



# Sub-Saharan Africa Region

29 - 31 May 2012, Nairobi - Kenya, Kenya School of Monetary Studies



**Groundwater Governance**  
A Global Framework for Action



# Groundwater Governance - A Global Framework for Action

2011-2014) is a joint project supported by the Global Environment Facility (GEF) and implemented by the Food and Agriculture Organisation of the United Nations (FAO), jointly with UNESCO's International Hydrological Programme (UNESCO-IHP), the International Association of Hydrologists (IAH) and the World Bank.

The project is designed to raise awareness of the importance of groundwater resources for many regions of the world, and identify and promote best practices in groundwater governance as a way to achieve the sustainable management of groundwater resources.

The first phase of the project consists of a review of the global situation of groundwater governance and aims to develop a Global Groundwater Diagnostic that integrates regional and country experiences with prospects for the future. This first phase builds on a series of case studies, thematic papers and five regional consultations.

Twelve thematic papers have thus been prepared to synthesize the current knowledge and experience concerning key economic, policy, institutional, environmental and technical aspects of groundwater management, and address emerging issues and innovative approaches. The 12 thematic papers are listed below and are available on the project website along with a Synthesis Report on Groundwater Governance that compiles the results of the case studies and the thematic papers.

The second phase of the project will develop the main project outcome, a Global Framework for Action consisting of a set of policy and institutional guidelines, recommendations and best practices designed to improve groundwater management at country/local level, and groundwater governance at local, national and transboundary levels.

## Thematic Papers

- No.1 - Trends in groundwater pollution; trends in loss of groundwater quality and related aquifers services
- No.2 - Conjunctive use and management of groundwater and surface water
- No.3 - Urban-rural tensions; opportunities for co-management
- No.4 - Management of recharge / discharge processes and aquifer equilibrium states
- No.5 - Groundwater policy and governance
- No.6 - Legal framework for sustainable groundwater governance
- No.7 - Trends in local groundwater management institutions / user partnerships
- No.8 - Social adoption of groundwater pumping technology and the development of groundwater cultures: governance at the point of abstraction
- No.9 - Macro-economic trends that influence demand for groundwater and related aquifer services
- No. 10 - Governance of the subsurface and groundwater frontier
- No.11 - Political economy of groundwater governance
- No.12 - Groundwater and climate change adaptation



**GEF Project on “Groundwater Governance: A global framework for country action”**  
**(FAO, GEF IW, IAH, UNESCO-IHP, WB)**  
**Regional Consultation**  
**Sub-Saharan Africa Region**  
**29 – 31 May 2012**  
**Nairobi - Kenya**  
**Kenya School of Monetary Studies**

**REGIONAL CONSULTATION REPORT**

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## Acronyms

FA	Framework for Action
FAO	Food & Agricultural Organization of the United Nations
GEF	Global Environment Facility
GEO	Global Environmental Objective
GRAPHIC	Groundwater Resources Assessment under the Pressures of Humanity and Climate Change (UNESCO-IHP)
GWMATE	Groundwater Management Advisory Team
GWADI	Water and Development Information for Arid Lands (UNESCO-IHP)
GWES	Groundwater for Emergency Situations (UNESCO-IHP)
GWP	Global Water Partnership
IAEA	International Atomic Energy Agency
IAH	International Association of Hydrogeologists
IBNET	International Benchmarking Network for Water and Sanitation Utilities
IGRAC	International Groundwater Resources Assessment Centre
IHP	International Hydrological Programme (UNESCO)
INBO	International Network of Basin Organizations
INWEB	International Network of Water-Environment Centres for the Balkans
IOC	International Oceanographic Commission (UNESCO)
IR	Inception Report
ISARM	International Shared Aquifer Resource Management (UNESCO-IHP)
IUCN	International Union for the Conservation of Nature and Natural Resources
IW	International Water (GEF Focal Area)
IWC	International Waters Conference
IW-LEARN	International Waters Learning Exchange and Resource Network
IWMI	International Water Management Institute
IWMR	Integrated Water Resources Management
LAC	Latin America and the Caribbean
LD	Land Degradation GEF Focal Area
MAB	Man and the Biosphere Programme (UNESCO)
MAR	Management of Aquifer Recharge (UNESCO - IHP)
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
MODFLOW	U.S. Geological Survey modular finite-difference flow model
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organization
OAS	Organization of American States
OECD	Organisation for Economic Co-operation and Development
PC	Project Coordinator
PCU	Project Coordinating Unit
PDO	Project Development Objective

PIR	Project Implementation Review
PSC	Project Steering Committee
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO-IHP	UNESCO International Hydrological Programme
UNICEF	United Nations Children’s Fund
UN-ILC	(United Nations) International Law Commission
WB	The World Bank
WHO	World Health Organization
WHYMAP	World-wide Hydrogeological Mapping and Assessment Programme
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development
WWAP	World Water Assessment Program
WWC	World Water Council
WWV	World Water Vision

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b. <b>Shammy Puri</b> (Secretary General of the International Association of Hydrogeologists, IAH, on behalf of the Project Steering Committee)	
c. <b>Rafik Hirji</b> (World Bank)	
d. <b>Alice Aureli</b> (UNESCO International Hydrological Programme, UNESCO-IHP, on behalf of the Project Steering Committee)	
e. <b>Ruhiza Boroto</b> (Senior Water Resources Officer, Food and Agriculture Organization, FAO, Ghana)	
f. <b>H.E. Mary M Khimulu</b> (Ambassador and Permanent Delegate, Permanent Delegation of Kenya to UNESCO)	
g. <b>Charles Ngangoué</b> (African Ministers' Council on Water, AMCOW)	
h. <b>Hon. Charity Kaluki Ngilu</b> (Minister, Ministry of Water and Irrigation, MWI, Kenya)	
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7. Case studies powerpoint presentations (**Muna Mirghani** – Gash Groundwater Governance)

8. Questionnaire answers:

No.	Name	Affiliation
1	Abdelkader Dodo	Sahara and Sahel Observatory / Obsevatoire du Sahara et du Sahel (OSS) - Tunisia
2	Abdulasir Abdullaahi Mohamed	Department of Water Resources - Somalia
3	Antony Turton	South Africa
4	Callist Tindimugaya	Ministry of Water and Environment - Uganda
5	Cheikh Gaye	Département de Géologie, Faculté des Sciences et Techniques, Université Cheikh Anta Diop - Senegal
6	Dam Mogbante and Arba Diallo	GWP West Africa - Burkina Faso
7	Daniel Nkhuwa	University of Zambia - Zambia
8	Deborah Mwesigwa	Ministry of Water and Environment - Uganda
9	Debbie Roets	African Forum of Utility Regulators (AFUR) - South Africa
10	Eberhard Braune	University of the Western Cape - South Africa
11	Eiman Karar	Water Research Commission (WRC) Southern Africa - South Africa
12	Ernst Bertram	Water Affairs - Department Water Affairs - South Africa

