

## Water Science to support Policy Making in Africa

### Headlines

- ✓ In the African continent, 90% of water resources are found in 63 transboundary river basins. By inference, **Water Diplomacy** based on a sound knowledge foundation should be one of the key component to ensuring efficiency, efficacy, equity, inclusiveness and sustainability of the management of water and related resources in Africa.
- ✓ Globally, proper management of the Water sector is hampered by the lack of reliable **knowledge, information and data** on water quantity and quality. In Africa, the Water sector should **integrate local and traditional knowledge** to fill the gap in existing knowledge, information and data needed for evidence-based policymaking. There is also a growing need for a nexus approach as a way to tackle cross-sectoral issues, trade-offs and stimulate interdisciplinary dialogues.
- ✓ There are **significant capacity gaps** (e.g. researchers, professionals and technicians) and regional differences in the priorities of capacity needs. The extent and type of these gaps need to be assessed in detail and then addressed. The International Water Association (IWA) survey in ten (10) developing countries in Africa and Asia estimated that in 2014 over **780,000 sector staff were needed** to achieve the Millennium Development Goals (MDGs). These aspirations need to be updated to address the Sustainable Development Goals (SDGs).
- ✓ **Discrepancies** exist between the **Water Sector needs** and what **educational institutions are able to provide** in terms of knowledge, skills and competences.
- ✓ **Education content gaps limit job opportunities** in the Water Sector, contributing to migration of personnel to other sectors or geographical areas for better opportunities. These gaps often overshadow the central role of women in water management.
- ✓ The **UA-NEPAD Centres of Excellence** on Water Science are **mapping skill gaps** at the national level and **proposing updated curricula** to 1) improve skills by meeting the industry's qualification and competency requirements; 2) provide hands-on training to institutional, professional and technical staff to enable them to adapt to sector/technical changes; and, 3) develop new responsive courses tailored to the actual needs of the sector.

### Policy Context

The **2020 Global Risks Report**<sup>1</sup> of the World Economic Forum ranks Water Crises and other water related issues among the top five global risks in terms of impact since 2015. This risk is aggravated by climate change and population growth as they impact the quantity and quality of available freshwater, leading to adverse effects on human health and/or economic activity. SDG 6 aims to ensure availability and sustainable management of water and sanitation for all – water is crucial for the sustainability and development of the livelihood of low-income households and developing economies in general. Similarly, sustainable access to clean water and sanitation, as well as water resources management, play an important role in the rest of SDGs, especially 1, 2, 3, 4, 5, 7, 11, 12, 13, 15 and 16. The linkages and interactions between the SDGs require a concerted effort and collaboration among all relevant actors at all levels to ensure that by 2030 no one is left behind.

Water is essential for economic and social development. Freshwater availability is a key determining factor in efforts to ensure food and energy security as well as for increasing industrial production – thus underpinning jobs and employment in a wide range of sectors. The quality of freshwater ecosystems has a direct impact on the well-being and productivity of human populations and, thus, on the sustainability of national economic growth and development. Access to clean water is fundamental to the health of human communities<sup>2</sup>. Secure and equitable access to safe water and sanitation and good water management practices contribute directly towards achieving gender equality and access to education, health and well-being.

Current political debate is increasingly engaging in the future availability of freshwater in a changing world. More than 40% of the population of Sub-Saharan Africa does not have sufficient access to safe water and sanitation. **Access to water and sanitation, and renewable water resources per capita in Africa** are spatially **highly unequal and variable** (Fig. 1). Eight out of ten people who still lack basic services live in rural areas, and almost half of them live in Least Developed Countries<sup>3</sup>

<sup>1</sup> [Water Economic Forum 2020 Global Risk Report](#)

<sup>2</sup> FAO 2012. Nature and Faune. Enhancing natural resources management for food security in Africa Volume 27, Issue 1, pg 3

<sup>3</sup> 5.3 billion people of the world population used safely managed services. An additional 1.4 billion used at least basic services. 206 million people used limited services, 435 million used unimproved sources, and 144 million still used surface water (Progress on household drinking water, sanitation and hygiene 2000-2017.

