

ARC-X REGIONAL WORKSHOP SOUTHERN AFRICA

Strengthening Transboundary Basin Cooperation for Disaster Risk Prevention and Preparedness
7-9 July 2026, Johannesburg – South Africa

ArcX project – Water Component

WEFE nexus analysis over selected transboundary river basins

July 8th, 2026



Ezio CRESTAZ, Daniela ANGHILERI, Cesar CARMONA-MORENO – JRC D.2

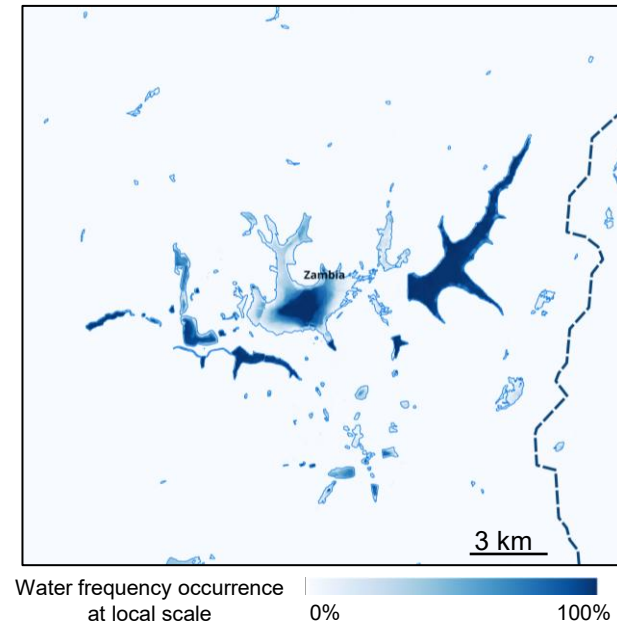
Scope

JRC.D2 Water Team role in the framework of the ACEWATER3 project covers:

- **scientific guidance and support** to DGINTPA, implementing bodies, RCoEs; member of ArcX and ACE3 steering Committees, the team provides feedback on scientific priorities and activities to enforce a coherent framework, aligned with lessons-learned from former project phases (ACE1, 2009-2014; ACE2, 2016-2020);
- **Identification and engagement with key stakeholders**, agreement on **key priorities**, contribute to both **scientific activities** (eg. data management, analysis, modelling, SDSSs) and **human capacity development actions over selected TRBs**, while addressing the science-policy debate and the operationalization of strategic solutions.

Current presentation focuses on the second point, history and status of ongoing collaborations over the TRBs, involved RCoEs and stakeholders, :

- Tanganyika and Kivu lake, marginally extending over Zambia (2%)
- Zambezi, object of extensive research during ACE2 with 10 collaborating RCoEs
- Cubango-Okavango



Technical Workshop – River basin water balance methods approaches and key challenges in the Lake Tanganyika and Lake Kivu basins



Tanganyika lake: coordination and synergies with ICPAC



ACEWATER3: ICPAC AND JRC

Objective: Quantify the water balance components, hydropower production and its change over time for the Lake Tanganyika basin.

- **SO1:** Assess the long-term climate variability of the Lake Tanganyika Basin
- **SO2:** Quantify the proportions of the key Lake Tanganyika water balance components
- **SO3:** Model the total basin wide hydropower production and its variation and trend over time
- **SO4:** Recommend actions to reduce the risk associated with extreme lake surface water variations

JRC – TAKIWAMA

Broad scope: waste management, water quality, lakes limnology, WEFE nexus analysis, capacity building

