

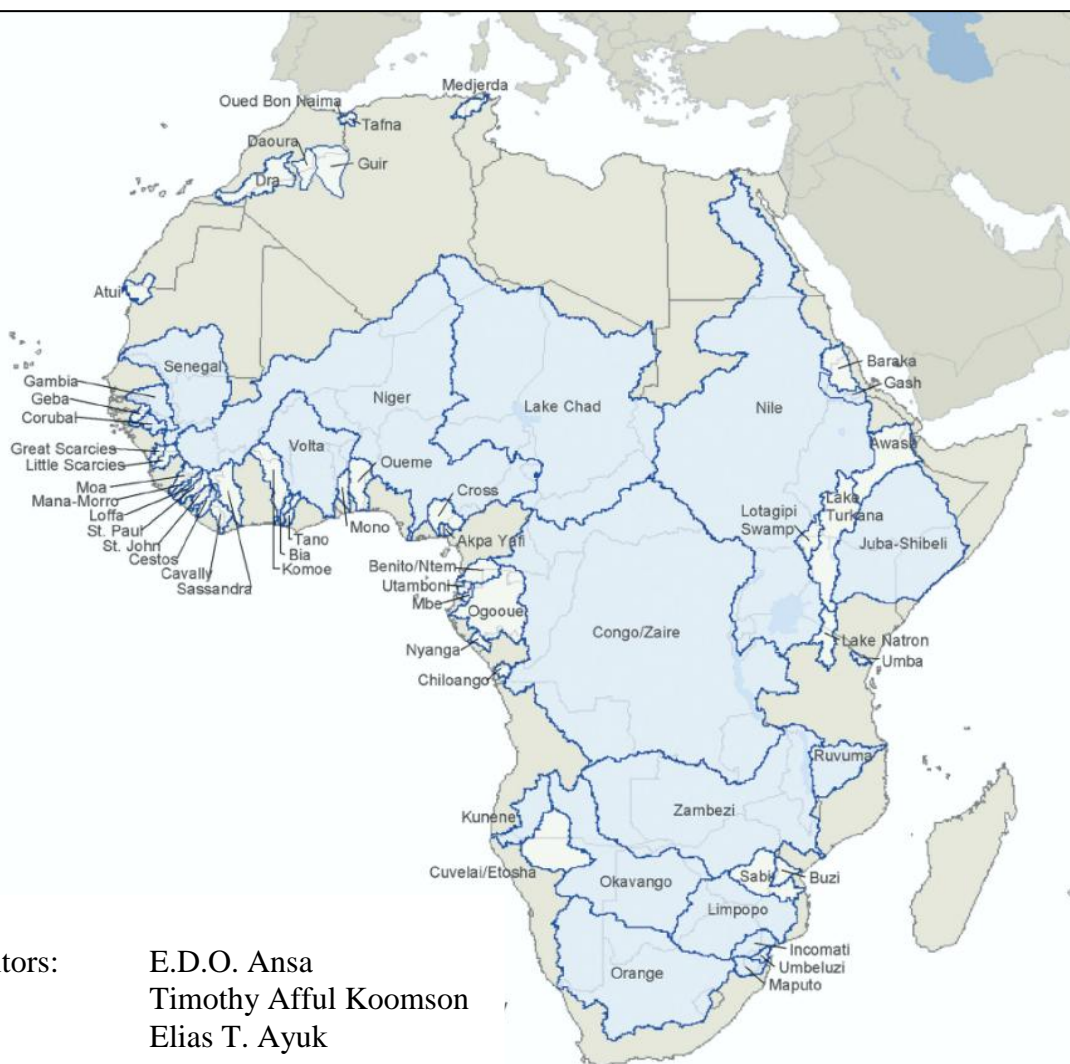
Hosted by United Nations University (UNU)



Proceedings of the seminar on

# National and Trans-boundary Water Resources Management in Africa

March 26-30, Dodowa, Ghana



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## **Introduction**

As part of its mission to strengthen the capacities of development practitioners in Africa, the African Development Institute (EADI) in collaboration with the Water and Sanitation Department (OWAS), the African Water Facility (AWF) of the African Development Bank (AfDB) and the United Nations University – Institute for Natural Resources in Africa (UNU-INRA) conducted a seminar on National and Trans-boundary Water Resources Management for scientists and river basin managers from the 26<sup>th</sup> of March to the 30<sup>th</sup> of March 2012 in Dodowa, near Accra, Ghana. The seminar drew 28 participants from 18 African countries representing regional and national water commissions as well as river basin and related technical institutions. Participants also represented African countries at different levels of integrated water resources management (IWRM) implementation; ranging from those who for some reason are yet to start the implementation of IWRM to those who have already developed and implemented instruments for IWRM. This meeting was in response to previous regional calls for action and also formed part of the strategic plan of the African Development Bank. The purpose of the meeting was to conduct a review of progress made at the national and regional levels in the use of instruments for IWRM and to share experiences on the development of IWRM instruments in countries and river basins/aquifers in Africa so as to build the capacity of policy makers and other development actors in the water sector.