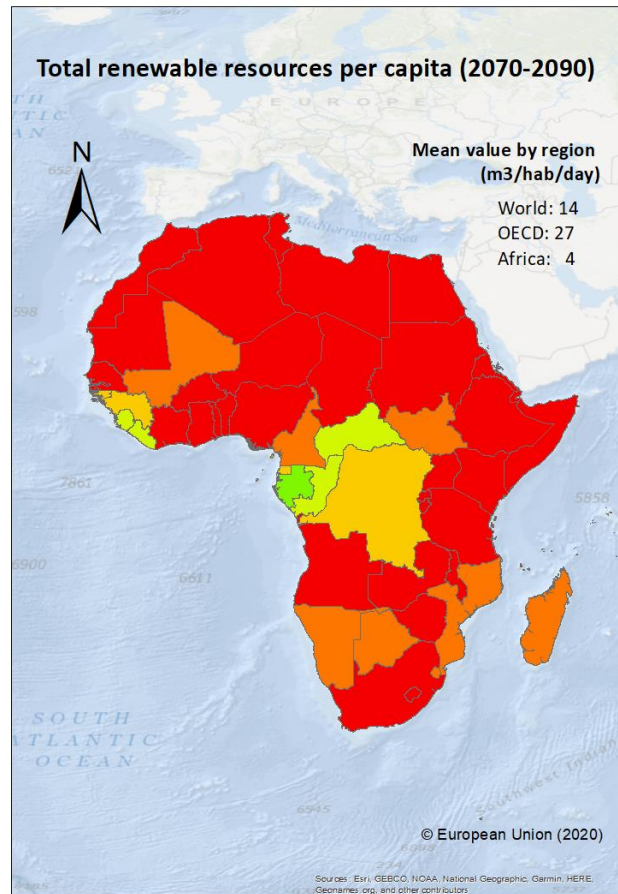
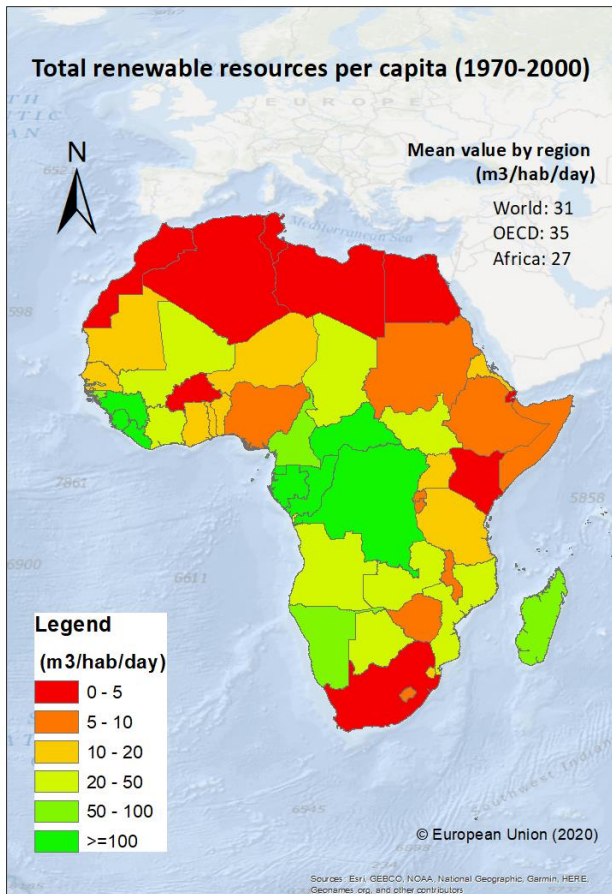


Figure 1. Total Renewable Water Resources per capita and projections<sup>4</sup>.

More than 90% of Africa's water resources fall within 63 river basin catchments shared by multiple countries (Fig. 2). In Africa, there are many governance mechanisms for water management from the national and regional levels (basin organisations and regional economic communities) to the continental level (African Ministers' Council on Water – AMCOW). **Water Diplomacy** emerges as a suitable tool for strengthening peace and sustainability addressing issues and challenges in water resources management in Africa, involving negotiations, international and cooperative dialogues that must be based on sound knowledge and informed decisions. The **Science-Policy interface** plays an essential role in fostering water management dialogues on various institutional levels. These dialogues are particularly important in international watercourses, where competition for the allocation of water resources among countries and uses, exacerbated by climate change and population growth, could become a potential source of conflict or an opportunity for cooperation. To illustrate the need for these dialogues, the African population is forecasted to double by 2050<sup>5</sup> increasing the continent's share in the global population from 16% in 2015 to 25% by 2050 and 39% by 2100, which will have a clear impact

on access to the resources and the need for development and cooperation (Fig. 1).