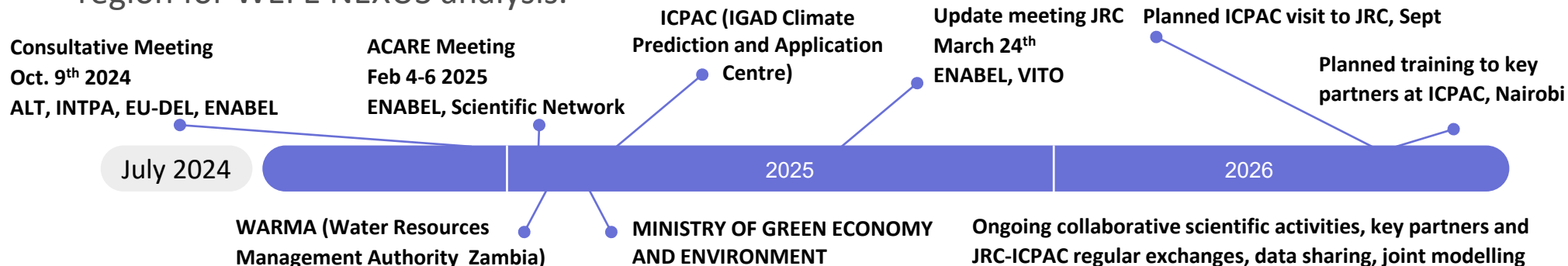
Specific JRC objective: Contribute to the improvement of water resource management, biodiversity, and human and economic sustainable development of the TRB.

- **SO1:** Provide scientific and technical assistance to ENABEL
- **SO2:** Develop robust data analysis, remote sensing/geospatial information, and comprehensive assessments of the basin's resources and their sustainability, taking into account the impacts of climate variability, anthropogenic pressures, and increasing water demands, coastal floodings, erosion.
- **SO3:** Support the development of a transboundary environmental monitoring system for the lakes limnological characterization and the WEFE nexus analysis



Tanganyika lake: coordination and synergies with ICPAC

- **Identification of key regional priorities:** through the involvement of key regional stakeholders (LTA, ABAKIR) and local stakeholders, high level meetings organization, on-field missions (e.g ICPAC field trip to Burundi), capacity building (ICPAC visit planned for September at JRC headqauarter, joint training for regional partners in October)
- **Data collection and sharing:** regular exchanges on potential data sources, suitability of existing datasets (spatial and temporal coverage and resolution, public availability, sensitiveness etc.) and sharing of specific products (e.g. river discharge data, pre-processed precipitation and reference evapotranspiration). Examples:
 - **Analysis and comparison of precipitation products** (CHIRPS, MSWEP) from remote sensing over the region
 - Soil characterization and hydraulic properties data, hydropower and river discharge data
 - Ongoing land cover datasets comparison and identification of crop distribution and their water requirements.
 - Use of ground data to validate SWOT products in the African Great Lakes region
- **Planned joint publication:** on the analysis and comparison of precipitation products from remote sensing over the region for WEFE NEXUS analysis.



Zambezi TRB: coordination and synergies with the Un. of Zambia and ZAMCOM

Research article [Get rights and content](#)

Research paper

Zambezi River Basin aquifer systems: Opportunities and challenges in using freely available data sources and groundwater flow modelling for spatial exploratory analysis

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University of Zambia

Dr. Kawawa Banda

RCoEs

FOCUS

**UPPER ZAMBEZI
and
INTERMEDIATE BASIN**

Discussions took place during:

1. *a JRC mission to Zambia in Feb 2025;*
2. *UoZ delegation visit at JRC in Jan 2026;*
3. *joint analysis ongoing*

FORMER

ACE2 scientific research on: gw flow modelling, DRASTIC risk assessment (Un. of Zambia; NUST, Zimbabwe; Un. of Western Cape, RSA; SADC-GMI);

THEMATIC

Improved groundwater management for the Upper and Intermediate Zambezi Basin

The Upper Zambezi Catchment hosts a transboundary groundwater aquifer poorly documented. Knowledge on this system would help to propose appropriate governance mechanisms both from a quality and quantity perspective.

- Conjunctive water management (gw & surface water interactions)
- Improved management of groundwater dependent ecosystems
- Improved groundwater knowledge and information systems
- Support decision-making in Zambezi TRB
- Assessment of managed microreservoirs in Zambia and Zimbabwe

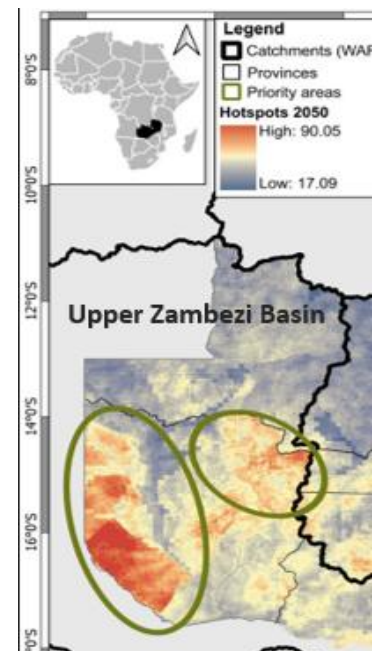
Mapped Key Water Challenges

Adaptation to climate variability and change

(Adaptation strategies; CV analysis and impact assessment;