### **AfDB Bank's Capacity Development Strategy and IWRM interventions**

An introduction on AfDB's capacity development strategy and its interventions in IWRM was given by Susan Emiko, Training Officer, AfDB and Francis Bougaire, Principal Engineer, AWF, AfDB respectively.

The AfDB Capacity Development Strategy (2010-2014) focuses on improving the capacities of the bank's institutions as well as the capacities of African countries through the forming of partnerships with African universities and institutions with a regional focus as well as with other global centers of excellence to produce knowledge and expertise. The capacity developing efforts seek to address challenges relating to

- Strengthening the data and information base of African countries for IWRM
- Management of trans-boundary water resources for regional benefit

- Building strategic infrastructure to ensure basic water security for socio-economic uses

The AfDB's IWRM policy therefore is to

- Support studies that identify the benefits of regional and shared water resources projects;
- Promote regional co-operation and integration by assisting in institutional development for managing shared waters;
- Assist in the development of appropriate legislations and
- Support infrastructural development for generating and sharing data and information.

Over the past 37 years, AfDB has invested about USD 6 billion in multipurpose water and agricultural projects as well support for national and transboundary water resources management efforts.

### **Updates on IWRM implementation in Africa**

Update on IWRM implementation was given by Kwame Ababio, a consultant of Hydro-Environ Solutions (HES).

The meeting of African Union ministers in Sharm el Sheikh in 2008 to tackle issues affecting the water sector is a demonstration of political will at the highest level of governance. Many African nations currently have national water laws and policies resulting in significant increase in the number of countries having completed national water plans or having its implementation underway increasing from 25% to 38% (GWP and UN-Water Survey, 2008). Countries like Zambia, Mali and Malawi have incorporated IWRM into their National Development Plans. Giant strides have been made in the area of stakeholder participation and subsidy/micro-credit schemes. There are many challenges which impede the smooth implementation of IWRM in Africa. These include:

- Absence of National IWRM Plans that are linked to national development priorities particularly in agriculture
- Absence of plans that adequately addresses critical challenges such as climate change, dam safety and food security
- Limited information on groundwater resources and little motivation for research in ground water and related fields of study

- Differences in levels of decentralization in various countries
- Frequent changes in the local political & technical leadership
- Land tenure challenges (for buffer zone preservation)
- Lack of coordination of different sectors of governance resulting in limited capacity of national institutions to undertake integrated planning
- Absence of monitoring and enforcement schemes in transboundary agreements

It is recommended that the functions and authority of water management institutions be properly coordinated. Priority should be given to building capacity at the local, national and regional levels for IWRM. Experience sharing across Africa and other regions such as Asia should be encouraged. Political will of African governments should translate into adequate funding of IWRM.



## **Session 1: Water resources information sharing**

The session on water resources information sharing was chaired by Jauad El Kharraz, Information Data Manager of EMWIS/SEMIDE, France. Contributors to the session were Abou Imani, Regional Hydrologist, UNESCO, Nairobi and Robert Dessouassi, Executive Director of Niger Basin Authority, as well as Jauad El Kharraz.

### **Challenges of information management and sharing**

African rivers had been characterised by very high variability in water quality and quantity (Fig. 1). Water resources information management system in Africa is either nonexistent or poorly developed. Coordination and networking for information sharing is a huge challenge on the continent due to the absence of legal and technical frame for standardizing, reporting and sharing of data. There has also been very limited use of hydrological models for decision making due to huge gaps in existing database. In addition to some of the challenges mentioned above, the Niger basin, for example, is characterized by decreased discharge levels, increased variability and a huge data gap with respect to ground water information. Cultural farming practices and other land use practices like mining cause erosion of river banks and siltation in river basins; posing a threat to water quality. A subvention of 1.2 million Euros from the Global Environmental Facility (GEF) to build capacity for managing Niger Basin Organizations, develop and operate a 15 year plan for Niger Basin Observatories stands the risk of drying out due to the current global financial crisis.

Key decisions relating to how irrigation can be carried out and how much water is available and at what time of the year are difficult questions that the basin authorities need to answer in order to manage the increasing demand for water (Fig. 2). In addition issues bordering on the water quality of the river basin had to be tackled. The transboundary nature of the basin required that any basin project to be undertaken by a member country is evaluated.

Critical questions that needed to be answered are

- i) How do we utilize water resources to reduce poverty?
- ii) What is the proportion of water resources in a country that is produced outside the country?
- iii) How do we distribute or apportion this water resource equitably, share costs and benefits and thereby promote development and regional integration?