### Key Science-Policy Interface Issues.

In general, the role of science as a driver of capacity, knowledge and information development is key to good governance and cooperation initiatives. However, it is also acknowledged (Hodgson, 2010), particularly in the African context, that policy formulation requires more than knowledge derived from scientific evidence to improve the effectiveness of policies. The use of research results in the implementation of SDGs and programmes cannot be a mere technical process<sup>6</sup> and must be driven by a strategic vision of the future. Only policymakers can provide the latter. To overcome these challenges, the United Nation's 2030 Agenda (SDG 17) emphasises the importance of creating science-policy partnerships.

The interface between policy and research is always subject to tensions for several reasons, including, among others, differing rationales and time horizons and subsequently lack of mutual expectations. In particular, in the African context, several "obstacles" have been identified<sup>7</sup>, including:

1. The complexity of evidence: while researchers consider

Special focus on inequalities. New York: [UNICEF and WHO Joint Monitoring Program Report, 2019](#)

<sup>4</sup> [FAO, 2020. Projections of future total renewable water resources \(TWR\) by country for different climate change scenarios available](#)

<sup>5</sup> [Based on United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2019 Revision](#)

<sup>6</sup> Fourie, W., 2018. "Six Barriers that make it difficult for African states to use Research for Policy". [The Conversation Africa blog](#).

<sup>7</sup> *Ibidem*, 6.

<sup>8</sup> Grimm et al, 2018. The Interface between research and policy making in South Africa: Exploring the institutional framework and practice of an uneasy relationship. [Deutsches Institut für Entwicklungspolitik \(DIE\)](#).

scientific literature an important form of evidence, policymakers rely on practical knowledge from the field and political understanding. Moreover, scientific evidence on the same subject may sometimes be contradictory if different methodologies, perspectives and theoretical principles are used. This leads to mistrust of scientific results by policy makers.



**Figure 2.** The Niger River, the third-longest river in Africa has a basin area equivalent to 21% of the area of Europe and 2.6 times the size of the Danube Basin and is shared by 9 sub-Saharan countries.

2. **The structural underfunding of research:** some research on evidence-based policy interventions can be very costly and incompatible with the African governments' available budgets.
3. **Limited incentives** for applicable and policy-oriented research publications.
4. **Different timeframes** between research and policymaking. It is often the case that long and protracted timeframes for in-depth research activities (including peer-reviewed publication) could not be synchronised with the urgency of policy formulation to address sometimes pressing societal challenges. On the policy side, too, there is a reluctance to reading research papers and technical reports.
5. **Gaps in the education system:** relevant topics in the water sector are not always fully considered or addressed by education system. Therefore, young students are not sufficiently trained to become decision-makers or researchers. They need additional training and experience.
6. **Mistrust between researchers and policymakers** is historically well anchored. From perspective of researchers, policymakers generally lack experience and knowledge to understand cutting-edge research. From the perspective of policymakers, research results need to be contrasted with the reality on the ground, as research end before on-ground implementation. Researchers are not always fully engaged in practical implementation.
7. **Inadequate expectations** regarding the research-policy

interface, which are unlikely to be met due to differing agendas, rationales and roles.

8. **Communication** between the two communities is often **irregular and ambiguous**, using vocabularies that are not always appropriate or in common. This can also mean that policymakers may not have access to up-to-date information on research advances and tools, and researchers may not have access to information on relevant challenges considered by the decision-makers.

## The Science-Policy Interface: Dynamics of Challenges-Causes-Consequences and Solutions.

These different "obstacles" combine into complex challenges that make the research-policy interface even more difficult to construct. An analysis of these challenges to identify the causes and consequences is necessary in order to come up with recommendations and sustainable and coherent solutions.

1. **Challenge:** Unknown, growing and very heterogeneous skills gaps across countries in the Water Sector in Africa<sup>9</sup>.

