

Filling the data gap: a common approach for data collection and use in Africa

SUMMARY

Information is needed to support decisions for daily water management operations and long-term adaptation to Climate Change. To generate this information, stakeholders in the water sector in Africa can use the AfriAlliance triple sensor approach for combining data from remote sensors, in-situ sensors (e.g. weather stations), and human sensors (e.g. citizen-sensed data). This approach helps fill data gaps and provides more information than just relying on one type of sensor. However, there is a need to use a common approach when planning data collection projects to generate relevant data. To this end, this policy brief presents a generally applicable process to design, collect and share data and information and ensure comparability across regions and users.

Introduction

Up-to-date information is needed to support decision-making to manage water resources and adapt to Climate Change. The low capacity of some African countries to generate and process this information delays the development of effective policy and actions. At the policy level, the lack of data also makes it difficult to track progress towards achieving the Sustainable Development Goals (SDGs), especially in relation to water and climate action, and to increase transparency and accountability for development assistance^{2,3}. At the operational level, the lack of data reduces the ability of water managers and Civil Society Organizations (CSOs) to plan their operations and use resources efficiently and effectively⁴ (see Box 1).

Information on the condition of local water resources and infrastructure enables water managers and stakeholders to design strategies for fast intervention. For example, during the drought in Ethiopia in 2016, water authorities did not have updated information on the condition of boreholes. Therefore, they could not direct financial and human resources to the locations where repairs were needed to ensure that people had access to drinking water (Box 2).

KEY MESSAGES

- Using the AfriAlliance triple sensor approach to combine different types of data helps improve water resource monitoring and forecasting.
- A common approach to design projects for data collection supports information sharing for better adaptation to Climate Change.
- Consistent data collection by citizens can help fill data gaps and support water management decisions.

BOX 1

Daily operations require data to support decisions

AfriAlliance's outlook of research and innovation needs to strengthen the water sector in Africa⁴ identified, among others, how the lack of data affects the short and long-term activities of water stakeholders:

- **River Basin Organizations** need to combine data on water quality and quantity with information on the condition of ecosystems to define priorities for restoration of catchment areas.
- **Water Utilities** need information on the quality and quantity of surface and groundwater to decide how to allocate water and what treatment process is required based on raw water quality.
- **Civil Society Organizations** need information on the state of water resources to advise communities on the adoption of sustainable farming practices, and to engage stakeholders in protecting water resources to increase food security.



Zambezi River Basin. Photo: International Rivers. Creative Common license

Without the information base that data provide, decision-makers and stakeholders face great uncertainty when planning adaptation strategies. The Development Sector has identified data deficiencies as a hindrance for transition to economic and social development in Africa^{2,3,6}. Many countries in Africa depend on development assistance to establish monitoring networks to track the SDGs and provide information on water and climate. Nonetheless, in 2015, around 80% of the national meteorological and hydrological services in Africa could not provide data and reliable warnings⁵. Expanding the coverage of data networks and increasing the technological and human capacity to manage them will provide relevant information at multiple spatial and temporal scales, and make it accessible to different types of users^{5,7,8}.

To support socio-economic growth in Africa, the African Union⁸, the European Union⁹, the East African Community, and the Southern Africa Development Community¹⁰, among others, have called for multi-stakeholder collaboration at national, regional and continental levels to support Science, Technology and Innovation strategies. This requires generating multi-scale information to evaluate the implementation of agendas and using consistent and systematic approaches for data gathering to make research findings shareable and comparable across regions.

In response to these needs, AfriAlliance has been focusing efforts in two areas: *integrating* data gathering efforts at different spatial scales, and *developing guidance* for a common approach for data gathering and sharing.

The AfriAlliance triple sensor approach for data integration at multiple scale

To increase data coverage and accuracy AfriAlliance has developed a triple sensor approach⁷ to combine information from multiple sources that are seldom integrated but can complement each other. By combining the coverage and capacity of human sensors (citizens, geo-crowdsourcing and communications), physical in-situ sensors (e.g. meteorological stations), and space-based satellite sensors (Figure 1), the triple sensor approach aims to overcome the problems of accessibility, reliability and accuracy that are often associated with approaches that rely on a single source of data.