## **Opportunities for information sharing**

Water-related disaster risk management anticipation depends on historical data and current data. The opportunity exist for existing regional groupings such as ECOWAS SADC and the African Water Information System (AWIS)<sup>1</sup> to develop legal and technical frame that establishes networks capable of producing standardized data such as use of common software and data that is clearly linked to its source. Legal framework should define personnel to be involved in data collection and frequency of data collection. Ecological stations should be well resourced to be able to generate good, quality data that is well defined and accessible to all. An intimate relationship between basin authorities and policy makers of member states would help facilitate their funding mechanisms and options. Regular platforms should therefore be created to harmonize the relationship. On the other hand, experiences based on the lessons learnt from EMWIS approach used in North African countries could inspire other African countries to build a national and regional water information systems with harmonized water data and standards.

## **Recommendations**

- Address the diffused functions and authority of water management institutions
- Give priority to capacity building across local, national, transboundary and regional scales
- Harness the power of networking to share experiences across Africa and other regions (Mediterranean & Asia for example)
- Political will of African governments should go hand in hand with adequate funding of IWRM
- There is the need for water resources assessments involving water quality and quantity, variation and water sources in relation to time
- Measurement networks and stations need to be created to fill existing data gaps. Data need to be merged (for example integrating water quality and quantity data for taking key decisions)

Establishing a data base can start with a rapid assessment involving for example water demand, social impact, risk and vulnerability assessment.

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<sup>1</sup> African Water Information System (AWIS): <http://www.oieau.fr/iowater/our-projects-news-and-update/article/african-water-information-system>



- Awareness need to be raised about the importance of information systems as tools for decision making
- There is the need to standardize definitions, methods and formats of data collection and research is central to achieving this
- Regional capacity building should be strengthened and emphasis should be placed on training and retraining of technical staff
- Research initiatives to improve knowledge on the relation between groundwater and surface water is essential
- Information must be managed at the appropriate level and information provided once should be used for many purposes
- There is the need to have a national documentation centre standardization of data collection among nations should be assigned to particular peoples/institution for responsibility
- Continuous dialogue between all stakeholders is essential for the coordination between research and policy
- In establishing a young river basin organization such as Nile Basin Authority (NBA), a lot of education and communication need to take place among stakeholders. The creation and sustainable funding of environmental observatories is very important as they play a pivotal role in promoting transparency and accuracy in decision making
- Ground water data collection had not received the necessary attention to date and future activities should lead to enhanced data collection and knowledge acquisition in this area
- Basin authorities need to have an intimate relationship with policy makers of member states to help facilitate their funding mechanisms and options
- Commitment is needed and understanding of the tools by all countries and stakeholders involved is key
- The setting-up of information systems for water resources management at the river basin level or coherent hydrographic units, having guaranteed compulsory funding to secure their long-term continuity will assist in information management and sharing