13	Gourang Mamadi N'Garkelo	Political and operational Focal Point -Tchad
14	George K'Ouma	Export Hydro - Kenya
15	Greg Christelis	Ministry of Agriculture and Water Resources - Namibia
16	Henri Claude Enoumba	Niger Basin Authority (NBA) / Autorité du Bassin du Niger (ABN) - Niger
17	Johnson Oguntola	Economic Commission for Africa (UNESCA) - Zambia
18	Juma Omondi	UNESCO Category II centre on Groundwater for Eastern Africa - Kenya
19	Karen Villholth	International Water Management Institute (IWMI) - South Africa
20	Kevin Okoth	Eco Check Systems - Kenya
21	Kevin Pietersen	SLR Consulting - South Africa
22	Leulseged Tadesse	Sahara and Sahel Observatory / Obsevatoire du Sahara et du Sahel (OSS) - Tunisia
23	Lyliose Umupfasoni	Ministry of Natural Resources - Rwanda
24	Mahamane Dédoué Toure	Economic Community of West African States (ECOWAS) - Burkina Faso
25	Moustapha Diene	Africa GW Network - Senegal
26	Muna Mirghani	Nile IWRM – Net - Sudan
27	Nindaoua Alain Savadogo	Université de Ouagadougou - Burkina Faso

28	Omogbemi O Yaya	UNESCO category II centre on Integrated River Basin Management in Kaduna - Nigeria
29	Odilo Mukiza	Ministry in charge of Water - Rwanda
30	Osward Chanda	Water and Sanitation Department (OWAS) - AFDB
31	Oteng Lekgowe	Geological Survey of Botswana - Botswana
32	Oumar Mohomone Toure	Organisation pour la mise en valeur du fleuve Sénégal / Senegal River Basin Organization (OMVS) - Senegal
33	Ousmane Boureima	FAST Université Abou Mounoumi Département de Géologie - Niger
34	Phera Ramoeli	Southern African Development Community (SADC) - Botswana
35	Tom Armstrong	Kenya Water Industries Association - Kenya
36	Yongxin Xu	UNESCO Groundwater chair, University of Western Cape - South Africa

9. First and Second day presentations

No.		Name	Presentation Title
1	<b>FIRST DAY - TUESDAY 29 MAY 2012</b>	Alice Aureli	Introduction to the GEF Project on Groundwater Governance: Presentation of the Synthesis Report and Objective of the Regional Consultations Component; Regional Consultation for Sub-Saharan Africa
2		George Khoda	Questionnaire: Answers Received from the Participants and Synthesis
3		Eberhard Braune	Gaps and Challenges in Groundwater Governance: Lessons Learnt

4		Karen Villholth	Agricultural Groundwater Governance: Opportunities and Obstacles in SSA
5		Greg Christelis	Groundwater Governance for Production and Food in Rural Areas
6		Daniel Nkhuwa	Groundwater Governance in Urban Areas in Zambia
7		Boureima Ousmane	Case Study: Water Management Unit (Unité de Gestion de l'Eau, UGE) of the Liptako-Gourma River
8		Nindaoua Savadogo	Groundwater Governance in Burkina Faso
9	<b>SECOND DAY - WEDNESDAY 30 MAY 2012</b>	Kevin Pietersen	Case study : Groundwater Governance in South Africa
10		Callist Tindimugaya	Institutional and Legal Framework for Groundwater Management in Uganda
11		David Ochillo	Case study: Groundwater Governance and Policies in Kenya
12		Abdelkader Dodo	Transboundary Aquifers: Iullemeden Legal Management Framework
13		Shafick Adams	Capacity Building of Groundwater Governance in South Africa
14		Frank Van Weert	The International Groundwater Resources Assessment Centre (IGRAC)
15		Lucilla Minelli	The GEF IW:LEARN Groundwater Community of Practice
16		Muna Mirghani	Gash Groundwater Governance: Towards Coordinated Institution

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**GROUNDWATER GOVERNANCE : AGLOBAL FRAMEWORK  
FOR COUNTRY ACTION REGIONAL CONSULTATION**



**29 - 31 MAY 2012 AT KENYA SCHOOL OF MONETARY STUDIES - NAIROBI**

## **Chapter 1: Background for Regional Consultations on Groundwater Governance**

### **1.1 Introduction**

The GEF Project on “Groundwater Governance: A global framework for country action” focuses on addressing concerns over the depletion and degradation of groundwater. The overall project objective is to increase awareness of the importance of a sound management of groundwater resources in preventing and reversing the global water crisis. The main drivers of groundwater depletion and degradation includes, but not limited to:

- a) Increase utilisation of groundwater resources as a result of population growth, pressure caused by climate change impact, and increased urbanisation;
- b) Weaknesses of groundwater governance structure; and
- c) Limited knowledge groundwater science and lack of awareness of its role in socioeconomic development.

The project is intended to focus of a set of human behaviours that determine groundwater use and abuse. The aim is to reverse groundwater depletion and unsustainable management by adopting groundwater resources governance that shifts management from institutions to individual water users. As a final result, the project will develop a global "Framework of Action" (FA), consisting of a set of effective governance tools: guidelines for policies, legislation, regulations and customary practices. The FA will foster the evaluation of groundwater as a key natural resource, and of the social, economic and ecological opportunities that sustainable groundwater management could provide through an interdisciplinary dialogue.

### **1.2 The Purpose of Regional Consultations**

The purpose of the regional consultations is to solicit regional perspectives on the practical application of groundwater governance. The specific objectives are:

- a) Compilation of first-hand knowledge provided by direct local sources - groundwater experts, resource managers and actors in different areas – about the main features of the region;
- b) Discussion about the different subjects that derive from the specific characteristics, challenges and priorities of the region based on case studies elaborated by national experts;
- c) Build partnerships amongst cross-sectoral collaborating project agencies, stakeholders, decision-makers and specialists.

The results of the regional consultations will contribute towards the preparation of a “Global Groundwater Governance Diagnostic”, which will serve as a technical basis for the different stages of the process.

Regional consultations are organized in:

- a) Montevideo, Uruguay, for Latin America and the Caribbean, 18<sup>th</sup> – 20<sup>th</sup> April 2012;

- b) Nairobi, Kenya, for Sub-Saharan Africa, 29<sup>th</sup> to 31<sup>st</sup> May 2012;
- c) Amman, Jordan, for Arab Countries, 8<sup>th</sup> – 10<sup>th</sup> October 2012;
- d) Shijiazhuang City, China, Asia , 3<sup>rd</sup>-5<sup>th</sup> December 2012; and
- e) The Netherlands, for USA, Canada, Europe including SEE, Central Asia and a day devoted to the Private sector, March 2013.

The meeting in Nairobi was intended to cover the Sub-Saharan African region. The consultation was organised through UNESCO-IHP network and was designed to bring together a set of groundwater practitioners and policy makers.

The consultations were organised in 7 Plenary Sessions, 3 Breakout Sessions, and 8 Working Groups. The Workshop Agenda is shown in Annex 2.