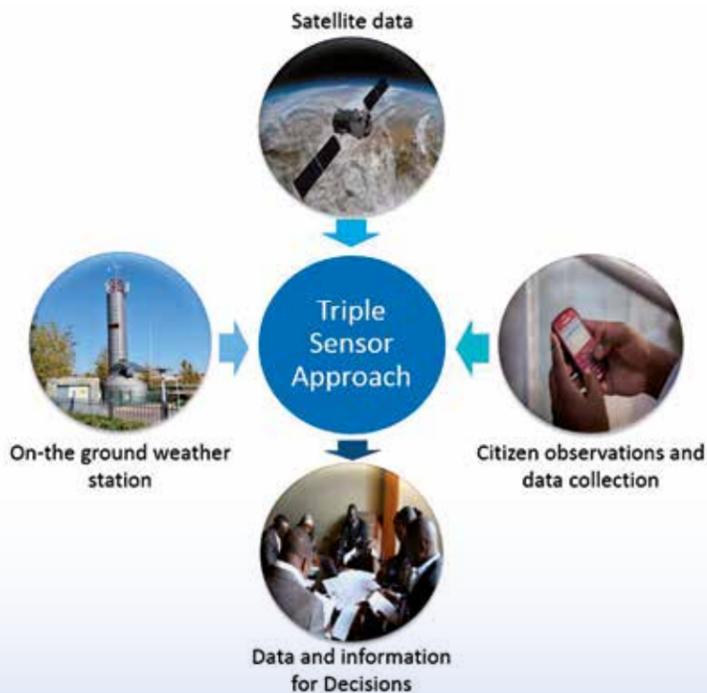


Figure 1. Triple sensor approach (created with images from Creative Commons license)

BOX 2

The role of data in responding to drought in the Horn of Africa

In 2016 and 2017, the prolonged drought in large parts of Ethiopia greatly affected the Somali region. The movements of people and livestock in search of water increased the pressure on water resources and there were outbreaks of acute diarrhea. Drought response was coordinated by the Ethiopia WASH cluster, headed by UNICEF including other NGOs and the Somali Region Water. A priority was to ensure that high-yielding motorized boreholes, tapping into deep groundwater, would keep functioning. Crucial for planning and implementing an emergency response was to have accurate information on the status of water points. Borehole data needed to be updated fast to effectively target areas most in need of water.

AfriAlliance partner Akvo and the International Rescue Committee were invited to collect data on all motorized boreholes and their functionality. Early 2017, field teams started collecting data for a baseline. Once complete, the baseline was verified with regional and zonal data collectors and supervisors. Afterwards, the data were visualized in an online decision-making dashboard, where they could be filtered by geographic area. The inventory of water points was updated within one month. This accurate information supported decisions on where to send water trucks and maintenance teams to repair or rehabilitate non-functional and low-yielding boreholes.



Somaliland Drought. March 2012. Oxfam East Africa. Licensed under the Creative Commons Attribution 2.0 Generic license.

A triple collocation method is used to combine and validate data to fill data gaps and obtain better results with limited monitoring budgets. Using direct collaboration with local and regional stakeholders, this approach can help fill the void that many African countries have regarding hydrological data and make information accessible to those who need it.

A common approach for data gathering and sharing

For the water sector in Africa, the lack of local weather data⁵ to set the baseline for Integrated Water Resource Management (IWRM) is aggravated by inconsistent methodologies used across different data gathering efforts. This reduces data utility and/or comparability. Sharing data and knowledge (Figure 2) supports the implementation of common strategies to use water resources and adapt to Climate Change. It also helps use financial resources more efficiently by avoiding duplication. Although African stakeholders and international organizations have highlighted the need for consistency and comparability of data from continental to local levels, there was no common approach for planning the collection and use of data.



Figure 2. Mobile phones are increasingly used to support data gathering (Photo: Akvo).

Targeting this need, AfriAlliance has produced a Handbook¹¹ that outlines a process for developing and implementing a plan for data collection and monitoring. *The handbook advises on the implementation of the data collection process; the integration of collected data with data from other sources; the analysis of data to obtain information that will support informed decisions; and on sharing data as an openly available product.* The process is divided into five stages and ten phases (Figure 3) which are outlined in Box 3 and expanded in the Handbook¹¹.

