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Global Water Partnership West Africa

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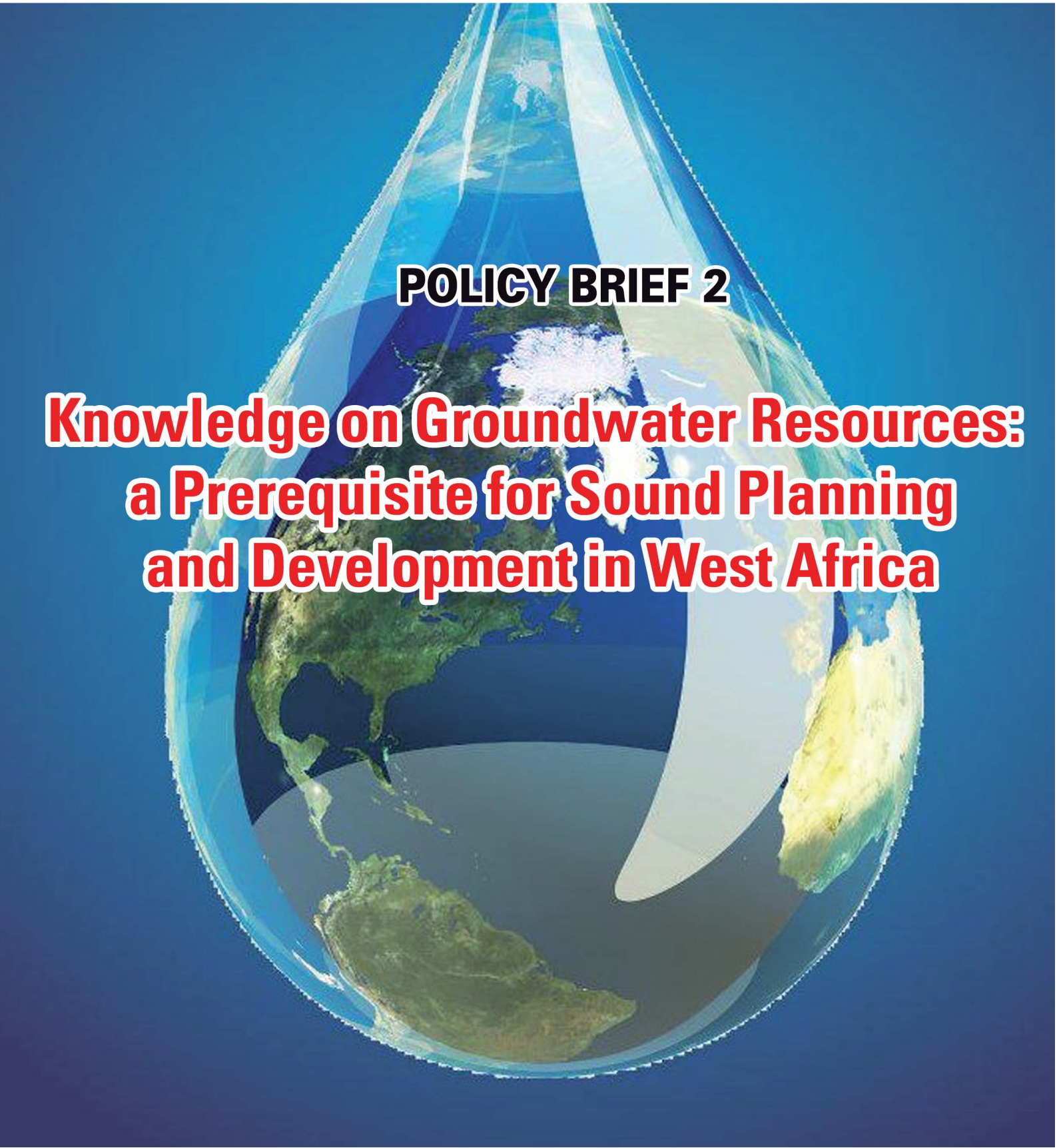

