

SATELLITE TECHNOLOGIES FOR RIVER BASIN MONITORING

Earth Observations (EOs) and the allied technologies presents a cost-efficient complementary approach for enhanced and comprehensive environmental monitoring and assessment for water resources such as lakes, rivers and reservoirs and their changes in quantity and quality and prediction of potential risks and hazards such as floods and droughts. It involves the collection of information about the Earth's surface and variables using remote sensing (RS) and allied technologies such as satellites for the purpose of sustainable environmental management. The derived data and information provide invaluable insights into various changes in our environmental parameters, including land cover, land use, water quality river /streamflow and vegetation health. The satellite-based technologies provide several advantages over conventional approaches to environmental monitoring. Significant technological advancement has been made on RS to provide continuous high temporal and spatial resolution of environmental parameter.



Fig: Constellation of satellite & NBI EUMETCast ground receiver

Therefore, Nile Basin Initiative (NBI) leverages on the open sources EO data and information as well as technologies for stewardship and management of Nile water resource through bias correction with ground stations and analysis for the development of information products for several decision-making applications on the shared Nile water resources. The EO and satellite technologies complements the recently established Regional Hydrological Monitoring System in the provision of real time river flow information and forecast of hydrological extremes for water resources assessment and water related disaster risk reduction within the Nile River Basin.

As an acknowledging the importance of EO data, the NBI established a EUMETCast ground receiving satellite dishes at the secretariate to support its operations and key objective of basin wide monitoring. The EUMETCast is a data dissemination service supplied by the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). This service provides a multitude of environmental data, such as weather forecasts, sea surface temperatures, and land surface parameters, which are essential for water resource management. The station receives nearly real time data through Telecommunication Satellite free of Charge. Some of the frequent applications include;

- **Flood and Drought portal.** This portal is developed by NBI for drought and flood monitoring using freely available Earth observation data. Currently, the portal reads 198 EO data from different sources. The portal generates a monthly report automatically. Countries can access this portal to generate climate and water resource related data and monthly report from here: <https://www.flooddroughtmonitor.com/data>

This data supports evidence-based decision making in the member states.

- **Basin Monitoring Bulletin.** This bulletin is a quarterly information product based on EO data. The bulletin includes information on precipitation, Evapotranspiration, water level and runoff status within the basin.
- **Data Analytics Services:** NBI Data Analytics Services is a cloud-based analytics service based on public domain EO data. The development of this application is under development and will be publicly available for users.
- **Regional Hydrological Monitoring System:** Established through collaboration with Member States to enhance transboundary cooperation in the applications for water resources monitoring, assessment and prediction of hydrological extremes such as flood and drought and hydropower production.
- **Strategic Water Resources Assessment (SWRA):** Aims to improved water use efficiency, regional optimization of cropping patterns, as well as active trade of “virtual water” (water used in the production of a good) between countries can offer tangible solutions to address future gaps in water availability.
- Other projects such as River flow forecasting system, wetland project, water quality, ground water etc. utilizes EO data.
- **Capacity Building on EO:** NBI is building capacity of water related experts on EO data analytics using open-source software tools such as R, Python QGIS etc. regularly.

Therefore, EO and the allied technologies have proved to be an invaluable source of information for environmental monitoring within the Nile River Basin and Member States



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DR Congo



Egypt



Ethiopia



Kenya



Rwanda



South Sudan



The Sudan



Tanzania



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