North Africa Regional Water Sector M&E Rapid Assessment Report

MISR CONSULT
Envir. & Infra Str. Studies

MEWINA
مشروع التقييم والمتابعة لقطاع المياه بدول شمال أفريقيا
Monitoring and Evaluation for Water in North Africa

CEDARE
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African Water Facility
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Mobilising Resources for Water in Africa

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Acronyms

ADB	African Development Bank
ABH	Hydrographic Basin Agencies
ABN	Niger Basin Authority
ADE	Algerienne des Eaux
AFD	African French Agency for Development
AGIRE	National Agency for Integrated Management of Water Resources
ANBT	National Agency of Dams and Transfers
ANRH	Agence Nationale des Ressources Hydrauliques
BASHYD200	Climatology Database
BADGE2000	Hydrogeology Database
CBLT	Commission of the Lake Chad Basin
CNRE	Centre National des Ressources en Eau
DAEP	Direction of Potable Water
DEAH	Direction of Studies and Hydraulic Development
DGRE	Direction Générale des Ressources en Eau
DHA	Direction of Agricultural Hydraulics
DHS	Household Surveys
DMRE	Direction for Water Resources Mobilization and Planning
DPAE	Direction of Planning & Economical Assessment
EAU II	Programme d'appui au secteur de l'eau et de l'assainissement
EU	European Union
GLASS	Global Annual Assessment of Sanitation & Drinking Water
IAO	l'Agronomico Oltremare
INRAA	International Institute of Agronomic Research of Algeria
INSP	National Institute of Public Health
IWRM	Integrated Water Resources Management
JMP	Joint Monitoring Program
MDG	Millennium Development Goals

MEUP	Ministry of Environment and Land Use Planning
MICS	Multi Indicator Cluster Surveys
MWRI	Ministry of Water Resources and Irrigation
MRE	Ministère des Ressources en Eau
NGO	Non-Governmental Organizations
NWSAS	Western Sahara Aquifer System
NWRP	National Water Resources Plan
ONA	National Sanitation Office
ONID	National Office for Irrigation and Drainage
ONM	National Office of Meteorology
ONS	National Office of Statistics
OSS	Sahara and Sahel Observatory
PDARE	Master Plan for Water Resources Management
PSRE	Support Plan for Economic Recovery
SAGESSE	Database
SGIIAR	Integrated Management System of Agricultural Information and Rural
SME	Environmental Management Systems
SORES	Observation System for Underground Water Resources
TAT	Technical Assistance Team
WSS	Water Supply & Sanitation
WWTP	Waste Water Treatment Plant

1. Methodology for Collecting Data

The time frame of the project is very limited for collecting all required data. As such, in order to speed up the data collection phase, Misr Consult has adopted the following methodology for data collection:

Desk Study
- Pertinent literature reviewed
- List of required information and possible sources assembeled

Preparation of Questionnaires
- The RAR template prepared by AWF has been used to prepare a short form that can be sent to NTF members
- Transboundary basin (country level) template prepared and sent to MEWINA local office
- Transboundary basin (basin level) template prepared and sent to transboundary organization head/local office

Interviews at Project Training Workshop
- face-to-face interviews conducted with MEWINA national coordinator and M&E specialist
- feed back on templates and questions asked

Country Visit
- From2nd to 3rd of December
- Met with local NTF committee
- Discussed data availability and sources
- Conducted face-to-face interviews with key stakeholders

Follow up with MEWINA Local Office
- Collected filled templates
- Received agreed upon data and documents
- Communicated regarding missing information for possible reception from the NTF

National RAR reports
- National RAR are produced
- National teams revised RAR
- RAR was produced finalized according to latest update of each country

2. M&E Aspects from Countries Rapid Assessment Reports

The following sections show the most important aspects of monitoring and evaluation for water resources, water supply and sanitation in North African countries.

2.1. IWRM M&E Framework

2.1.1. Algeria

While there is no solid structured framework of M&E in the Algerian water sector, their important M&E policies are embedded in the various institutional missions and are already being performed on many aspects. The M&E policies are also included in the tasks of the water resources management committee consisting of several basins representative, where the committee is responsible for developing the information system on water through the establishment and updating of databases and tools of geographic information; establish management plans of water resources and surface and groundwater develop tools for decision in the matter; and managing the data system established under the use of public natural hydraulic entrusted. The relationship between various water sector institutions within an integrated water resources management is not clear within M&E framework. The following institutions in the Algerian water sector are working in M&E.

