

**GROUNDWATER NEED
ASSESSMENT
ORGANISATION FOR THE
DEVELOPMENT OF
SENEGAL RIVER BASIN
(OMVS)**

BY

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AGW-NET

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Acronyms

ABN		Autorité du Bassin du Niger
ANBO		African Network of Basin Organisations
AWF		African Water Facility
CB	-	Comité de Base
CCEG	-	Conférence des Chefs d'Etats et de Gouvernement
CCPD		Comité Consultatif des Partenaires au Développement
CNRE		Centre National des Ressources en Eau
CPE		Commission Permanente des Eaux
ECOWAS		Economic Commission for West African Sates
GEF project		Global Environmental Fund
GWP		Global Water Partnership
GWP/WA		Global Water Partnership/West Africa
INBO		International Network of Basin Organisations
I&TWRM		Integrated Transboundary Water Resources Management
IWRM		Integrated Water Resources Management
MDGs		Millennium Development Goals
OERS		Organisation des Etats Riverains du fleuve Sénégal
OMVG		Organisation de Mise en Valeur du fleuve Gambie
OMVS		Organisation de Mise en Valeur du fleuve Sénégal
RBO		River Basin Organisation
UN		United Nations
UNESCO		United Nations Educational Scientific and Cultural Organisation

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1. Introduction

The Senegal River basin is located in West Africa, between latitudes 10°30' and 17°30' N, and longitudes 7°30' and 16°30' W. The Senegal River is the second longest river of West Africa (length 1,800 km), and its main tributaries are the Bafing, Bakoye and Faleme Rivers, which have their sources in the Fouta Djallon Mountains (Guinea) or in Mali. The managing RBO is the Organisation for Senegal River Basin Development (Organisation pour la Mise en Valeur du Fleuve Sénégal – OMVS).

2. Objectives

The objective of the needs assessment survey is to assess the present framework, experiences, and capacity for groundwater management in Senegal River basin organisation and identify shortcomings for integrated groundwater management as part of integrated and transboundary water resources management (I&TWRM). Furthermore, the objective is to develop targeted and prioritized recommendations for enhancing the capacity of OMVS for integrated groundwater management in the basins, based on consultations with the RBO.

3. The basin and its water management

3.1. Bio-physical conditions

The Senegal River is mostly the northern boundary of Senegal, and its basin area is estimated to be about 289,000 km². It has three distinct parts: the upper basin, which is mountainous, the valley (itself divided into high, middle and lower) and the delta, which encounters a lot of sites of biological diversity and wetlands. The high plain in Northern Guinea covers 31,000 km² (11 % of the basin), 155,000 km² are localized in Western Mali (54 %), 75,500 km² in Southern Mauritania (26 %) and 27,500 km² in Northern Senegal (10 %). In terms of groundwater environment, the upper basin corresponds to basement rock aquifer, and the valley, as well as the delta, is the domain of sedimentary aquifers.

The river's flow regime depends mostly on rain that falls in the upper basin in Guinea (about 2,000 mm/year); in the valley and the delta, rainfall is usually below 500 mm/year. Three major divides characterize the climatic regime: a rainy season from June to September, a "cold" and dry season from October to February, and a hot and dry season from March to June. In terms of river flow, this climatic context has implications; high-waters period or flood stage takes place between July and October, and low-waters period between November and May - June.

The three main tributaries (Bafing, Bakoye and Faleme) ensure over 80 % of the Senegal River's flow. However the Bafing transfers half of the flow; mainly for this reason the Manantali dam (11.5 billion m³) is built on its course, while the second built dam "the Diama dam", is located 23 km from Saint Louis near the River mouth in the delta. At Bakel, which is the reference station on the Senegal River (due to its location below the last major tributary – Faleme-), the average annual discharge is about 690 m³/s; this rate corresponds to an annual input of around 22 billion m³.



Fig. 1. Senegal River Basin (Source: Prepared for the World Water Assessment Programme – WWAP- by AFDEC)

3.2. Socio-economic conditions

The population of the River basin is estimated to be around 3,500,000 inhabitants (2002), among them 85 % live near the river, within 25 km from the riverbank (/6/). They represent approximately 16 percent of the total populations of the OMVS member states (Mali, Mauritania and Senegal, included Guinea). The population growth within the basin is about 3 % per year; considering this rate, the population amount will be around 5 millions in 2012.

Agriculture is the dominant economic activity, followed by fisheries. Actually irrigated agriculture is still the driving activity of the basin development, particularly in the valley and in the delta areas. Diverse varieties of products are grown (rice, onions, tomatoes, potatoes, sweet potatoes) on about 100,000 hectares of land: 60,000 hectares during the rainy season (June-September) and 20,000 hectares during the dry season (March-June).

3.3. Hydro-geological conditions

The alluvial aquifer is the main shallow aquifer in the river basin. It extends roughly in valley and delta areas, and in all of the flood plain at various depths, with a groundwater level generally less than 2 m. Its mean thickness is about 25 m. These quaternary formations consist mainly of (/3/):

- clays and fine sands, which correspond to Post Nouakchottian deposits, and

- coarse or gravelly alluvium, and clayey sands corresponding to the Ogolian period or recent to mean Quaternary.

The alluvial groundwater covers the major bed of the River. On the valley and delta parts of the basin, alluvial aquifer is usually underlain by intermediate and deep aquifers, which are respectively:

- **Continental Terminal aquifer** made of sand and sandstone, and present in major parts of Senegal and Mauritania (Trarza aquifer that supplies Nouakchott); near the valley, it may be assimilated to the quaternary aquifer due to similar geological facies;
- **Eocene aquifer consisting** of calcareous and mainly of sandy formations in the valley, where it lays directly under quaternary formations, except in structural uplift area (upper valley) where it is absent;
- **Deep confined Maastrichtian aquifer** that extends in overall sedimentary basin shared by Mauritania and Senegal, as well as Gambia and Northern Guinea Bissau; its outcrop appears through structural uplift near Matam area in the upper part of the valley.

All these aquifers belong to the Senegalo-Mauretanic sedimentary basin, they are bearing groundwater with various extensions, spatially and stratigraphically as well. The deepest one is the Maastrichtian groundwater that extends nearly in all sedimentary basin excepted west of 17° parallel. It is not the case for the others, which extensions are limited spatially within the sedimentary basin.

Water level in the alluvial aquifer varies with the seasons and river level, along with the general hydrological regime in the valley. Piezometric measurements indicate that alluvial groundwater is alternately recharged and drained by the River.

The hydraulic relationship between these different aquifers is mainly appreciable and varies spatially. The exchanged volume between the river and the groundwater is estimated to about 330 millions m³/year, this assessment is based on data from 1989. However, this volume depends heavily on yearly water availability, and the impacts of River management on groundwater are primarily felt on the alluvial aquifer. The latter shows annual water level oscillations whose magnitude is a function of the distance to the River and the proximity of an irrigated field.

Groundwater level variation versus distance from river and irrigated areas in different localities (in /4/ , /1/)

	Yearly piezometric variation (m)				
	Dagana	Podor	Kaedi	Matam	Selibabi
Far from irrigated fields and water course	0.2 - 0.3	0.5 - 0.8	0.2 - 0.5	0.5 - 1.2	0.4 - 1.0
Near water course	1.0	0.8 - 1.85	0.6 - 2.5	1.6 - 3.0	
In irrigated fields	1.9	0.8 - 1.5	1 - 2		1.0
In irrigated fields and near water course		1.5 - 2.0	2.7		3.0

3.3.1. Transboundary aquifers

When considering transboundary aquifers that may interact with the Senegal River basin, two have emerged, which lay in the Senegalo-Mauritanian sedimentary basin. This latter extend from Guinea Bissau in the south to Mauritania in the north through the Gambia.