## **2. The Opening Ceremony**

The Opening Ceremony was chaired by Kenya's Permanent Secretary of the Ministry of Water and Irrigation, Eng. David Stower. He admonished the participants to:

- a) Re-define groundwater resources from its narrow and poor understanding;
- b) Consolidate ideas on potential of groundwater in the region; and
- c) Raise the profile of groundwater resources in Sub Saharan Africa, which is largely dry and relies on groundwater resources.

He further elaborated on three challenges facing groundwater management in the region, especially in Kenya as follows:

- a) Poor understanding of groundwater regimes due to limited human and technical capacity;
- b) Poor and or inadequate data and information; and
- c) Groundwater quality issues, including salinity, fluoride and pollutants contamination.

Dr. Shammy Puri, Secretary General of the International Association of Hydrogeologists in his opening remarks admonished participants to make bold steps to resolve the groundwater issues suggesting that the challenge for data and information remains central for tackling the governance challenge.

Dr. Rafik Hirji, from the World Bank in analysing the groundwater challenge emphasised that rapid, unplanned, poorly managed groundwater development in the phase of climate change has grave implications for water supply and food security in Africa. He described 5 completed case studies that have used governance structure for South Africa, Kenya, India, Tanzania and Morocco and have formed the basis of World Bank investments in water supply in Kenya and Tanzania.

Dr. Alice Aureli, from the UNESCO-IHP on behalf of the Project Steering Committee, thanked the National Authority and the Permanent delegate of Kenya to UNESCO H.E. Mary Khimulu for facilitating the consultation. She urged participants to identify key governance constraints to the scaling and uptake of groundwater management and articulate elements of a regional perspective to

frame effective groundwater governance in the future. Dr Aureli informed the participants that the General Conference of UNESCO approved the establishment of a Centre on Groundwater Resources in Kenya under the auspices of the Organization.

Dr. Ruhiza Baroto Senior Water Resources Officer with FAO described the relationship between groundwater resources and energy suggesting that shallow well still remains FAO's first priority regarding irrigation water. He introduced three knowledge products that are essential in improving groundwater governance, Voluntary Guidelines on Land Tenure, Guidelines on Water Tenure, the latter with implications to maximise, optimise and practice best use of water for irrigation.

Hon. Ambassador and Permanent Delegate of Kenya to UNESCO H.E. Mary Khimulu described the joint effort of the 54 ambassadors from Africa in requesting to the UNESCO General Conference to prioritise issues of water in Africa.

Mr. Charles Ngangoué of AMCOW Secretariat described how AMCOW prioritised groundwater leading to the establishment of the AMCOW Groundwater Commission, the only one of its kind in the world, to ensure that groundwater management is brought to the fore front of the water agenda.

The official opening of the workshop was done by the Deputy Minister for Water and Irrigation for the Republic of Kenya. He described the challenges facing Kenya, and indeed, the rest of Africa. He thanked UNESCO for approving the request presented by Kenya to host a Category 2 Regional Centre on Groundwater Research that will work under the auspices of UNESCO.

### **3. Plenary 1: Objectives of the Groundwater Governance Project**

#### **3.1 Objectives**

**Groundwater governance** is the **process** by which groundwater resources are managed through the application of responsibility, participation, information availability, transparency, custom, and rule of law. It is the art of **coordinating administrative actions and decision making** between and among different jurisdictional levels – one of which may be global. (Adapted by the experts of the drafting group of the Thematic Paper 5, after Saunier and Meganck. 2007. Dictionary and Introduction to Global Environmental Governance)

The objective of the GEF Project on Groundwater Governance Project is to accelerate the adoption of improved groundwater resource governance from resource management institutions to millions of individual users. The project rests on three pillars, namely, **Baseline study** that will produce a Synthesis Report, **A Global Groundwater Diagnostic** developed from regional consultations integrating local and national experiences, and **Shared Vision and Global Programme of Action**.

The Synthesis Report highlights the situational assessment of groundwater use and management and provides a prognosis for its better use with the assumption that often the present governance

structure can be inadequate as demonstrated by increasing depletion and degradation of the resource. The synthesis report is divided in to three parts, namely the status and trends of groundwater use, how to improve governance and thirdly, new horizons in the management of groundwater resources.

The regional consultations was meant to assist us identify and discuss key governance constraints for groundwater management. The participants were provided with background information before arriving in Nairobi. Besides “An Overview of Groundwater Governance Issues: Points for Discussion” and “Groundwater Governance: Synthesis of Thematic Papers/Case Studies”<sup>1</sup> having been sent earlier, participants were also expected to fill questionnaires and send them back for summary and discussion.

### 3.2 Summary of Responses of the Questionnaires

**Table 1: Profile of Respondents**

Country	Number of Respondents
Botswana	2
Burkina Faso	3
Kenya	4
Uganda	2
Republic of South Africa	7
Namibia	1
Niger	3
Nigeria	1
Rwanda	2
Somalia	1
Tchad	1
Tunisia	2

<sup>1</sup> “An Overview of Groundwater Governance Issues: Points for Discussion” and “Groundwater Governance: Synthesis of Thematic Papers/Case Studies” can be obtained from the project website.

<b>Zambia</b>	<b>2</b>
<b>Africa Development Bank</b>	<b>1</b>
<b>UNECA</b>	<b>1</b>
<b>Senegal</b>	<b>3</b>
<b>TOTAL</b>	<b>36</b>

In order to prepare participants to identify key local, national and regional governance constraints to groundwater management, a questionnaire had been sent to participants. The purpose is to compile and articulate elements of various perspectives (local, national and regional) that assist framing effective groundwater governance in the future. The List of Attendants is shown as Annex 1.

**Table 2: Categories of respondents by institutions**

<b>No.</b>	<b>Affiliation</b>	<b>No of representatives</b>
<b>1</b>	Government/Department of Water Resources/Environment	<b>9</b>
<b>2</b>	University/Université	<b>6</b>
<b>3</b>	Water Research Commission/Institutes	<b>2</b>
<b>4</b>	River basin Organisations	<b>2</b>
<b>5</b>	UNESCO Centre on Groundwater	<b>4</b>
<b>6</b>	Consulting Firms	<b>4</b>
<b>7</b>	Economic Communities/AfDB	<b>4</b>
<b>8</b>	Network Organisations	<b>7</b>
		<b>38</b>

There were 13 questions. The questions progressed from identification, adequacy and levels of institutions of groundwater governance (Q. 1 and 2), groundwater governance priorities (Q.3), and policies, legislation and challenges of groundwater governance (Q. 4 and 5). Q.6 dealt with problems of water quality and quantity while Q. 7 was on how to increase investments in groundwater management, Q.8 asked for interdisciplinary dialogue to lay ground for shared vision (Q9), and steps for action (Q.10). The respondents were asked to submit case study and key message (Q.12) as well as definition of groundwater governance in SSA (Q.13). Detailed report was prepared under separate cover.