2.1.2. Mauritania

The IWRM framework does not exist in a structured clear form in Mauritania; the country action plan was launched in the year 2007 and in 2010, the Ministry of Water & Sanitation announced a management scheme that would be implemented by the ministry. Moreover, the M&E for the IWRM framework almost does not exist. The following figure shows the primitive institutional framework for M&E in water resources management in Mauritania.

2.1.3. Tunisia

The IWRM framework does not exist in a structured clear form in Tunisia. The participatory approach in the management of water resources and infrastructure is in place, including the management of water supply systems in rural areas by the agricultural development group (GDA) or by associations of collective interests. The Water Code (1975) remains the most appropriate instrument concerning infringements committed on public water domain and any resulting conflicts. It is currently being revised and updated.

2.1.4. Libya

On the national level, IWRM M&E is undertaken by several institutions, namely: Ministry of Water Resources, GWA with its regional branches, AEMMmRP with its regional branches, The EGA, a semi-autonomous organ of the Ministry of Health, The NCM, a semi-autonomous organ of the Ministry of Transportation, Joint Authority for Study Development of the Nubian Sandstone Aquifer System (NSAS), The North-Western Sahara Aquifer System (NWSAS).

There is no national structured framework for M&E in Libya. Different institutions have their own IWRM M&E frameworks but no national IWRM M&E framework exists. These frameworks are not integrated, in contrast to the National Water Strategy recommendations, and, therefore, their outputs are of limited use. However, the GWA of the MWR plays a key role in IWRM M&E coordination.

2.1.5. Egypt

There is no national structured framework for M&E&R in Egypt. However, the National Water Resources Plan, NWRP unit of the MWRI chairs the coordination platform (CP) for M&E of the NWRP-2017 within the premises of the MWRI. The NWRP-CP was formed to assist the various functional actors involved in NWRP implementation at central and non-central level with getting the planning and decision making process effectively on the ground, which is needed for the efficient and timely implementation of the NWRP. On the regional level, the Nile Basin Initiative (NBI) and the Joint Authority for the Nubian Sandstone Aquifer System (NSAS) are not so active on the M&E of the shared transboundary surface and groundwater resources, respectively (NBI, 2013; NSAS, 2013). The two organizations cooperate with the transboundary countries to collect data and build models.

2.2. Basin Monitoring Networks

It is to be noted that the basin monitoring networks include both national and transboundary level networks.

2.2.1. Algeria

Table 1. Monitoring Network & their status in Algeria

	Type of station			
	River Gauging	Rainfall	Meteorology	Groundwater & Water Quality
North Western Sahara Aquifer System Consultation Mechanism (NWSAS)	NA	NA	NA	11,166
Algeria (National Agency of Water Resources in the MRE)	124 (quality of streams)	800	220	More than 700

NA means not available

2.2.2. Mauritania

Table 2. Monitoring Network & their status in Mauritania

	Type of station				
	River Gauging	Rainfall	Meteorology	Water Quality	Groundwater
Senegal River Basin (OMVS data)	30	NA	NA	22	20
Other parts in Mauritania (CNRE data)	NA	70	13	NA	14,000

2.2.3. Tunisia

Table 3. Monitoring Network & their status in Tunisia

	Type of station				
	River Gauging	Rainfall	Meteorology	Water Quality	Groundwater
DGRE	175	1,020	NA	1,200	3,309

2.2.4. Libya

Table 4. Monitoring Network & their status in Libya

	Type of station				
	River Gauging	Rainfall	Meteorology	Water Quality	Groundwater
NSAS	NA	3	5	74	74
NWSAS	NA	NA	NA	167	167

2.2.5. Egypt

Table 5. Monitoring Network & their status in Egypt

	Type of station				
	River Gauging	Rainfall	Meteorology	Water Quality	Groundwater
NBI	300	NA	NA	NA	NA
NSAS	NA	NA	NA	74	74