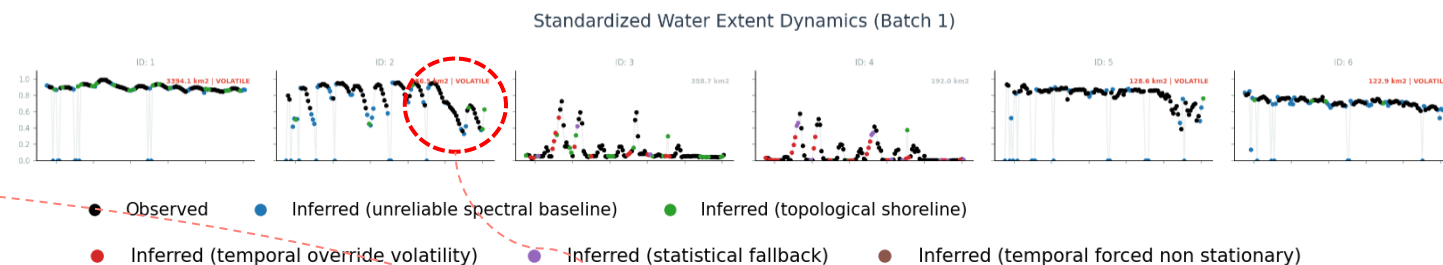
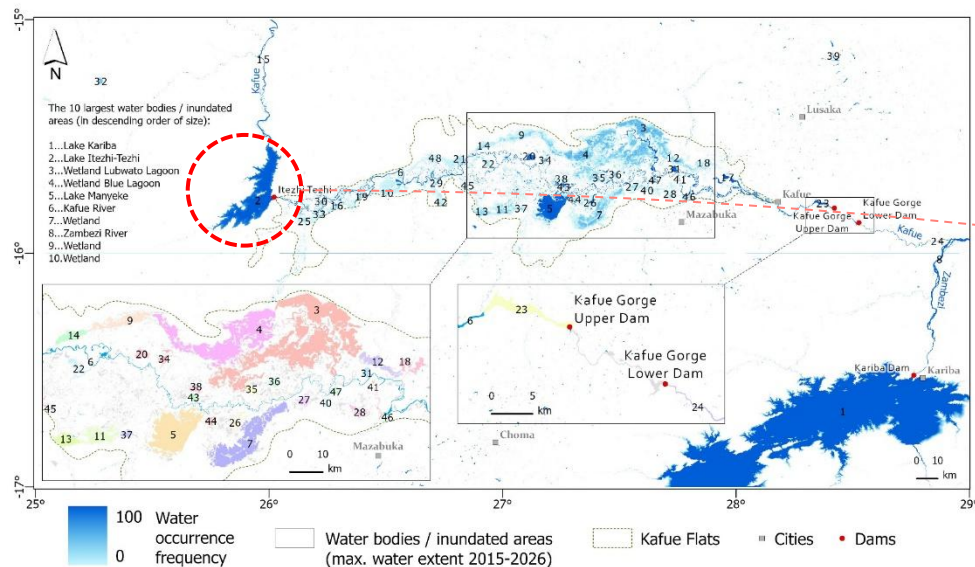
Management of the increasing water demand
(Improve groundwater knowledge)

Improve transboundary coordinated water use monitoring, data collection and management



Hotspot areas of climate change (Source: World Bank, 2019)

