

# HARNESSING SCIENCE, TECHNOLOGY, AND INNOVATION TO ENSURE ACCESS TO SAFE WATER AND SANITATION

STI solutions and learnings from the Philippines

**LEAH J. BUENDIA, Ph.D.**

Undersecretary for Research and Development

Department of Science and Technology

Republic of the Philippines

**7,641 islands**

**3 Main groups of islands**

Luzon

Visayas

Mindanao

**15,000 km coastline**

- 5<sup>th</sup> longest in the world

**Maritime zones form 86.3% of the PH's total territory**

**Diverse reef**

- 70% of the Coral Triangle

- World's 10<sup>th</sup> largest fishing catch

# THE PHILIPPINES

An archipelagic country

## Challenges in safe water and sanitation

- Several sources are contaminated and are unsafe for human consumption
- Lack of access to safe water (some travel long distances using motorcycles or tricycles just to fetch water)
- Increasing demand for water which causes shortages
- Insufficient data/information for comprehensive assessment
- Lack of wastewater management facilities

## Policies

National Innovation Agenda - Blue Economy and Water

Philippine Clean Water Act or RA 9274

Harmonized National Research and Development Agenda

S&T Water Environment Roadmap



**How does the Philippines harness science, technology, and innovation for safe water and sanitation?**

## Application of remote sensing and data science

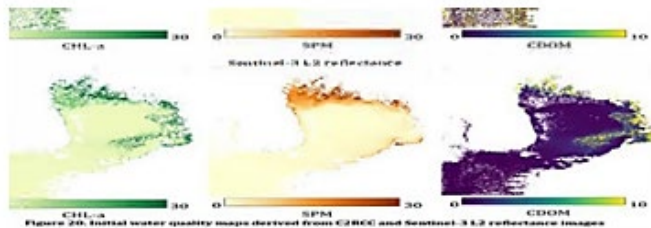


The Department of Science and Technology (DOST), through its Remote Sensing and Data Science Project (DATOS), developed a GIS-plugin to train and implement AI models in extracting features from satellite imagery. The technology uses the DOST-Advanced Science and Technology Institute's High-Performance Computing which can be further utilized by public users from academic institutions as well as government agencies.

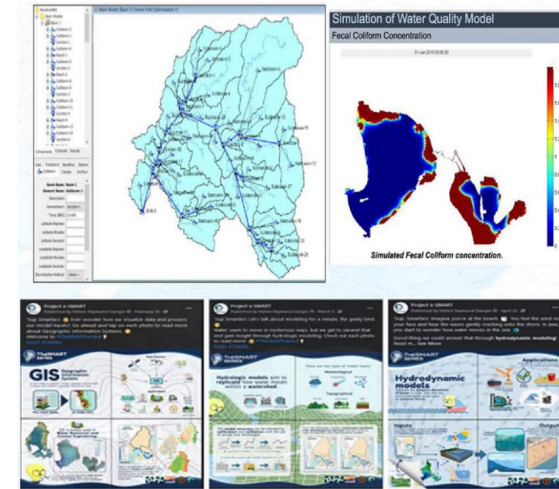
We partnered with Laguna Lake Development Authority and Libmanan Water District, to provide support and capacitate more resource managers and planners in their operations using space assets and advanced image processing techniques.

# Development of Integrated Mapping, Monitoring, and Analytical Network System for Manila Bay and Linked Environments (MapABLE)

The project will develop and deploy an integrated system for mapping and monitoring the water quality of Manila Bay and linked systems including major tributary rivers using geospatial technologies and citizen science.



Hydrologic Model Setup



# Eco-System Modeling and Material Transport Analysis for the Rehabilitation of Manila Bay (e-SMART)

This aims to provide streamline solution interventions for the rehabilitation of Manila Bay through hydrodynamic and material transport analysis of the integrated Manila Bay-Pasig River-Laguna Lake and surrounding watersheds system using numerical modeling.