**Table 3: Responses on Institutional Arrangements**

Institution	No. of respondents Reporting	Comments
Members of Parliament	1	Expressed once as in charge of budgeting.
Directorate of Water Resources Management of the Ministry of Water/Environment/ Agriculture;	5	
Water Service Boards	5	Functional in Kenya only
Catchment Management Agencies, WRMA	6	
International Waters Units	4	
Districts, Municipalities & Local Councils	4	
Ministry of Finance	1	
Line Ministries	2	
Development Partners	5	
National Environment Management Agencies (NEMA)	2	

### 3.3 High Level Debate on Scope and Objectives of the Project: Key Issues relevant to the SSA Region

The debate centred on a working definition of groundwater governance, whether groundwater governance is considered as within the River Basin management/Organisations (RBOs), financing mechanisms, and the role of regional economic units.

The panellists agreed that:

- a) Groundwater governance must be seen in the broader view of water governance and within the IWRM;
- b) Governments must take responsibility, via the triologue of science, society and government;
- c) Groundwater is a public resource in the hands of private individuals;
- d) Knowledge on groundwater resources is limited, especially of Transboundary aquifers;
- e) Clear objectives will lead to clear financing opportunities; and

- f) Limited capacity.

#### **4. Plenary Session 2: National and Regional Experiences: Gaps and Challenges and Urban-Rural Tensions**

##### **4.1 Gaps and Challenges in Groundwater Governance: Lessons Learnt - Eberhard Braunne**

The main challenges are:

- a) External funding for groundwater management;
- b) One half of the society depends on groundwater, more so for rural water supplies;
- c) Although each RBO has a groundwater component, aquifers do not necessarily coincide with basin boundaries. The issue of appropriate location of groundwater governance when the aquifer geometry does not coincide with the transboundary river basin was also highlighted.
- d) It was acknowledged that there was no business model yet for attracting financing, creating the need to address the issue in the proposed groundwater governance framework.
- e) There is need to seek support from Parliamentarians.
- f) Discussions faulted the way stakeholder consultation is currently practiced, given its full cost on scientists rather than water users.
- g) It was suggested that ground water governance should be anchored on the wider water resources management framework, rather than being treated separately, in order to enjoy other IWRM components such as watershed management to boost groundwater recharge.

##### **4.2 Agriculture and Groundwater Governance: Opportunities and Obstacles – Karen Villholth**

Opportunities:

- Groundwater for intensive irrigation
- Urban water supplies
- Proactivity in enhancing governance with stakeholders;
- Transboundary aquifers;

Obstacles:

- Climate Change
- Legislation generally takes time;
- Land use change, land degradation, inability of infiltration process.

The positive and negative impacts of agricultural water uses, in terms of quality and quantity were flagged as an important issue that did not come out of the presentations. The need to extend research studies in this direction emerged as a general consensus.

##### **4.3 Groundwater Governance in Urban Areas of Zambia – Daniel Nkhuwa**

Lack of coordinated approach and planning of urban settlements generally will cause water quality and quantity deterioration. The non-inclusion of data on chemical characteristics of the urban aquifer

diagnosed to be contaminated by uncontrolled urban waste management practices. There is need to protect aquifers from pollution sources.

#### **4.4 Case Study: Water management Unit of the Liptako-Gourma River – Boureima Ousman**

There are 7 management administrative regimes. The institutional arrangement includes Association of Water Users, Fishermen, delimitation of boundaries. The surface water potential is very high. There is an established legislation and regulations and training programme. There is a new Water Code and National Communication on Water and Sanitation.

#### **4.5 Groundwater Governance in Rural Water Supply in Burkina Faso – Nindaoua Savadogo**

The country is facing climate change and therefore there has been adoption of policies on agriculture and pastoralism. The area is 274,000km<sup>2</sup> receiving rainfall ranging from 400 mm to 1000mm per annum.

The need to formulate strategies for getting support from Parliamentarians for government funding of groundwater management projects where no visible infrastructure are involved was stressed.

#### **Recommendations**

The second plenary session recommended the following:

- That wider consultation was still needed on the issue of effective participatory process as experience in Sub-Saharan Africa was still limited;
- That groundwater availability in Sub-Saharan Africa was sufficient for small-scale irrigation development at the minimum;
- That there was need to raise awareness of farmers and other local beneficiaries with respect to potentials as well as consequences of intensive use of groundwater;
- That there was need for groundwater governance even though farmers can actually apply simple rules themselves, in order to minimize lowering of groundwater level;
- That two or more RBOs could collaborate on transboundary aquifers, eliminating the need to establish separate institutions for such transboundary aquifers.

#### **4.6 Summary Reports of Breakout Sessions**

##### **4.6.1 Working Group 1: Knowledge and Understanding Gaps that Hinder Good Governance**

###### **Findings:**

- i. Data gaps and collection of data not standardized, therefore not possible to capture the state of groundwater resources to make informed decisions.
- ii. Data not shared between stakeholders and also between riparian states, especially on shared resources. Data not harmonized, geo-referenced and quality control measures lacking, thus no meaningful interpretation

- iii. Groundwater data and information should be appropriately packaged in a format understandable to the intended recipients i.e. policy makers, and be disseminated to relevant people
  - iv. Linkages between groundwater data/information and other related sector information not established (land use data/information)
- Finance:
  - i. Groundwater management continues to receive meager financial allocation especially for data collection and knowledge improvement (from government, donors, private sector)
- Capacity Development:
  - i. Inadequate knowledge on groundwater systems
  - ii. Investment in capacity development and infrastructure is low
  - iii. Inadequate groundwater monitoring networks
  - iv. Lack of exchange of experience especially at regional level
  - v. Groundwater does not fit into IWRM institutional arrangement, I lacks appropriate simple indicators that describe its status
- **Groundwater Governance:**
  - i. **It should not be a challenge to Hydrogeologists only**, but other relevant professions especially Social-scientist, Socio-economist, Politicians, Transformative leaders, etc should be involved in designing practical solutions. Furthermore, no single governance framework will work everywhere, there is need to customize them for each state.
  - ii. Several international forums have been held on groundwater, it is time to move forward and implement the recommendations from these initiatives
  - iii. Need of practically implement bottom up approach (local to regional)
  - iv. Harmonization of policies at the regional level
  - v. Governance of surface water should be linked to groundwater
  - vi. Repackage challenges into opportunities i.e. relate data collection/processing to investment opportunity especially in groundwater development
- **Data and Information:**
  - i. Develop data sharing protocols and the need to have standards for data collection
  - ii. There should be similarity in management tools to assist in meaningful comparison, especially for shared groundwater resources.
  - iii. Programs for groundwater governance knowledge improvement and data collection should be packaged in a result oriented format, clearly demonstrating the economic values (social equity and economic development) of these programs and the impacts if such programs are not implemented
  - iv. Develop transparent data sharing platforms (acquisition of qualitative and quantitative data)
  - v. Invest in groundwater monitoring networks