The deep and confined Maastrichtian aquifer contains considerable groundwater resources. It stretches over nearly 200,000 km² in the Senegalo-Mauritanian basin, from the northern part of Mauritania to the South of Guinea Bissau where it becomes shallow. The reservoir is composed mainly of coarse sands and sandstone interbedded with some clay units. The aquifer provides 40 % of the total drinking water extracted in Senegal and is tapped by more than 1,000 boreholes in this country, while in Mauritania it is salty and not used.

The second groundwater, that can be considered as transboundary, is the alluvial one contained within the river basin. Its bearing layers are quaternary formations consisting of clays and fine sands, or coarse or gravelly alluvium interbedded with clayey sand. The alluvial aquifer ensures rural water supply through individual dug-wells; it is reported that some secondary towns (like Bakel, left bank) located near the river bank are using this groundwater for their domestic needs through drilled wells. Its main features are already described above.

3.4. Water governance framework

The Organization for the Development of the Senegal River (Organisation pour la Mise en Valeur du fleuve Sénégal - OMVS) is a river basin organization with a mandate to manage and develop Senegal River basin resources. It was established about three decades ago by three out of the four riparian states (Mali, Mauritania and Senegal). Major stages that have dominated the establishment of OMVS are (/10/):

- On July 25, 1963, very soon after independence, Guinea, Mali, Mauritania and Senegal signed the Bamako Convention for the Development of the Senegal River Basin. An 'Interstate Committee' was created to oversee its development.
- On May 26, 1968, the Labé (Guinea) Convention created the Organization of Riparian States of the Senegal River (OERS,) to replace the Interstate Committee;
- After Guinea withdrew (January 1967) from the OERS, Mali, Mauritania and Senegal decided, in 1972, to establish the OMVS, which pursues the same objectives.

Since then the main conventions or legal treaties governing OMVS can be summarized as followed:

- The Convention related to the status of the Senegal River (March 1972). The Senegal River and its tributaries were declared an 'International Watercourse', guaranteeing freedom of navigation and the equitable water access for users;
- The Convention creating the OMVS (11 March 1972);
- The Convention related to the Legal Status of Commonly-owned Infrastructures (December 1978), supplemented by the Convention concerning the Financing of Commonly Owned Infrastructures (March 1982).
- The Senegal River Water Charter (May 2002) that set the principles and procedures for :
 - allocating water between the various use sectors,
 - acceptance of new water use projects
 - environmental preservation and protection
 - water user participation in decision-making processes.

The diagram below inserted show an overview of the various constituencies of OMVS and their interlinkages, their role/function can be stretched as followed:

- The Conference of Heads of States and Governments (CCEG) is the Organization's supreme body that defines the development and cooperation policy. Unanimity is the rule of the Conference.
- The Council of Ministers is the concept and control body. It elaborates the overall policy on resources development and cooperation between riparian States. It receives support from consultative bodies like:
 - Basin Committee (CB) that gathers river basin stakeholders;
 - Consultative Committee of Development Partners (CCPD) where government, financing institutions and OMVS are represented;
 - Permanent Water Commission (CPE) that is in charge with defining the principles and modalities for allocating water resources among water use sectors, it receives, studies and submits proposals for allocation; high level member countries' representatives attend its meetings.
- The High Commission is the Executive body, with HQ located in Dakar (Senegal). It is in charge with the implementation of the Council of Ministers' decisions; it has permanent staff (technical and administrative) that manages the day-to-day activities, as long as advisory committee to deal with finding out the ways and means of implementing OMVS programme, particularly in mobilization of financial and human resources. Its functioning budget is supported by member countries.

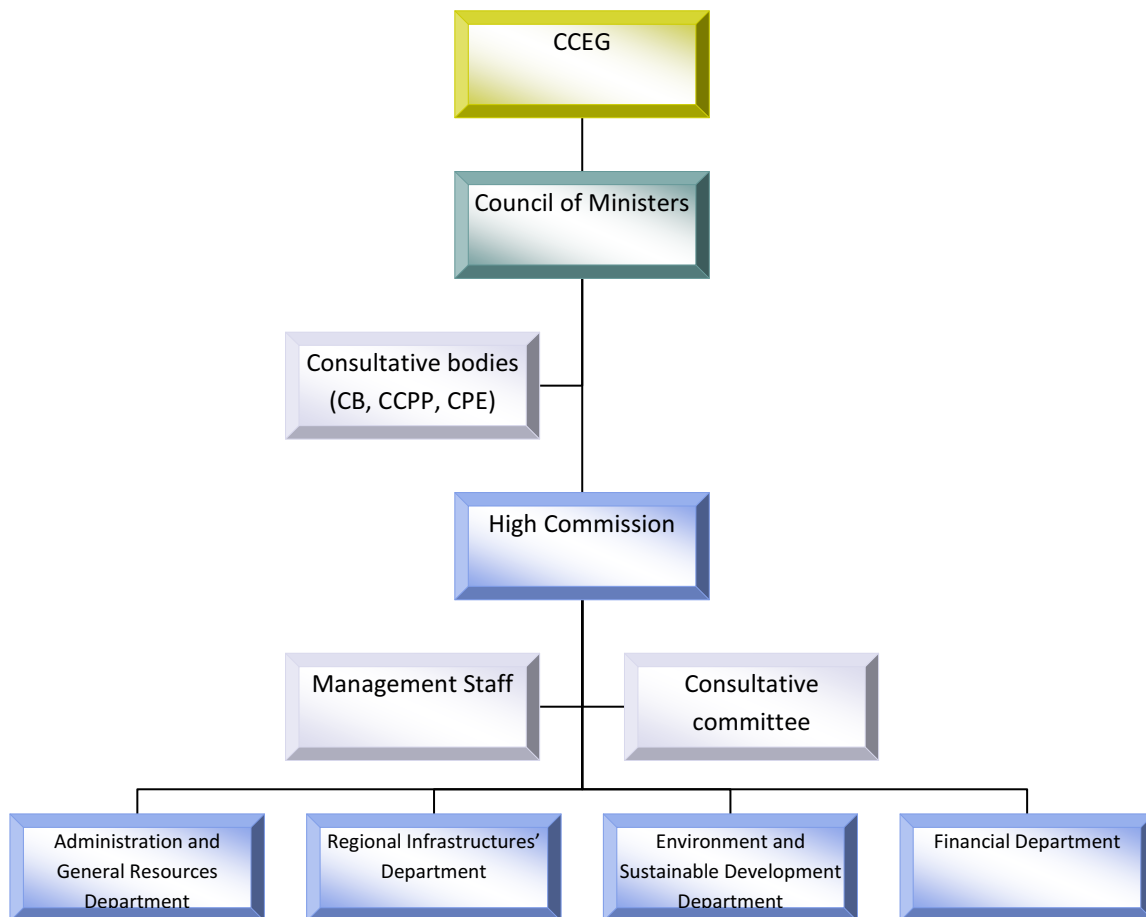


Fig. 2. Diagram of OMVS organisation (source: OMVS)

This organizational and governance framework is supplemented in each member state by OMVS National Unit (Cellule Nationale OMVS), which plays the role of interface between national departments and the basin organisation. Usually its national coordinators are high level staffs who provide national Water Ministers with technical advises, and compose the

Permanent Water Commission. They are permanent bodies funded by states with the financial support of OMVS.

4. Interviews

The process that is steering this survey is to carry out a desktop study, which outcome is to achieve a basin profile describing main groundwater conditions and physico-hydrological feature of the Senegal River basin. After then a survey, involving face-to-face interviews with core personnel of OMVS headquarters in Dakar was done, as well as telephone interview with country representatives or focal points, and senior government hydrogeologists in Guinea, Mali, Mauritania and Senegal.