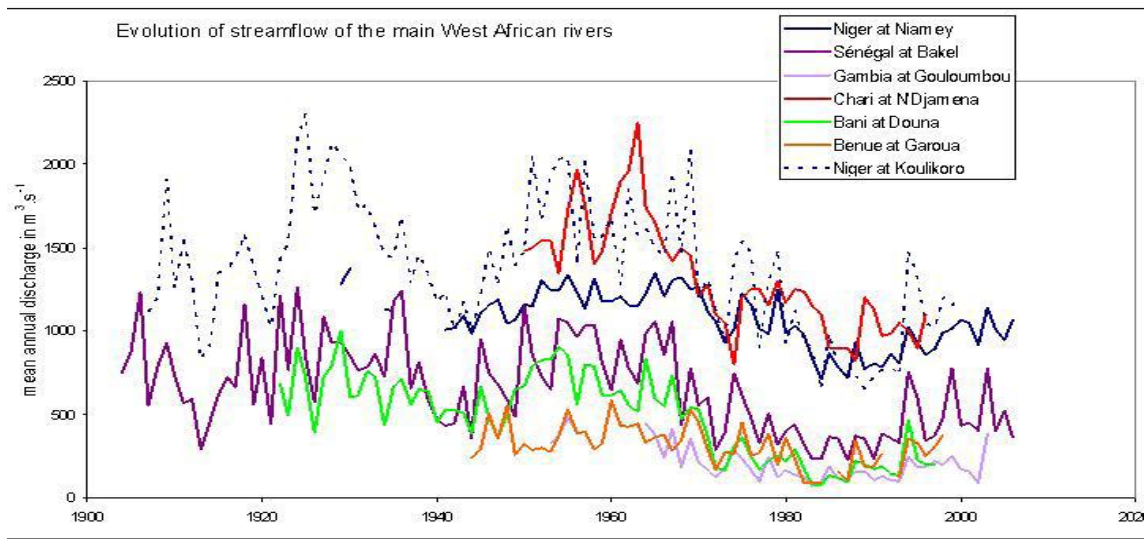


Fig. 1. Stream flows of some rivers in West Africa

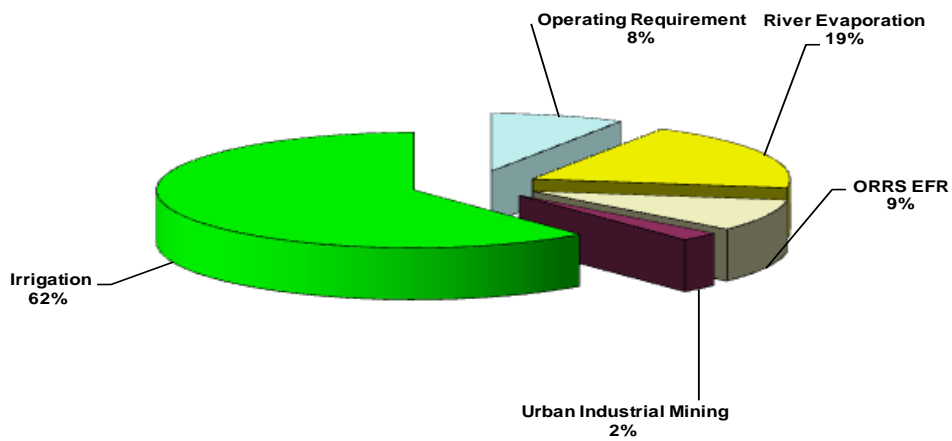


Fig. 2. Water demand in the Orange-Senque river basin, Southern Africa



Seminar participants visit the Volta River Authority, Akosombo, Ghana



A stakeholder meeting

## **Session 2: Platform for coordination, cooperation and participation**

Session 2 was chaired by C.A. Biney, Executive Director, Volta Basin Authority, Burkina Faso with Lenka Thamae, Executive Secretary, ORASECOM giving two presentations on platforms for consultation of stakeholders and on the challenges and opportunities available in the Orange-Senqu basin.

SADC countries in relation to the rest of sub-Saharan African have made giant strides in fostering regional integration for trans-boundary water resources management. The most recent development in regional integration was the creation of ZAMCOM which involved all 9 SADC states coming together to form a basin authority; replacing previous bilateral agreements between various states in the region. These initiatives have resulted in reduced risk of conflict, greater credibility and public support with more informed decision making ability. Success chalked so far include:

- Organization of workshops on SADC river basins to develop guidelines in best practices as well as monitoring tools of protocol (or indicators)
- Facilitation of Regional Water Dialogues (convened in collaboration with global water partnership) that creates themes and aims to reach beyond the water sector
- Water quantity use by stakeholders is captured and reported, advising on various scenarios of uses
- Stakeholders are also empowered to manage water looking at competing needs at various levels. These are usually done in community meetings
- Collaborative decision making process involving grassroots level participation from 3 riparian states (Angola, Botswana and Namibia) and shared understanding beyond the elite and the water managers

### **Challenges**

Challenges encountered so far include:

- Obstacles relating to existing disparity in ability to access information and capacity such as the lack of availability of sufficient tools for making convincing decisions
- Mobility of staff from one country to another for greener pastures
- Industrial and mining pollution makes management of water quality difficult
- Great stress on the river basins in terms of water need and demand

- Use of different equipment types by different countries makes standardization of methods and results difficult

## **Opportunities**

The ORASECOM agreement provided a platform for promoting awareness and public participation in policy and programme implementation. Through a defined context of participation, potential stakeholders are identified and characterised in order to enhance effective participation and communication. This approach helps to provide in depth analyses of core issues, reaching out to marginalized groups and providing updates on specific initiatives. Countries also had individual responsibility to control pollution and to control aquatic weeds.

For relatively young transboundary basin organizations such as the Volta Basin Authority (VBA), codes of conduct and commitments need to be clearly discussed and agreed upon. To facilitate the development of joint projects commitments from the highest level of governance is essential. As it is difficult to schedule regular and frequent meetings among heads of state for the purpose of IWRM, meetings of regional groupings such as ECOWAS could be used to create platform for discussion on transboundary IWRM.

## **Key Messages & Action Plans**

- Stake holder participation has to be defined at various levels be it scientist, communities. However, definition is evolving
- As stakeholders are involved in participation strategies the involvement should first agree on values, principles, strategies and then actions
- Defining equitable allocation and benefit sharing with limited available water resource and basin wide data is an evolving process
- Water scarcity would be compounded by climate change. Enhanced joint Basin river health surveys and annual basin scale water resources modelling for operation of infrastructure is key
- Using NGOs to create bridges in communities is essential while building capacities and creating a basin wide platform
- Effectively involving all stakeholders at basin level e.g given assymetry of stakeholder groups in basin States
- Ensuring consistency in delegations and maintaining institutional memory.

