

## CASE STUDY

# Establishment of a 3D Geographic Information System-Based Water Resource Management System



A 3D geographic information system can bring important benefits to water resource management. Photo credit: ADB *Lessons learned from the establishment of a Water Resources Management Information System in the Philippines.*

## Overview

The project is establishing an integrated 3D geographic information system-based water resources management information system in the Philippines. By using the integrated 3D based geographic information system it made fast and scientific decision making is possible. The National Water Resources Board of the Philippines was closely involved in the project.

## Project snapshot

### Dates

- **December 2013 to December 2015:** Duration

<b>Cost</b>	<ul style="list-style-type: none"> <li>• <b>US \$ 3.4 million:</b> Cost</li> </ul>
<b>Institutions and Stakeholders</b>	<p><b>Executing agency</b></p> <ul style="list-style-type: none"> <li>• Korea Institute of Civil Engineering and Building Technology &amp; GEO C&amp;I Co. Ltd</li> </ul> <p><b>Financing</b></p> <ul style="list-style-type: none"> <li>• Korea International Cooperation Agency</li> </ul>

## Challenges

The Philippines is rich in water resources, but because of its geographical situation and seasonal changes, water availability is rapidly changed by time and location. Saline water intrusions have been observed in coastal areas of Metro Manila and Bulacan, caused by excessive groundwater abstraction across the country, water scarcity during certain seasons and a decline in water quality by water pollution.

The reason why there is no strong action for those chronic water resources problem is because more than 30 agencies in the Philippines are in charge of water resources management and development and their tasks are subdivided. The administrative structure causes weakness of policies and regulation, and also difficulty sharing water resources information, which works against the formulation of a long-term and systematic national water resources policy.

The National Water Resources Board that handles most water resources management became an executive office of the President in 1987 and the establishment of water resources information system is needed for integrated operation because related information is still spread among agencies.

An acute shortage of agricultural water in the project area (Pampanga and Bulacan) due to urbanization and industrialization by a population explosion in nearby Metro Manila has had a negative influence on agricultural products, and there has been no scientific solution found.

## Solutions

The Philippines requested assistance with an integrated water resources management solution and construction of an operational environment to solve related problems and systematically implement information management of all of water resources in Pampanga and Bulacan and to support decision making for securing water resources and analyzing water balance.

The National Water Resources Board of the Philippines worked with the Republic of Korea to establish an integrated 3D-geographic information system based water resources management information system in the provinces of Pampanga and Bulacan. The objective of the projects are as follows

- Establishment of real-time integrated water resources information system for scientific water resources allocation, use, regulation, assessment and supporting decision making of National Water Resources Board using 3D geographic information system remote sensing technology.
- Enhancement of capability for water resources plan, management and policy making of National Water Resources Board.
- Setting up water resources collection and sharing system between agencies.
- Setting up real-time transmission of hydrological information on dams (Angat dam, Ipo dam and Bustos dam).
- Setting up business process reengineering of the National Water Resources Board.

Before launching the project, there was a discussion of problems and solutions with recipient agencies through the use of business process re-engineering that includes analysis of water resources current status, future model, and action plan and other elements. A result management plan was also established, as was a phased plan to improve scientific decision making/water resources planning. The work also included management and policy making effectiveness for water resources' allocation, use, regulation, and evaluation.

As part of the construction of a geographic information system, the processing and editing of a basic and thematic map was undertaken, along with the digital aerial photography and production of orthophoto, as well as production of a digital elevation model. As part of the construction of a spatial watershed data warehouse, a 3D-geographic information system for use in the Water Resources Information Management System was established, along with real-time transmission of hydrological information to the National Water Resources Board. A river flow management system was established and equipment was obtained to support geographic information system software for self operation. A data center was also established and consulting functions were expanded to enhance capacity for water resources management.

## Results

Through this project, the government of the Philippines now has a 3D geographic information system-based water resources information management system, orthophoto with aerial/satellite imagery, and 10-year information strategy plan. Water resources management ability and systematic policy making has been strengthened.

Administration work processing time has been reduced with administrative efficiency increased by with scientific policy determination using spatial information.

- Annual No. of Approvals: 800 cases
- Annual reduced time: 92000 hours
- Estimated reduced amounts: 16,385,400 peso

Public service benefits include the less inconvenience for applicants visiting relevant organizations, including those checking drawings/blueprints, and bringing the drawings to the field works.

- Annual No. of Approvals: 800 cases
- Annual reduced time: 19200 hours
- Estimated reduced amounts: 10,905,600 peso

There has been a lowering of costs for applicants visiting relevant organizations to submit drawings and government works.

- Annual No. of Approvals: 800 cases
- Estimated Amount of Transportation Cost: 176,000 peso

## Lessons

When the project started, the Philippines already had several related systems, which were supported by foreign aid agencies. However most of the systems were not working because of maintenance problems. A permanent revenue model should be established for developing the country's information technology system.

## Resources

Summary: ***Six Lessons to Learn from Asia's World-Class Universities***

Case Study: ***An Eco-friendly Approach to Waste Management***

Case Study: ***Sustainable Water Management for Smart Cities***

Insight: ***How East Asia Can Reduce Climate Change Impact***

Explainer: ***Get On My Cloud - Explaining the MathCloud System of Learning***

Insight: ***Smart Strategies for Getting More Women into the Workforce***

Insight: ***A Successful Example of How to Shift to Cyberlearning***

Explainer: ***Using Television to Improve Education Systems***

Case Study: ***Revitalizing a City by Reviving a Stream***



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Last updated: January 2018