



Global Partnership for Sustainable Development Data

Satellite Data is Helping Create Safer Drinking Water

With the Africa Regional Data Cube, the Water Resources Commission in Ghana is assessing and improving water quality.

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Background

Over last two decades, Ghana has experienced significant population growth and development. As the population grows, demand for water has grown as well. Unregulated human activities around river systems have caused damage such as vegetation clearance and degraded water quality.

In 1996, the Government of Ghana established the Water Resources Commission (WRC) with the mandate to manage and regulate Ghana's water resources. Ownership and control of all water resources are vested in the President on behalf of the people, and the WRC is defined as the overall body responsible for water resource management in Ghana. The WRC has been collecting in-situ water quality data on major rivers from 2005 to date, using the data to inform water resources and environmental management decisions. However, there are gaps in the data available, particularly before 2005.

Challenges with Monitoring and Managing Water Quality

One area the WRC has been focusing on is the Densu River, which originates from the Atewa Range Forest Reserve, flows towards the Akwadum-Koforidua area, and gradually flows into the Weija Reservoir. This reservoir is one of the main sources of freshwater treated by the Ghana Water Company Limited as potable water supply for the city of Accra and its peri-urban areas.

Upstream of this reservoir, improper land use, indiscriminate lumbering, and waste management practices have negatively impacted its water quality. Additionally, the situation was compounded by uncontrolled human settlements and extensive encroachment towards and within the buffer of the reservoir. Consequently, local government officials had to demolish some built structures and subsequently deploy national security personnel to safeguard the reservoir. Other notable interventions have been put in place to manage the situation, but more monitoring is needed to protect the reservoir.

A Solution from the Sky

The Water Resources Commission used the [Africa Regional Data Cube \(ARDC\)](#), a tool that harnesses Earth observation data and satellite technology, to conduct an analysis of a representative 15-year period, from January 2002 to December 2017. Using Landsat data made available through the ARDC, the WRC is strengthening its ability to report on two water-related Sustainable Development Goal (SDG)

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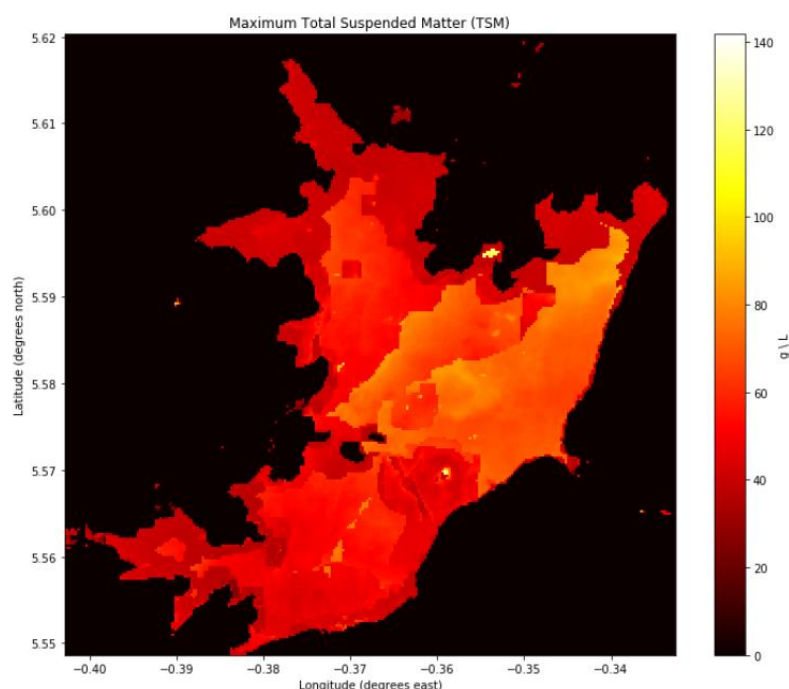
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indicators – 6.3.2 on water quality and 6.6.1 on the change in the extent of water-related ecosystems. The ARDC is enabling the WRC to assess progress on these indicators in the Weija Reservoir.

The ARDC algorithms provide an overview of the suspended solid matter and chlorophyll-A levels in the reservoir, which highlight areas of potential concern and can be used to target in-situ water quality testing and assessment through effective ground truthing. In view of the water quality results, officials can decide which interventions, from river catchment protection, public awareness campaigns and education, and/or law enforcement, among others, to pursue within the river basin. The ARDC is helping the WRC better understand changes in the quality and extent of water bodies over time by providing access to data that is consistent, has more coverage, is timely, and less costly.

Outcomes

Using the ARDC, the WRC is becoming more efficient, able to more quickly identify areas that need further investigation before deploying human and financial resources. Previously, basin officers would make infrequent monitoring visits or respond to alerts from community members and other relevant stakeholders to check areas of potential concern (hotspots). The basin officers typically commence mitigative actions in collaboration with relevant institutions on their stakeholder determined boards. In certain cases, these findings are sent to the head office to determine next steps. This process may rely on irregular information and infrequent information-sharing between officials of the local basin office, WRC head office, and other stakeholders to inform decision-making. With the ARDC, the WRC can analyze large areas from its head office/basin offices faster, identify hotspots, and coordinate with basin officers to investigate specific areas, allowing for much more efficient transfer of information and decision-making.



*Figure 1: Weija Reservoir -
Maximum TSM over time*

Figure 1 shows the ARDC algorithm result for Total Suspended Matter (TSM). The results show suspended solids. The dark red areas indicate the hotspots that require immediate ground truthing and further testing. Water quality status can have severe negative effects on human and environmental health, so hotspots require immediate attention.

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Figure 2: NASA Ocean Colour Chlorophyll-A OC3 Algorithm

Figure 2 shows the ARDC algorithm result for chlorophyll-A, based on the NASA Ocean Colour Chlorophyll-A OC3 Algorithm. This provides an indication of areas with the presence of algae. Higher concentrations of algae indicate poor water quality. The outer edge of the reservoir reveals higher algae resulting from high nutrient loads. These results call for an investigation of the sanitation situation in the reservoir and around the river basin.

The WRC is using the ARDC to obtain more information on the quality of many other water bodies, including some of the larger bodies of water that serve people across the country. The ARDC is enabling the WRC to do more, and better analysis of more bodies of water – work that likely would not have otherwise been possible due to limited staff and funding.

Based on the Weija Reservoir case, the WRC is now using the ARDC to analyze other water bodies in Ghana including the Ashaiman Dam, Lake Bosomtwe, and Lake Volta. For example, the ARDC can study the whole of Lake Volta in just a few minutes. Previously, this would have taken the Water Resources Commission several months to conduct any water quality research. With the incorporation of more relevant algorithms and high resolution imageries, the ARDC will assist in the provision of water quality data that WRC can use to make decisions and manage water resources throughout the country, leading to better water quality, safer drinking water, more productive harvests, a healthier environment, better lives, and improved socio-economic development for present and future generations to come.