**Causes:** Lack of sector skills analyses, limited resources for capacity development, and limited skill- or competence- based curricula or even absence of relevant water-related curricula in technical, vocational and higher education institutions.

**Consequences:** Mismatch between competencies and skills required by industry and those offered by capacity building institutions, which limits the usefulness of graduates in the sector. As a result, trained professionals and technicians move to other sectors while the water sector remains understaffed.

**Recommendations and Solutions:** i) map out the actual gaps in skills and human capacity at the national scale<sup>10</sup>; ii) work closely with the private sector and training and education institutions to develop appropriate curricula; iii) promote internship opportunities tailored to actual needs in the field; iv) create job opportunities in the water sector; v) strengthen hubs for developing and sharing knowledge and information between scientific and technical professionals; vi) develop a NEXUS approach in education to build more sustainable solutions and give water professionals a broader base for job-seeking; vii) Involve local communities in science-policy discussions for the development of the sector in order to integrate traditional and field-based practical knowledge on water resource management, including water consumption, conservation, quality and storage methods. The contribution of women is considered here as an essential input.

2. **Challenge:** Many of the research tools proving the challenges facing the sector and the interrelationships between sectors are either not used or under-used by policy-makers and water managers. This represents a gap between Water Science and

<sup>9</sup> WASH Human Resource Capacity Gaps in 15 Developing Economies. [International Water Association, 2014.](#)

<sup>10</sup> "There is no blanket approach to capacity development at scale. We need country-by-country tailored solutions." Five solutions to avoid a water sector human resources crisis. [IWA Newsletter, September 4, 2016](#)



Policy Making that hinders understanding of water-related issues and challenges in order to provide concrete and sustainable solutions.

**Causes:** 1) Scientists developing tools do not always integrate the institutional, economic and cultural constraints under which policymakers operate; 2) policymakers are often unaware of the availability of relevant scientific research and tools; 3) there is an inconsistency between the timeframes within which scientists/researchers and policymakers operate<sup>11</sup>; and, 4) the limited engagement between researchers and policymakers leads to researchers pursuing topics of fundamentally scientific interest and little immediate relevance/priority to the policymaker.



**Figure 3.** European Development Days – 2019. Water Science and Policy Dialogues: AMCOW – Executive Secretary, DEVCO, JRC, UNESCO, PAWES, AU—NEPAD Centres of Excellence on Water Science.

**Consequences:** The key role of water as a driver in economic development is often insufficiently understood in many sectors. Water is treated as an assumed precondition. Conversely, the potential adverse effects of economic development on the quantity and quality of water resources are also not systematically recognized and sometimes ignored. Thus, water and the achievement of the objectives of SDG 6 are not high on the economic development policy agenda. There is no clear articulation of water and its interactions with the different sectors to highlight the key role of water in development and the achievement of other SDGs.

**Recommendations and Solutions:** i) Communication and collaboration are key to building and strengthening links between Water Scientists and Researchers, Water Practitioners, Policymakers and other key stakeholders on the Policy Makers' agenda; ii) Develop and strengthen a common platform for dialogue – a space for communication and exchange – functioning as a Water Think-Tank to address a wide range of topics and set priorities, proposing concrete

solutions designed for clearly defined and effective outcomes, e.g., Baseline Studies, Position Papers, Policy Briefs, Action Plans; iii) Clarify the assumed catalytic role of water in development for other sectors; iv) Government officials and researchers need to engage in co-creation of research to reduce uncertainties, working on more targeted research topics that support country priorities; v) Outcomes should be presented to the institutions of both the European Union (EU) and the African Union (AU), including the African Ministers' Council on Water, the Regional Economic Communities (RECs), as well as River and Lake Basin Organisations (R/LBOs) to initiate Policy Declarations (Fig. 3). The next steps would be to downscale and implement these Policy Declarations and target government institutions at national, sub-national and cross-sectorial levels (Fig. 4). vi) Researchers should participate more in field projects to contrast research with the ground realities. These actions can provide an impetus for the EU and AU to raise the profile of the water agenda in national regional and international fora.

**3. Challenge:** The lack of data and knowledge exacerbates the complexity of managing water ecosystems and the uncertainty about the outcomes of choices and decisions made in managing water resources. There are constraints to availability of, and/or access to, data of enough quality and knowledge on: i) water quantity and quality parameters; and, ii) the impact of climate variability and change on water and other natural resources.

