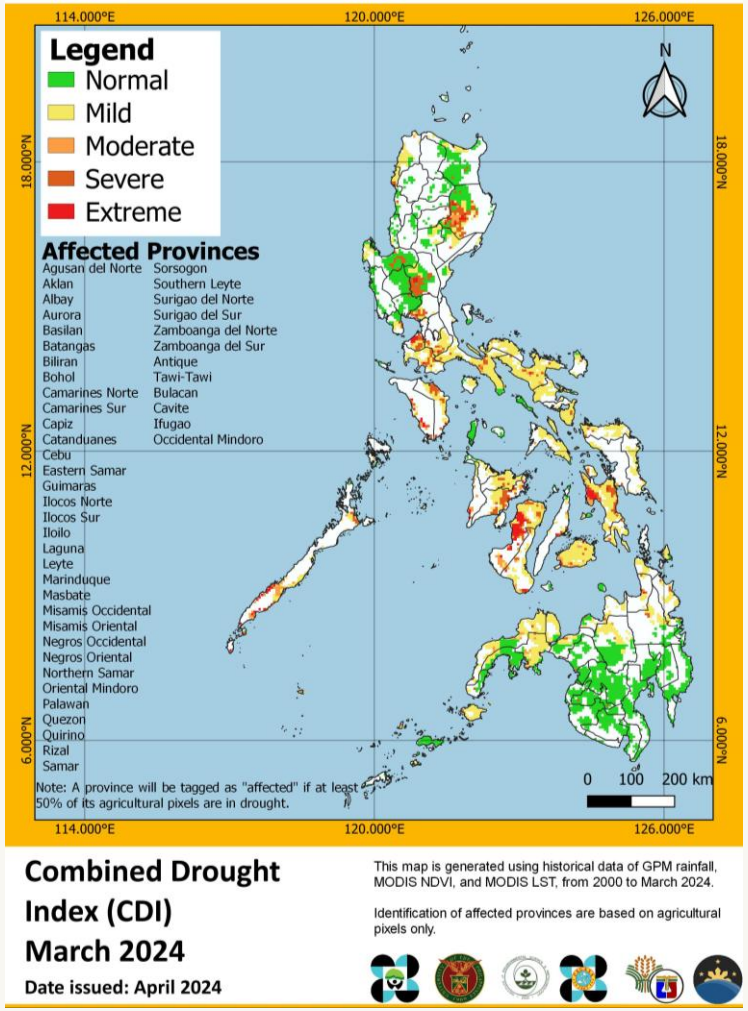


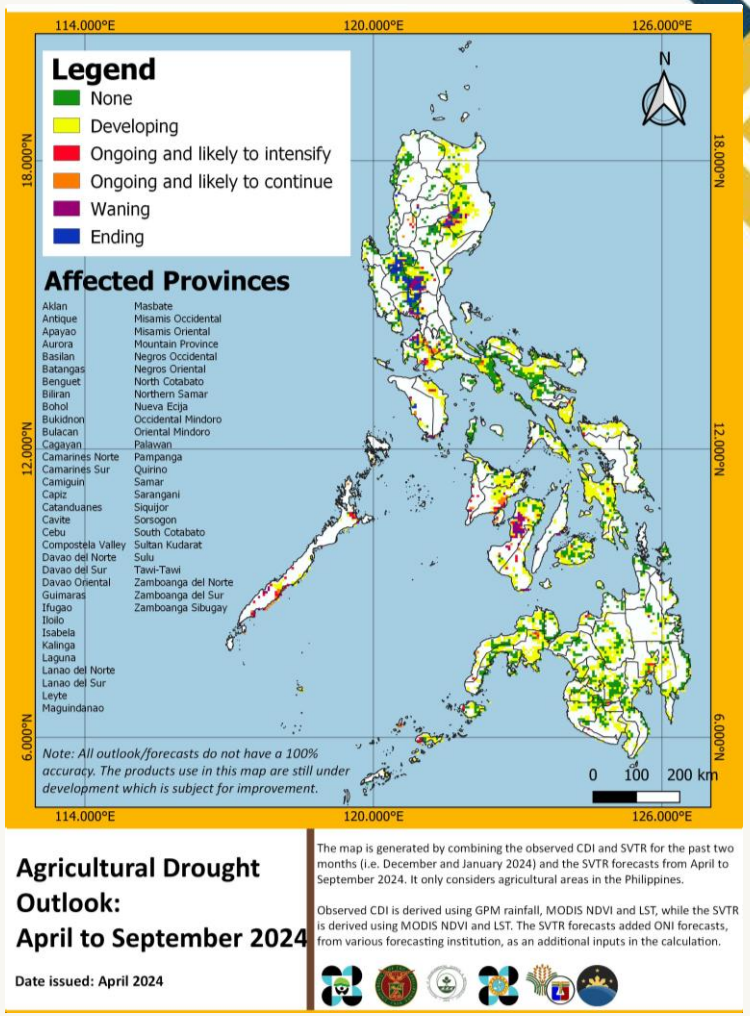
Enhancing preparedness for slow-onset hazards of local governments using space technologies

Mapping Disasters and Its Impact

Agricultural Drought Forecasting







Drought map based on SVTR
from **temperature** and **vegetation health**

Drought map based on CDI
from **rainfall**, **temperature**, and **veg. health**

Drought Outlook map
from **CDI** and **SVTR forecasts**

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Mapping and Monitoring the Country's Environment and Natural Resources

PhilSA uses SST to map and monitor the environment.

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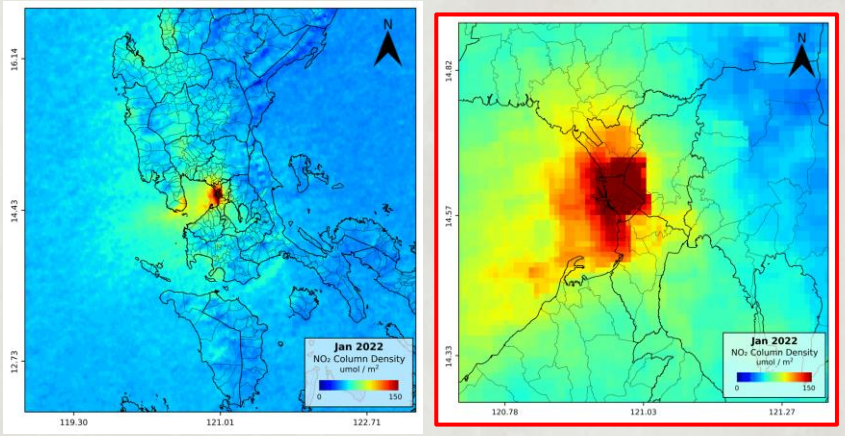
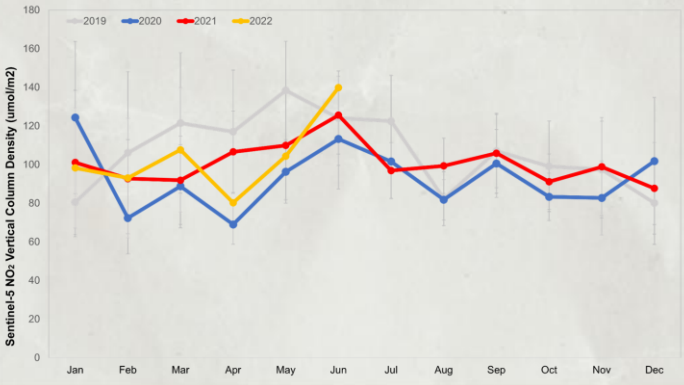
Environmental Health and People Well-being

Monthly to Daily NO_2 and other Trace Gases Nationwide

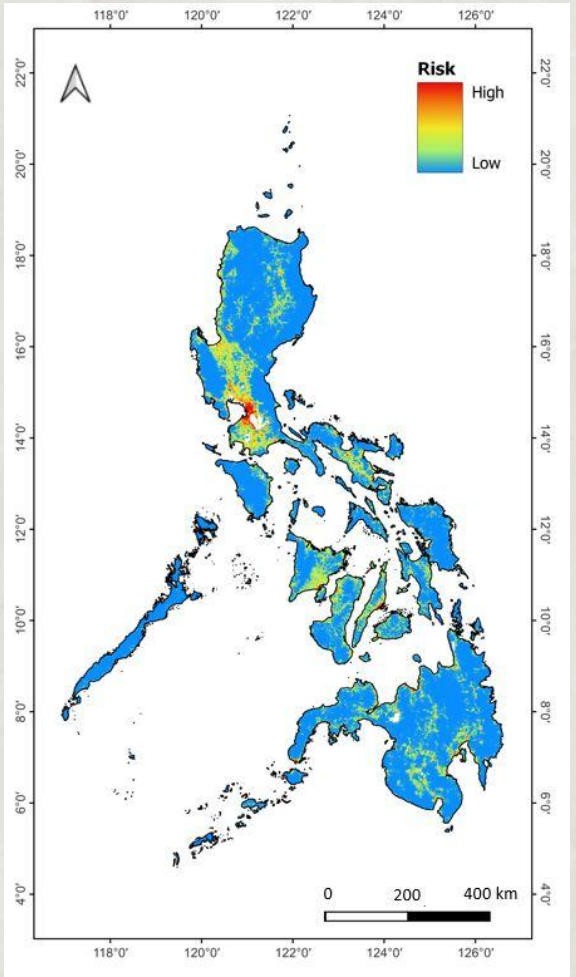
Monitoring of Aerosol, Greenhouse gases and their precursors to aid policy and decision making





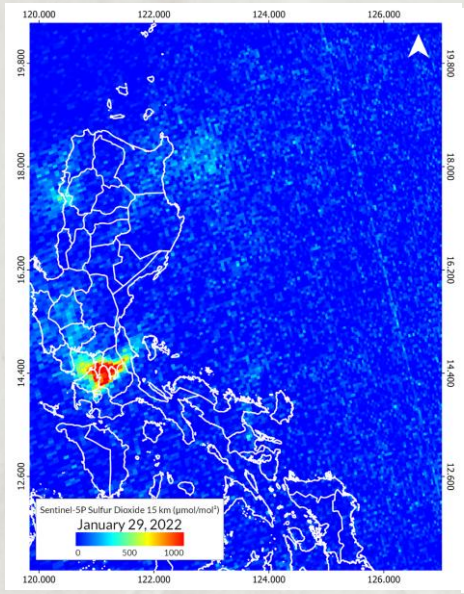
Monthly Urban Heat Health Risk Mapping

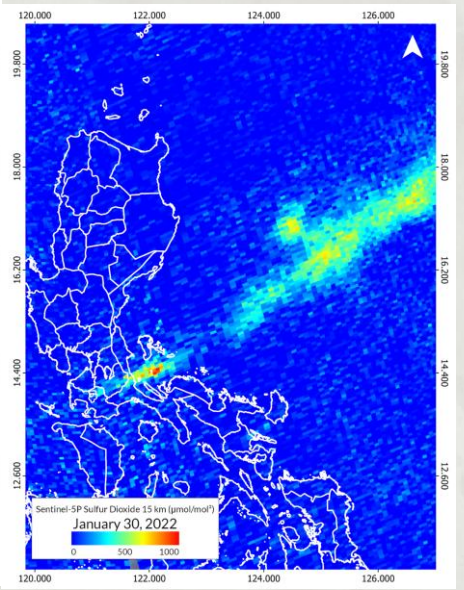
Assessing health hazards caused by Urban Heat for people living in highly-urbanized areas.