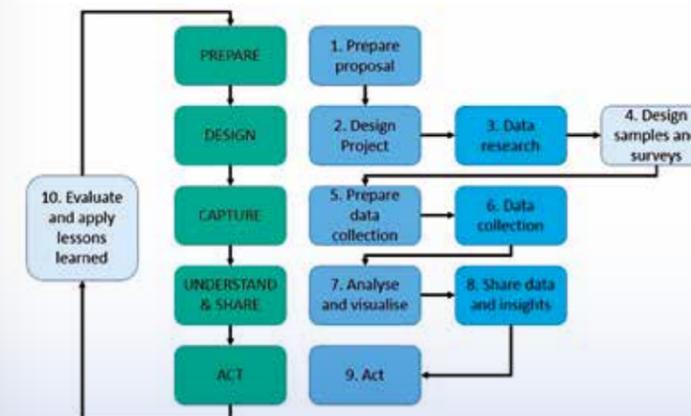


Figure 3. Phases and stages of the process for data collection and sharing, according to the AfriAlliance Handbook¹¹

BOX 3

Phases and stages of the process for data collection and sharing

Prepare

- *Prepare project:* Define the purpose and expectations for the project, what information is needed and what data will be required.

Design

- *Design project:* Determine the data needed to inform stakeholders and support their decisions. Follow a "Theory of Change" approach: first define the long term goals for the use of data and then plan backwards what data gathering activities and resources are required.
- *Research data:* Before starting to design data collection, systematically assess what data already exist, their reliability, and data gaps to fill.
- *Design samples and surveys:* Clearly define research questions. Think about how to collect data to find the answers, how to ask questions, to whom, and to how many people.

Capture

- *Prepare data collection:* Plan and prepare the collection process to ensure high quality data and efficiently use resources.
- *Collect data:* Before entering the field, conduct a final check, include crosscommunication with all team members. Finalize logistics arrangements and check data quality as it is being collected in the field.

Understand and share

- *Analyse and visualise data and gain insights:* Define in advance the steps to clean and analyse data.
- *Share data and insight:* Think in advance what other groups will use the data and/or insight (the target audience), in which formats and channels they can use data, (e.g. internet, mobile phone), and what final products they need (e.g. maps or tables).

Act

- *Act & make informed decisions (Data to Decision):* Make decisions based on the information that data provide, instead of on preconceptions, opinions or other influencing factors. This will increase transparency and accountability.
- *Evaluate and apply lessons learned:* Consistently and continuously evaluate the project to show its real effect.

How can data needs in Africa be met more efficiently and effectively?

- To strengthen the capacity of African countries and use development assistance more efficiently and effectively, donors and governments should consider involving citizens and other stakeholders in data gathering and processing (Figure 4).
- To have better information to support decisions, donors and decision makers involved in water management and Climate Change adaptation should consider a triple sensor approach to integrate information generated at various spatial scales to support IWRM.
- To increase data and information sharing and comparability, donors, authorities and other stakeholders involved in data collection can use the process outlined in the AfriAlliance Handbook to achieve consistency in generating and sharing data and information.



Figure 4. Citizen involvement in data collection. (Photo: IHE-Delft)

AfriAlliance is a five year project funded by the European Union's Horizon 2020 research and innovation programme. AfriAlliance facilitates the collaboration of African and European stakeholders in the areas of water and climate innovation, research, policy and capacity development by supporting knowledge sharing and technology transfer. Rather than creating new networks, the 16 European and African partners in this project consolidate existing ones. The ultimate objective is to strengthen African preparedness for future Climate Change challenges. AfriAlliance is coordinated by the IHE Delft Institute for Water Education (Project Director: Dr. Uta Wehn) and runs from 2016 to 2021. [Website: afrialliance.org](http://www.afrialliance.org)

PRODUCTION: **Authors:** Angeles Mendoza, Joel Angoran, Uta Wehn (IHE Delft) | **Contributors:** Annabelle Poelert (Akvo), Linda Velzeboer (IHE Delft), Rob Lemmens (ITC) | **Graphic Design:** Carola Straatman

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afrialliance@un-ihe.org www.afrialliance.org [f](#) [in](#) [t](#)