POLICY BRIEF 2

Knowledge on Groundwater Resources: a Prerequisite for Sound Planning and Development in West Africa

This policy brief paper presents the main outcomes of the regional dialogue on the joint management of groundwater resources in West Africa with focus on scientific and technical knowledge generation that have been identified as one of the main key thematic areas in the context of climate change. Water is a key factor which can promote and limit any socio-economic sustainable development that goes beyond the diversity of its actors and stakeholders. In the field of research and knowledge generation and improvement, groundwater is often the less considered component of water resources. However, groundwater is an important element of the adaptation strategies to climate change in Africa. Indeed, it constitutes the most important reserve. Yet groundwater is and remains an alternative resource which can help meet most of the water needs for agricultural, industrial or domestic purposes. In the context of both the fast growing demand for the resource and climate change challenges, the dialogue presents a major interaction and consensual management tool amongst stakeholders sharing the trans-boundary aquifer resources, which are socio-economic and environmental in nature.

Box 1. Key Messages:

1. Groundwater represents a key element of food security, and, therefore contributes to poverty reduction;
2. Groundwater is climate sensitive resource and meanwhile is a very important resource for West Africa, notably for the Sahelian countries;
3. Poor knowledge on the groundwater resources in both quantity and quality for the current, short and long-term periods further exacerbates the resource vulnerability to anthropogenic pressure and climate related impacts;
4. The water tables recharge mechanisms remain little known and studied to date;
5. The insufficiency of available long observation chronicles does not also facilitate the analysis of the impacts of the climate on groundwater;
6. Information and communication of the scientific and technical knowledge on the groundwater status are extremely relevant for the resources management;
7. Yet, there is no direct interaction between researchers and farmers or end-users such as agro-industries to promote exchange of information on the trans-boundary aquifers issues.

Regarding groundwater resources and more specifically the aquifer systems, the establishment of a dialogue between stakeholders directly or indirectly involved in their utilisation, management and development is even more relevant as it facilitates prevention of over exploitation and associated irreversible damages.

So, the dialogue is a multidimensional activity that promotes a more efficient management of the groundwater resource. Therefore, in order to come up with solid consensual working bases and address the genuine priority challenges, a regional dialogue on groundwater that takes into account climate issues with a particular focus on trans-boundary aquifers has gathered key stakeholders, policy makers, regional bodies, and representatives of West African countries and other part of the world. The current initiative on the regional dialogue on concerted management of groundwater in West Africa is a response to strong needs expressed at the high political level, in terms of water management, sustainable development and population well-being. The aim of the dialogue is to promote consultation between groups from various sectors, organizations and traditions having divergent interests. This new dialogue concept under the facilitation of GWP/WA and ACPC provides a way forward and clear actionable interventions for a sustainable and concerted management of groundwater resources in West African. Key messages noted during the regional consultative dialogue on groundwater emphasized need for knowledge generation (see Box 1).

Aquifer Systems and Knowledge Gaps

The state of knowledge and management of West Africa groundwater resources is not well known for most of the trans-boundary aquifers resources. Yet, there is not a lot of knowledge on aquifers and little initiatives exist related to the matter. In West Africa, likewise surface waters, underground waters are characterized by their cross-border dimensions. Out of the 40 most important aquifers identified in Africa, 10 are entirely located in West Africa and are shared by at least two countries of the sub region. Amongst the 15 continental West African countries, 12 are covered by at least one cross bordered aquifer (Figure 1) (cited by GWP/WA 2011a).

Two essential factors need to be taken into account for better knowledge of groundwater resources: the knowledge of aquifers in their hydrodynamic and geometrical dimension on the one hand and the evolution of physicochemical parameters on the other hand GWP/WA (2011b). Indeed, there are real weaknesses from the knowledge perspective and also from socio-economic and environment dimensions on the aquifers systems. It should be noted that in order to better know an aquifer, it must be regularly exploited and appreciated over all its dimensions (hydrodynamic behavior, geometric and physiochemical characteristics, but also the inflows and outflows, among others). The management of the cross border aquifers system raises specific knowledge gaps in West Africa given in Box 2.