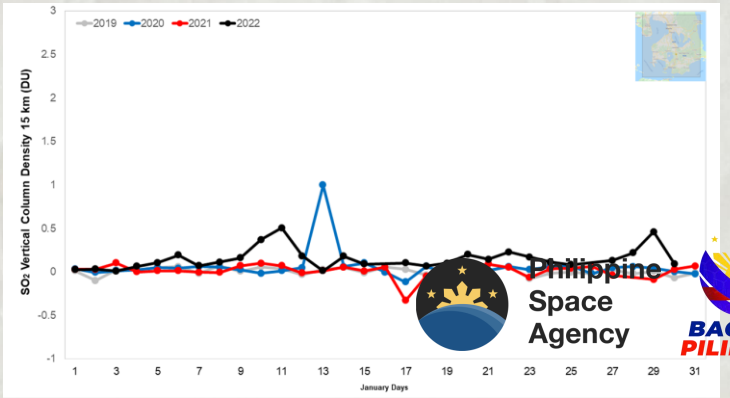


Daily SO_2 Monitoring for Volcanic Emissions

Keeping track of volcanic activity through gaseous emissions







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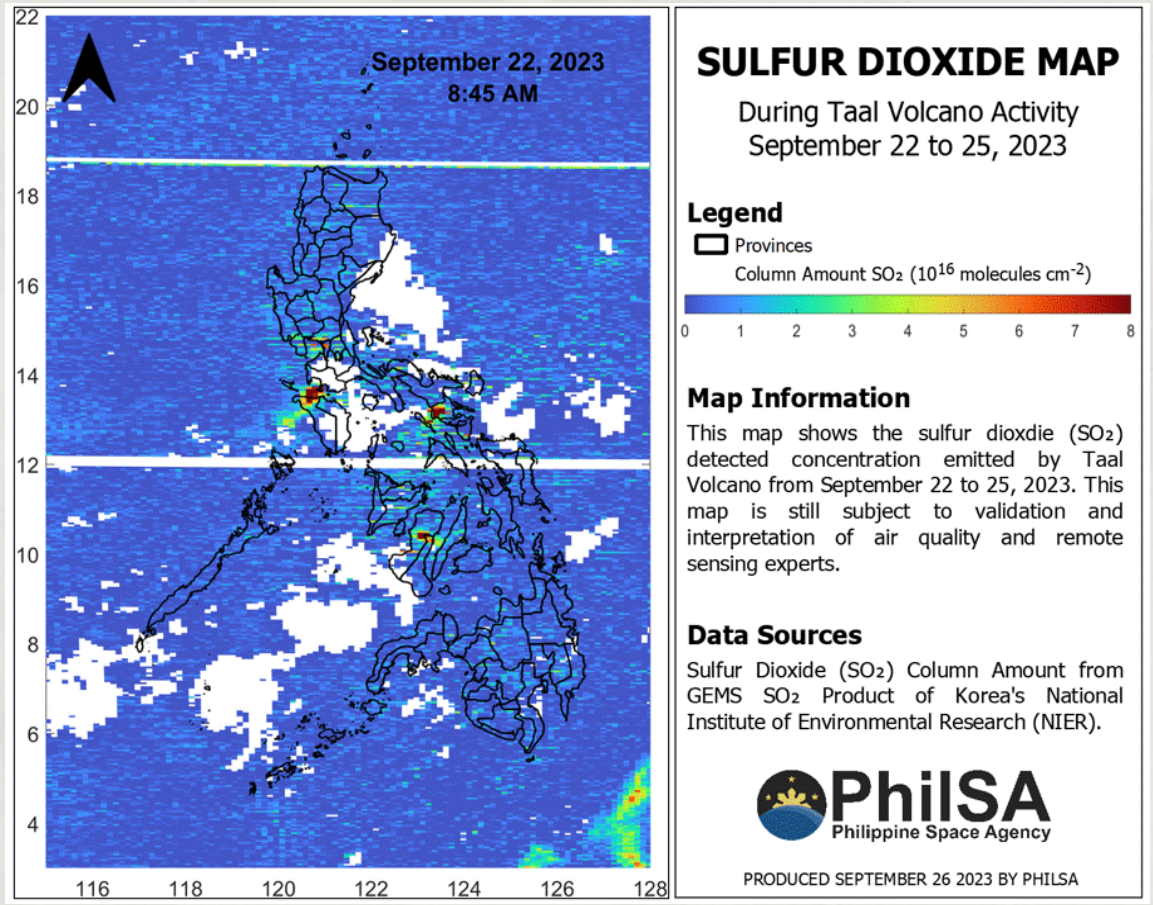
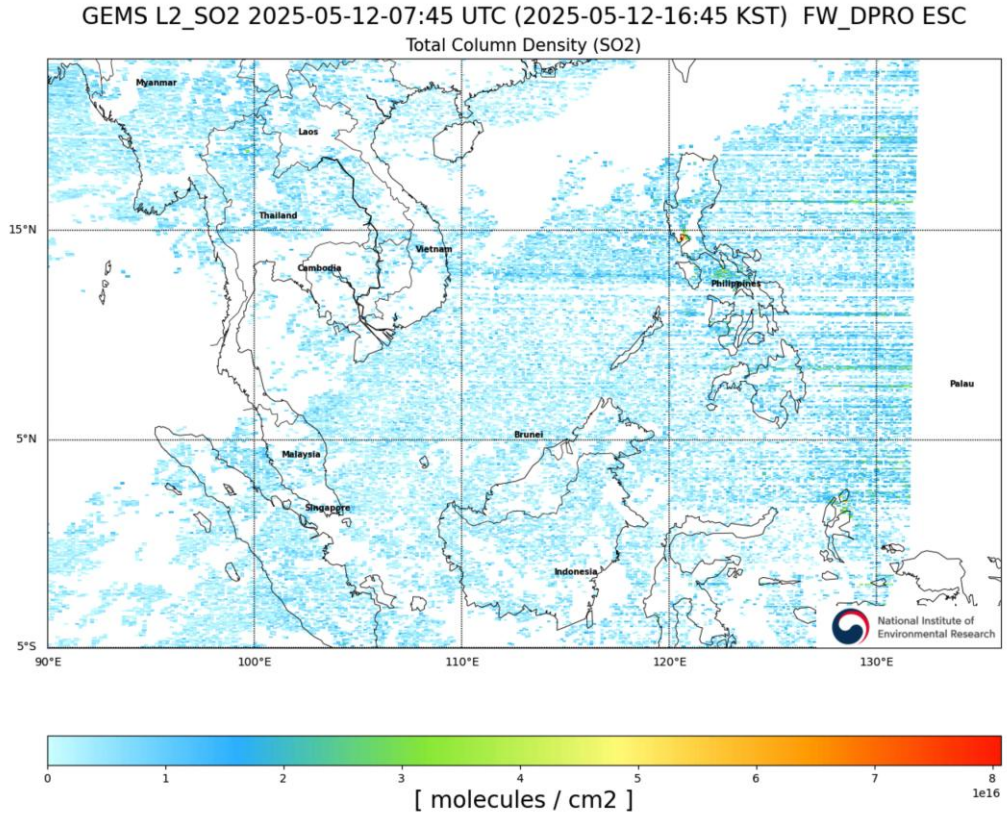
Environmental Health and People Well-being

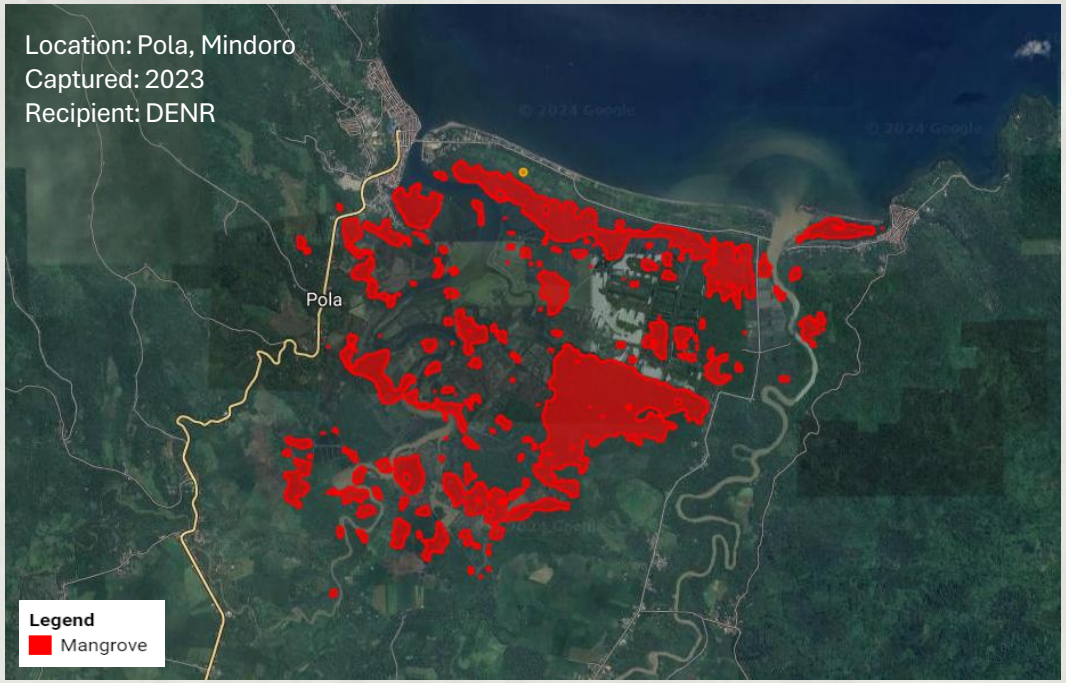


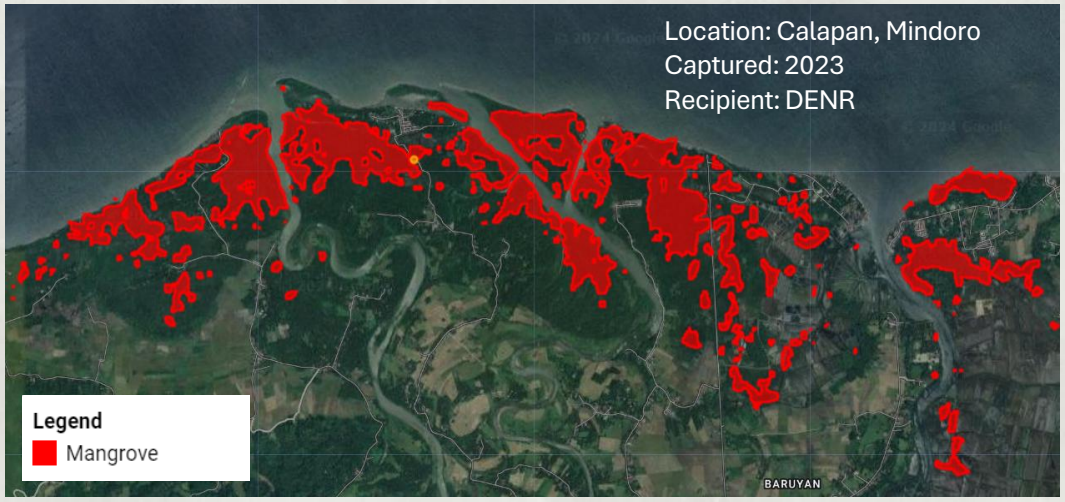
Taal Volcano (September 2023)