# Developing an Upgraded Disinfection System for Emergencies in Communities

An initiative of the Department of Science and Technology in the Philippines, with deployment in partnership with local government units and non-government organizations

a government-developed ready-to-use water treatment facility, with solar panel for power supply, that can treat raw water to address the problem of drinking water shortage during natural disasters, such as flooding, earthquakes, and typhoons





Project **FRESH**

FIELD-TESTING OF ECO-FRIENDLY SEPTIC SYSTEM (ECO-SEP) FOR TOURISM, AND ENVIRONMENTALLY COMPROMISED AREAS IN THE PHILIPPINES

THE **ECO-SEP TECHNOLOGY**

The DOST, through the Adamson University, developed the Eco-friendly Septic System (Eco-Sep) which can help address the treatment of sewerage from the resorts and public toilets.

**Uses an organomineral called vigormin made from locally available materials**



SAMPLE LAYOUT OF ECO-SEP SYSTEM IN PROJECT SITES



Low-cost



Easily deployable method



Mitigate water pollution from public

Photo by Vigormin™



MAJOR FINDINGS

Effectively reduce odor in septic tanks

Improvement of Septic Water Quality

0.5 kg/pax of Vigormin or organomineral:

- reduced Biochemical Oxygen Demand (BOD) by 73%
- reduced total suspended solids at 76%
- maintain pH volume of 8

QUICK FACT

Septic Tanks in most establishments, households and beach resorts have a bottomless design (no cemented flooring) which allow wastewater to seep directly to the round water.

PROJECT LOCATION

General Luna Public Market

Traveller's Beach Resort

General Luna National Highschool

SIARGAO ISLAND, Surigao del Norte



ECO-SEP INVENTOR  
DR. MERLINDA A. PALENCIA  
Adamson University

pus, Ampayon, Butuan City

fb.com/dost.caraga

2-9053

www.caraga.dost.gov.ph

Department of Science and Technology  
Caraga Region

Infographics by the  
Department of Science and Technology  
Caraga Region



i-knowbasyon



#FEATUREFRIDAYS  
... VIGORMIN



## Vigormin

Innovation by Dr. Melinda Palencia of the Adamson University in partnership with the Department of Science and Technology

It is a natural, odor-free, safe, and effective treatment of septic tank, and water. It usually comes in powder form to be dissolved in water.

Vigormin is also now being used to treat water in different lakes in the Philippines and is already commercially available in supermarkets and e-commerce platforms.

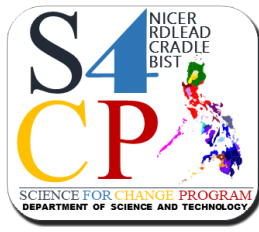
# Water treatment and simple filters using nanotechnology

Ceramic filters deployed in local government units in the Northern Luzon by the DOST Cordillera Administrative Region Office

It aims to address problems on access to safe drinking water, particularly through ceramic filtration to take out microbial/particulate contaminants in drinking water for household level use.



Photos by the DOST-CAR



## Niche Centers in the Regions through R&D (NICER): Smart Water Infrastructure and Management R&D Center (SWIM)

The SWIM R&D Center provides innovations in water management and promote disaster-resilient infrastructures.



## Collaborative R&D to Leverage the Philippine Economy (CRADLE): Enhanced Forecasting Model for Complex Water Supply Systems of the East Service Area of Metro Manila

This aims to develop a forecasting model for various dams, a model for water supply to Manila Water treatment plants, and optimal water supply distribution in the EastZone due to robust forecast of water flow to MWC treatment plants.



# Learnings, observations, and recommendations

- ✓ The STI solutions, especially technologies, do not usually fall under a “one-size-fits-all” approach.
- ✓ While the government plays a crucial role in achieving SDG 6, multistakeholder collaboration is also essential especially for financial and human resources.
- ✓ These STI solutions for safe water and sanitation provides multi-pronged solutions which can generate economic savings, mitigating pollutions, and reduce diseases, thereby also protecting humans and communities.
- ✓ The government shall also create a synergistic ecosystem (through policies and initiatives) that is conducive for R&D institutions, startups, academe, NGOs, and other players in the field to harness STI to solve various issues in the society.



## Role of international cooperation

1. Establish partnerships to implement joint initiatives that may address common water-related issues and create bigger impact (e.g., especially countries in the same region and similar geographical characteristics)
2. Sharing of resources, technical know-how, and technology transfer among partners
3. Exchange of information on lessons learned, best practices implemented, and challenges encountered for assessments and policymaking