- **Stakeholder participation:**
  - i. Involvement of all stakeholders (participatory) critical to improving groundwater governance, including communities (grass roots participants), technocrats, politicians, private sector, municipality managers, development partners and related sector specialists
  - ii. Ensure the commitment of the decision makers to invest on groundwater projects\_
- **Capacity Development:**
  - i. Groundwater education should be included in the curricula of primary, secondary, tertiary and university education, as well as for managers and administrators.
  - ii. Awareness creation and advocacy at all level (from local/communities level)
  - iii. Invest in capacity development, and retain trained personnel
  - iv. Beneficiaries should be familiar (contribute) with costs of groundwater development in order to appreciate and participate in governance
- **Financing**
  - i. Carry out cost benefit analysis to justify extra-budgetary allocation from traditional and non-traditional sources; repackage information into socio-economic returns

#### 4.6.2 Working Group 2: groundwater for Agriculture: Rural Needs and Urban Demands

##### Findings:

- a) Groundwater has several opportunities including reliability, not seasonal and on demand;
- b) Lack of knowledge, little information and low level of participation in small scale irrigation;
- c) Low level of financing and high operation and maintenance- there was no business model yet for attracting financing, creating the need to address the issue in the proposed groundwater governance framework.;
- d) Capacity building institutions are few; and
- e) Spares not locally manufactured.

##### Recommendations:

The second plenary session recommended the following:

- That wider consultation was still needed on the issue of effective participatory process as experience in Sub-Saharan Africa was still limited;
- That groundwater availability in Sub-Saharan Africa was sufficient for small-scale irrigation development at the minimum;
- That there was need to raise awareness of farmers and other local beneficiaries with respect to potentials as well as consequences of intensive use of groundwater;
- That there was need for groundwater governance even though farmers can actually apply simple rules themselves, in order to minimize lowering of groundwater level;
- That two or more RBOs could collaborate on transboundary aquifers, eliminating the need to establish separate institutions for such transboundary aquifers.

#### 4.6.3 Working Group 3: Groundwater in the face of Climate Change: Current Policies and the Future

Findings:

##### **Governance (Policies and legislature)**

- a. Water policies and regulations exist at national, basin and regional levels
  - b. Current policies and regulations prior to the current climate change era do not discuss issues pertaining to climate change.
  - c. They do not include latest developments such as the safe disposal/or use of CBM water during both the exploration and development of CBM.
  - d. Strategic climate adaptation processes have been designed and launched in the sub Saharian Region, the case of SADC. The processes have various programs and projects dealing with water governance and management.
  - e. Aquifer monitoring Networks gather ground water data. Nevertheless, it is not evident the recorded data related to climate change.
  - f. Weak enforcement of laws and standards
- **Visible Adverse Impacts Of Climate Change**
    - i. Climate change has impacted groundwater through increased pressure on the resource due to the drying up of surface water resources.
    - ii. Pressure is being exerted on groundwater resource leading to over-exploitation.
    - iii. Burkina Faso-reduced rainfall –intensified abstraction, from hundreds of wells to thousands of wells as well as the drilling of deeper and deeper wells.
    - iv. The current climate change situation presents to us both a challenge and opportunity. And it is our responsibility to benefit from the opportunity presented. The challenge is the double jeopardy to the resource (reduction of recharge (70%) and increased use). The opportunity is that it is issues of climate change that get more attention hence there is a chance that the value of groundwater will finally be a priority.

##### **Recommendations (Main Messages to Be Included In the Framework for Action)**

###### **1. Governance (Policies and legislature)**

- Formulate Policies that arrest the uncontrolled use of this resource
- Involvement/inclusion of the youth in policy formulation so as to have their buy-in as well ensure continuous supply of experts in the field at all levels.
- Groundwater while being of prime importance is not included in RBO- as a way forward it ought to be included
- Multi sectoral approach that help regulate the use of groundwater
- GWG – RBO be regarded as the hub for GW
- Legislation-realign so as to get buy in to push for GW agenda
- Managed aquifer recharge/artificial policies and be participatory.

- Legislation and policy-strict accountability and transparency are important on the integrity of ground water management
- 2. Capacity Building**
  - Have a deliberate move to address the issue of skills gap which is severe and can affect the successful groundwater governance
  - Improve water use efficiency for all purposes
  - Groundwater should be integral part of the different climate change strategic fora.
- 3. Data Collection**
  - Develop monitoring networks for WL changes
- 4. Groundwater For Development**
  - From the drought mitigation in dryland area point of view/Perspective, formulate policies so as to maximize/optimize the use of groundwater to ensure food security.
  - Institutionalize the governance issue of ground water.
- 5. Technological Transfer**
  - Adaptive research to take advantage of existing technologies
  - Capture run-off to recharge the shallow aquifers
- 6. Institutional Framework**
  - Involve the African Commission on groundwater as per RECs water policies and climate change adaptation strategies
  - Involvement of all stakeholders to ensure Ground water governance
  - Climate regional and subregional bodies-organise a forum for economic players from various sectors to enable GW managers to predict the impacts on GW systems.
  - Let us not use climate change as a scape goat. Do what we know we have to be doing as the GW expert even if we did not have the climate change challenge-what adaptation mechanisms do we put in place so as to know and understand our groundwater systems since the effects of climate change are similar to those induced by other plethora of known problems such as population expansion
  - Regulatory bodies should take all their responsibilities in combating uncontrolled drilling of BHs, case of Mombasa.
  - Institutionalize groundwater-make groundwater be managed properly linking groundwater with development.
  - Learn to communicate with others properly to promote understanding groundwater issues
  - 2 aspects of management:
    - i. Monitoring and
    - ii. Service provision. Re-allocation demand management
- 7. Identify opportunities**
  - Environment payment mechanism
- 8. Finance/Funding**
  - Economic aspect-opportunity cost lower that of surface water. More calculation needs to be done.
  - Create a water fund with a dedicated window for groundwater

- Cost/benefit analysis to provide some benefit=environmental/social or economic. Economic value of the earth gains- true project value and areas of risks which are being mitigated etc.
- Climate change financing-each participating country should ensure that their Climate change are adequately managed and monitored to ensure the funds are used for the intended purpose.

## **5. Plenary 3: Highlights of Case Studies on Groundwater Governance and Policies: Institutional Structures and Legal Settings**

### **5.1 South African Groundwater Governance**

- Policies, legislation and institutional arrangements determined at the National level while strategies for management of groundwater resources is determined at local level in view of differences in local aquifer regimes
- SA Water Act comprehensive and complex, therefore strategic plans reviewed every 5 years
- Authorization for groundwater abstraction required (including Environmental requirements), but not for drilling
- Inadequate groundwater information, and limited hydrogeological capacity
- Priority actions include constant review of policies/legislations, human and institutional capacity, groundwater research and awareness/advocacy
- The cost of not financing groundwater programmes is 10 – 100 times more expensive in terms of damage to the resources and the environment
- Governance provisions should focus also on ‘soft areas’ such as participatory approach, capacity building of WUAs and governance actions should start from local to national (bottom – up).