Table 1. People who have been interviewed

No.	Title	Name	Position	Interview schedule ^a	Representation/ organisation	Email	Telephone
1	Mr	Tamsir Ndiaye	Head of Environment and Sustainable Development Department (DEDD)	1	OMVS HQ	ndiayetamsir2002@yahoo.fr	+221774500520
2	Mr	Cheikh Taliby Sylla	Director of Administration and General Resources	1	OMVS HQ	cheikhtaliby@yahoo.fr	+221774924014
3	Mr	Malang Diatta	Water resources management Expert,	1	OMVS HQ	diattamalang@live.fr	+221775362827
4	Mr	Fadel Ould Saad Bouh	Water resources Expert	2	OMVS National Unit in Mauritania	fadelsb56@yahoo.fr	+22022622156
5	Mr	Lamine Diop	Water resources management Expert	3	OMVS National Unit in Senegal	iseld2004@yahoo.fr	+221772204744
6	Mr	Abraham Sogoba	Rural development expert	2	National focal point in Mali	abrasogoba@yahoo.fr	+22376603718
7	Mr	Assane Gaye	Senior Hydrogeologist	2	Groundwater focal point in Mauritania	ass2005gaye@yahoo.fr	+22246716862
8	Mr	Alpha Tougué Diallo	Senior Hydrogeologist	2	Head of Studies and Planning Division, SNAPE - Guinea	pnaepa2015@hotmail.com	+22464383781

^a 1. OMVS HQ, 2. By telephone; 3. OMVS National Unit in Senegal

5. SWOT analysis

5.1. Groundwater Governance

OMVS is a river basin organisation gathering 4 countries (Guinea, Mali, Mauritania and Senegal), which has mandate to promote the coordinated development of the Senegal River basin resources. Groundwater is among these resources, to be developed sustainably. Among tasks assigned to OMVS, inserted in the Waters Charter, groundwater occupies a relevant place. In fact, it was specified that groundwater mapping, recharge assessment, surface and ground waters interactions should be achieved (Art 17).

The structural governance design encounters an executive body (High Commission) that has permanent staff, so it is the case for OMVS national units that bring together representatives of Ministries, civil society involved in or affected by water management. One of the most

relevant advisory bodies to OMVS is the Permanent Water Commission, which is composed of senior experts representing States members; it allocates river water with respect to water sectors needs (not country demand).

Various instruments or schemes are commonly used in river water resources management and planning. However, groundwater is not fully considered, except for monitoring activities, which so far rely on States burden. Efforts are made by OMVS to support national States Departments to sustain activities, and on the same line a minimum piezometric network is tested by telemetric data measurement.

Moreover, there's no specialized working group or groundwater management board to foster groundwater management in the governing structure, on the other hand monitoring activities are enhanced through OMVS national Units, even though there are disparities among States in groundwater interest as well.

5.1.1. Strengths

OMVS member States recognise that the portion of their territory located in the Senegal Basin is governed primarily by OMVS conventions when it comes to water resources management. Then the scope of OMVS mission encompasses shared groundwater resources, among them the alluvial quaternary aquifer.

The process of decision making in OMVS is by consensus which means that States are committed to implement actions once an agreement is reached

Mandate as well the 2002 waters charter address groundwater explicitly (Art. 17)

OMVS has permanent staff at its HQ located in Dakar, along with a permanent body (OMVS national Unit) with equipped staff in each country that can foster collaboration between States department and River basin organisation, or between States institutions in charge with water resources

OMVS has long standing experience of implementing and operating joint infrastructure and programme on the ground.

5.1.2. Weaknesses

It is lacking a specialised board/group in the structural governance body that highlights groundwater aspects, and push forward for better integration into RBO and member countries priorities

There are disparities in groundwater challenges and context as well as groundwater development and management, which may result in disparities in individual interest of States on groundwater. For instance, Senegal and Mauritania may be more interested in sedimentary aquifer that they share in the valley and the delta as well, letting behind Guinea or Mali that would be focussing on surface water.

There's an interest expressed by 2002 waters charter, to address groundwater resources. But this commitment, ratified by high level authorities of members countries, is not fully translated into operational management actions

5.1.3. Opportunities

All these countries are engaged in poverty alleviation and water supply programme to meet or catch up with MDGs; since groundwater is major source of drinking water particularly in rural areas, OMVS is the right framework to enhance cooperation on the basin groundwater resources covering area where near 5 million of people rely mainly on these resources

Countries members have qualified hydrogeologists in their national departments, as well as in research and training institutions.

Regional IWRM framework is available for regional cooperation through ECOWAS or GWP/WA, as well as at continent level with ANBO and AMCOW.

5.1.4. Threats

Lack of financial resources if we consider huge on-going programme on hydropower infrastructures

Uncertainties and lack of knowledge on groundwater resources maintain river basin organisation priorities toward more visible and “known” surface water resources

5.2. Society/collaboration/inclusion

Currently knowledge on groundwater – surface interactions is limited to more or less qualitative assessment of the process, in locally defined areas. In delta area, the driving process of groundwater level change is not well understood, whether it is due to River or irrigation water, the issue is not clearly assessed. So far the transboundary aquifer process is not yet fully on board in the River basin management process.

The main constraint is the deficit of knowledge. Despite the implementation of hundreds of observation wells that were monitored from 1987 to 1990. Unfortunately, after these years monitoring activities were not regularly pursued by respective States. OMVS is assisting national department in charge with water resources in sustainable data collection programme. Data sharing mechanism adopted is involving all actors in different national institutions dealing with river basin resources. To that end, thematic groundwater focal points are collaborating with OMVS national water units as driving actors for the data sharing process.

The weak point of the overall process is the lack of capacity (human, financial) to maintain activities sustainability. Other relevant point is the deficit of staff with hydrogeological background in the RBO executive body. Fortunately, OMVS is taking advantage of local expertise available in the four countries members.

5.2.1. Strengths

Institutional bodies that foster collaboration and information/data exchange are already in place. The GEF/BSF project (Water resources and Environment management project) that aims to set up a strategic and participative framework has strengthened knowledge/information sharing within the basin. The participative dynamic acquired may be used to foster groundwater awareness (/1/)

Experience gained on surface water collaboration for years, may serve for sustainable use of transboundary groundwater; the PGIRE programme (Integrated water resources management and multi-purpose usages development programme) is an operational programme that aims to implement on-the-ground actions to enhance resources development for the benefit of local population (/1/).

5.2.2. Weaknesses

The concept of transboundary aquifer is not well perceived or acknowledged by river basin stakeholders (politically and socially) as a 'cross-border' issue, since groundwater aspects seem to be handled as a technical issue

5.2.3. Opportunities

OMVS has experienced long term international partnership with river basins networks (ANBO, INBO) and other international institutions (UNESCO, GWP, bilateral/multilateral cooperation), with active participation and a leadership role. This can be seen as an opportunity for experience exchange, and for bilateral/multilateral cooperation to meet financial capacity

At regional scale, ECOWAS has set up IWRM framework, considering transboundary water governance, supporting IWRM process in the basins, and advancing in regional integration within the water sector; more recently GWP/WA has initiated a regional project on dialogue for concerted groundwater management (including transboundary aquifer).

There's a presence of research institutions with outstanding expertise on (ground)water that has carried out studies related to Senegal River basin (for instance Geography and Geology departments of Dakar University, Gaston Berger University in Saint Louis)

5.2.4. Threats

Lack of common interest of member states on groundwater resources, and disparities on commitment toward joint (ground)water resources management

The sustainability of the current mechanism of data/information collecting/sharing framework may be threaten by decreasing motivation of thematic (groundwater) focal points, it seems like focal points do not perceive "interest" in this activity.

5.3. Science/data/capacity building

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5.3.1. Strengths

Mechanism of data sharing is well implemented within the river basin structure, and has a participative character since it involves all representatives of national structures in charge with water resources.