Kanlaon Volcano (May 2023)

Natural Resource Mapping





1 NO POVERTY

6 CLEAN WATER AND SANITATION

11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

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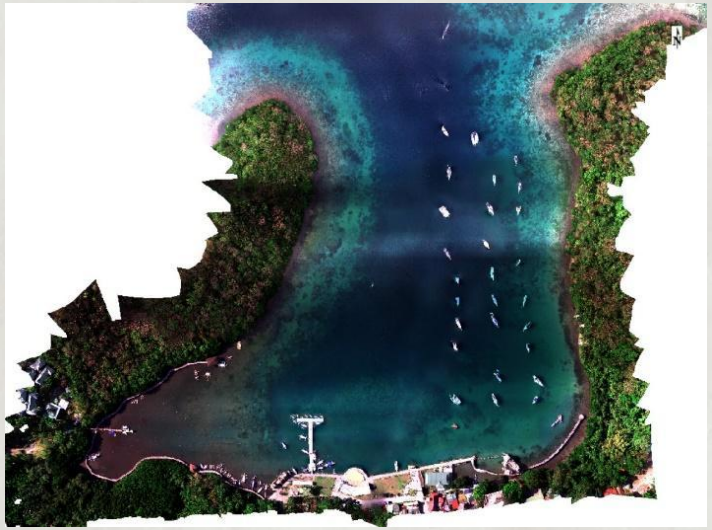
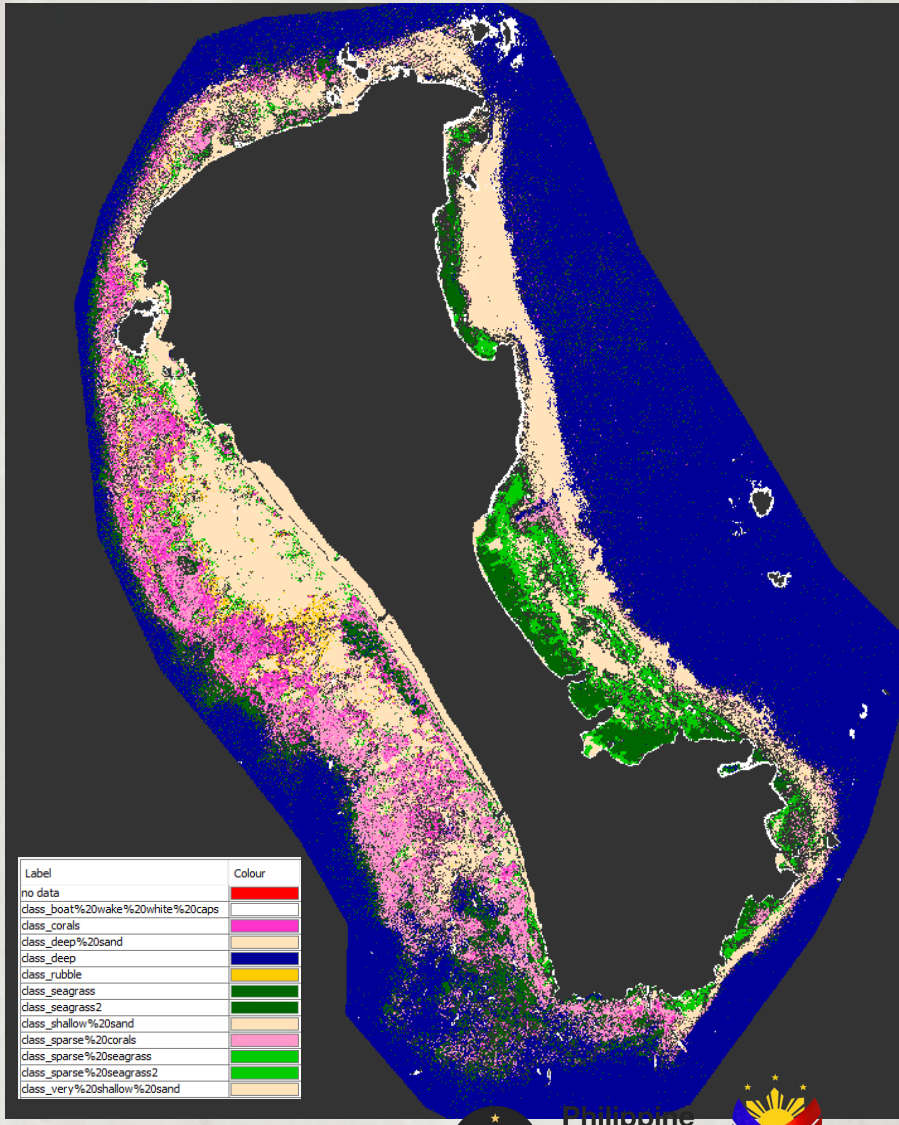
Natural Resource Mapping

Field assessment using drone and underwater cameras



Drone image of the coastal areas in Puerto Galera



Initial benthic habitat map of Boracay

1 NO POVERTY
2 ZERO HUNGER
6 CLEAN WATER AND SANITATION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND

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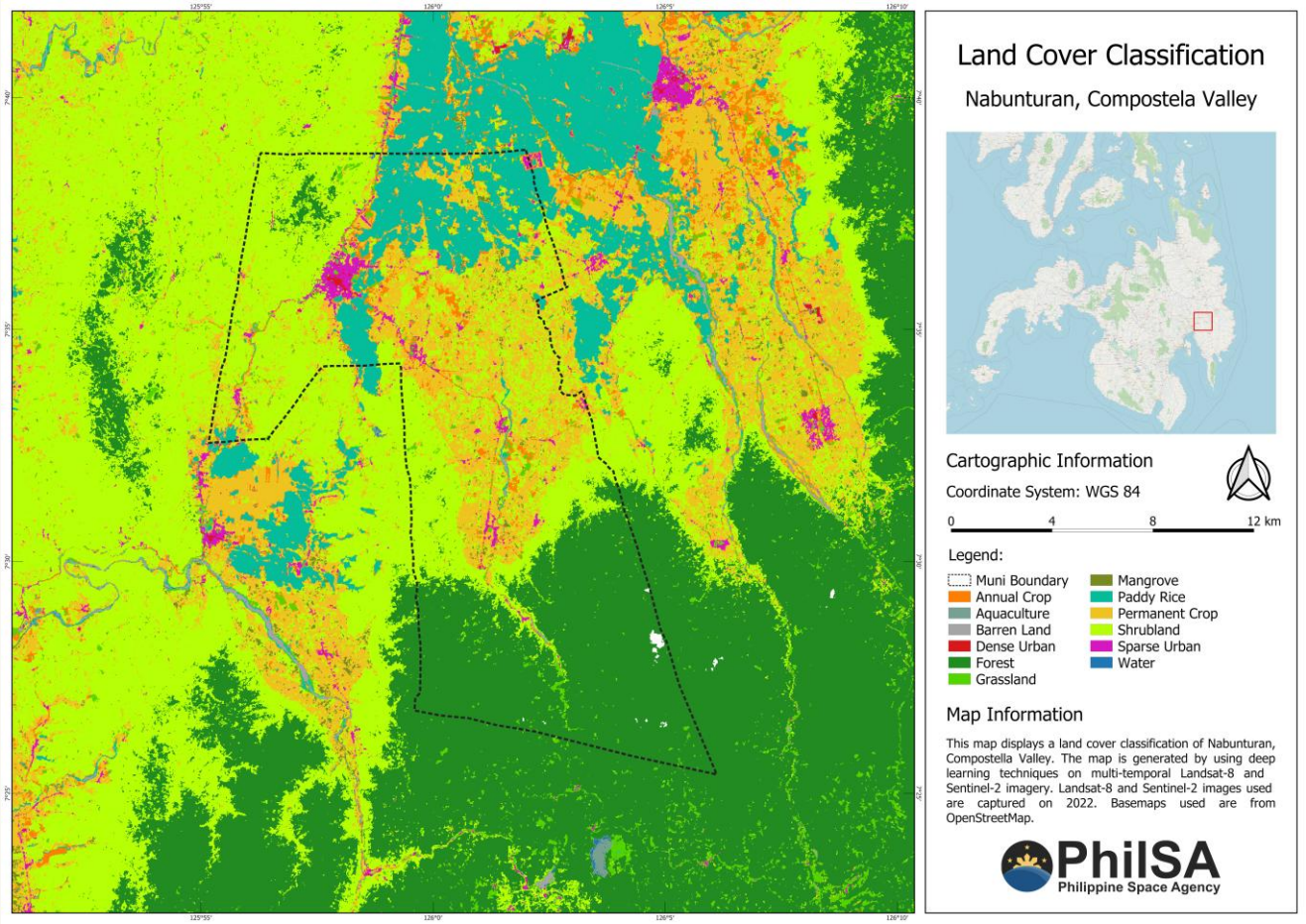
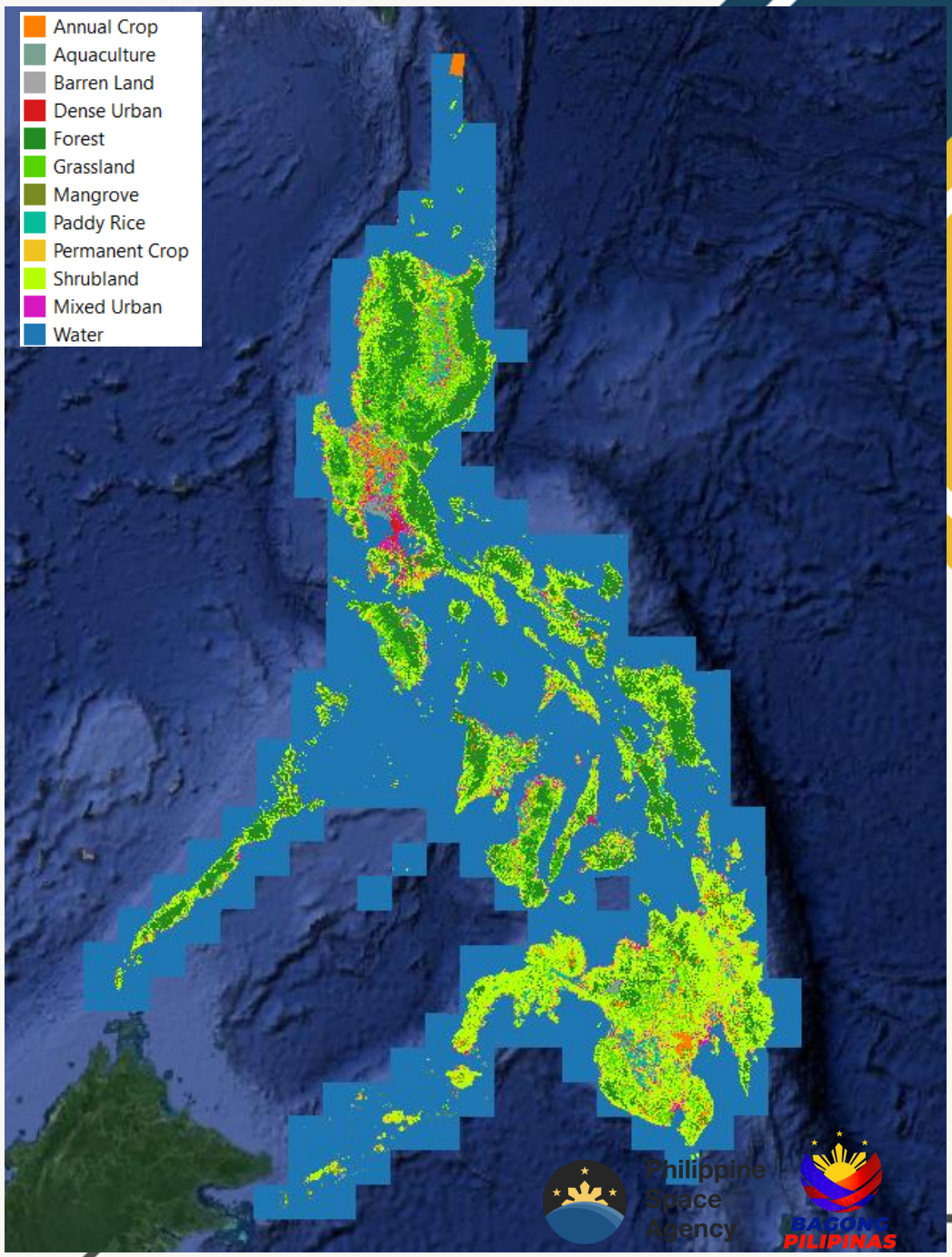
Land Cover Mapping