- Need for active participation in feasibility studies towards infrastructure development such as facilitation of notification process for infrastructure projects
- Continuous mobilisation of strategic international partners such as GIZ (BMZ, UKAid and Australia Aid), French GEF, EU, UNDP and GEF for delivery of components of the programme and continuous experience sharing would enhance cooperation
- Development of rules and procedures such as equal representation, equal cash contributions towards secretariat operations, equal powers and decision making by consensus has contributed to the success of the cooperation, including benchmarking and seeking international best practices
- Platform for heads of state should be created in similar regional groupings to facilitate decision making



The Orange-Senque River Basin, Southern Africa



The 14 member states of SADC

### **Session 3: Political and Legal instruments employed for basin and transboundary water resources management**

The purpose of this session was to introduce key political and legal instruments used at the national and regional levels for IWRM. Presentations were made by Bernadette Adjei, Legal Officer, Ghana Water Resources Commission, Lenka Thamae, Executive Secretary, ORASECOM and Francis Bougaire, Principal Engineer, Africa Water Facility (AWF). The session was chaired by Fred Kyosingira, Assistant Commissioner, Water Resources Monitoring and Assessment, Uganda.

The setting up of AWF by African ministers' council in Abuja to mobilise resources to finance water resources management was a milestone in IWRM in Africa. 68 projects in 36 countries had been funded since 2006 estimated at €80 million. AWF strategic priority for 2012-2016 is to support water governance and infrastructure, knowledge acquisition and support of institutions such as the Lake Chad Basin (LCB), Nile Basin Organizations (NBO), Volta Basin Authority (VBA), ORASECOM etc. Having enough funds to disburse has however been a major constraint facing the AWF.

The development of legal instruments for shared water resources had been hampered by minimal political will. Other challenges include the limited and uneven distribution of the water resources and the lack of a comprehensive framework that captures and addresses these constraints particularly in relation to ground water resource in regional protocols. Protocols agreed upon by SADC countries for example have had to be revised many times and it is still difficult to interpret some aspects of the protocol.

In 1997, the UN General Assembly adopted the United Nations Convention on the Law of the Non-navigational Uses of International Watercourses. The convention however currently lacks the signature of nineteen countries which would bring it into force. This is because some countries think they have more right or more need and could be disadvantaged when they come onboard. The 1997 UN convention requires countries to cooperate on the equitable and reasonable use and management of international watercourses, with a view to attaining their sustainable utilization and adequate protection by

- Adopting agreements that implement or adjust the convention to their specific circumstances and needs



- Participating actively and equitably in the development and protection of international watercourses
- Taking appropriate steps to minimize or avoid causing significant harm to shared watercourse states and to the water environment by preventing, reducing and controlling pollution
- Following a procedure of consultation, negotiation, and data exchange before the drawing and implementation of plans relating to IWRM on shared waters
- Seeking the peaceful settlement of disputes, following the Convention's procedures in the absence of applicable agreements

## **Opportunities**

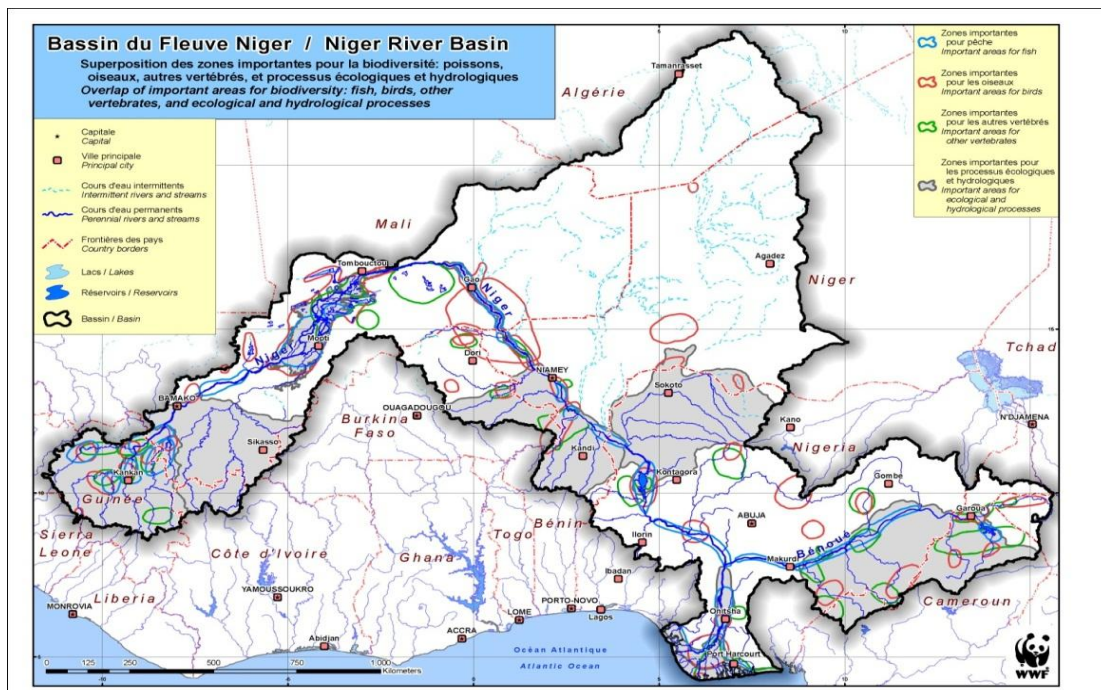
As water resources dwindle and the effects of climate change exacerbate current management problems and cross-border tensions, the UN Watercourses Convention will contribute to preventing conflict over shared water resources and enable the achievement of development goals by:

- Filling a regulatory gap in the governance structure for transboundary waters as a global instrument enabling and supporting interstate cooperation at all levels; and
- Strengthening the principles and approaches of international law and policy that govern and sustain international cooperation on the development, management, and protection of shared basins
- Creating an effective UN Watercourses Convention that will offer a stronger enabling environment for ECOWAS Member States to:
  - Implement and monitor transboundary integrated river basin management
  - Improve dialogue and exchange of information and data with non-member States sharing freshwater resources within the region
- In June 2008, an ECOWAS workshop on Treaty Law and Practice and the Domestic Implementation of Treaty Obligations, held in Accra examined the UN Watercourses Convention, its global relevance, and its applicability in West Africa, underscored the need for the widespread adoption and implementation of the Convention across the region

- A code of conduct and commitments currently under preparation by Ghana and Burkina Faso for use on the Volta Basin mirrors the UN Watercourses Convention in substance
- The convention creates the necessary regional legal framework for subsequent participation of all the six member states of the Volta Basin Authority (Burkina Faso, Togo, Ghana, Cote d' Ivoire, Benin and Mali)
- The UN Watercourses Convention will advance National Water Policies by contributing to several of its provisions in that it adds value to bilateral agreements and serves as a legal framework for governance of international waters that do not have interstate agreements
- Over 70% of renewable water resources in the SADC region occurs between two or more member states and the development of a stronger framework for cooperation stands to benefit all



The Volta River Basin



The Niger River Basin

## **Key Messages & Action Plans**

- In other regions, there is the need to move from bilateral agreements towards a river basin or regional agreements
- There is the need to develop guidelines that would ensure that the necessary impact of the protocol is felt at the grassroots levels
- Emerging issues involving ground water resource management, climate change and green economy should be incorporated into the SADC and other protocols
- In the Lake Chad Basin, an approach that can be adopted is sharing benefits rather than sharing water
- The UN Watercourses Convention is essential for conflict prevention, advancing the Millennium Development Goals and the 2010 target under the Convention on Biodiversity. The Convention will supplement multilateral environmental agreements on climate change, desertification and wetlands, better enabling the achievement of the goals those instruments pursue
- The convention can advance national water policies by serving as a framework on which negotiations on future water course agreements could be based
- Signatories to the convention could benefit from stronger legal framework governing its own trans-boundary river basins
- For the next five years (2012-2016), the priority of Africa Water Facility (AWF) will devote 15% of its budget for enhancing water governance, another 15% for knowledge promotion and 70% for bankable and sustainable investments in water infrastructure
- Potential applicants for this funding need to prepare adequately by way of the necessary documentation showing economic viability, social and environmental impact assessments of the proposed project



Aluvial diamond mining in the lower Orange-Senque River Basin



Seminar participants visit the Akosombo dam, located on the Volta River

## **Session 4: Financial mechanisms available for water resources management**

This session was introduced by Timothy Afful Koomson, Environmental Policy Fellow of UNU-INRA with an overview on financial mechanisms available for water resources management. Examples of such financial mechanisms are capitalization funds, revolving funds, endowment funds, sinking funds, and project funding by public-private partnerships (PPPs). Funds could be established with contributions from riparian states and donors and revenues from projects, community levy, user-pay and polluter-pay taxes. After a short discussion on this overview two groups were formed to identify the challenges affecting the finance of water resources management, the lessons learnt over the years and to prescribe the way forward in addressing these constraints. Group 1 led by Trevor Shongwe of Swaziland Water and Agricultural Enterprise (SWADE) discussed financial mechanisms relating to national water resources management while Group 2 led by Loay Sief El Din, Nile Water Sector, Ministry of Water Resources and Irrigation, Egypt focussed on financing regional and basin water resources management.

### **Challenges in financing IWRM**

At the National Level (Group 1)

- Grants are declining while loans are increasing yet countries may not have enough money to invest in big projects and their borrowing power may also be low
- High default in payment contributions, unstable political environment reduces the credit profile of most African countries
- In some countries, the legal framework positions water supply and distribution as a social service and this does not seem to attract private investment. In such circumstances getting returns on investment takes a long time.
- In some countries moneys generated by the water sector goes into a consolidated fund and usually getting that money back to re-invest in the sector becomes a herculean task
- Funds obtained from some donors take a long time to be disbursed by donor.
- Sometimes planning is not made as to how funds would be administered
- Insufficient funds from the donor country are provided particularly during prefeasibility studies. This does not ensure that a thorough job is done

- Cost of feasibility studies are high; yet sometimes an immediate follow-up to implement project is not done. After a while another feasibility study is recommended again before project implementation takes off as factors on the ground may have changed
- Donor agency bureaucracy in procurement and hiring of consultants impede the swift implementation of projects