Piezometric monitoring network already exists in at least 3 member countries, which may provide database with reliable data. Telemetric tools are tested now to collect groundwater data; it is expected to get regular and continuous information for better understanding of hydraulic process

A long surface water level record exists that eases interdependency survey with connected groundwater

5.3.2. Weaknesses

There is a lack of sufficient human capacity with a background in hydrogeology in executive body that may sustains advocacy of more consideration to be given to groundwater

Monitoring activities are irregular; in fact they become a burden for national departments in charge with water resources. Hence one can notice an absence of long term background data on groundwater-related information, which is indispensable for informed decisions.

Piezometric network design was not based on groundwater management purpose, but relies on specific purpose, for instance impacts of the two dams or impacts of irrigated agriculture on groundwater level/salinity

5.3.3. Opportunities

There's interest expressed by RBO authorities to get more understanding on river-groundwater interactions

Diagnostic survey has been carried out and has given an exhaustive inventory of existing piezometers. An "optimal" network was proposed for sustainable monitoring programme in Mali, Mauritania, and Senegal (Guinea does not encounter piezometric network in its part of the basin).

There are a lot of scattered surveys on the alluvial aquifer, either in the left bank (Senegal) or in the right bank (Mauritania) where groundwater contained in bearing quaternary formations is mainly used; the upper basin also needs to be explored as well

5.3.4. Threats

Vandalism of hydraulic infrastructures like piezometers is persistent, this may be a result of lack of stakeholders participation and awareness; it is noticed that development of irrigated fields impedes, in many cases, access to some observation wells.

Lack of human and financial capacity and prioritisation of available resources that target primarily jointed hydraulic infrastructures.

6. Conclusions

Groundwater management is not in fact fully considered in OMVS. So far attempts that are made by the RBO are focusing mostly on monitoring activities. In fact transboundary groundwater management within OMVS framework is still a challenge. The process of integrating aquifer management into OMVS institutional/legal framework should be at this stage limited to alluvial groundwater shared by member states. Extension to Senegalo-Mauritanian basin seems to be not viable, since this basin is bearing several separated groundwater units (in Guinea Bissau, Gambia, Senegal and Mauritania), only two of them are really transboundary ones. Beyond the difficulties of merging aquifer management framework and RBO management framework, the major obstacle lies on the differences of interest with regard to availability of groundwater resources. The confined maastrichtian groundwater is the most used one in Senegal for domestic purposes, in Mauritania it is not used at all due to poor quality. So its integration to the scope of OMVS, may not interest all member states; it will be a challenge (organisational and institutional) to find out a collaborative framework between OMVS and OMVG to include this aquifer.

7. Recommendations

7.1. Groundwater Governance

It is necessary to institutionalize groundwater management within existing RBO framework; first step will be to make “visible” groundwater resources through a working group/board composed of experts (e.g. focal points, individuals, development partners), which main tasks should be to develop awareness, interest, as well as political motivation on groundwater resources (promotion of UN resolution ratification), and to scale up from national management (of alluvial aquifer) to transboundary management via OMVS. To that end, the working group/board should be stated as a sub-commission in the Permanent Water Commission and the Water Charter needs, in terms, to be amended to include aquifer management.

Since the IWRM process is not fully completed in member countries, OMVS may take the leadership in implementing IWRM concepts through a strategic framework that includes (alluvial) aquifer management into its (real) scope; the Permanent Water Commission’ mission (bearing in mind its sub-commission) should in terms, extend to regulatory measures (e.g. allocation for large abstraction) for groundwater management and protection

To extend aquifer management to the Senegalo-Mauritanian sedimentary basin, an institutional “bridge” needs to be found between OMVS and OMVG (Gambia RBO), in order to include shared aquifers in a same management framework.

When negotiating project funding of common infrastructures, OMVS may include as a whole package fund for monitoring impacts on groundwater; this may be a strategy to overcome financial constraints.

7.2. Society/collaboration/inclusion

It appears necessary to hold basin stakeholders forum especially on groundwater that aims to increase member states commitment and awareness of basin actors on groundwater as a “cross-border” issue. The outcomes should be a global diagnostic of existing and expected collaboration/partnership, at local/national/regional level to foster transboundary groundwater management within OMVS framework. The groundwater group/board may be the main actor to “selling” groundwater use benefits in water supply, small irrigation, in ecosystem preservation, in biodiversity sustainability, and in climate change adaptation strategy (aquifer as a buffer).

In the same line it is a need to adopt more inclusive approach to revive collaboration with research institutions in OMVS countries for middle and long terms studies objectives; the idea is get a partnership between OMVS, research and training national institutions, and donors through bilateral/multilateral cooperation, which objective would be to settle effective involvement in knowledge

7.3. Science/data/capacity building

Set up a multi-purpose programme (with groundwater group/board as leading actor) on groundwater funded through bi/multilateral cooperation (e.g. AWF) that takes into account below listed items:

- Inventory survey of on-going studies or already completed ones with respect to groundwater and surface water within the river basin, the aim is to get an overview on what was done and what needs to be done. The scope of this survey should encompass all States members
- a conceptual model of the whole transboundary aquifer should be a sound River basin objective for providing information base that supports development of resources within the basin
- monitoring of an “optimal” designed network jointly monitored with the participation of representatives of national water management structures; acquired groundwater data should be processed and disseminated and/or available to all actors
- Development of capacity building activities on groundwater management within river basin (workshops, courses, institutionalized training with universities/high schools collaboration)
- Implementation of agreed (institutional and organisational) framework to include alluvial aquifer management into the River basin management framework.

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<http://www.ssoar.info/ssoar/files/usbkoeln/2009/774/studie%2032.pdf>

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/9/ Tandia, M., 1996. Analyse piézométrique et caractérisation hydrodynamique et hydrochimique de la nappe alluviale de la Moyenne Vallée du Fleuve Sénégal (Rive droite). Mém. de DEA. Dépt. Géologie, Faculté des Sciences et Techniques, Université Cheikh Anta Diop de Dakar. 88 pp + annexes.

/10/ World Water Assessment Programme : case study Senegal river basin, year??

http://www.unesco.org/water/wwap/case_studies/senegal_river/senegal_river.pdf

Appendix 1. Table of basic data for the L/R/ABO

River Basin	Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS)									
Major tributaries	The Bafing, Bakoye, and Faleme Rivers contribute 80% of the river's flow , Karakoro River, Gorgol River									
Riparian states	1. Guinea 2. Mali 3. Mauritania 4. Senegal									
Upstream riparian states	Guinea, Mali									
Downstream riparian states	Mauritania, Senegal									
Total basin area (km ²)	300,000									
Mean annual runoff (mill. M ³ /year)	22,000									
Total population (mill.)	Around 5.0									
Riparian state	Share (%) of basin area	Share (%) of population	Mean annual runoff (million M ³ /year)	Average rainfall in riparian basin part (mm/yr)	Primary land uses/cover in basin part	Primary water uses in basin part	Major cities in basin part (Mill. pop.)	Protected areas, national parks in basin part	Major water transfer schemes between states	Transboundary conflicts over rivers
1.Guinea	11	-	Not available	1475	agriculture	agriculture	Labé		Not registered	
2.Mali	53	-	Not available	855	agriculture	Agriculture hydropower	Kayes Kita	Bafing fauna Reserve	Not registered	
3.Mauritania	26	-	Not available	270	agriculture	agriculture	Kaedi Bogué Sélibabi	Diawling National Park (Ramsar), Chat Boul reserve	Not registered	1989 and 2000 (Fossil valley project)

