GMES AND AFRICA

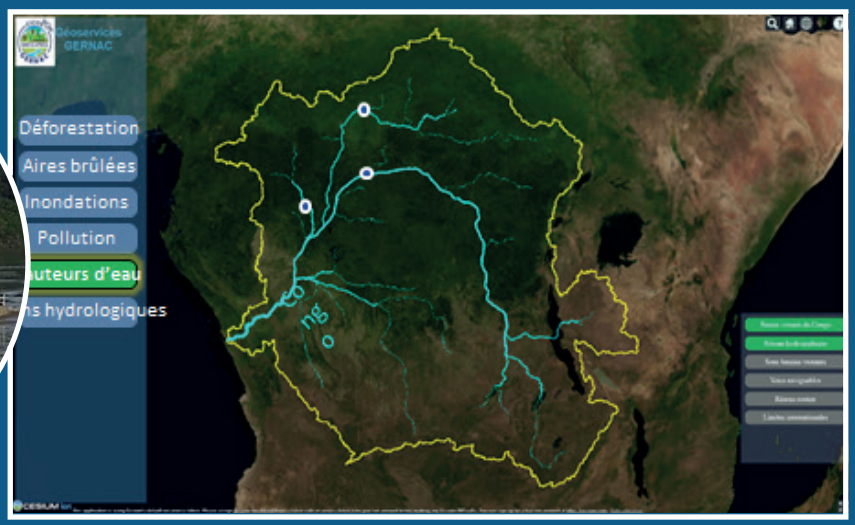
African Union

CICOS
Commission Internationale du bassin Congo-Oubangui-Sangha

Monitoring Water Levels to Enhance River Navigation in the Congo Basin for Shipowners, Captains, and Local River Operators

BACKGROUND:

The Congo Basin spans approximately 4 million km², with 62% located in the Democratic Republic of Congo (DRC). This vast territory houses one of Africa's most extensive and navigable river networks, covering about 25,000 km, of which 15,000 km are classified as navigable waterways. Due to the deterioration of road and rail infrastructure, waterways have become strategically essential for transporting agricultural products (accounting for 80% of river freight), facilitating trade, and promoting regional integration.



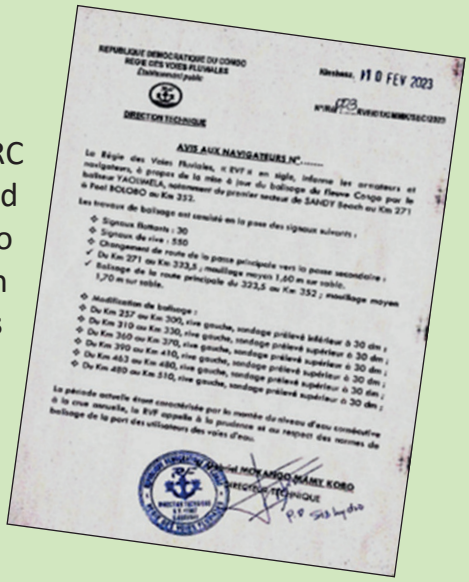
The DRC's Riverways Authority (RVF) is responsible for maintaining navigable waterways, conducting hydrology, bathymetry, hydrography, and producing navigation

maps. However, decades of infrastructure degradation and chronic resource shortages have posed challenges for ensuring safe and efficient river transport. As part of the GMES & Africa program, the International Commission of the Congo-Oubangui-Sangha Basin (CICOS) has advanced services aimed at improving river navigability in the Congo Basin while enhancing RVF's operational and financial capacities.

This use case highlights the application of Earth Observation (EO) data in enhancing navigation safety, reducing accidents, and optimizing travel times on key routes like Kinshasa-Kisangani and Kinshasa-Ilebo.

END-USER PROFILE:

The Riverways Authority (RVF) is a public entity in the DRC tasked with maintaining and developing the country's inland waterways. Its activities facilitate navigation, contribute to the blue economy, and ensure seamless trade between urban and rural areas. The RVF issues **navigation notices** to shipowners, boat captains, and local river operators, ensuring the safe and efficient transport of goods and people.



USER NEEDS:

As a CICOS partner within the consortium addressing natural resources and water in Central Africa, RVF has been actively engaged in user workshops, shaping the design of the navigation service. The RVF identified the need for reliable water-level prediction systems, effective navigation planning tools, and accident prevention measures.

INFORMATION PROVIDED:

In response to RVF's needs, CICOS has developed innovative EO-based products leveraging satellite altimetry and Sentinel data from the European Copernicus program. These include:

- Low Water Alerts: Reduce travel time and transportation costs.
- Digital Navigation Maps: Overcome challenges of accessing forecasts in remote areas with no telecommunication coverage.
- Smartphone Application: Offers simplified access to essential navigation information.

Additionally, the CICOS consortium, in partnership with African private sector stakeholders, created the GERNAC web platform (accessible via https://gernac.afeos.ma/). This platform

centralizes tools and data to support navigation activities, including maps derived from Sentinel-2 data, navigation elements (beacons, villages, kilometer markers), and custom configuration options.

USAGE:

The CICOS consortium organized training workshops for shipowners, boat captains, and port operators on the use of the smartphone application and digital navigation maps based on Earth Observation (EO) data, particularly water levels derived from satellite altimetry. Over 300 shipowners and boat captains were trained jointly by experts from the company AFEOS, as well as from RVF and GIE-SCEVN. This way, navigational personnel have access to the smartphone application that enables them to navigate safely.

Navigators begin by preparing their mission by logging into the GERNAC platform and activating the «Go in Mission» mode. Then, they select the waterways and the desired navigation data, followed by downloading the necessary data, including the available base maps (from Sentinel-2 data), navigation elements (beacons, villages, kilometer markers, etc.). Finally, they configure their mission by importing additional files in KML or GeoJSON format and setting the visibility of objects related to the navigation route.

IMPACT:

User feedback has demonstrated significant socio-economic benefits, including:

- 60% reduction in travel time (e.g., Kinshasa-Bangui).
- 35% reduction in transportation costs.
- Fewer accidents and incidents.
- Enhanced trade and lower prices for essential goods.

AWARENESS AND SUSTAINABILITY:

Feedback from navigators is collected through bilateral consultations and emails. The service is promoted via national and regional workshops, media coverage, and publications. At the November 23, 2023, Ministerial Committee in Brazzaville, Congo, CICOS received praise for its water-level monitoring service. To ensure sustainability, CICOS collaborates with RVF and GIE-SCEVN to disseminate navigation-related information. Its regional mandate to promote inland navigation, combined with stakeholder capacity-building efforts, guarantees the long-term viability of the service.