Location: Nabunturan, Compostela Valley
Captured: 2022
Recipient: Nabunturan LGU



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Mapping and Monitoring Agricultural Areas

PhilSA uses SST to map crops and monitor crop diseases.

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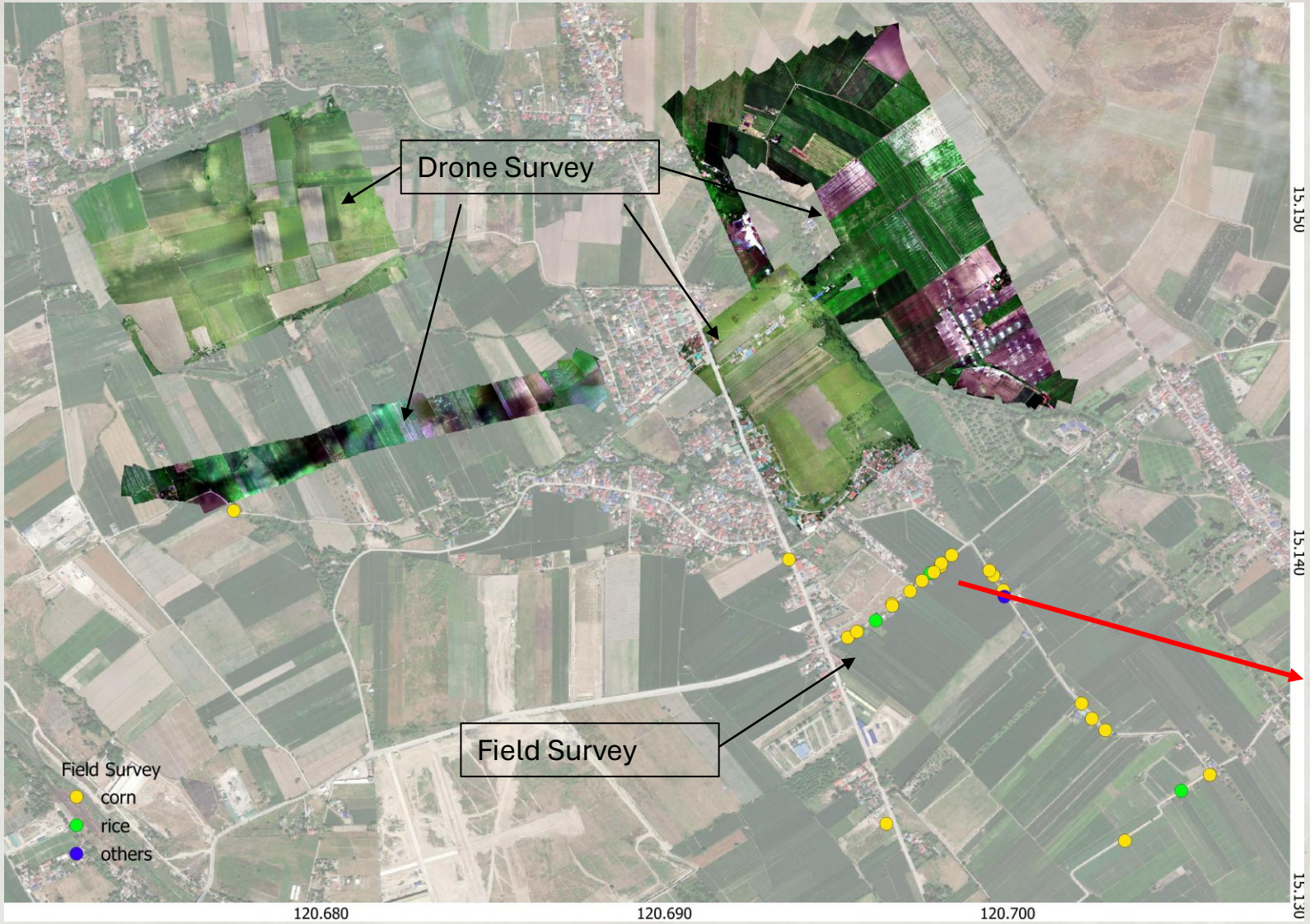
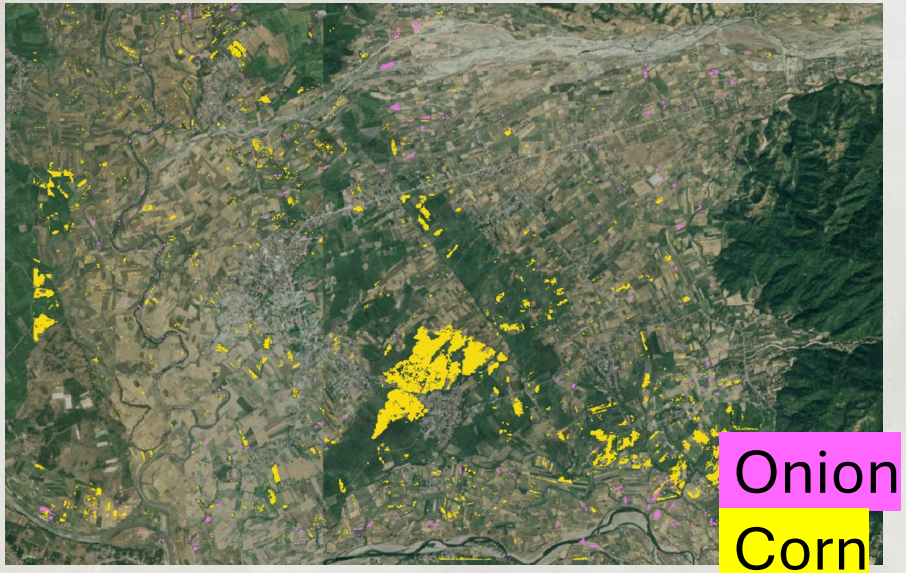
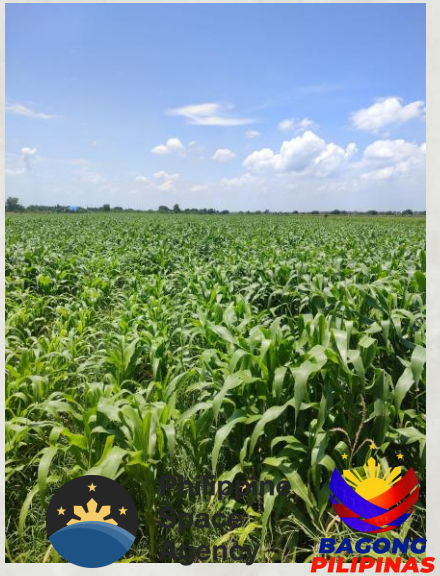
Corn Mapping





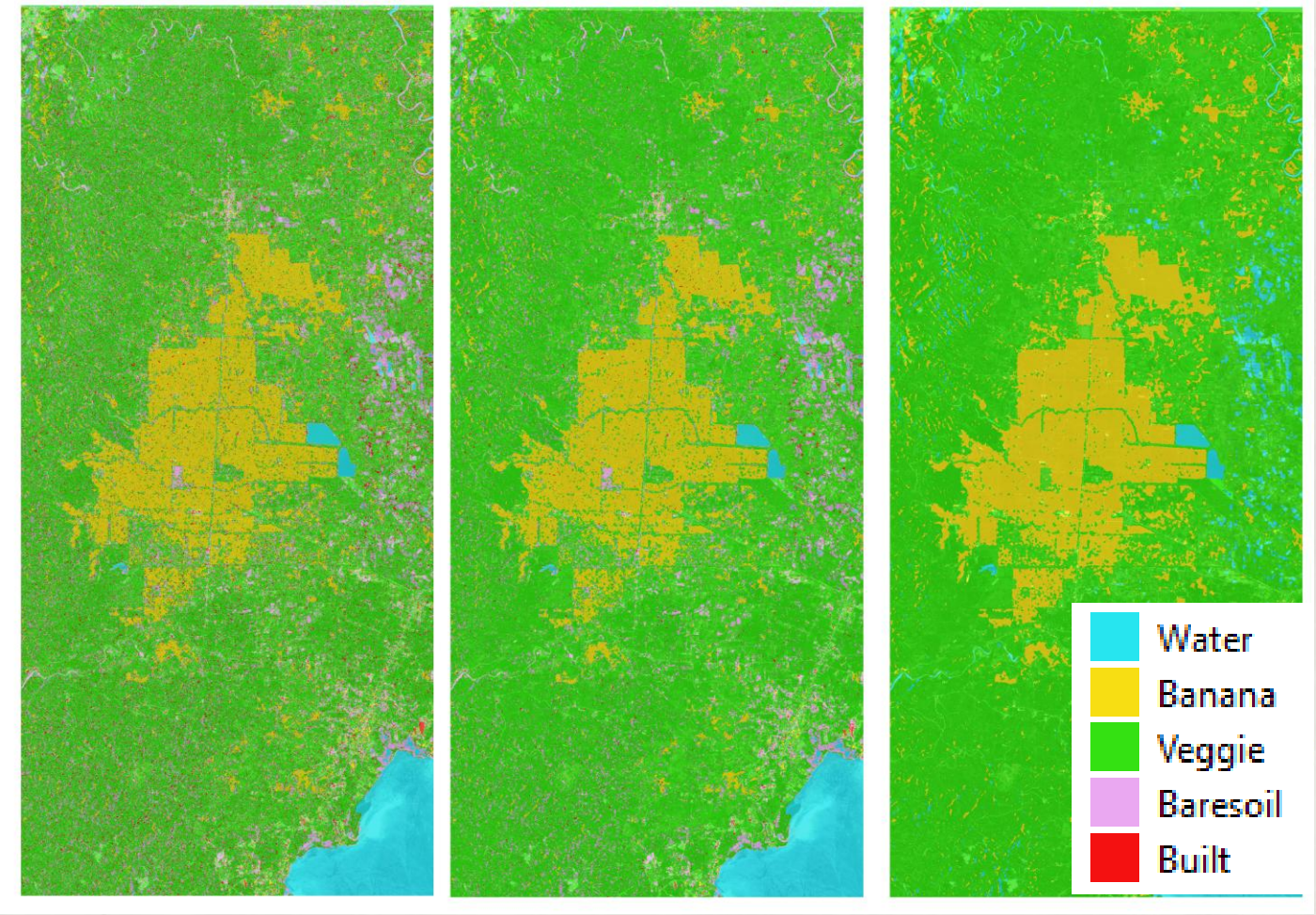
Field Point Data Sample

date_planted (approximate)	2023-05-19
Date sampled	2023-07-19
crop_stage	Vegetative
crop_condition	Normal condition
location-Latitude	15.1394186
location-Longitude	120.6978496
location-Altitude	64.09999847
location-Accuracy	4.15