Zambezi TRB: surface water dynamics in the Kafue flat plains



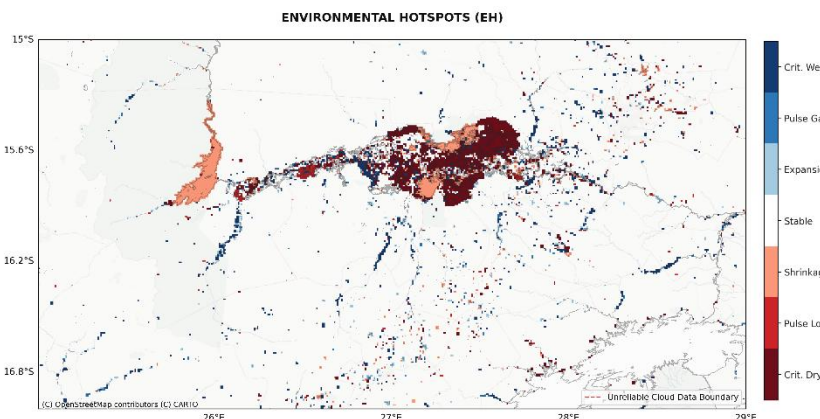
Drastic lowering of water level in Itzekhi-Tezhi impact downstream



RCoEs



University of Zambia



- Paper on Wattled Crane habitat change in the Kafue flats (under preparation)
- Upcoming research on conjunctive water mgmt and aquifers governance in the upper basin. Potential combination of surface water dynamics analysis and groundwater modelling to address WEF nexus and impacts on ecosystems

Coordination and synergies with the Okavango Research Institute (Un. of Botswana) and CORB

EU action – JRC / COPERNICUS

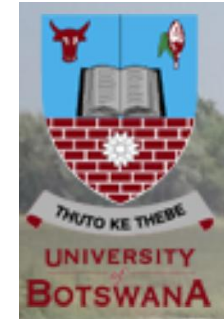
Main objective: to conserve inland water ecosystems and preserve water stocks through conjunctive water management across river basins and aquifers in the SADC region, and in the Cubango-Okavango TRB, in particular.

SO2: Improve mechanisms and coordination for evidence-based management of water resources to guarantee water security - SDSS

- **O2.1:** Improvement of data-management practices and cooperation. Development of a DSS to provide RBOs with actionable, science-based information.
- **O2.2:** Strengthening the capacities of decision makers and water managers in IWRM/ICM principles

Early discussions took place during the roundtable “Transboundary Water Management in Southern Africa”, held in Maun (Botswana) in May 2025. Ongoing collaborations with all the key partners on needs and priorities identification in the basin, hydrological modelling, water dynamics assessment, SWOT analysis of water volume changes

RCoEs



Partners to align with: OKACOM, ORI GiZ, EU Del, World Bank – in synergy with the broader EU landscape (eg. Team Europe on TWM in Africa, TENBAWAS on SWOT satellite)

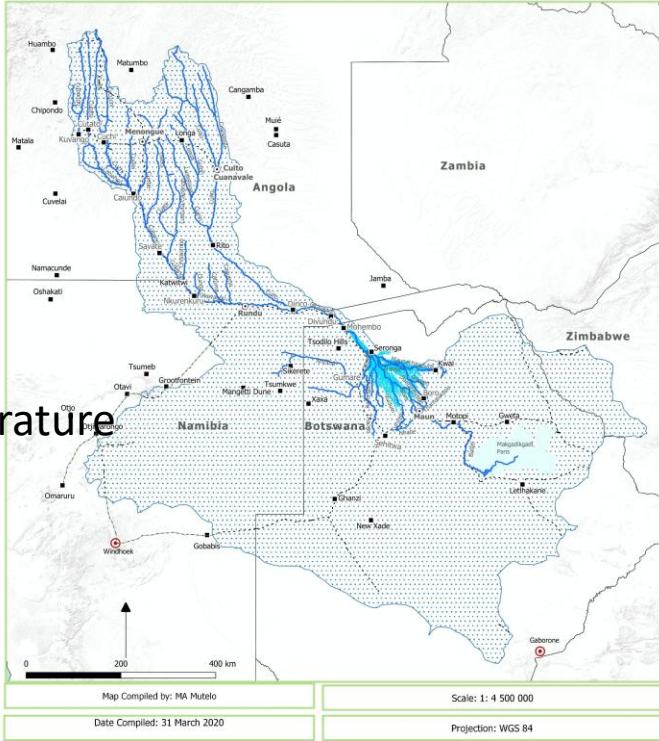
Thematic areas: Hydrology, Climate change, Water quality, Biodiversity, Human-wildlife and livelihoods, Governance, Delta and wetland ecology, Monitoring and early warning, Transboundary impacts, modelling and SDSS operationalization.



