Regional workshop: Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges, 10 - 11 July 2017, Malaysia

Lessons Learned and Challenges of Africa in Upscaling Water Security

by

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Introduction

1. Africa faces a number of serious socio-economic problems (water supply – Food Security)

2. Lack of Physical Water Resources

3. WR is Threatened by Many Natural and Human Factors:
   • The multiplicity of transboundary water basins;
   • Extreme spatial and temporal variability of climate and rainfall, coupled with CC;
   • Growing water scarcity, shrinking of some water bodies, and desertification,
   • Inappropriate governance and institutional arrangements in managing national and transboundary water basins;
   • Depletion of WR through pollution, environmental degradation, and deforestation;
   • Failure to invest adequately in resource assessment, protection and development;
   • Unsustainable financing of investments in water supply and sanitation
In four continuous decades the Sahel faced prolong and serious drought and water shortage.

June to October, mean Sahel precipitation anomalies, 1900-2009 - Washington Univ. 2009
Sahel and Sudan Group: Burkina Faso, Cape Verde, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Sudan

Rainfall index (normalized)

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Objective

To contribute to the African upscaling of the existing approaches in WR management with scientific collaboration and tools, to support, design and implement Ecohydrology and HELP Strategies and Policies for Sustainable WR Management
1- Lake Chad

The apparent disappearance of Lake Chad in West Africa is symptomatic of the growing scarcity of water in Africa. Originally believed to have an area of about 350,000 km², the lake was reduced to 25 000 km² in the early 1960s. However, today, it is reduced to about 2,000 km².

2- Two Features of Africa WR

Africa WR has two main features which critically effective the management:-

First, precipitation across much of the region is exceptionally variable (both in time and space) and unpredictable.

Second, runoff is extraordinary low. …….. The consequence of these two features is endemic drought.
Groundwater in Africa

Groundwater is extremely important in Africa. It is estimated that more than 75 % to 80 % of the African population uses groundwater as a main source of drinking water.

But the Question is that
Whether Groundwater is available in all African Countries?
Africa Water Withdrawal

A- 85 % is for use in agriculture, 9 % is for community water supply and 6 % is for industry.

B- It is noteworthy that for Africa, as a whole, the amount of water withdrawal for the three major uses of water amounts to only 3.8 % of internal renewable WR. This may reflect a low level of development and use of WR on the continent. At the same time it tells that there is a good opportunity for further development in different areas related to water utilization.
Challenges Facing Africa WR Management

i. Drinking Water Supply and MDGs and improving access to safe and clean water.

ii. Africa has 63 shared water basins and 94 international water agreements to address potential conflicts over transboundary WR.

iii. Agriculture uses the most water in Africa and the agricultural production is low.

iv. Hydroelectricity supplies 32 % of Africa’s energy, the hydropower potential is greater than the entire continent’s electricity needs.

v. Land degradation and water pollution reduce water quality and availability.

vi. Africa is one of the most vulnerable continents to CC and climate variability.

vii. Current institutional, financial and human capacities for managing water are lacking.
Climate Change (CC)

i. Global warming and its human cause are undeniable. Warming patterns in Africa are consistent with global ones and Africa is already subject to important spatial and temporal rainfall variability.

ii. Africa’s repeated drought cycles kill thousands of people each event. Moreover, floods also occur regularly with severe impacts on peoples’ livelihoods.

iii. Africa is one of the most vulnerable continents to CC and climate variability.
Drought
Dust – Storm last May 2007 in Khartoum – Capital of Sudan

Strong Dust Storm - Haboob – June 2017 – Khartoum, Sudan
Impacts of drought on Human and Livestock – Kenya 2006
Africa is suffering from recent Drought – Kenya 06
Agriculture and People suffering from Drought - Africa
Drinking Water is a real problem in Africa
Water Scarcity in Western Sudan (W. Kutum) - 2002
Number of people killed and affected by Africa’s worst droughts - (EM-DAT 2010)
Damaging Floods
Displacement of People by floods

Climate Variability
Flash Floods Season 2013 – Khartoum State
Khartoum, Sudan, 2014
Number of people killed and affected by Africa’s worst floods- (EM-DAT 2010)
Opportunities for Africa WRM and CC

Examples of Measures Opportunities which can be adopted:

a. Reinforce traditional adaptation mechanisms;

b. Provide early warning system;

c. Introduce adaptation measures informed by a more reliable system of seasonal predictions;

d. Support public-private partnerships that develop innovative adaptation measures;

e. Improve physical infrastructure.
South-South Cooperation for Africa Water Security

Some benefits of the South-South cooperation for Africa:-

- Strengthening of the voice and bargaining power in multilateral negotiations;

- Develop new capacities and open additional channels of communication and strengthening of economic integration.

- Enhancement of the multiplier effect of technical cooperation and fostering of economic, scientific and technological self-reliance;

- Coordination of policies on development and development of indigenous technology.