Appendix 1. Table of basic data for the L/R/ABO

							Rosso	(Ramsar),		
4.Senegal	10	-	Not available	520	agriculture	Agriculture fishing	Saint Louis Matam Dagana Podor Bakel Richard-Toll	Djoudj National Park (Ramsar), Ndiaël and Gueumbeul special fauna reserves (Ramsar), Langue de Barbarie National Park	Not registered	1989 and 2000 (Fossil valley project)
Year of formal recognition of Basin Org.	1972									
Primary mandate of Basin Org.	Optimal and sustainable management of river basin resources									
Type of Org.	<u>X Lake/River Basin Commission</u> <u>Technical Committee</u> <u>Lake/River Basin Authority</u>									
Name of treaties or legally recognized agreements governing water mgt. in the basin	<p>1. The Convention creating the OMVS (11 March 1972) Between (states): Mali, Mauritania and Senegal</p> <p>2. The Convention concerning the status of the Senegal River (11 March 1972) Between (states): Mali, Mauritania and Senegal</p> <p>3. The Convention concerning the Legal Status of Jointly-owned Structures (12 December 1978) Between (states): Mali, Mauritania and Senegal</p> <p>4. The Convention concerning the Financing of Jointly Owned Structures (12 March 1982) Between (states): Mali, Mauritania and Senegal</p> <p>5. Framework cooperation agreement (in 1992) Between (states): Guinea and the OMVS</p> <p>6. The Senegal River Water Charter (May 2002) Between (states): Mali, Mauritania and Senegal (and Guinea, which jointed the basin organisation recently)</p>									

Appendix 2. Transcripts of interviews

Reply from OMVS HQ

Questionnaire for which L/RBO: **OMVS**

Name: **Cheikh Taliby SYLLA**

Institution (if different from L/RBO): _____

Function - please let us know your job title, role and main responsibilities:

Title: **Director of Administration and General Resources**

Role and responsibilities:

Administrative and logistics management

How many years in present position: **1 year**

Background education: **administration**

Country: **Guinea**

E-mail address: **cheikhtaliby@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+221 77 492 40 14**

Date of Interview: **October 18, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: **Dakar**

Or if done by telephone: _____

Questions:

1. Governance:

a. What is the principal and legal role/mandate of your L/RBO wrt. **groundwater**:

i. To allocate GW: Yes **X** No

ii. To oversee GW mgt.: Yes **X** No

iii. To monitor TBAs in basin: Yes **X** No

iv. To advise riparian states on issues related to GW: Yes **X** No

v. To implement joint GW development projects: Yes **X** No

Appendix 2. Transcripts of interviews

vi. Other. Specify:

- b. Does your L/RBO have a staffed permanent Secretariat? Yes No
- c. Does the constitution/agreement establishing your L/RBO specifically/explicitly address GW and groundwater issues? Yes No
- d. If yes, how?

Somewhere, in OMVS charter it is mentioned that OMVS mission is to manage River basin resources

- e. Which water management instruments/schemes do you use? (e.g. management plans, action programs, monitoring and information systems, etc.)

Diverse instruments or schemes are used by OMVS

- f. To what extent is groundwater already considered in your water management structure and what actions/initiatives/programmes are you using to foster groundwater management within your organisation? (e.g. groundwater working group at ORASECOM)

The environment observatory was set up, which objective is to monitor environmental changes (included groundwater change)

- g. Do you collaborate with organisations/programmes/institutes/projects that have a groundwater component? (African networks, policy decision makers (e.g. AU, AMCOW, AGWC, etc.) and international donors)

Yes, OMVS provides the secretariat of African River Basins Network (ANBO)

- h. Are you aware of the AMCOW work plan? Yes No

Maybe in INBO, I am not aware

- i. If yes: Are there any activities you have taken on board due to the AMCOW work plan?

- j. Do you know about the existence of the UN resolution on transboundary aquifers? Yes No

Comments:

Appendix 2. Transcripts of interviews

2. Society/collaboration/inclusion:

- a. What are the major uses of groundwater within the basin?

- b. What are the main water challenges your basin/lake is confronted with? (e.g. groundwater pollution, (ground-) water shortage, institutional, etc.)

- c. Are there great disparities between the water conditions and challenges in the riparian states?

- d. Also in the level of groundwater development and management?

- e. How is the exchange of knowledge/data and cooperation between the L/RBO and the riparian states' water mgt. structures?

The cooperation is satisfactory

- f. Do you find the commitment of the riparian states to include GW on the political agenda sufficient? Yes No

- g. Does this influence your functionality?

- h. What are you doing to strengthen the participation of the riparian states? (e.g. are formal structures, like stakeholder forums, in place with clear roles and responsibilities in water resources management and in the decision making process, are regular meetings taking place, etc.)?

Appendix 2. Transcripts of interviews

- i. Do you exchange knowledge, experience with other L/RBOs? Yes No
- j. If yes, which?

OMVG, ABN

3. Science/data/capacity building:

- a. Is there a good understanding to which extent groundwater-surface water interaction determines water balance and water quality in your basin and across riparian territories? Yes No

Comments:

- b. Where are you in the process of managing TBAs (also fill in Table 3 for individual TBAs)?
 - i. Identification
 - ii. Delineation
 - iii. Diagnosis
 - iv. Conceptual/numerical model
 - v. Allocation principles
 - vi. Implementation of joint infrastructure projects
- c. Which data, if any, do you collect related to groundwater in the basin?

- d. What data bases, information portals, and monitoring networks exist in your organization, where groundwater is (or could simply be) added?

Appendix 2. Transcripts of interviews

- e. What is the process/mechanism for data sharing with the riparian states' national groundwater dept.?

- f. How many hydrogeologists, or staff with hydrogeological background, are working in your organization? Are all allocated posts filled?

- g. Do you find your present capacity (in terms of human and financial resources) sufficient to address groundwater management appropriately? Yes No

- h. How is prioritisation made in your organisation to meet the limited resources (e.g. human, financial, technical resources)?

- i. What capacity building on groundwater is ongoing or planned?

- j. What in particular is lacking regarding capacity on GW management

Appendix 2. Transcripts of interviews

Reply from OMVS HQ

Questionnaire for which L/RBO: **OMVS**

Name: **Malang DIATTA**

Institution (if different from L/RBO): _____

Function - please let us know your job title, role and main responsibilities:

Title: **Water resources management Expert**

Role and responsibilities:

In charge with the secretariat of the Permanent Water Commission that allocate water resources

How many years in present position:

1 year, I was for 10years Head of Water resources management division

Background education: **Rural Infrastructures Engineer, water resources management specialist**

Country: **Senegal**

E-mail address: diattamalang@live.fr

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+221 77 536 28 27**

Date of Interview: **October 21, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: **Dakar**

Or if done by telephone: _____

Questions:

1. Governance:

a. What is the principal and legal role/mandate of your L/RBO wrt. groundwater:

- i. To allocate GW: Yes No
- ii. To oversee GW mgt.: Yes No
- iii. To monitor TBAs in basin: Yes **X** No

Appendix 2. Transcripts of interviews

- iv. To advise riparian states on issues related to GW: Yes No
- v. To implement joint GW development projects: Yes No
- vi. Other. Specify: ***After the two dams implementation, a project was funded to observe impacts of these infrastructures on alluvial groundwater in the delta area***

- b. Does your L/RBO have a staffed permanent Secretariat? Yes No
- c. Does the constitution/agreement establishing your L/RBO specifically/explicitly address GW and groundwater issues? Yes No
- d. If yes, how?

- e. Which water management instruments/schemes do you use? (e.g. management plans, action programs, monitoring and information systems, etc.)

For groundwater resources, a monitoring system is used

- f. To what extent is groundwater already considered in your water management structure and what actions/initiatives/programmes are you using to foster groundwater management within your organisation? (e.g. groundwater working group at ORASECOM)

OMVS national units play the role of interface between the basin organisation and national administration. They organise every year in each country workshop that aims to collect thematic data in the river basin (included groundwater data). Beside that OMVS has set up minimum observation wells network (as a pilot project) to monitor groundwater level by telemetry

- g. Do you collaborate with organisations/programmes/institutes/projects that have a groundwater component? (African networks, policy decision makers (e.g. AU, AMCOW, AGWC, etc.) and international donors)

No

- h. Are you aware of the AMCOW work plan? Yes No

Maybe in the framework of INBO, I am not aware

- i. If yes: Are there any activities you have taken on board due to the AMCOW work plan?