#### At the Regional Level (Group 2)

- Basin and regional issues are not given priority in the plans and financing of members' states
- Countries contributions to river basin organizations are generally low and often not paid on time due to minimal political will (or political instability in some countries). This results in inadequate funding for operations and investments leading to reliance on donor funding
- Lack of review of the level of countries contribution on the operations of lake and river basin organizations (L/RBO). This perhaps is due to the inability to demonstrate tangible benefits to the countries in a timely manner
- Lack of platforms to allow countries to learn from success stories regarding financial mechanisms such as those adopted in some basin organizations
- Maintaining donors interest in basin management and development programmes
- The capacity to prepare bankable proposals and the ability to follow it through to implementation may be lacking
- Maintaining institutional memory within the L/RBO as well as within the corridors of governance is difficult due to staff mobility and political changes
- The lack of funds to follow up activities and sustain results
- Sources of finance of L/RBO are not diversified
- There is a challenge of aligning the support of partners with the priorities of L/RBO

## Lessons Learnt

### At the National Level (Group 1)

A broad financial base is required for financing transboundary and regional projects. This may include the following:

- Funds that require fiscal input but rather technical support for areas such as biodiversity conservation, climate change and capacity development. The technical support may come either in the form of equipment provision or advisory services or both. L/RBO therefore should identify the types of funding available and then develop the appropriate mechanisms for its accessibility and administration
- Using skilled personnel in basin organizations such as engineers as a contribution in public-private partnerships
- Looking for alternative arrangements such as partial credit guarantees from organizations such as International Finance Corporation (IFC)
- Exploring value addition through the stock exchange and issuing bonds
- Counterpart funding from Governments in the form of cash contributions to prevent delays in project implementation. Counterpart funding from governments could also take the form of assets such as offices and personnel
- Some countries (like Liberia) start project implementation even when donors have not disbursed promised funding. The funds eventually come in when project implementation are underway
- When the community is involved in the operation and maintenance of systems, there is ownership of the project by the community and in the long run the operation becomes cheaper. In Swaziland, the water utility is responsible for supplying water to the entire country. Some towns could have good returns whereas others do not. So those who break even pay for those who cannot

### At the Regional Level (Group 2)

- There is the need to diversify financing sources
- Harmonization of partner's interventions and coordination of projects are important (eg. Multi donors Trust Funds)
- Hydropower generation and interconnectivity provides early benefit for regional cooperation and integration



- L/RBOs which have well established systems with international credibility usually attract direct partner funding
- Ensuring that environmental, social and participatory approaches are well addressed.
- Capacity building on the formulation of bankable projects and fundraising is essential (competent agencies can assist on that task, e.g EMWIS<sup>2</sup> experience with North African countries)
- The development of strategic action plans with suitable investments plans; Consultation with stakeholders at national level secured, followed by donor conference have been found to be a useful process to secure funding for the programmes of some L/RBO
- The preparation of autonomous and sustainable mechanism of funding for L/RBOs could be a useful approach to identify the various funding options to obtain political commitment and support, as well as conduct consultations with regional organizations and partners (eg. Ongoing process at NBA)

### **Key Messages & Action Plans**

- The problem of default in payment of dues by member countries of L/RBOs could be overcome by accessing capitalization fund as this guarantees income only for shareholders of the fund
- The creation of private special purpose companies by basin organizations is a pragmatic way of circumventing legal constraints
- Governments in the region should lead the way in developing products from banks that encourages water resources management
- Funds generated from the water sector should not be taken to the consolidated fund, but to a pool of the water sector funds so that it could be easily accessed when required
- The other sectors that use water to generate money like hydroelectric power, should provide some to the water sector responsible for water resources management. Some of this could be used for water resources projects
- Training of the key implementers of the project is required before implementation. Training in project management about donor procedures should be an essential part of project implementation

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EMWIS/SEMIDE: <sup>2</sup> Euro-Mediterranean Information System on know-how in the Water sector:  
[www.emwis.net](http://www.emwis.net)

- It is recommended that procurements and acquisition of equipment as well as hiring of consultants are made before signing the actual project implementation. This activity should be outside the effective project timeline
- Governments should be advised on new and innovative ways of funding water resources projects
- Countries need to develop the capacity to understand donor guidelines and procedures
- Africa need to go for more market based funding sources for transboundary IWRM projects. Basin organizations need to expand their funding sources taking into consideration the specific context and/or features of the L/RBOs
- The element of mentoring to retain capacity for sustainability is essential.
- Continual sensitization of policy makers and politicians to ensure political commitment to the organizations. For example basin organizations featuring in the national annual budgets of member states

## **Session 5: New and innovative technologies for water resources management**

The session on new and innovative technologies was presented by C.A. Biney, Executive Director, Volta Basin Authority and E. D.O. Ansa, Research Scientist, Water Research Institute, CSIR Ghana. The session was chaired by Loay Sief El Din, Nile Water Sector, MWRI, Egypt.