Box 2. Identified Knowledge Gaps:

1. Insufficiency of scientific and technical information on the aquifer systems at all dimensions (hydrodynamic, geometrical and physicochemical characteristics);
2. Weak knowledge on the hydro geological unit in accordance with the state of its knowledge, hydro geological complexity, the aquifer's geological structure, its supply method and the state of its exploitation.
3. Inadequacy of observation networks, database at all scales, missing or poor quality of data from the existing networks;
4. Insufficiency of tools to control and process information;
5. Lack of/or weak research institutions capacity and insufficiency of specialized human resources capacity;
6. Heterogeneity of and disparity in the data format and codifications amongst countries,
7. Inadequate knowledge of climate change impact on groundwater in West Africa and about climate uncertainties and future trends.

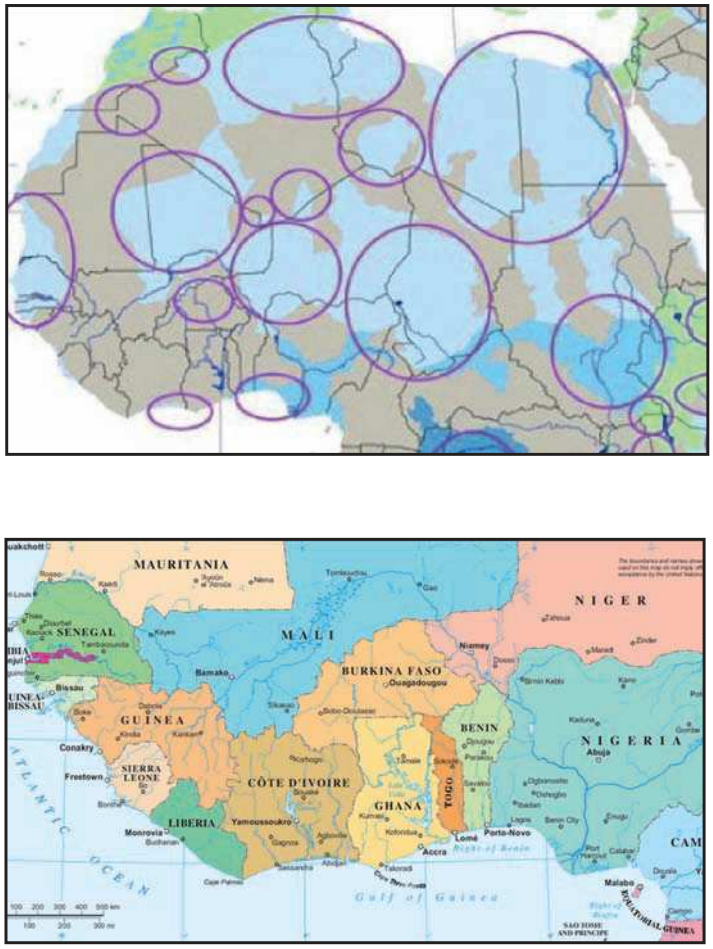

Figure 1: Carte politique (A) et localisation des principaux aquifères transfrontaliers (B) en Afrique de l'Ouest

For this reason, it appears crucial to strongly enhance the scientific and technical knowledge on the aquifers resources that are shared by several states. Hence, there is urgent need to upgrade and develop the data observational network, and build capacity at all levels to generate and enhance the state of knowledge on the resources. There is need also for scaling up the knowledge gap on the groundwater analytically research

And map out the groundwater information across national and regional boundaries including the hydro geology, meteorology, geo-references, resources capacity, recharge dynamic, land-use, etc… Quantitative and qualitative knowledge on both ground and surface waters are essentials in West Africa. Identified actions for knowledge generations on groundwater across the region are summarized in section recommendations section.

Knowledge on Aquifer System for Social, Economical and Environmental Development

Knowledge on the groundwater resources, particularly the trans-boundary aquifers has a great importance for the social and economic development in Sahelian countries.