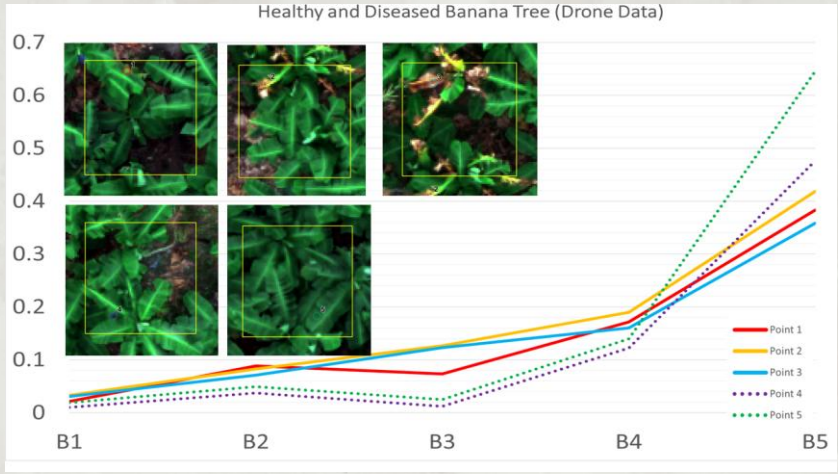


Banana Plantation Mapping

Crop Mapping &
Disease Detection



CART RF SVM



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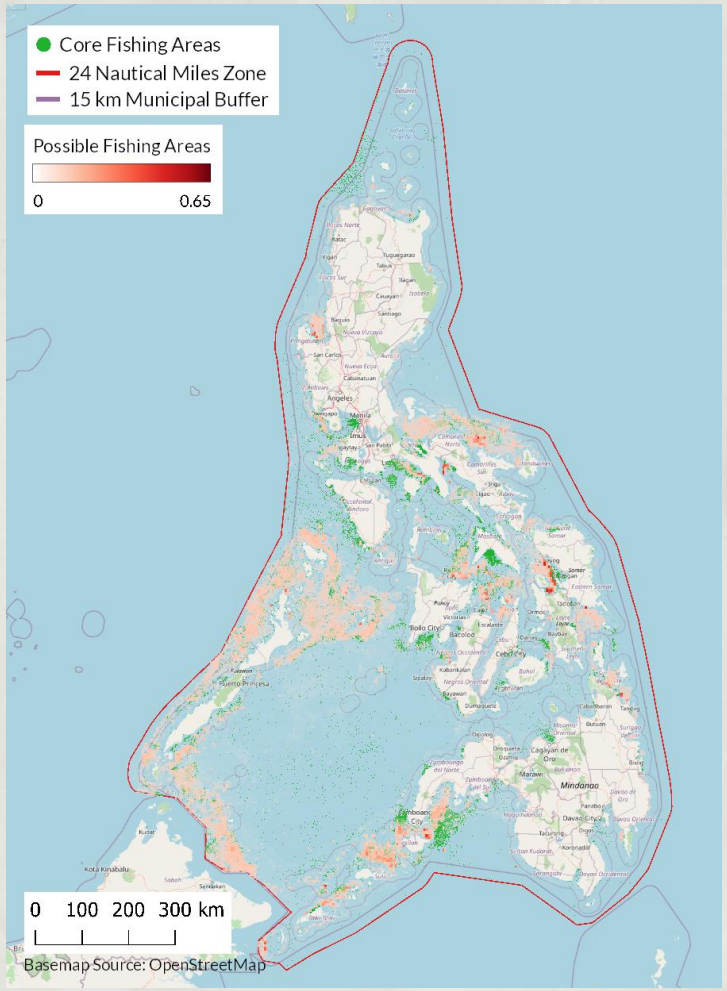
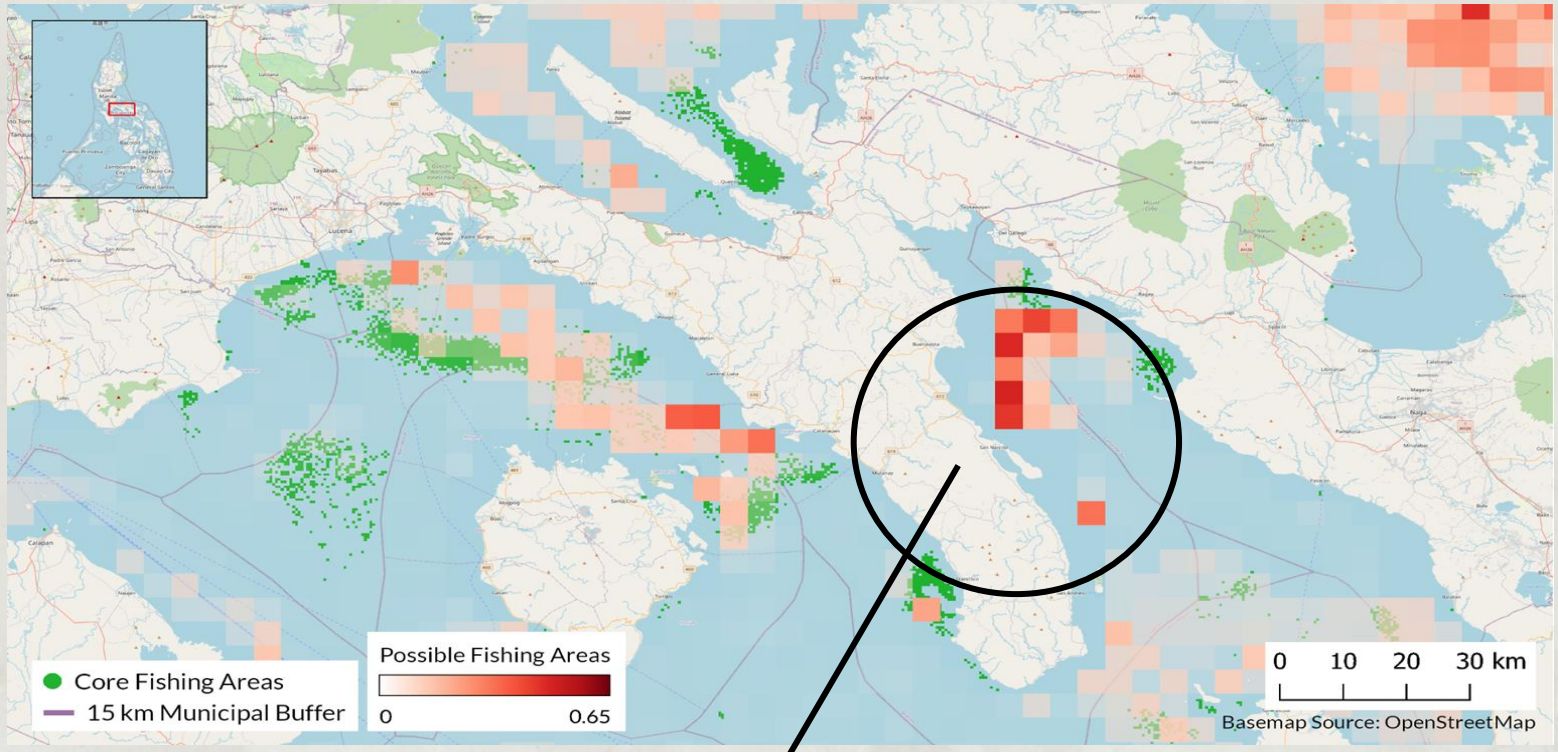
Potential Fishing Zones Prediction



Preliminary Predicted Suitability Map along w/ the CFAs (Quezon and Marinduque)



Identification of NEW potential fishing zones within municipal waters in addition to known core fishing areas

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Monitoring Government Infrastructure

Satellites can also be used to monitor infrastructure.

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Infrastructure Monitoring

Farm-to-Market Road (FMR) Construction progress

Brgy. Masadag, Sinait, Ilocos Sur

Planet (3m resolution)

14 May 2023 Skysat (0.5m resolution)

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Infrastructure Monitoring

Construction progress monitoring

Pangil Bay Bridge (Misamis Occidental-Lanao del Norte)
Sentinel-2 (10m resolution)

Road Dike/Esplanade (Occidental Mindoro)
Sentinel-2 Super-resolution (1m resolution)

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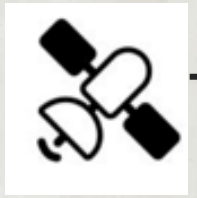
The Space Value Chain

Satellites and Upstream Infrastructure



Data and Services Suitably Accessible

Ground Infrastructure for Downloading and Hosting

Capacity to Analyze and Generate Insights

Ability to Mobilize and Act

Socio-economic Value and Benefit Realized

Supporting the Space Data Value Chain			
Research and Development	Education and Capacity-Building	Public Outreach	Policy, Planning and International Cooperation

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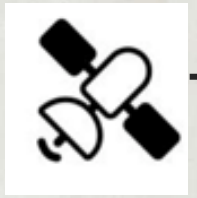
Adapted from: Current and future value of earth and marine observing to the Asia-Pacific region, Australian Government | Asia-Pacific Economic Cooperation

The Space Value Chain

Satellites and Upstream Infrastructure



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Adapted from: Current and future value of earth and marine observing to the Asia-Pacific region, Australian Government | Asia-Pacific Economic Cooperation

Ability to Mobilize and Act

- Benthic Habitat
- Land Use and Human Settlement Monitoring
- Accelerated Electrification Plan
- CopPhil Copernicus Administrative Arrangement
- CopPhil Copernicus Technical Operating Arrangement
- Digital Agri Project
- Application of Japanese ALOS2/PALSAR2 Satellite Data for Environmental Monitoring Environment and Natural Disaster
- Mindanao Socio-Economic Development
- Protection and Management of Marine Biodiversity
- Community, Conservation, and Natural Climate Solutions
- Monitoring Power Assets
- Analytics for Agri-Financing
- Farming-related insurance
- Digital Information for Monitoring and Evaluation
- RGIN – use of GIS for regional development and planning

Philippine Space Agency

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

Philippine Space Agency

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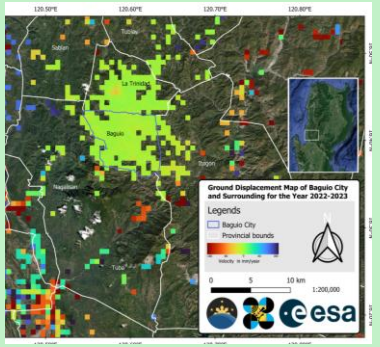
National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