The use of real time innovative technologies for pollution monitoring has many advantages in that very accurate, reliable and multiple sets of data can be acquired in real time without the physical presence of the monitoring team on the river or lake. Pollution control technologies have benefits not only for man but also for the environment and the innovative ones make use of renewable sources of energy. The use of innovative technologies having renewable sources of energy supply as well as economic benefits is rapidly gaining acceptance worldwide. Technologies for real time monitoring of water bodies stands the risk of vandalization and theft by locals. The use of these technologies usually come with the challenge of high initial capital costs for investment and capacity development for its operation, maintenance and research for technology adaptation.

### **Challenges confronting research in IWRM**

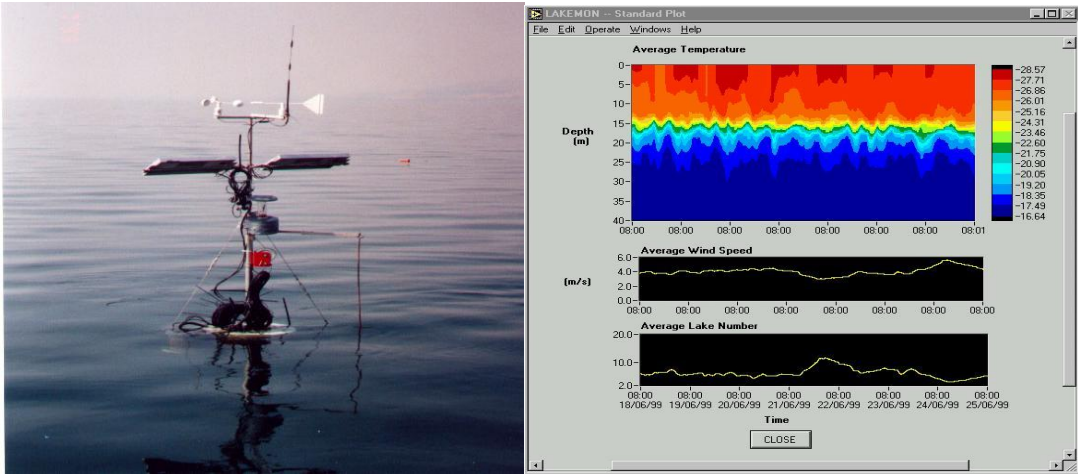
- IWRM takes place at various levels and at each level there must be knowledge acquisition
- Use of innovative technologies should go hand in hand with community education or knowledge transfer
- Comprehensive and quality data in various aspects of IWRM is needed to convince decision makers of the consequences of inaction
- Africa has low adaptive capacity to climate change and research is key in dealing with this issue
- Basin organizations and affiliates need to link up with research institutions and universities in addressing identified problems and objectives

## Key Messages & Action Plans

- A major portion of water abstraction from basins is used for agricultural purposes. Re-using wastewater would make available nutrient-rich water for agricultural purposes. In doing so, use should be made of eco-technologies that have great potential in Africa
- Use of real-time monitoring technologies should be adapted to local conditions and used as a complement to portable field technologies
- Strong linkages should be established between research and training of IWRM institutions and the need to strengthen capacity in these institutions
- The importance of political support cannot be over emphasized
- Research agenda should be made relevant as new financing schemes and options are explored
- There should be increased awareness on the importance of research and the need to allocate adequate financial resources to support such research for IWRM
- Replacement of staff on IWRM due for retirement is impeded by donor agency conditions that places ban on employment of new staff. Mentorship schemes for young staff in institutions is virtually non-existent and should be encouraged



Constructed wetland for removal of pollutants



Real time monitoring of water quality



Growing *Tilapia* in the Volta basin

**Appendix : List of participants**

<b>No.</b>	<b>Name</b>	<b>Designation/Affiliation</b>	<b>Country</b>
1.	ANDARGE, Mekuria T.	Acting Director, Strategic Planning and Management Nile Basin Organization	Uganda
2.	AMANI, Abou	Regional Hydrologist UNESCO Regional Office, Nairobi	Kenya
3.	KARURANGA, Dismas	Water Resources Expert Ministry of Natural Resources Kigali	Rwanda
4.	OWORE, Dan Odour	Regional Program Coordinator, Lake Victoria and Programs	Kenya
5.	KYOSINGIRA, Fred Wilson	Assistant Commissioner, Water Resources Monitoring & Assessment, Uganda	Uganda
6.	SAINE, Amadu	Permanent Secretary, Ministry of Water Resources , Banjul	The Gambia
7.	BINEY, Charles A.	Executive Director Volta Basin Authority	Burkina Faso
8.	GWAIKOLO, Saye Hilton	Technical Assistant to The Minister, Ministry Lands, Mines and Energy, Monrovia	Liberia
9.	ANSA, Ebenezer D. O.	Research Scientist, CSIR Water Research Institute Accra	Ghana

**List of participants (Continued)**

<b>No.</b>	<b>Name</b>	<b>Designation/Affiliation</b>	<b>Country</b>
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