**Causes:** i) reliability and availability of data and research results often not packaged in an accessible (or usable) form for decision makers; ii) insufficient database systems and related Information Communication Technology (ICT) tools, networks and equipment that are openly shared across institutions (or countries in the case of transboundary river basins and aquifers); iii) a lack of adequate networks of hydro-meteorological and gauging stations and necessary maintenance; iv) a looming gap in long-term human competencies, due in part to a lack of smooth handover of skills and capacities, but also due to training gaps of a younger generation of professionals and technicians; v) evidence from research is not often accessible to decision-makers.

**Consequences:** i) There is a poor (technical and scientific) collection, analysis utilisation, storage, updating and management of data and related information management infrastructure; ii) missed opportunities for knowledge creation and scientific research; iii) difficulties in producing usable long-term datasets; and, v) negative impact on the quality of project identification and formulation.

**Recommendations and Solutions:** i) Create and maintain national, regional and continental hubs for sharing and improving local and traditional knowledge; ii) Sharing

<sup>11</sup> Agricultural Water Management, [Proceedings of a Workshop in Tunisia \(2007\)](#), Chapter: How can scientific research be more effectively integrated into public policy making?

information and data and monitoring systems at different institutional and inter-institutional scales; **iii)** Research results need to be accessible by summarising and translating complex data in short, and concise policy recommendations for decision-makers with limited time; **iv)** Continuous engagement, promoting partnerships and building trust between researchers and data-responsible authorities such as Water Ministries or National Statistics Offices to allow access to data and information; **v)** Orienting curricula to address maintenance for data collection apparatus, consistency of data measurement and data storage; **vi)** Incentivise researchers to produce policy-oriented outputs. Science communication is a key competency that enables translating research results into usable information by policymakers.

### Science-Policy Interface: The Way Forward.

**EU-AU Institutional Policy.** The AU-EU joint Strategic Partnership<sup>12</sup> includes the Development of Knowledge-based Societies: “Efforts need to be made to address the scientific divide and increase Africa’s research capacities”. In this framework, Africa and the EU stressed their common will to strengthen the collaborative links between African regional and sub-regional partnerships and European partners, and contribute to the sustainability of centres and networks of excellence already established in Africa.

Since 2009, the European Commission has supported the implementation of the **AU-NEPAD Centres of Excellence on Water Science**<sup>13</sup> within the wider framework of the AU-EU Strategic Partnership. With the support of the Joint Research Centre of the European Commission, the activities implemented by the AU-NEPAD Water Centres of Excellence are enhancing collaboration between the different actors in the water sector in Africa, improving the scientific and technical capacities of local and regional institutions, and supporting them by providing quality knowledge and evidence to decision-makers of the water sector. Collaboration and coordination between the local/regional technical and scientific institutions are strengthened through regular meetings. This joint effort allows producing reports, databases and models on successful developments at different levels (national, river basin, regional and continental), addressed to AMCOW-Technical Advisers Committee (AMCOW-TAC) (Fig. 5), the African river basin authorities and the regional economic commissions.

The Executive Committee of the African Ministers’ Council on Water (AMCOW), in Cairo 2013<sup>14</sup>, noted: “the growing human

resources shortages to achieve water and sanitation goals in Africa and directs the Secretariat to work with the AUC and **NEPAD Centres of Excellence** to develop a Human Capacity Development Programme aimed at addressing junior professional and technician level capacity challenges in the water sector”.



Figure 4. WEF-SENEGAL – NEXUS Dialogues<sup>15</sup>.

In late 2017, during the EU-AU Summit in Abidjan, the Heads of State and Government of Member States of AU and EU affirmed the importance of “Investing in Youth for Accelerated Inclusive Growth and Sustainable Development”. They further noted the necessity of deepening collaboration and exchange in the fields of education, technology development, knowledge, skills and research, in order to cope with the impacts of the fourth industrial revolution through the unlocking of the youth potential. Concretely, the objective was to increase the employability of young people, to set up pathways to facilitate the mobility of entrepreneurs, students and researchers, and to develop better and more flexible mechanisms for regular migration.