PhilSA

Ursula von der Leyen
European Commission President

"We're currently setting up a so-called **Copernicus data mirror site within the Philippine Space Agency**. And we have just signed an agreement **to boost the flow on Earth observation data between us.** This is very important for early warning, for example, for extreme weather phenomenon and to improve the climate resilience. **This is a first in space cooperation in Asia.**"

CopPhil Pilot Projects



Ground Motion Monitoring

Land cover (LC) and Forest Mapping Service

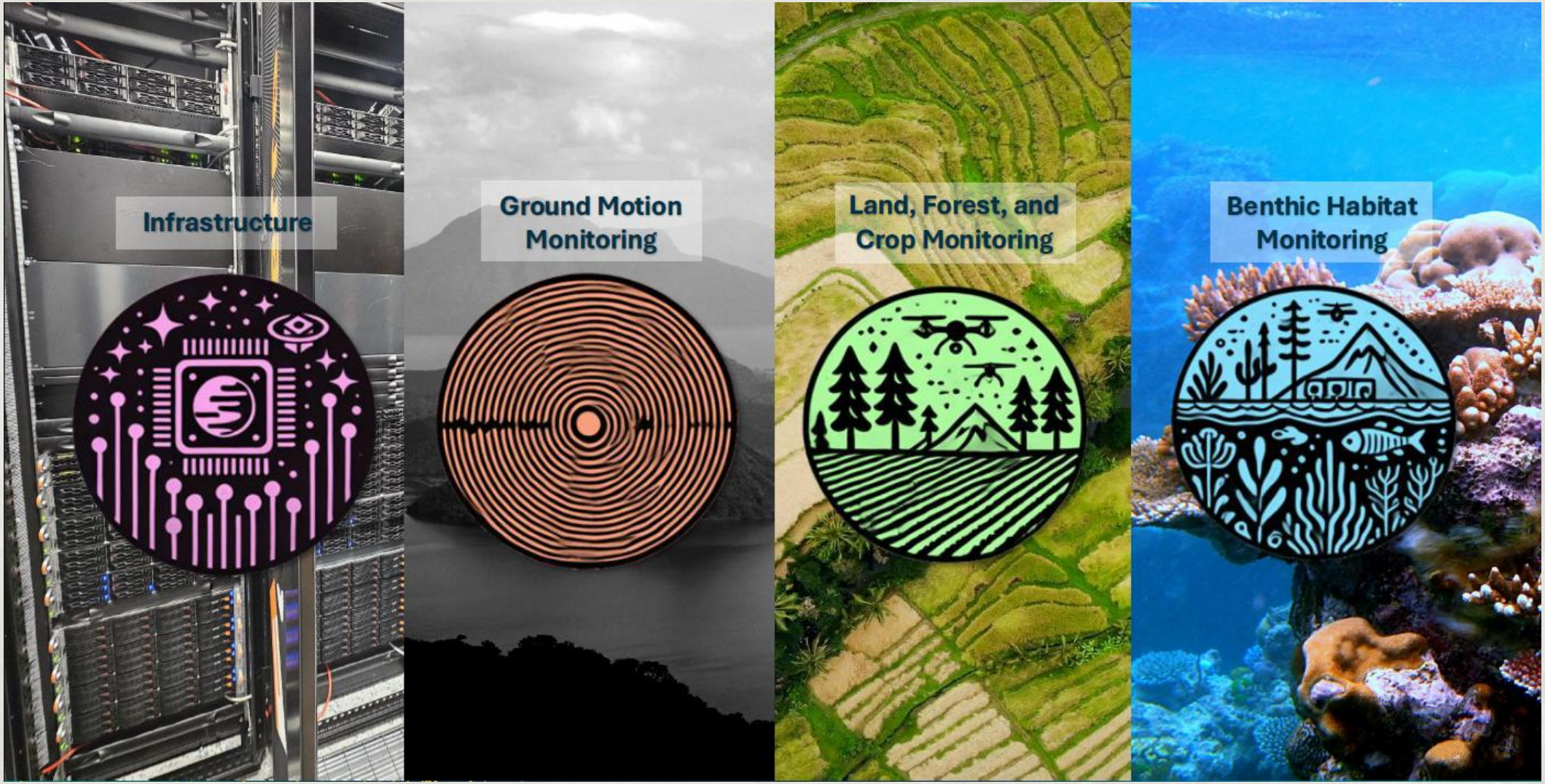
Benthic Habitat Monitoring Service

PhilSA – European Commission
Copenicus Administrative Arrangement

PhilSA – ESA
Copernicus Technical Operating Agreement

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

PhilSA



National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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Copernicus Mirror Site

- CopPhil **deployed a local infrastructure** dedicated to the efficient distribution of large datasets in a controlled cloud environment.
- Offering **open-source tools and a software** optimised for discovering, cataloguing, and using Earth Observation data
- The CopPhil Infrastructure provides **free, open, and immediately accessible information** services through a **Copernicus Data Centre**.

https://infra.copphil.philsa.gov.ph/

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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Copernicus Mirror Site

https://infra.copphil.philsa.gov.ph/

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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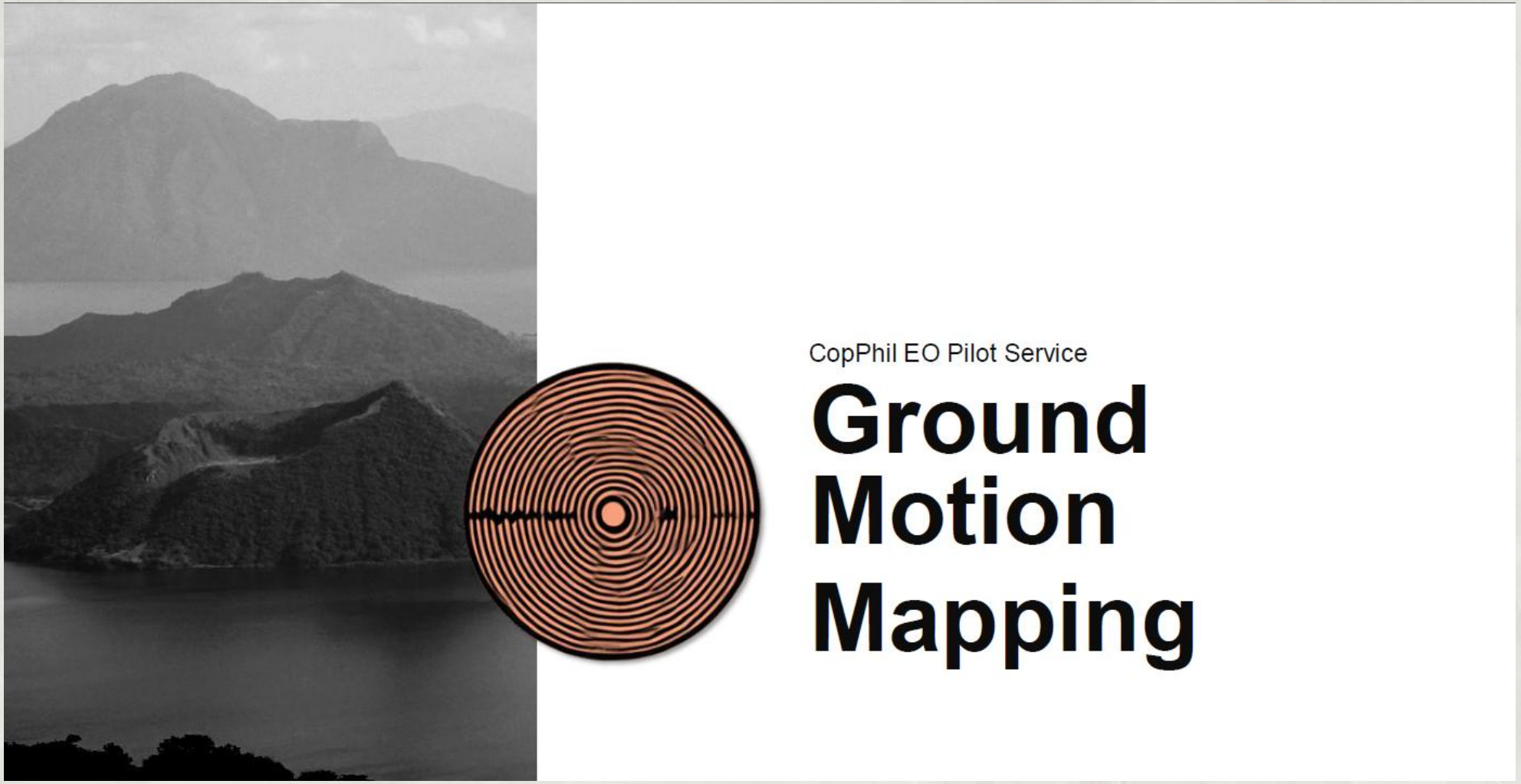