Appendix 2. Transcripts of interviews

- j. Do you know about the existence of the UN resolution on transboundary aquifers?
Yes No

Comments:

2. Society/collaboration/inclusion:

- a. What are the major uses of groundwater within the basin?

Domestic use (that's not in OMVS mission, however OMVS has funded drinking water supply utilities to countries members)

- b. What are the main water challenges your basin/lake is confronted with? (e.g. groundwater pollution, (ground-) water shortage, institutional, etc.)

Pollution by irrigation water, by pesticides used in agriculture activities

- c. Are there great disparities between the water conditions and challenges in the riparian states?

In the upper basin (Guinea and Mali) the occurring aquifer formations are mainly crystalline basement rock, in the valley and delta (Mauritania and Senegal) they are rather sedimentary. In the delta groundwater is not used because of poor quality (salty water), whereas in basement area boreholes with manual pump supply domestic demand

- d. Also in the level of groundwater development and management?

In Guinea for instance there's no piezometric network, there is also disparities in groundwater data availabilities

- e. How is the exchange of knowledge/data and cooperation between the L/RBO and the riparian states' water mgt. structures?

The present framework is correctly functioning, every year workshops are held in countries members to get data

- f. Do you find the commitment of the riparian states to include GW on the political agenda sufficient? Yes No

Groundwater is far behind in basin organisation activities. A network of more than 500 piezometers was implemented in late 80s, after then they were handed over to respective states. But monitoring was not sufficiently carried out

- g. Does this influence your functionality?

Sure, there's lack of knowledge on groundwater

- h. What are you doing to strengthen the participation of the riparian states? (e.g. are formal structures, like stakeholder forums, in place with clear roles and responsibilities in water resources management and in the decision making process, are regular meetings taking place, etc.)?

Appendix 2. Transcripts of interviews

MoU has been signed with national structures in charge with water resources management to get data available for OMVS; it helps them to get capacity for data monitoring

- i. Do you exchange knowledge, experience with other L/RBOs? Yes No
- j. If yes, which?

L/RBOs members of INBO

3. Science/data/capacity building:

- a. Is there a good understanding to which extent groundwater-surface water interaction determines water balance and water quality in your basin and across riparian territories? Yes No

Comments:

Monitoring activities are carried out, data are assessed but so far the quantification of surface / groundwater interaction is lacking

- b. Where you are in the process of managing TBAs (also fill in Table 3 for individual TBAs)?
 - i. Identification
 - ii. Delineation
 - iii. Diagnosis
 - iv. Conceptual/numerical model
 - v. Allocation principles
 - vi. Implementation of joint infrastructure projects
- c. Which data, if any, do you collect related to groundwater in the basin?

Static level, EC

- d. What data bases, information portals, and monitoring networks exist in your organization, where groundwater is (or could simply be) added?

Data base acquired in late 80' on groundwater are lost after project ended

Web portals exist but groundwater data are not published

- e. What is the process/mechanism for data sharing with the riparian states' national groundwater dept.?

Annual workshops are held each year in countries

- f. How many hydrogeologists, or staff with hydrogeological background, are working in your organization? Are all allocated posts filled?

As I know, there may be 2 or 3

Appendix 2. Transcripts of interviews

- g. Do you find your present capacity (in terms of human and financial resources) sufficient to address groundwater management appropriately? Yes No
- h. How is prioritisation made in your organisation to meet the limited resources (e.g. human, financial, technical resources)?

The way human resources are used may not be appropriate

- i. What capacity building on groundwater is ongoing or planned?

Don't have information on this

- j. What in particular is lacking regarding capacity on GW management

Human and financial resources to monitor basin resources

Appendix 2. Transcripts of interviews

Reply from OMVS HQ

Questionnaire for which L/RBO: **OMVS**

Name: **Tamsir NDIAYE**

Institution (if different from L/RBO): _____

Function - please let us know your job title, role and main responsibilities:

Title: **Director**

Role and responsibilities:

Head of Environment and Sustainable Development Department (DEDD)

Former Head of Environmental observatory

How many years in present position: **12 years**

Background education: **Geology Engineering, Master in environmental sciences**

Country: **Senegal**

E-mail address: **ndiayetamsir2002@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+221 77 450 05 20**

Date of Interview: **October 28, 2011**

Interview performed by: **Moustapha DIENE – AGW-Net**

Place of interview: **Dakar**

Or if done by telephone: _____

Questions:

1. Governance:

a. What is the principal and legal role/mandate of your L/RBO **wrt. groundwater**:

i. To allocate GW: Yes No

ii. To oversee GW mgt.: Yes No

Appendix 2. Transcripts of interviews

- iii. To monitor TBAs in basin: Yes No
 - iv. To advise riparian states on issues related to GW: Yes No
 - v. To implement joint GW development projects: Yes No
 - vi. Other. Specify: **Management of river basin resources (surface water and groundwater)**
-

- b. Does your L/RBO have a staffed permanent Secretariat? Yes No
- c. Does the constitution/agreement establishing your L/RBO specifically/explicitly address GW and groundwater issues? Yes No
- d. If yes, how?

OMVS charter specifies groundwater resources mapping, recharge assessment and surface water / groundwater interaction as tasks to be completed

- e. Which water management instruments/schemes do you use? (e.g. management plans, action programs, monitoring and information systems, etc.)

Various instruments or schemes (about 15) are used: management plans, planning instrument, monitoring and information systems...

- f. To what extent is groundwater already considered in your water management structure and what actions/initiatives/programmes are you using to foster groundwater management within your organisation? (e.g. groundwater working group at ORASECOM)

So far groundwater is not explicitly considered in water management structure because impacts of surface / groundwater interactions on water management are not well known. Knowledge on basin aquifers is lacking, OMVS is interested in pollution risks assessment

- g. Do you collaborate with organisations/programmes/institutes/projects that have a groundwater component? (African networks, policy decision makers (e.g. AU, AMCOW, AGWC, etc.) and international donors)

Yes, OMVS is ensuring secretariat of African River Basins Network. OMVS collaborates with UNESCO, BGR (?), GWP...

- h. Are you aware of the AMCOW work plan? Yes No
- i. If yes: Are there any activities you have taken on board due to the AMCOW work plan?

In the framework of African River Basins Network we are working on shared water aspects.

- j. Do you know about the existence of the UN resolution on transboundary aquifers? Yes No

Comments:

During some international event that I attended, I did hear about it

Appendix 2. Transcripts of interviews

2. Society/collaboration/inclusion:

- a. What are the major uses of groundwater within the basin?

Domestic use

- b. What are the main water challenges your basin/lake is confronted with? (e.g. groundwater pollution, (ground-) water shortage, institutional, etc.)

Salinity of alluvial aquifer, access to groundwater

- c. Are there great disparities between the water conditions and challenges in the riparian states?

Knowledge is lacking regarding groundwater in general. However, we know that in the upper basin (Guinea, Mali) groundwater is occurring in basement fractures; it is the case in the valley and delta (Mauritania, Senegal) where sedimentary aquifers are present

- d. Also in the level of groundwater development and management?

Maybe sources of water are different; in Guinea for instance surface water is mainly used, groundwater is not of major concern

- e. How is the exchange of knowledge/data and cooperation between the L/RBO and the riparian states' water mgt. structures?

The cooperation is successful. Every year workshops are organised in countries members to collect data from states' water mgt. structures. However, due to lack of capacities in countries, OMVS has set up a telemetric network to monitor 18 piezometers (6 for each country, considering that Guinea does not have network). As a pilot project funded by the Netherland, we have been collecting data for year

- f. Do you find the commitment of the riparian states to include GW on the political agenda sufficient? Yes No

We have concerns on knowledge and access regarding groundwater

- g. Does this influence your functionality?

For sure!

- h. What are you doing to strengthen the participation of the riparian states? (e.g. are formal structures, like stakeholder forums, in place with clear roles and responsibilities in water resources management and in the decision making process, are regular meetings taking place, etc.)?