### **5.2 Uganda institutional and legal framework for groundwater management**

- Comprehensive institutional/legal framework provide stakeholder participation and enabling environment for investment; surface and groundwater management integrated
- Understanding the system; Groundwater monitoring networks installed and comprehensive groundwater assessment carried out and data processed in various formats and at various scales (local, district, national)
- Groundwater management is decentralized into management units (4 zones).
- Regulation for groundwater abstraction (5 years for motorized pumps) and water level monitoring every 3 months
- Water Resources management and planning are synchronized within the principle of subsidiarity (from catchment – management zones – National – Regional); Uganda designed its policies and regulation following the principles of IWRM

- Legal provisions include; Constitution of Uganda (1993) stating management of water resources is by the government in trust by the people; Water Act; Regulations and Standards which include permitting system and setting standards
- Challenges; dispersed rural communities, rapidly growing urban centres, increasing water demand for industrial and agricultural

### **5.3 Kenya Groundwater Governance and Policy Perspective**

- Groundwater governance in Kenya is modelled along principles of IWRM and management of resources is by catchment basins (5No)
- Two-thirds of the country is ASAL, with groundwater unevenly distributed.
- Water policy of 1999 initiated reforms in the sector, backed by Water Act 2002. Other related sector policies (irrigation, land, environment, climate change). Five year National Water Resources Management Strategy developed, classifying various groundwater bodies and their status.
- Water resources management decentralized (6 Catchment area authorities), different roles and responsibility by water various institutions.
- Permitting system; groundwater abstraction, waste water management, pumping regime.
- Challenges include; data and information gaps, poor monitoring networks, no clear policies and strategies on groundwater management, poor knowledge on transboundary waters, low awareness by populace

### **5.4 Sahara and Sahel Observatory/Iullemeden transboundary aquifer legal management framework**

- Aquifer traversed by Niger River, which is a key factor for sustainability of the aquifer
- Initially three countries involved, presently seven countries involved in 2<sup>nd</sup> phase of project; role of Niger Basin Authority focusing mainly on surface water
- Although aquifer not degraded, serious threats of population pressure and climate change real, poor data/information exchange, low level of aquifer knowledge, reduced discharges, water quality degradation (pollution, mineralization, fluoride, uranium etc).
- To address these threats; need for comprehensive groundwater flow measurements (database), capacity development at all levels, develop common mathematical model after harmonizing data collection and processing.
- Structure for consultation mechanism developed; Technical Committees to Council of Ministers
- Lessons; Basin awareness/common vision, basin-wide investment strategies, legal and institutional mechanism

### **5.5 South Africa Capacity Building of Groundwater Governance**

- The need to build capacity at all levels (individual, institutional, societal and eventually people oriented) and subsequent retention of the same with competitive remuneration.

- The complexity of groundwater requires inclusivity of cross-sector professionals and stakeholders (community, public sector, academia, private sector); and to adequately address 'soft issues'
- Lack of capacity and institutional development (build capacity to make institutions function); effective groundwater monitoring; challenges to opportunities
- The need to reform the groundwater education system, adapt new approaches
- Coordination Between Researchers And Policy/Decision Makers

## 5.6 Synthesis/Discussions

- Adequate institutional structures and legal settings exist; but require capacity building
- Best practices should be highlighted since these impact positively to good governance; these should include pumping regimes, borehole locating and monitoring, groundwater as a strategic reserve, compliance with regulation/enforcement
- Other mechanisms for financing groundwater governance should be explored other than the traditional sources of government, user-charges, donor, i.e. ecosystem services?
- Hydrogeologists and related technocrats have been selling groundwater governance messages to themselves; need to address soft issues and inclusivity should be encouraged, i.e. include resource-scientists, social-scientists, politicians, transformative specialists, community/grass-roots leaders, municipality managers, governors specialists etc
- The need to integrate other sector-related policies into IWRM framework
- Conduct cost-benefit analysis in groundwater governance programs (including the cost of not implementing good practices)
- The challenge of implementability of the overall water policies framework related to groundwater.
- Regulation related to groundwater at local level is key.
- National IWRM frameworks are important, but local institutional arrangements determine the success of groundwater governance

## 5.6 Summary Discussion of Breakout Sessions

### 5.6.1 Working Group 4: Policies and principles Adopted by Countries of the Region

#### Findings:

- a) Policies do exist at macro levels and for water in general;
- b) Major challenges relate to coordination gaps, top down decision making, decentralisation and unsustainable management;
- c) Monitoring activities low, role of environmental laws not enforced and groundwater assessment incomplete.

#### Recommendations

- a) Groundwater to be integrated in IWRM;

- b) Need for knowledge led policy formulation;
- c) Capacity is the pillar for groundwater governance;
- d) Policy made with integrity, participation, accountability
- e) Economic valuation of groundwater and ecosystems.

### 5.6.2 Working Group 5: Institutions engaged in Groundwater Governance

Several categories of institutions were identified, namely, regional/international including AGWC, RBOs, RECs, international organisations such IGRIC, etc. These institutions are able to coordinate and harmonise activities and are capable of mobilising resources as their strengths. Their main weakness is that they ignore some stakeholders. Similarly, they:

- experience conflicts of interest,
- groundwater not directly mentioned in their mandates,
- have poor linkages,
- little priority on groundwater,
- Limited capacity.

The main recommendation was to harmonise policies, develop institutional linkages, recognise stakeholders and focus on groundwater management.

National institutions include ministries, parastatals, state governments, natural resources management institutions, centres of higher learning and regional bodies. The national institutions have been engaged in water sector reforms, have clear mandates, and institutions of groundwater management do exist.

However the national institutions are poor in cooperation and collaboration, poor planning, limited capacity, suffers from corruption, inability to recognise other actors, limited data/use, limited focus on research, geohydrology not a preferred entry for recognition, consultants and contractors not regulated and there exists a gap between NGOs and governments. Recommendations were:

- Coordination;
- Cooperation;
- Promotion of groundwater management institutions;
- Workshops; and
- Develop tailor-made courses for groundwater practitioners.

Local institutions are Catchment based, WUAs, CSOs, local governments and individuals. These local institutions have as their strengths local knowledge of the resource, operate at local level and are easier to integrate groundwater and surface water actions in IWRM. The main weaknesses however are:

- Lack of awareness, limited capacity and limited visibility of groundwater management;
- Limited knowledge
- Different stages of development;
- No aquifer management plans.

The key recommendations included building capacity, develop procedures, strengthen community participation, and increase awareness at local levels. RBOs are suitable for groundwater management but need to improve knowledge, exchange information sharing, synergy, increase investment and include additional procedures for incorporating groundwater. It was concluded that RBOs are sufficient for groundwater governance.