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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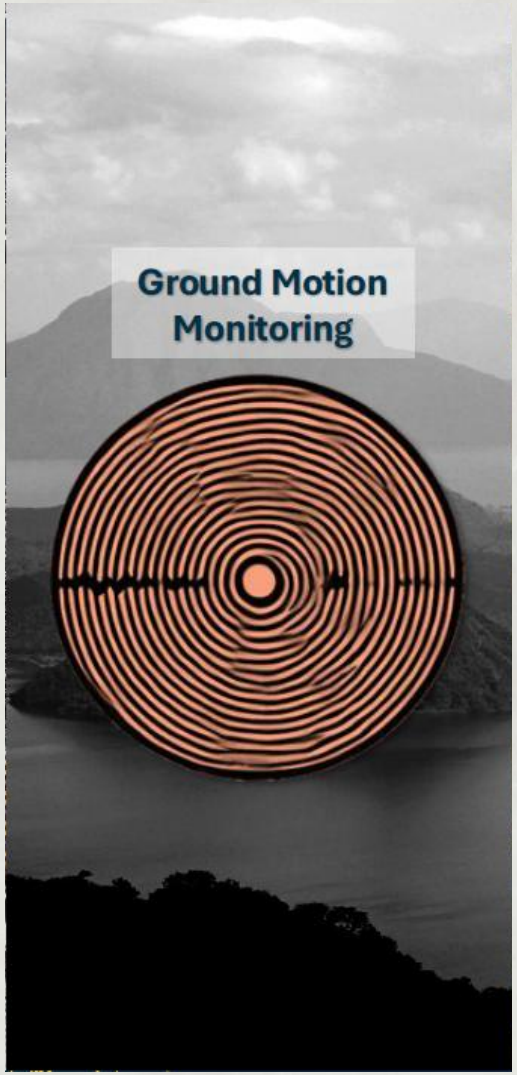
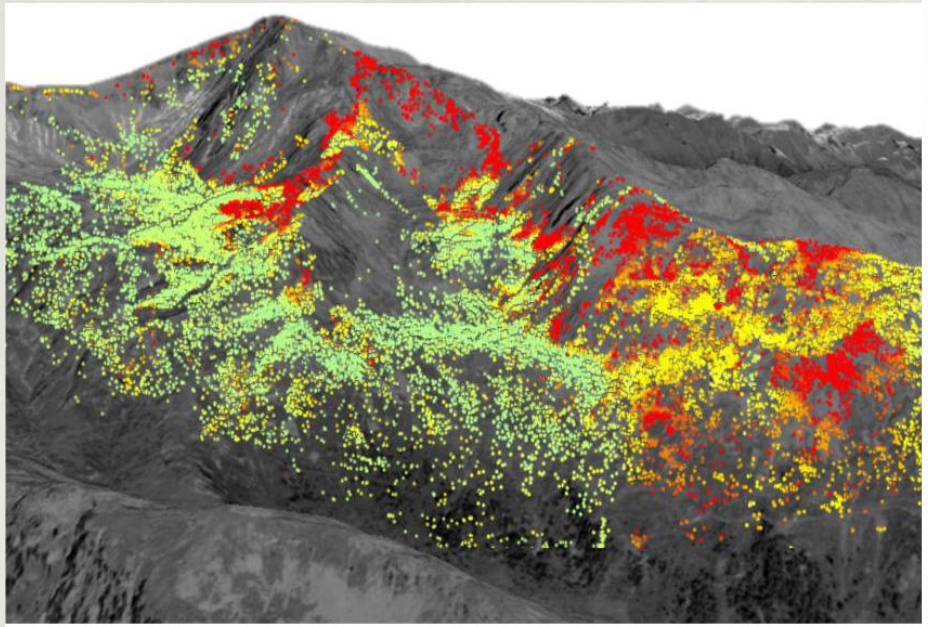
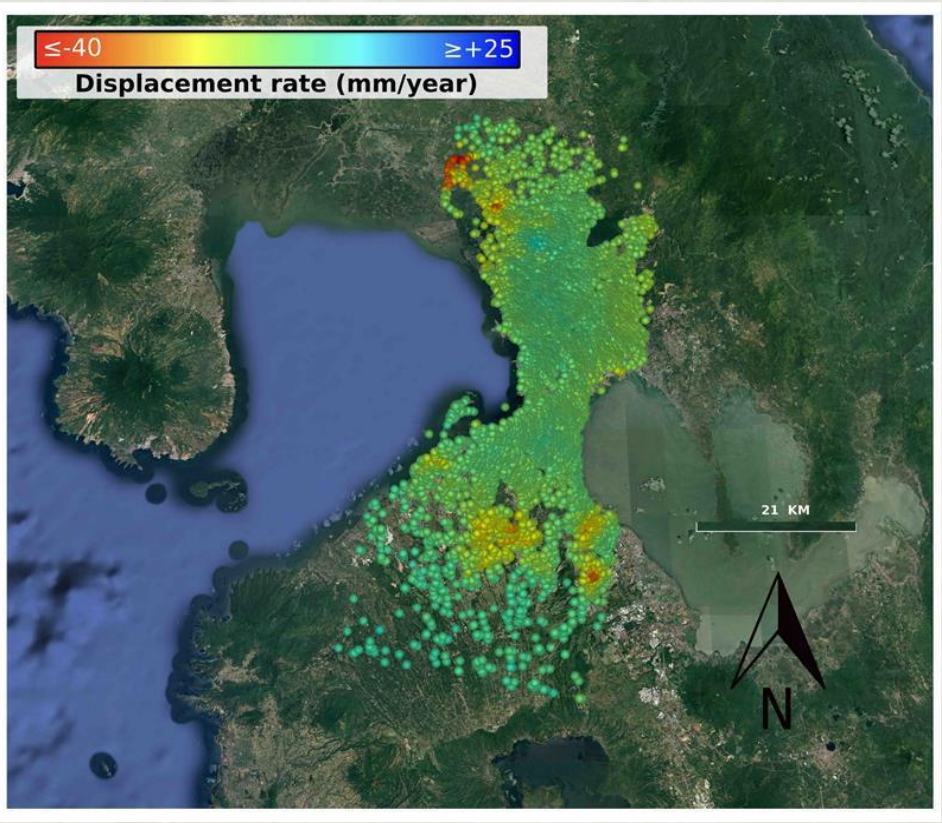


- Production of information layers on Earth Surface deformation
- Use Cases: landslides, subsidence, seismic, urban subsidence, and mining.





National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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CopPhil EO Pilot Service

Land Cover, Forest, & Crop Mapping

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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Product ID	Product	Processing resolution	Frequency of update
P2.1	Land cover map	10m	annual
P2.2	Land cover change map	20m	annual
P2.3	Tree cover density	50-100m	annual
P2.4	Forest area and type	10-30m	annual
P2.5	Near-Real Time Forest disturbance monitoring	10-30m	Weekly or Every 2 weeks ~~annual~~
P2.6	Annual cropland extent	10m	annual
P2.7	Seasonal crop type	10m	annual

Pilot Implementation: Region III, XI, XIII

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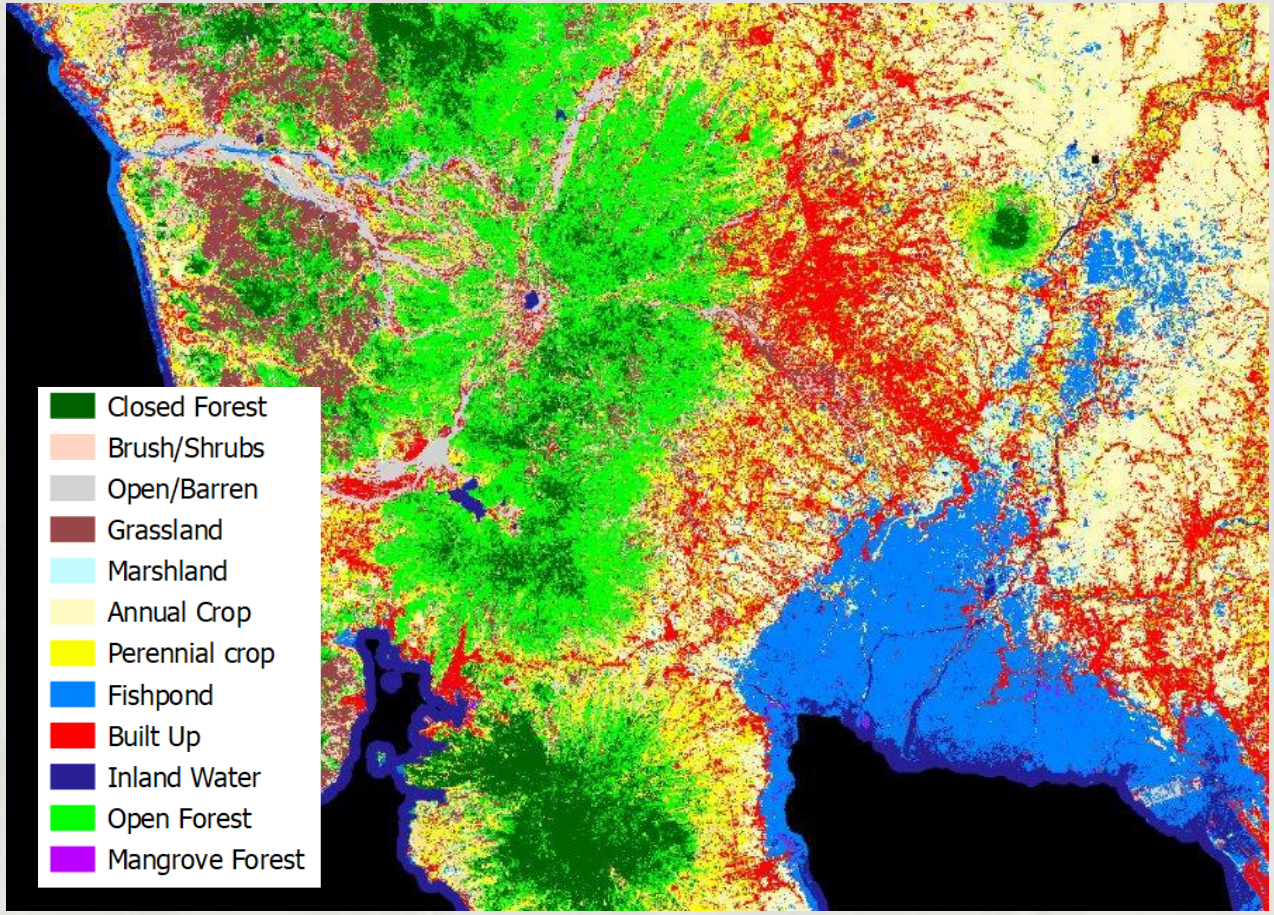
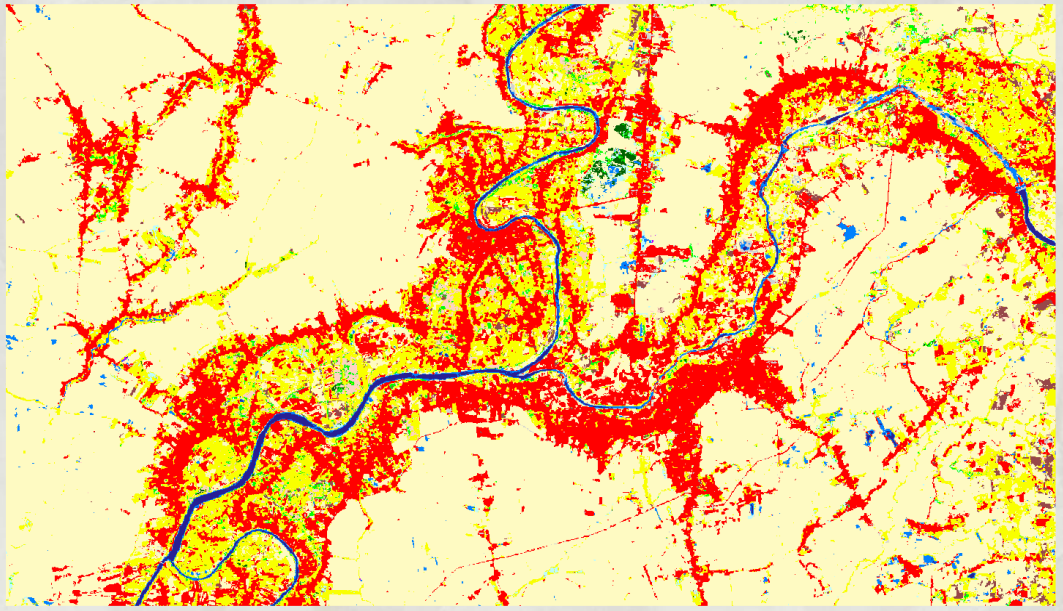


- Track urban expansion
- Urban Planning
- Monitor critical habitats
- Preserve biodiversity hotspots



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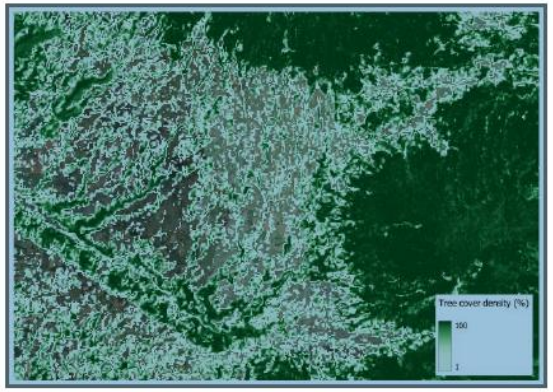
P2.3 Tree Cover Density (TCD)