Via OMVS national Units, annual workshops are held, involving all national water management structures, that aim to get thematic data monitored by these structures. OMVS is contributing financially to support monitoring activities.

Appendix 2. Transcripts of interviews

- i. Do you exchange knowledge, experience with other L/RBOs? Yes No
- j. If yes, which?

In the framework of African River Basins Network, in which OMVS is filling the post of secretary

3. Science/data/capacity building:

- a. Is there a good understanding to which extent groundwater-surface water interaction determines water balance and water quality in your basin and across riparian territories? Yes No

Comments:

It is a need that is expressed by OMVS

- b. Where are you in the process of managing TBAs (also fill in Table 3 for individual TBAs)?
 - i. Identification
 - ii. Delineation
 - iii. Diagnosis
 - iv. Conceptual/numerical model
 - v. Allocation principles
 - vi. Implementation of joint infrastructure projects

We are carrying out groundwater monitoring only, there's no specific survey

- c. Which data, if any, do you collect related to groundwater in the basin?

Water level, physic-chemical parameters

- d. What data bases, information portals, and monitoring networks exist in your organization, where groundwater is (or could simply be) added?

In the master database where all data related to water resources are stored, we have a mini database on groundwater

- e. What is the process/mechanism for data sharing with the riparian states' national groundwater dept.?

Since we have registered all actors, we provide them with monitoring forms, that we get them filled in return during workshops

-
- f. How many hydrogeologists, or staff with hydrogeological background, are working in your organization? Are all allocated posts filled?

Appendix 2. Transcripts of interviews

We don't have hydrogeologists but we have 2 or 3 staff with hydrogeological background. And there are no allocated posts.

- g. Do you find your present capacity (in terms of human and financial resources) sufficient to address groundwater management appropriately? Yes No

Of course the High Commissary has not sufficient capacity but OMVS is not reduced to this body, so we do have sufficient human capacity in the countries members

- h. How is prioritisation made in your organisation to meet the limited resources (e.g. human, financial, technical resources)?

We need to use technical/human resources that are available in the four member states to improve knowledge on water resources, characterize them and then use modelling

- i. What capacity building on groundwater is ongoing or planned?

No, we are taking advantage to human/technical resources existing in our states

- j. What in particular is lacking regarding capacity on GW management

Knowledge on aquifers

Appendix 2. Transcripts of interviews

Reply from OMVS National Unit in Mauritania

Questionnaire for which L/RBO: **OMVS**

Name: **Fadel OULD SAAD BOUH**

Institution (if different from L/RBO): **OMVS National Unit in Mauritania**

Function - please let us know your job title, role and main responsibilities:

Title: **Water resources Expert**

Role and responsibilities:

National focal point

How many years in present position: **From 1986 to 1993 in charge with groundwater resources management. Since 1993 he works for OMVS national Unit**

Background education: **hydrology with a background in hydrogeology**

Country: **Mauritania**

E-mail address: **fadelsb56@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+220 2 262 21 56**

Date of Interview: **October 27, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: _____

Or if done by telephone: **X**

Questions:

- a. What is your position in the principal government water management structure(s) in the riparian state where you reside?

I am expert in charge with water resources management in OMVS national Unit in Mauritania

- b. Are decisions taken within these structures first ratified by the L/RBO board at HQ before they are implemented? Yes **X** No

Regarding surface water, yes we should submit request to Water Permanent Commission. Concerning groundwater, no

Appendix 2. Transcripts of interviews

- c. Do you find that groundwater management is strongly and adequately addressed and integrated into overall water management of your country? Yes No

Comments:

In the right bank (Mauritanian side) for instance monitoring is not adequately addressed

- d. What is the level and effectiveness of cooperation between the L/RBO and the national groundwater management authorities?

It is efficient, however may be improved. For instance, CNRE (water resources national centre) in charge with water resources, has not sufficient capacity to ensure monitoring; so OMVS should assist in achieving these activities

- e. Is there an operational protocol between the L/ RBO and the countries on GW data/information sharing? Yes No

Comments:

Focal point at CNRE provide OMVS with all available GW data

- f. What are the procedures and costs involved in groundwater data sharing between the national groundwater management authority and the L/RBO?

Workshops are held with national groundwater management authority to get data

- g. Do you acknowledge/value the work done by the L/RBO in terms of groundwater management? Yes No

Comments:

OMVS has been monitoring piezometric network for couple of years, and after then observation wells were handed over to states. The latter took this task with its own capacity, but activities were not satisfactory due to lack of capacity. However, OMVS is supporting us to motivate staff working on monitoring

- h. Are there cooperative activities between the L/RBO and national groundwater authorities, for instance monitoring activities? Yes No

Comments:

In fact national groundwater authorities are doing these activities; it is among their duties. However OMVS is supporting them in terms of capacity (hardware, allowance...)

- i. What are your key concerns with regards to transboundary groundwater issues?

Cooperation on getting knowledge on transboundary aquifer (for instance Trarza groundwater which is of great importance for Mauritania)

- j. How important, in your professional opinion, is the interaction between surface water and groundwater in terms of i) transboundary water balance and ii) transboundary water quality?

There are any impacts observed

Appendix 2. Transcripts of interviews

Reply from: OMVS national Unit in Senegal

Questionnaire for which L/RBO: **OMVS**

Name: **Lamine DIOP**

Institution (if different from L/RBO): **OMVS national Unit in Senegal**

Function - please let us know your job title, role and main responsibilities:

Title: **Water resources management Expert**

Role and responsibilities:

Supervise thematic data exchange between national structures and OMVS

How many years in present position: **5 years**

Background education: **Rural engineering, IT applied to water resources management**

Country: **Senegal**

E-mail address: **iseld2004@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+221 77 220 47 44**

Date of Interview: **October 31, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: **Dakar**

Or if done by telephone: _____

Questions to L/RBO Country Representatives in the Riparian States;

- a. What is your position in the principal government water management structure(s) in the riparian state where you reside?

National focal point at OMVS national Unit in Senegal, I have been contracted by OMVS

- b. Are decisions taken within these structures first ratified by the L/RBO board at HQ before they are implemented? Yes **X** No

If these decisions are related to surface water abstraction, yes the Permanent Water Commission should approve. OMVS Units are involved in all technical interventions undertaken in the basin

Appendix 2. Transcripts of interviews

- c. Do you find that groundwater management is strongly and adequately addressed and integrated into overall water management of your country? Yes No

No, if you compare with surface water. I think groundwater is not adequately considered, despite the telemetric network implementation by OMVS

Comments:

- d. What is the level and effectiveness of cooperation between the L/RBO and the national groundwater management authorities?

The cooperation is tight. For instance all national structures are involved in Permanent Water Commission activities/meeting; focal points (including groundwater focal point) are collaborating with OMVS via OMVS national Units. But I think groundwater data availability is of major concern

- e. Is there an operational protocol between the L/ RBO and the countries on GW data/information sharing? Yes No

Comments:

OMVS has signed agreement with Ministries, and an additional one was signed as well with national structures. In each national department, there is a focal point. Thematic data collected by these structures are shared with OMVS through national units

- f. What are the procedures and costs involved in groundwater data sharing between the national groundwater management authority and the L/RBO?

OMVS assists all focal points in terms of equipments, allowance.

- g. Do you acknowledge/value the work done by the L/RBO in terms of groundwater management? Yes No

Comments:

OMVS is interested by groundwater, but it is obvious that surface water is dominating. Efforts were made since a year to take groundwater in board, in the framework of GEF Project.

- h. Are there cooperative activities between the L/RBO and national groundwater authorities, for instance monitoring activities? Yes No

Comments:

National structures provide OMVS with data via focal points and OMVS national units. Each year workshops are held in each country to validate data

- i. What are your key concerns with regards to transboundary groundwater issues?