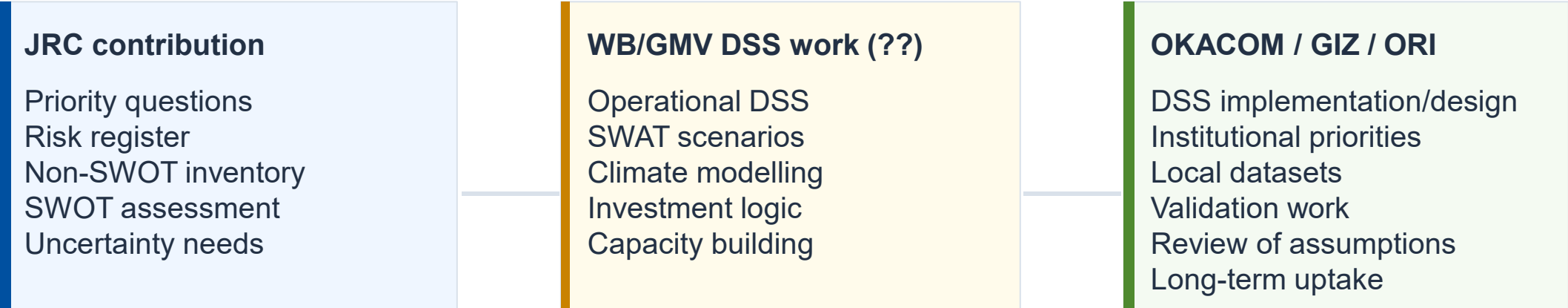
Okavango TRB: current advancement status

FIRST JRC INCEPTION AND PRIORITISATION FRAMEWORK REPORT UNDER FINALIZATION

- Review hydrology, flood-pulse dynamics, ecology, transboundary issues and EO/SWOT literature
- Define problem areas and knowledge gaps for water availability
- Translate priority questions into a scored prioritisation matrix
- Define study area, sub-areas, water-feature classes and variables
- Set risks, assumptions and workplan for next scientific analysis



The useful interface is between JRC evidence products, the DSS workflow and partner-owned data