2.3. Water Resources data collection

2.3.1. Algeria

Table 6. Water resources data collection in Algeria

	Data	Quality & Timeline	Collection	Analysis & dissemination
OSS-NWSAS	Water abstraction, groundwater table piezometric head, drawdown, water quality, water salinity, farming practice, irrigation water consumption (by remote sensing), socio-economic data	Data is of excellent quality since monitoring networks are operational in a good state and data is checked and verified. Data is collected periodically and database is updated and old data is corrected.	National Algerian experts. No data analysis is made at this stage.	The data collected is analyzed and verified by the technical committee of the NWSAS after being provided by national experts. NWSAS is currently building the capacity of national experts to use the tools developed for dissemination of results; databases, GIS, hydrological models, remote-sensing.
ANRH	Rainfall, temperature, evapotranspiration, groundwater withdrawals and recharge, aquifer heads, use of non-renewable water resources in Sahara, streamflow, and water quality	Data is of a very good quality and reliable. Most of the data is measured continuously and on daily basis.	ANRH engineers and experts and station workers	The information collected on field verified by structures called sectors; they are then entered into a database and forwarded to the regional level to control the homogeneity of the information. This information is then transmitted to the central level or they are stored in a national database. This information is used for the needs of specific studies or general across the country.

2.3.2. Mauritania

Table 7. Water resources data collection in Mauritania

2.3.3. Tunisia

Table 8. Water resources data collection in Tunisia

	Data	Quality & Timeline	Collection	Analysis & dissemination
MARH, DGRE, DGGREE, DGBGTH	Water abstraction, groundwater table piezometric head, drawdown, water quality, water salinity, , irrigation water consumption (by remote sensing), socio-economic data , stream flow	Data is of good quality since monitoring networks are operational in a good state and data is checked and verified. Data is collected periodically.	National experts.	The data collected is analyzed and verified by the technical committee after being provided by national experts.
SASS	Water abstraction, groundwater table piezometric head, drawdown, water quality	Data is of a good quality and reliable. Most of the data is measured continuously.	National experts.	The information collected on field verified, they are then entered into a database and forwarded to the regional level to control the homogeneity of the information. This information is used for the needs of specific studies or general across the country.

2.3.4. Libya

Table 9. Water resources data collection in Libya

	Data	Quality & Timeline	Collection	Analysis & dissemination
MmRP, NSAS, NWSAS, GWA	Annual withdrawals, domestic water uses, agricultural water uses, Rainfall, temperature, groundwater withdrawals and recharge, aquifer heads, streamflow, and water quality	Data is of excellent quality of MnRP, other data is not of good quality. Data is collected periodically.	National experts. No data analysis is made at this stage.	The data collected is not analyzed and not verified after being provided by national experts.

2.3.5. Egypt

Table 10. Water resources data collection in Egypt

	Data	Quality & Timeline	Collection	Analysis & dissemination
MoHP, NBI, NSAS	Stream flow, Water abstraction, groundwater table piezometric head, drawdown, water quality, water salinity, farming practice, irrigation water consumption (by remote sensing), socio-economic data	Data is of excellent quality since monitoring networks are operational in a good state and data is checked and verified. Data is collected periodically and database is updated and old data is corrected.	National experts. No data analysis is made at this stage.	The data collected is analyzed and verified by the technical committee being provided by national experts. Egypt is currently building the capacity of national experts to use the tools developed for dissemination of results; databases, GIS, hydrological models, remote-sensing.

2.4. Water Resources data management info

2.4.1. Algeria

Table 11. Water Resources-Data Management info for Algeria

Theme	Data Sources	Measurable	Available	Accessible	Reliable
Stream flow	ANRH, ANBT	Y	Y	Y	Y
Water use and exploitation of groundwater	ADE, ONID, DREW	Y	Y	Y	Y
Groundwater recharge	ANRH	Y	Y	Y	Y
Use of non-renewable water resources in Sahara	ANRH, ADE, ONID, DREW	Y	Y	Y	Y
Agricultural water use	ONID	Y	Y	Y	Y
Climatology (Rainfall & Temp & Evapotranspiration)	ANRH, ONM, ANBT	Y	Y	Y	Y
Water Quality	ANRH, SPA, DAEP	Y	Y	Y	Y

Y= Yes, N= No

2.4.2. Mauritania

Table 12. Water Resources-Data Management info for Mauritania

Theme	Data Sources	Measurable	Available	Accessible	Reliable
Water Resources	DAR, PND, CNRE	Y	Y	N	N
Index overall quality of water (composite index)	DAR, CNRE	Y	Y	Y	N
Water use and overexploitation of groundwater	CNRE (SIPPE), OMVS (SIGM)	Y	N	N	N
Climatology	Service Agro-météo/ MDR	Y	Y	Y	Y
Water Quality	CNRE, OMVS (SIGM, SONADER)	Y	Y	N	N