Groundwater quality in the delta,

Exchange between river and aquifers

Groundwater knowledge

Appendix 2. Transcripts of interviews

- j. How important, in your professional opinion, is the interaction between surface water and groundwater in terms of i) transboundary water balance and ii) transboundary water quality?

I don't have information on this aspect

Appendix 2. Transcripts of interviews

Reply from OMVS national Unit in Mali

Questionnaire for which L/RBO: **OMVS**

Name: **Abraham SOGOBA**

Institution (if different from L/RBO): **OMVS national Unit in Mali**

Function - please let us know your job title, role and main responsibilities:

Title: **Mr**

Role and responsibilities:

National focal point for Mali

How many years in present position: **10 years**

Background education: **Agronomy**

Country: **Mali**

E-mail address: **abrasogoba@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+223 76 60 37 18**

Date of Interview: **November 5, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: _____

Or if done by telephone: **X**

Questions:

- a. What is your position in the principal government water management structure(s) in the riparian state where you reside?

Rural development expert

- b. Are decisions taken within these structures first ratified by the L/RBO board at HQ before they are implemented? Yes No

All national structures intervening in the Senegal River basin, are working in harmony with OMVS. They are involved in all OMVS decision-making bodies

Appendix 2. Transcripts of interviews

- c. Do you find that groundwater management is strongly and adequately addressed and integrated into overall water management of your country? Yes No

Comments:

There are groundwater focal points in each State, as well as surface water focal points, but there is disparity between resources allocated to surface water monitoring and those available for groundwater

- d. What is the level and effectiveness of cooperation between the L/RBO and the national groundwater management authorities?

Yes OMVS assists national GW structures; the Head of groundwater division is member of the Permanent Water Commission, which is an important body.

- e. Is there an operational protocol between the L/ RBO and the countries on GW data/information sharing? Yes No

Comments:

The DEDD (Environment and Sustainable Development Department) is in charge with environment characteristics change in the basin, which are measured through thematic data. OMVS has an agreement with national structures, which provide its database with monitored data. To this aim, every year workshops are held to get reception of them and to validate them as well. OMVS has agreed also to assist them, however recently funds are diminishing that impact on sharing data activities

- f. What are the procedures and costs involved in groundwater data sharing between the national groundwater management authority and the L/RBO?

Thematic focal points update their database, which is available to national OMVS focal point who plays the role of interface with OMVS (DEDD). Due to arising difficulties to get adequately data, annual workshops are "institutionalised" to foster data sharing.

- g. Do you acknowledge/value the work done by the L/RBO in terms of groundwater management? Yes No

Comments:

Surface water is more considered due to diversity of its used (hydropower, agriculture, cattle...) compared to groundwater water which is used for domestic need

- h. Are there cooperative activities between the L/RBO and national groundwater authorities, for instance monitoring activities? Yes No

Comments:

OMVS assists focal points in monitoring. The problem is that piezometric network is not well developed, and the States have to do themselves monitoring activities, it is their prerogative. Despite that OMVS is doing efforts in implementing telemetric network

- i. What are your key concerns with regards to transboundary groundwater issues?

More cooperation and collaboration like for surface water

Appendix 2. Transcripts of interviews

- j. How important, in your professional opinion, is the interaction between surface water and groundwater in terms of i) transboundary water balance and ii) transboundary water quality?

It is important, but difficult to assess it.

Appendix 2. Transcripts of interviews

Reply from Centre National des Ressources (CNRE) en Eau in Mauritania

Questionnaire for which L/RBO: **OMVS**

Name: **Assane GAYE**

Institution (if different from L/RBO): **CNRE (Centre National des Ressources en Eau)**

Function - please let us know your job title, role and main responsibilities:

Title: **Senior Hydrogeologist**

Role and responsibilities:

In charge with groundwater resources management, groundwater focal point of OMVS

How many years in present position: **4 years**

Background education: **Geology, Hydrogeology**

Country: **Mauritania**

E-mail address: **ass2005gaye@yahoo.fr**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+222 4 671 6862**

Date of Interview: **October 27, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: _____

Or if done by telephone: **X**

Questions:

- a. Do you share national groundwater data with the L/RBO? Does the L/RBO also share groundwater data from the other parts of the basin with your department?

Yes, via OMVS national unit we provide basin authority with data, we have opportunities during workshops organised to share data from riparian states.

- b. What are the procedures and mechanism of data sharing and funding?

Annual workshops are held, events where national thematic focal points gathered to receive or to validate data transferred to OMVS

Appendix 2. Transcripts of interviews

- c. Are there joint programs and activities with the L/RBO in terms of groundwater management and protection? Yes No

Comments:

Management of groundwater is a national activity of each country; however we did have tested with former Environment Observatory a programme to monitor groundwater level and quality

- d. In terms of national groundwater allocation, at what level are you required to obtain L/RBO approval?

Any approval is required to develop groundwater

- e. Is the linkage to surface water flows, surface water quality and environment considered when you allocate groundwater both internally (within the country) and in the transboundary situation? Internally: Yes No

Transboundary: Yes No

Comments:

We are just developing groundwater resources to supply population with drinking water

- f. What is the formal relationship between your groundwater department and the country representative of the L/RBO?

CNRE is the institution entitled par Mauritanian government to manage water resources. That's why there is an agreement with Environmental Observatory (now DEDD) to make available data from monitoring activities, with OMVS National Unit as national partner.

Appendix 2. Transcripts of interviews

Reply from SNAPE (Service National d'Aménagement des Points d'Eau) –
National Service of Water Points Management in Guinea

Questionnaire for which L/RBO: **OMVS**

Name: **Alpha Tougué DIALLO**

Institution (if different from L/RBO): **SNAPE (Service National d'Aménagement des Points d'Eau) – National Service of Water Points Management**

Function - please let us know your job title, role and main responsibilities:

Title: **Senior Hydrogeologist**

Role and responsibilities:

Head of Studies and Planning Division

How many years in present position: **26 years at SNAPE**

Background education: **hydrogeology**

Country: **Guinea**

E-mail address: **pnaepa2015@hotmail.com**

Gender: Female: _____ Male: **X**

Telephone number for possible follow up phone call: **+224 64 38 37 81**

Date of Interview: **November 3, 2011**

Interview performed by: **Moustapha DIENE– AGW-Net**

Place of interview: _____

Or if done by telephone: **X**

Questions to Chief Government Hydrogeologist or GW focal point in the Riparian States:

- a. Do you share national groundwater data with the L/RBO? Does the L/RBO also share groundwater data from the other parts of the basin with your department?

There's no piezometric network in Guinea, so far there was little consideration to aquifer data. We do share only data on inventory of boreholes that we implement in the basin. We do not have experienced data request from other parts of the basin, but there will not be a problem to share it.

- b. What are the procedures and mechanism of data sharing and funding?

Once a year OMVS team passes on to recover thematic data via OMVS national Unit, during a workshop where all actors gathered. OMVS support us in equipment, logistics ...etc. to get surface water data, not groundwater data

- c. Are there joint programs and activities with the L/RBO in terms of groundwater management and protection? Yes No **X**

Comments:

Appendix 2. Transcripts of interviews

- d. In terms of national groundwater allocation, at what level are you required to obtain L/RBO approval?

We don't need approval, however once national programme/project related to water resources is achieved, we do transmit information to OMVS through national unit

- e. Is the linkage to surface water flows, surface water quality and environment considered when you allocate groundwater both internally (within the country) and in the transboundary situation? Internally: Yes No
Transboundary: Yes No

Comments:

We need to assess impacts of climate changes on thematic data, particularly on groundwater, since in Guinean part of the basin, groundwater is major source of drinking water

- f. What is the formal relationship between your groundwater department and the country representative of the L/RBO?

SNAPE is the national structure in charge with water supply management in rural areas, it is collaborating with the basin organisation via OMVS national Unit in Guinea that plays the role of interface