The **AU-NEPAD Centres of Excellence programme** is in line with these various points and integrates the priorities of the **New European Consensus on Development 2017 (ECD)**<sup>16</sup>:

**People:** Support sustainable and integrated water management as well as more efficient use of water and water recycling, through a more strategic approach to regional development and integration (ECD art. 26).

**Planet:** Support the conservation and sustainable management and use of natural resources; and improve the governance and capacity building for the sustainable management of natural resources (ECD art. 44).

<sup>12</sup> [AU-EU joint Strategic Partnership \(JAES\)](#) is the formal channel through which the European Union and the African continent work together. JAES was adopted by Heads of State and Government at the second EU-Africa Summit in 2007.

<sup>13</sup> [ACEWATER Project](#). “African Centres of Excellence on Water” Project funded by the European Union, coordinated by the Joint Research Centre of the European Commission and implemented in collaboration with UNESCO-IHP.

<sup>14</sup> [Decisions of the 11th AMCOW Executive Committee of the African Ministers Council on Water \(AMCOW\)](#), 6th June 2013 in Cairo, Egypt.

<sup>15</sup> [WEF-SENEGAL project](#). Project funded by the European Union, coordinated by the Joint Research Centre of the European Commission and implemented in collaboration with the Italian Cooperation Agency (AICS) to promote cross-sectorial dialogues in the Senegal River Basin.

<sup>16</sup> [The New European Consensus on Development 2017 \(ECD\)](#). “Our World, Our Dignity, Our Future”. 2-June-2017.

**Prosperity:** Creating decent jobs for inclusive and sustainable growth (ECD art. 47). Public sector investment in research and innovation and cooperation in science and technology will also unlock private sector investment and drive inclusive sustainable growth in developing countries (ECD art. 49).

**Peace:** In the context of peace and stability, revitalise partnerships with qualified regional partners (ECD art. 68).

**Partnership:** The EU and its Member States will make use of different and complementary modalities and modes of aid delivery including twinning, technical assistance and capacity building (ECD art. 79). The EU and the AU will work together to promote South-South and triangular cooperation (South-North-South) to facilitate a strong institutional framework of dialogue.



Figure 5. Meeting of the African Ministers' Council on Water – Technical Advisory Committee (AMCOW-TAC) – 2018.

Future goals and challenges include **i)** the need to understand patterns of mobility of knowledge, **ii)** identify skills and migration demands in order to develop strategies that can both strengthen the resilience of Africa's Water Sector at the national and transboundary levels, **iii)** open up the sector to provide more employment opportunities, especially for the youth. Part of this understanding is being acquired with the efforts of **AU-NEPAD Centres of Excellence on Water Science** through the **mapping of skills gaps** at the national scale in 14 African countries with regional synthesis and considering gender aspects. Through the participation of government departments, water utilities, educational institutions and the private sector, the Centres of Excellence are developing frameworks for human capacity development, therefore, implementing the AMCOW EXCO directive of 2013<sup>17</sup> to address human resources shortages and improve the water sector. **Curricula** are being adapted or developed to **1) upgrade skills** by responding to industry skills and competency requirements; **2) provide better hands-on training** for institutional, professional and technical staff to equip them to adapt to sectoral/technical changes; and, **3) develop new responsive courses** to sector needs. **Preliminary results** suggest that there is a greater **need for training of Management and Administration staff** in Eastern Africa compared to Southern and Western Africa. In comparison, there is a greater **need for**

**vocational, technical education and training** in Southern Africa than in Eastern and Western Africa. There is also a greater **need for capacity development on water access and sanitation** in Western and Southern Africa, compared to Eastern Africa. In addition, these activities are augmented with **south-south exchange of students and academics**. **Engaging with the private sector** can further optimise and extend the sharing of local expertise/resources in Africa for the direct benefit and better career prospects of young professionals to resolve the actual needs of the water sector and other associated sectors (agriculture, energy, infrastructures). The next step would be to scale up these initiatives and roll out similar programmes in other countries given the lessons learnt with the aim of understanding the skills and competencies required to deliver sustainable water management, water supply and sanitation for all.

The AU-NEPAD Network of Water Centres of Excellence is active and the regional networks are growing. The next phase foresees the expansion of the network to include Centres of Excellence in North Africa and strengthening collaboration with the institutes of the Pan-African University.

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<sup>17</sup> [Ibidem, 14](#)