### **5.6.3 Working Group 6: Securing and Sustaining Financing in the Groundwater Sector**

Financing the development of groundwater will require basket funds, partnerships, knowledge of groundwater resources, better diagnosis of the problems to be analysed, capacity building and information exchange.

Key recommendations included:

- Diversify sources of funding including Foundations, Philanthropists, Banks, development Partners and Climate Change financing initiatives;
- Use available and appropriate technology;
- Develop solid argument for groundwater management;
- Promote groundwater as meeting food security, poverty alleviation, meeting MDGs and other agreed issues;
- Make benefits of groundwater be visible;
- Increase dialogue at regional levels;
- Increase country level resources mobilisation;
- Improve communication;
- PPPs;
- Capacity building require for each country varies
- Commitment to raise funds and develop special funds for groundwater governance.

## **6. Plenary Session 6: Securing and Sustaining Financing Groundwater in the Governance**

### **Current Situation; Strengths and Weakness of Sourcing Finance National Resources, from Occasional Funds and Private Sector**

#### **CURRENT SITUATION**

1. Insufficiency of effects of projects to be shown in order to secure international finance. Moreover, it is necessary to set priorities and devise strategies for mobilizing international communities.
2. Lack of ideas for creating one basket fund for water resources and sharing by the principle of equity.
3. Knowledge on groundwater is low and as well as on the use and required equipments so as to operate and maintain in a sustainable manner.
4. Lack of partnership with private sector to assess the groundwater resources and then to plane development.

5. Non application of the principle of imposing social obligations in the public domain so as to get revenue from GW users (big users) and polluters such mining companies and others.
6. Limited knowledge on the prices of groundwater development projects and the problem in making cost comparison with other water projects to show cost effective options.
7. Lack of diagnosis of projects and projection of the effects of the diagnosis.
8. Lack of human resource and capacity at individual and institutional levels in order to secure finance for GW development at country level. This requires devising innovative mechanism for regional level approach such as developing models for financing.
9. Lack of data sharing at regional scale for financing projects.

## **RECOMMENDATIONS**

1. As there is no sufficient fund for GW, seeking concessional fund from private sector can be taken as an option. To prominently show the resilient characteristic of GW in the events of drought occurrence and hence to climate change for securing fund.
2. To use the state of the art technique to develop the GW so that the rate of success will be high and acceptance in getting fund will not pose serious challenge.
3. The benefits of projects related to food security, poverty alleviation and conflict resolution are markedly seen and securing fund will not be a problem.
4. Knowledge of the GW resources and cost benefit analysis as compared to surface water projects from national perspective needs to be worked out and the best return be known.
5. Appropriate technology needs to be considered in light of operation and maintenance so that the sustainability of schemes and hence the viability. This is important in securing fund.
6. The aspect of regional dialogue and awareness creation at regional level is necessary for soliciting finance.
7. To differentiate the eligibility of projects at national and regional levels with defined scopes.
8. At national level to mobilize finance for GW needs the commitment of politicians.
9. It is deemed necessary to improve communication in the area of SWR and GW in order to make the right explanation to decision makers and get outright support for seeking fund.
10. Public private partnership needs to be explored as an option for availing finance.
11. To promote the idea of creating one basket fund for water resources and share by the principle of equity.
12. The project ground governance should examine the possibility of mobilizing financial resources for strengthening the capacity and implementation of water codes.
13. To take in to account the needs expressed by each country in the various water projects.
14. To invest in the protection of surface water that could pollute the groundwater.
15. To recover the investment cost

## **7. Groundwater Resources: Data, Information and Knowledge Exchange**

### **7.1 The International Groundwater Resources Assessment Centre – Frank van Weert**

Key Findings:

- Communication and coordination between the users of a shared groundwater resources is paramount.
- The bottom-up coordination can be organized by mobilizing and affiliating water users, either in form of Water Users Associations or IWRM fora with the purpose of monitoring of quantity and quality of the resource to avoid effects of climate change and to put in practice a strategy of resource allocation and multidimensional analysis as well.
- With preliminary assessment of quantity and quality of the resource, protect the resource, promote and practise code of conduct like safe waste disposal etc.
- Once the stakeholders have agreed on critical issues of governance, the regulator will facilitate setting the rules in a participatory manner.

## **7.2 The GEF IW: LEARN Groundwater Community of Practice – Lucilla Minelli**

Global Environment Facility's (GEF) International Water (IW) started in 1994 and will continue in 2014. The focus is on groundwater. The purpose is to share the large amount of information and knowledge and experience gathered over 20 years of GEF IW. IW:LEARN is a place to throwing questions, learn and exchanging information, share results and success case histories. It compiles targeted videos and visual material for training and capacity building. Groundwater Portfolio Analysis has been developed.

In addition, there are face to face meetings during IW Science conferences, GEF IW projects managers meetings, as well as national experts. Water resources practitioners and scientists as Community of Practice (CoP) regional meetings are organised.

## **8. Plenary Session 5: Effective Participation of Stakeholders in Groundwater Governance**

### **8.1 Panel Discussion**

The panellists included representative of the Kenya Water Industry Association (KWIA), Africa Groundwater Network (AGWN), and International Water Management Institute (IWMI), and Jomo Kenyatta University of Agricultural Technology.

From the KWIA, several products have been developed:

- Code of Practice for Drilling;
- Cost effective borehole drilling – meant to improve drilling efficiency.

There is a lot to be done as there is need for country-specific Codes of Practice.

The ignorance of the people involved is a serious hindrance to effective participation. There is need to explain the details of drilling to the client.

AGWN has been supporting better understanding and management of groundwater since 2008. Effective participation requires knowledge and capacity building in groundwater where there is terrible lack of information. Actions that are considered useful include:

- Need for sensitisation;
- Production of materials, especially in French;

Dr. Omgeni Yaya has organised competition on water issue to increase awareness, funding for fellowships to increase capacity and supported Youth Empowerment, WUAs and local level training on water management.

IWMI emphasised the importance of getting stakeholders to agree on rules/regulations on groundwater management. Stakeholders are of various types, viz, and large scale water users, small-scale and rural vs. urban users. Social regulation using demand management and aquifer recharge, etc has been practiced in India where groundwater is overly exploited.

The slow pace of shifting from IWRM to River Basin Management Plans provides an opportunity to introduce groundwater governance in RBOs. Water sector coordination started in 1977 but has been slow. Inter-Ministerial Coordination Committees have been slow and demonstrate little results.

Wangai Ndirangu suggested that groundwater practitioners must develop a marketing approach of taking the products to the market place by getting involved in developmental issues. There is need to increase stakeholders engagement through professional associations, etc.

## **8.2 Summary of Breakout Sessions**

### **8.2.1 Working Group 7: Groundwater Governance and Stakeholders Participation**

Key Findings:

- a) All are stakeholders, hence there need for foras for different stakeholders;
- b) There are knowledge gaps between regulators to user, hence need for synergy, multi-disciplinarily and sustained knowledge acquisition of water science;
- c) Need for awareness raising, incentives, education and information exchange (between users, professionals and policy makers) and stakeholders see this as a common good;
- d) Need for qualified groundwater professionals at all levels;
- e) Role of media - the engine room of (mis) information;
- f) Participation is a process, culture, power with high stakes, political requiring responsive approach.