- Promotion of: national science and technology plans; economic and social planning; linkage of research and development with economic growth; project planning and evaluation; use of human and natural-resource potential; modern management and administration … etc.

- Establish networks for the different institutions working in fields of IWRM.
ShouraConsult Co. Ltd. Sudan and Technical Cooperation

Tanzania - WSTP

Kenya - WWTP

Somalia - WSP

Sudan

Gambia

Niger

Lined Canal
Lessons Learned

a. In Africa several countries have experience with irrigation network management, e.g. Egypt, Sudan, Algeria, Morocco, Tunisia and South Africa, while the others depend mainly on the rain-fed agriculture? Irrigation in African might not exceed 35%, therefore, there is a good room for improvement.

b. In 2008 FAO released that South Africa achieved a notable success in Conservation Agriculture (CA) due to strategic campaigns based on location – Specific Approaches.

c. Increase productivity of any crop per unit cubic meter of water.

d. Improvement and upgrade of the indigenous agricultural practices through new scientific methods and new technologies are more useful than introducing new agricultural practices.
Lessons Learned

e. Education of all levels of the community and the preparation of managers with new approaches (e.g. IWRM)).

f. Integrated, predictive management with alternatives for improvement of the multiple uses.

g. Crop rotation is one of the three principles or pillars of CA.

h. Livestock have to be considered as part of an overall conservation.

i. Desalinization is one of the solutions that can become viable once the technology makes the cost of it more acceptable, especially for coastal cities.
Nile River Basin and GERD

Does the Grand Ethiopian Renaissance Dam (GERD) represent a real Challenge for the Nile Basin Countries in Particular Egypt and Sudan?
GERD Details

Country: Ethiopia
Location: Benishangul-Gumuz Region
Coordinates: Coordinates: 11°12'51"N 35°05'35"E
Purpose: Power
Status: Under construction
Construction: began April 2011
Opening date: July 2017
Construction cost: $4.8 billion USD
Owner(s): Ethiopian Electric Power Corp

Spillways
Six sector gates
Spillway type: Controlled overflow
Spillway capacity: 15,000 m³/s (530,000 cu ft/s)
Reservoir Total capacity: 74×10⁹ m³ (59,905,000 acre·ft)
Surface area: 1,800 km² (690 sq mi)

Power Station
Commission date: 2017 (planned)
Type: Conventional Turbines
16 x 375 MW Francis turbines
Installed capacity: 6,000 MW (max. planned)
Annual generation: 15,692 GWh

Dam and Spillways
Type of dam: Gravity, Roller-Compacted Concrete
Impounds: Blue Nile River
Height: 170 m (560 ft)
Length: 1,800 m (5,900 ft)
Elevation at crest: 645 m (2,116 ft)
Dam volume: 10,000,000 m³ (13,000,000 cu yd)
GERD -- Construction is Going on?

July 17

Abdalla A. Ahmed
GERD
Nile River Hydrograph

~ 135 Mm$^3$

BN average after GERD
Upscaling of Africa Water Security

- Upscaling of African WR Management requires a new way of thinking about water.

- It should result in fundamental changes in current Policies, Strategies and Legislative Frameworks, and also Institutional Arrangements and Management Practices.

- It should result in a desirable impetus to economic and social development, water for health, and water for food.

- Therefore, the following issues should be considered: New Policy, Strategy and Legislative Frameworks; Bottom-up Institutional Arrangements; Adherence to Demand-responsive Approaches while meeting the basic needs of the poor; food self-sufficiency.
Conclusions and Recommendations

1. Water is clearly a major factor in socio-economic recovery and development in Africa.

2. The continent appears to be blessed with substantial rainfall and WR inspite its uneven distribution.

3. Business as usual in WR management is not the way to overcome the Challenges. A New Africa Water Approach should be developed accordingly to address these problems and to stimulate a shift in thinking toward a more equitable and sustainable use.


5. Africa should learn from the other continents experiences in the field of IWRM and poverty alleviation, e.g. Asia.

6. One of the most promising areas is the water harvesting based on the experiences of North Africa, e.g. Tunisia, Morocco, Algeria.

7. The key word in sustainable water resources is “Storage”. The water storage in its wide context, as soil moisture, tanks, ponds, reservoirs, groundwater recharge, …
Recommendations

a. Develop integrated approach to urban water management and sanitation.

b. Develop appropriate regulatory frameworks and monitoring mechanisms for WR -- indicators need to be ambitious but realistic.

c. Share best practice from across the continent and promote peer-to-peer learning and Create culture of enforcement of policy and regulations.

d. Develop, promote and support responsible water & wastewater management, besides, a participatory approach to WR management.

e. Document and share best practices from across the region – peer to peer learning, besides, Capacity building at all levels is vital to take this forward.

f. Resources should be mobilized from the international community.

g. Manage all of the elements of water supply, storm-water, and wastewater as an integrated closed loop - one water.
Thank you for Your Attention