Product v1 release: Nov 2024
Integrated into CopPhil system

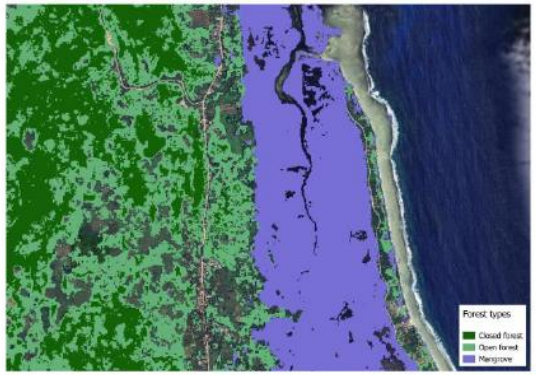


Technical details:
Inputs: S2
Method: Fractional vegetation cover algorithms and forest probability

P2.4 Forest area and type

Product v1 release: Nov 2024 → v2 expected in May (based on co-development activities)
Integrated into CopPhil system

Technical details:
Inputs: S2 / DEM
Method: Machine learning algorithm (Random Forest)
Internal validation: >95%



P2.5 Forest cover change

Product v1 release: Jan 2025
Integration into CopPhil system in progress

Technical details:
Inputs: S1 / DEM
Method: CuSum algorithm

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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CopPhil EO Pilot Service

Benthic Habitat Mapping

National Copernicus Capacity Support Action Programme for the Philippines (CopPhil)

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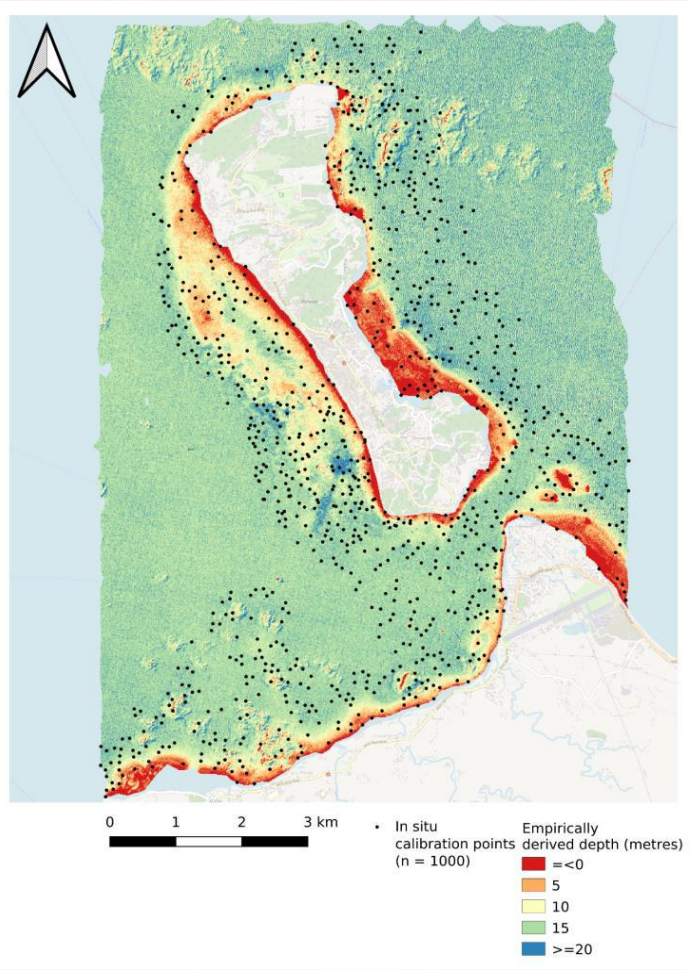
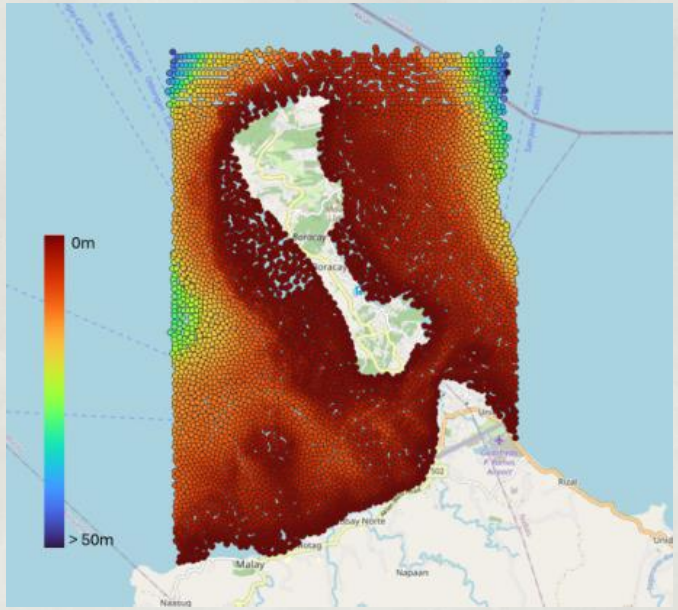
Satellite Derived Bathymetry (SDB)



SDB is not considered suitable for IHO nautical charts used in navigation, but ...

- Fill-in data gaps in shallow areas
- Monitor evolution of shallow water features e.g. sandbars
- To enable depth-segregated zonal benthic mapping



NAMRIA Bathymetric data

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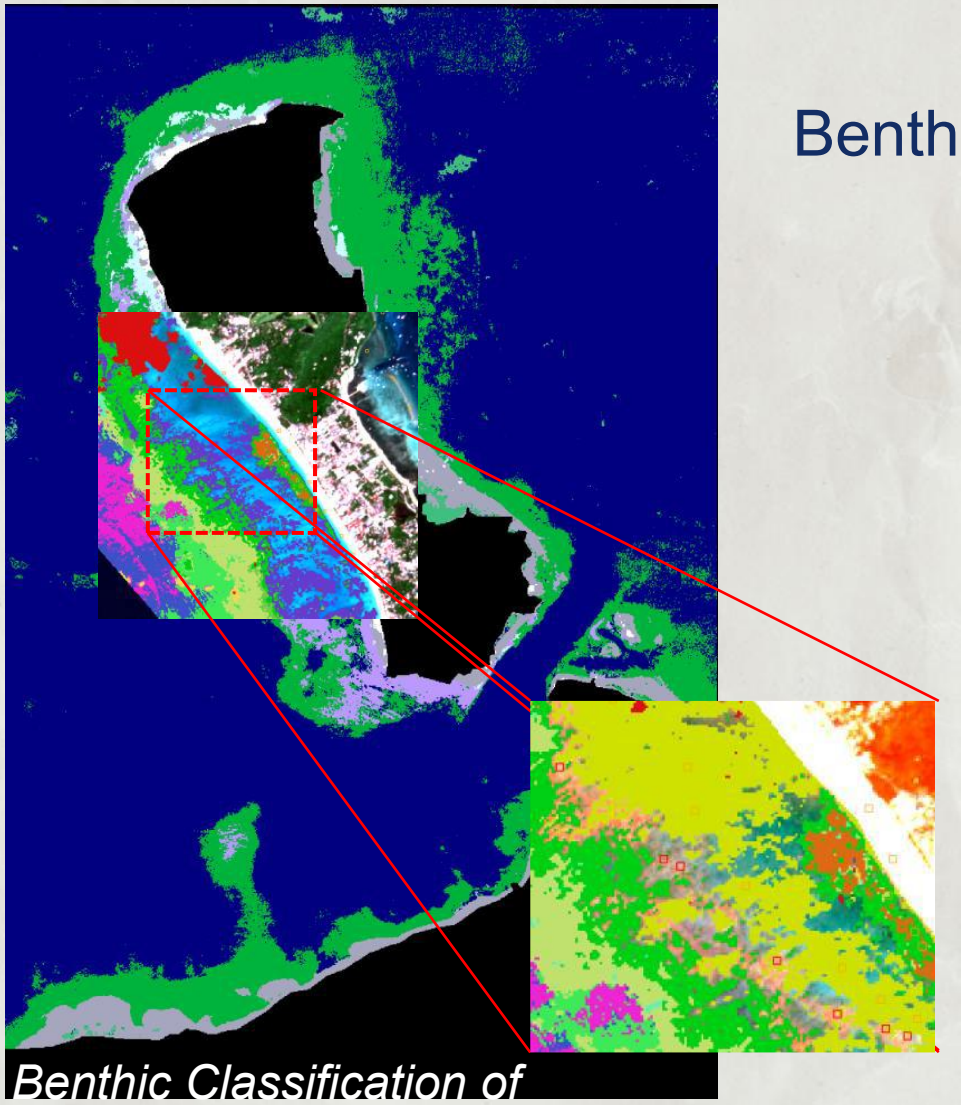

Benthic Classification of Boracay Island

Benthic Habitat Mapping

Potential applications:

- Coral bleaching detection and monitoring
- Mapping of regional benthic seascapes
- Assessment of Blue Carbon

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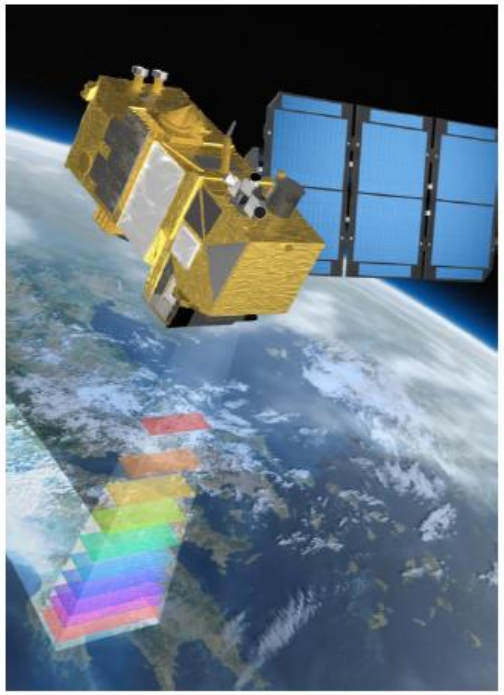
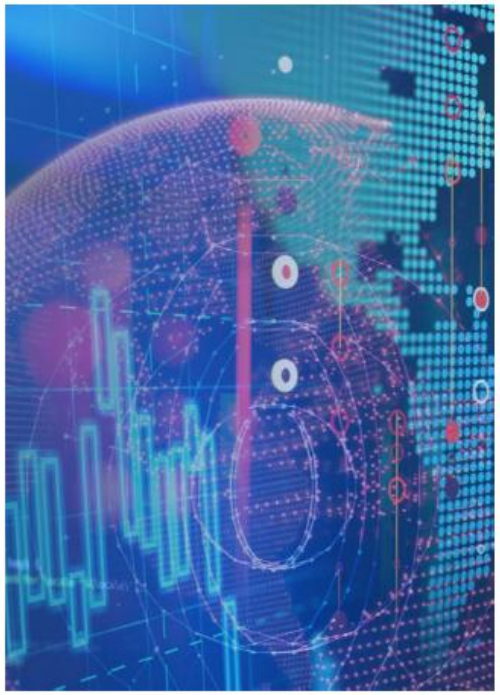


CopPhil → Theoretical Courses → EO Services → Applications

https://courses.copphil.philsa.gov.ph/

MULTISPECTRAL UNIT FOR LAND ASSESSMENT (MULA) SATELLITE

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Link to MULA Video: MULA Video.mp4

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