### **8.2.2 Working Group 8: Ethics for groundwater management**

Key Findings:

- a) Communication and coordination between the users of a shared groundwater resources is paramount. This coordination could both be facilitated within the coommunity when there is

willingness and capacity to undertake this or organized by an external authority when interests within the community are too much conflicting. Ideally both approaches top-down and bottom-up should be practiced together

- b) The bottom-up coordination can be organized by mobilizing and affiliating water users, either in form of Water Users Associations or IWRM fora with the purpose of monitoring of quantity and quality of the resource to avoid effects of climate change and to put in practice a strategy of resource allocation and multidimensional analysis as well.
- c) Have preliminary assessment of quantity and quality of the resource. To protect the resource, promote and practise code of conduct like safe waste disposal etc. This assessment is normally organized by the government (however increasing in co-production with local stakeholders). Results of such assessments should be made available to all water users in such a form it is usable even when you have limited understanding of groundwater dynamics
- d) The role of the regulator: once the stakeholders have agreed then it is easier to come together. The regulator will facilitate setting the rules of the game in a participatory fashion with all stakeholders instead of forcing people to allocate the resource (?)

## **9. Plenary 6: Sub-Sahara Africa region Inputs to the groundwater Governance Global Diagnostic and Recommendations for the Framework of Action**

### **Sub-Sahara Africa region Inputs to the groundwater Governance Global Diagnostic**

- All countries confirmed existence of policy related to groundwater at macro level, but difficulties to implement it locally. However groundwater is more or less embedded in general water policies.
- Challenge is not enough research and development for informed policy making
- Most West African countries are in the process of putting in place IWRM encompassing groundwater, but difficulties linked to the nature of groundwater;
- Often lack of coordination between water laws and general environmental ones; coordination and harmonization issues between central and local administrations
- Conflict of interest between economic profit and protection of WGR
- Mechanism of decision making more top-down than the reverse, although participatory approach is progressing;
- In several countries, decentralization is undertaken, while at local level stakeholders are not skilled to do the job;
- Often pastoralists do not believe to the central government in taking care of their interest and sharing of knowledge and participation are required
- The issue of sustainable development in terms of safe yield of aquifers to ensure at the same time equitable water supply, economic production (food and industry) and water for environment;
- Lack of transparency regarding impact of mining of groundwater resources;

- Development of transboundary aquifers and role of international water law; and
- In many countries the assessment of groundwater resources is very incomplete

### **Recommendations for the Framework of Action**

- Groundwater governance needs to be encompassed in the framework of IWRM;
- Need to learn from the groundwater users who used to live with water
- Attention need to be given to effective decentralization of the application of groundwater policies and principles
- Learn from existing success stories where there are good practices of groundwater governance in the frame of IWRM;
- Establish explicit policy for groundwater management;
- Value research in order to promote policy informed by knowledge;
- Avoid duplication in laws and regulations (harmonization)
- Capacity building should constitute a pillar of any policy;
- Policy should be made with integrity;
- A good strategy for implementing any policy should be based on transparency, participation and accountability;
- Countries should be encouraged to create incentives for groundwater use for economic purposes;
- Groundwater community should be ready to help policy making under uncertainty; and
- It is necessary to make decisions makers at all levels aware of the economic value of groundwater and how it supports the ecosystems.

### **10. Plenary Session 7: Conclusions and the Way Forward**

George Krhoda the Chair for the session summarised the challenges as follows:

- Poor understanding of groundwater systems
- Poor and inadequate information
- Groundwater quality
- Serious impediments to groundwater resources management

He expressed special thanks to Hon. Mary Khimulu, Kenyan Ambassador to UNESCO before inviting the panellists to make Concluding Remarks.

Ms. Alice Aureli expressed her pleasure and honour to represent the DG of UNESCO And also thanked the Government of Kenya, the authorities, participants and partners, the Kenyan School of Monetary Studies. She informed the participants that they will receive all presentations, reports of working groups, questions, case studies; everything will be posted on the web. UNESCO will establish a Permanent Consultation Mechanism to enable all to continue exchanging ideas with the regions. She announced that UNESCO-IHP was called to implement the UNGA Resolution on the law of Transboundary Aquifers (TBAs).

Dr. Rafik Hirji expressed gratitude to the Government of Kenya for hosting this significant meeting. Each consultation is a learning experience. On average, 97% national budget allocated to freshwater management goes to surface water management and only 3% goes to groundwater management. So we need to address the problem. The resource is invisible... we need to address it differently. The problem is within our community: we failed to build convincing cases. Groundwater specialists are very talented people but we are very poor communicators: good science can make a difference only if it is properly communicated. Maybe we should change our vocabulary, the way we communicate. The huge challenge ahead of us is a learning exercise. We should make strong economic arguments. He appreciated the work that GEF has done in funding groundwater projects.

Ruhiza Boroto thanked the people of Kenya. The measure the impact of this project now will be assessed in 20 years from now when hydrogeologists will have a higher salary than an engineer. Groundwater in 20 years will become a brand name like "Samsung". The political will is there, represented by AMCOW therefore thank all the partners of this project for the rich discussions, in the great preparations by UNESCO, the WB, IGAD, etc

Shammy Puri\_commenting on the British Geological Survey report the figures presented in the research showed that the volume of water underground is at least 20 times bigger than the volume of surface water in Africa.

This is the only continent that has a groundwater commission. We need to take the message forward! I invite you to participate in this PCM.

Charles Ngangoué thanked the Government of Kenya, UNESCO, FAO and WB for this successful regional consultation. Groundwater should become the first of all water sources, so that everyone could become an ambassador or an advocate of this resource. In rural areas, almost 100% of the population use groundwater. AMCOW is going to make all efforts to make sure that all countries will implement the recommendations coming from meetings such this consultation.

Arba Diallo expressed that we need to consider that coming from Nairobi we have won the water battle, on the water that sleep under our feet. The only place where the problem of water availability subsists is Africa and therefore there is need the commitment of our Head of States in order to allocate part of the budget to access to water and sanitation.

Hon. Ochillo Ayako expressed that Kenya is indeed privileged to have hosted this workshop for the Africa region and it's my hope that all the African countries would give top priority to the outcome of this workshop and adopt some of the resolutions which you have elaborated to suit our unique groundwater situation.

He thanked UNESCO for having approved the establishment of a Category 2 Regional Centre on Groundwater Education, Training and Research to be hosted at Kenya Water Institute where he is the Chairman of the Governing Council. The centre will play a critical role in creating awareness and

educating people in the region on issues pertaining to groundwater resources management. He expressed pride that the African region has contributed immensely to the development of a Global Framework for Action that will inform policy makers and stakeholders on effective governance of groundwater resources.