2.4.3. Tunisia

Table 13. Water Resources-Data Management info for Tunisia

Theme	Data Sources	Measurable	Available	Accessible	Reliable
Stream flow	MARH, DGRE, DGGREE, DGBGTH,CRDA	Y	Y	N	N
Water use and exploitation of groundwater		Y	Y	Y	N
Groundwater recharge		Y	N	N	N
Use of non-renewable water resources in Sahara		Y	Y	Y	Y
Agricultural water use		Y	Y	N	N
Climatology (Rainfall & Temp & Evapotranspiration)		Y	Y	N	N
Water Quality	MEED, ANPE MS (HMPE)	N	N	N	N

2.4.4. Libya

Table 14. Water Resources-Data Management info for Libya

Theme	Data Sources	Measurable	Available	Accessible	Reliable
Stream flow	MmRP, NSAS, NWSAS, GWA, GDC	Y	Y	N	N
Water use and exploitation of groundwater		Y	Y	N	N
Groundwater recharge		Y	N	N	N
Use of non-renewable water resources in Sahara		Y	Y	N	N
Agricultural water use		Y	Y	N	N
Climatology (Rainfall & Temp & Evapotranspiration)		Y	Y	N	N
Water Quality	EGA	N	Y	N	N

2.4.5. Egypt

Table 15. Water Resources-Data Management info for Egypt

Theme	Data Sources	Measurable	Available	Accessible	Reliable
Stream flow	MoHP, NBI, NSAS	Y	Y	Y	Y
Water use and exploitation of groundwater	CAPMAS, MWRI, NWRP, MSEA	Y	Y	N	N
Groundwater recharge		Y	N	N	N
Use of non-renewable water resources in Sahara		Y	Y	Y	Y
Agricultural water use		Y	Y	N	N
Climatology (Rainfall & Temp & Evapotranspiration)		Y	Y	O	Y
Water Quality	MoHP, MWRI, MSEA	Y	Y	N	Y

2.5. Water Resources-Information Dissemination

2.5.1. Algeria

Table 16. Water Resources-Information Dissemination in Algeria

Target Groups	Method	Frequency	Responsibility of
Environment (Pollution control)	Reports, Written Case Studies, Briefings, Presentations	Daily, weekly & monthly and event-based	ANRH, ONM, ANBT, ADE, ONID, DREW, ONA
Directorates-Basin level	Reports, Briefings, Letters, institutional committees	Daily and monthly	ANRH, ONM, ANBT, ADE, ONID, DREW, ONA
Ministry of Water Resources	Reports, Letters, webpages	Daily, weekly & monthly and event-based	Directorates-Basin level- DEAH, DMRE, DAEP, DHA, DPAE & NWSAS national unit
Transboundary Consultation Mechanism	Reports, Briefings, Letters, Presentations, institutional committees	Daily, weekly & monthly and event-based	National experts in Directorates at basin level and directorates in Wilayas
Tourism	NA	NA	NA
Agriculture	Informal meetings, letters, reports, internet	Frequent but not stated, when needed	ANRH, ONID, ONM, ANBT
Hydropower	Informal meetings, letters, reports, internet	Frequent but not stated, when needed	Ministry of Water Resources
Industry & Commerce	Informal meetings, letters, reports, internet	Frequent	Ministry of Water Resources
Water Supply & Sewerage	Informal meetings, letters, reports, internet	Frequent	Ministry of Water Resources
Transport/ Navigation	Informal meetings, letters, reports, internet	Frequent	Ministry of Water Resources
National Planning	Written project case studies, letters, reports	Frequent	NWSAS, Directorates-Basin level- DEAH, DMRE, DAEP, DHA, DPAE
Media/Civil society	Conferences, Journalists, Internet	Very frequent and can be daily or weekly	Ministry of Water Resources