Indeed, in the context of Sahel regions, water constitutes a key element for any social and economic development and environmental sustainability. The endogenous feature of groundwater which is divided into three dimensions by the experts makes it difficult for the others to see them, particularly to include the social, economic and environmental dimensions. A good knowledge of these aquifers can only be effective when all the actors of the water sector conjugate together all their efforts within the countries and across the borders countries that share the same aquifer. The West African sub region has a lot of water courses or rivers shared by many states. Social and economic aspects that consider food security and agricultural water use such as irrigation go from groundwater management to development of perennial water resources and promoting development that contributes to food security and reduction of poverty. The process can be illustrated by the following logical approach: groundwater - perennial water - development of small irrigation from the groundwater to allow several annual harvests - improved food security - reduction of poverty.

Box 3. Challenges of Climate variability and change and Knowledge on Aquifer Systems for planning & Development:

1. Current Climate change combined with future climate variability will increases water challenges and constitute additional constraints on groundwater availability, accessibility, supply and demand in West Africa;

2. CC will increase groundwater stress mainly in the regions where the resource is central for farming and domestic uses and will lead to early drying out of surface ponds;

3. Threat to the trans-boundary aquifer resources sustainable development and planning in the region;

4. Sea level rise will likely cause the extension of saline groundwater zones in the coastal zone of West Africa (Guinea Coast) and may constitute the source of diseases for the populations.

5. Limited regional and comprehensive knowledge of CC forecast and impacts on the aquifers systems remain difficult for the resources planning and development.

Aquifers shared by many countries are potential sources of conflict in the context of increasing withdrawals that result in hydraulic and therefore social, economic and environmental interdependences between countries. Knowledge on the aquifer system is the core of social and economical development and planning as illustrated from the countries cases reports (Senegal, Mali and Niger) of the dialogue.

Aquifer System and Climate Change and Variability in West Africa

Knowledge of Climate Change (CC) and Climate Variability (CV) on the cross-border aquifer systems is crucial for sound planning and remains a prerequisite to any development. Climate change combined with future climate variability will impose additional constraints on the availability, accessibility, supply and demand for water in West Africa and these are and will be strongly influenced by a galloping demography (GWP/WA, 2011e). CC impacts on water resources are expected to increase in the number for African countries many of which will experience water-stress by 2025. Africa's groundwater is an essential element of climate change adaptation strategies for the continent, as it is the most important water reservoir. Indeed, the aquifer systems constitute and play a crucial role in adapting to the effects of climate change. (Box 3). However, knowledge is limited and there are still uncertainties in many models that are far from being in agreement in West Africa. The climate change impacts on water resources are more complex, and their effects on the African river networks are translated by changes in the hydrological cycle.

Summary of Recommendations

1. Encourage and establish adequate sustainable soft and hard investments for the scientific and technical knowledge generation on the trans-boundary aquifer; provide incentive for knowledge and information generation and dissemination and sharing at all levels; Inventory of the “grey” literature/existing databases at the level of each country, recovery the existing data, and creation of a database network and/or upgrade the existing piezometric network; and digitalising and harmonizing the data in usable spatial and times series format;

2. Priority should be given to no/low regret researches on aquifers and climate impact studies, the resources vulnerability, adaptation and coping mechanisms;

3. Improvement of the knowledge and monitoring of the aquifers systems, geometry, hydro geological complexity, capacity, instantaneous recharge, limits and discharge rates, depth from surface to water table, and water quality (pollution sources and industries wastes) and hydro-dynamic characteristics, etc…,

4. Regional institutions with similar initiatives on groundwater should establish synergies and coordination, and enable strong leadership for groundwater planning & development (e.g. WRCC/ECOWAS Observatory, G-WADI/UNESCO Project.);

5. Raise awareness at all levels and also amongst key stakeholders to mainstream the social, economic and environmental aspects of groundwater issues in water sector planning and development.

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