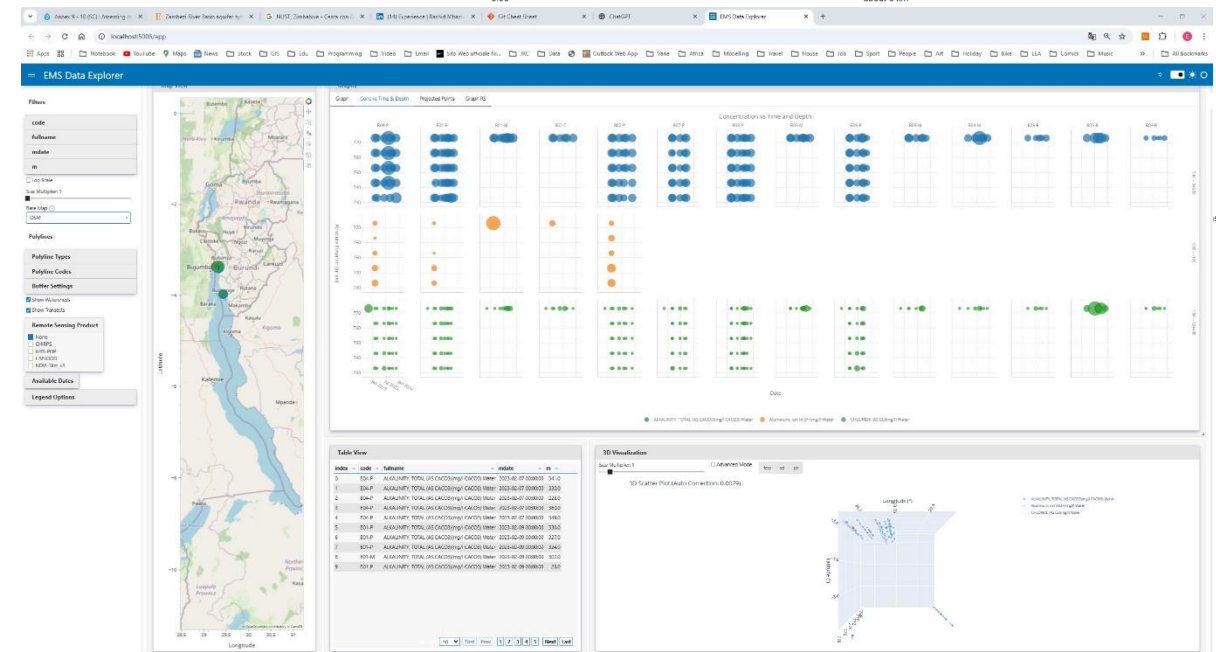
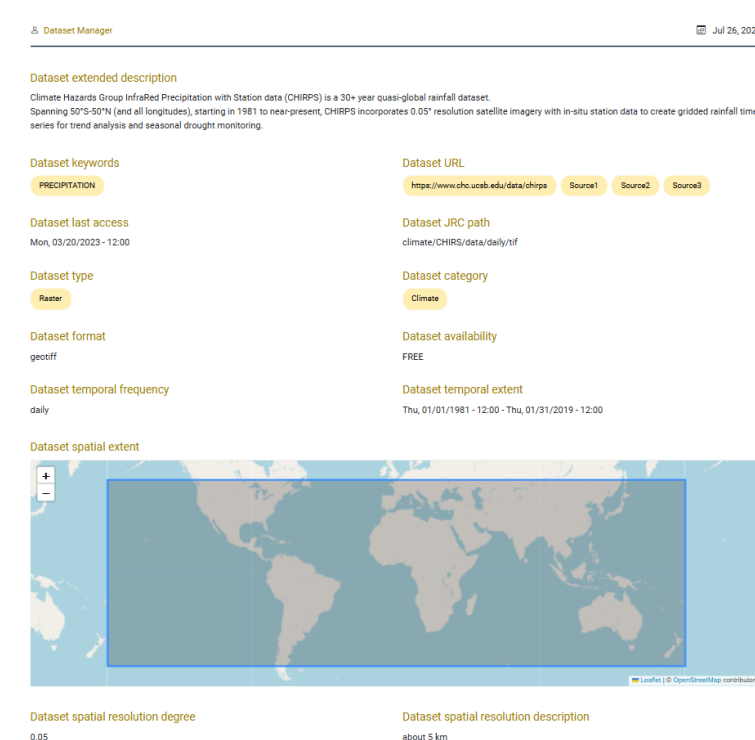
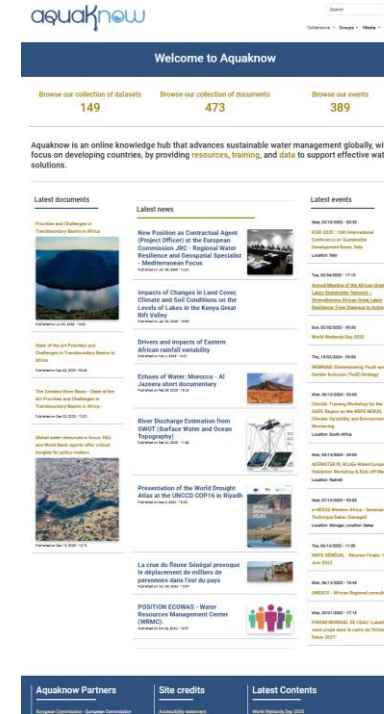


Shared interface: Use cases, data standards, validation datasets, model assumptions and update responsibilities



AQUAKNOW - A WATER KMS

- **Online knowledge hub that advances sustainable water management globally**, with a focus on developing countries and support to science based evidence policies;
- **Conceived under ACEWATER I (2009-2014)**, subject to continuous development, **it provides a gateway to past and ongoing TRBs projects, tools and training material** (eg. Mekrou, Burkina Faso, Senegal, Tanganyika), including ACE2 (2016-2020) scientific and HCD deliverables (Senegal, Niger, Blue Nile, Victoria lake, Zambezi)
- It provides a working platform, fully addressing **confidentiality constraints** (work in-progress, data and scientific outcomes sharing, private working groups setup) and covering dedicated tools to NEXUS analysis, climate variability, ground data standardization, management and spatio-temporal exploratory analysis.



Thank you

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