2.5.2. Mauritania

Table 17. Water Resources-Information Dissemination in Mauritania

Target Groups	Method	Frequency	Responsibility of
Environment (Pollution control)	Reports, Written Case Studies, Briefings, Presentations	Rare	CNRE, BDD & OMVS National Unit
Local governments	Reports, Briefings, Letters, Presentations, institutional committees	Monthly and semi-annually	CNRE, Directorate of Hydrology & Dams
Ministry of Water & Sanitation	Reports, Letters, webpages	Weekly & monthly and event-based	Directorate of Hydraulics, OMVS National Unit
Transboundary offices	Reports, Briefings, Letters, Presentations, institutional committees	Monthly	OMVS National Unit
Tourism	NA	NA	NA
Agriculture	Informal meetings, letters, reports	Random, when needed and where info is available	CNRE
Hydropower	Briefings, Letters	Random, when needed and where info is available	Directorate of Hydraulics, OMVS National Unit
Industry & Commerce	Briefings, Letters	Random, when needed and where info is available	Directorate of Hydraulics, OMVS National Unit
Water Supply & Sewerage (Directorate of Hydraulics)	Informal meetings, Letters, Reports	Random, when needed and where info is available	SNDE, ONAS, ONSER
Transport/Navigation	Briefings, Letters	Random, when needed and where info is available	OMVS National Unit
National Planning	Written project case studies, letters, reports	Semi- and annual	Directorate of Hydraulics, OMVS National Unit
Media/Civil society	Conferences, Journalists, Internet	Very frequent and can be daily or weekly	Ministry of Water& Sanitation

2.5.3. Tunisia

Table 18. Water Resources-Information Dissemination in Tunisia

Target Groups	Method	Frequency	Responsibility of
Environment (Pollution control)	Reports, Written Case Studies, Briefings, Presentations	Rare	MEED
Ministry of Agriculture	Reports, Letters, webpages	Weekly & monthly and event-based	MARH, DGRE, DGGREE, DGBGTH,CRDA
Transboundary offices	Reports, Briefings, Letters, Presentations, institutional committees	Rare	MARH, DGRE, DGGREE, DGBGTH,CRDA
Tourism	Reports, Briefings, Letters, Presentations, institutional committees	Annual	SONEDE
Hydropower	Briefings, Letters	Daily basis	DGBGTH
Water Supply & Sewerage	Informal meetings, Letters, Reports	Weekly & monthly and event-based	SONEDE, ONAS
Transport/Navigation	Briefings, Letters	Rare	Ministry of Agriculture
National Planning	Written project case studies, letters, reports	Project based	MARH, DGRE, DGGREE, DGBGTH,CRDA
Media/Civil society	Conferences, Journalists, Internet	Very frequent and can be daily or weekly	Ministry of Agriculture

2.5.4. Libya

Table 19. Water Resources-Information Dissemination in Libya

Target Groups	Method	Frequency	Responsibility of
Environment (Pollution control)	Reports, Written Case Studies, Briefings, Presentations	Extremely Rare	EGA
Ministry of Water Resources	Reports, Letters, webpages	Weekly & monthly and event-based	MmRP, NSAS, NWSAS, GWA, GDC
Transboundary offices	Reports, Briefings, Letters, Presentations, institutional committees	Weekly, Monthly	MmRP, NSAS, NWSAS, GWA, GDC
Tourism	NA	NA	NA
Agriculture	Informal meetings, letters, reports	Random, when needed and where info is available	Ministry of Agriculture& animal Wealth, GWA
Hydropower	Briefings, Letters	NA	NA
Industry & Commerce	Briefings, Letters	Random, when needed and where info is available	NA

Target Groups	Method	Frequency	Responsibility of
Water Supply & Sewerage	Informal meetings, Letters, Reports	Weekly, Monthly	GCWW
Transport/Navigation	Briefings, Letters	NA	NA
National Planning	Written project case studies, letters, reports	Semi- and annual	GCWW
Media/Civil society	Conferences, Journalists, Internet	NA	NA

2.5.5. Egypt

Table 20. Water Resources-Information Dissemination in Egypt

Target Groups	Method	Frequency	Responsibility of
Environment (Pollution control)	Reports, Written Case Studies, Briefings, Presentations	Annual	MoHP, MWRI, MSEA
Transboundary offices	Reports, Briefings, Letters, Presentations, institutional committees	Monthly	MoHP, MWRI, MSEA
Tourism	NA	NA	NA
Agriculture	Informal meetings, letters, reports	Random, when needed and where info is available	MoHP, MWRI, MSEA
Hydropower	Briefings, Letters	Random, when needed and where info is available	
Water Supply & Sewerage	Informal meetings, Letters, Reports	Random, when needed and where info is available	
Transport/Navigation	Briefings, Letters	Random, when needed and where info is available	MoHP, MWRI, MSEA
National Planning	Written project case studies, letters, reports	Semi- and annual	MoHP, MWRI, MSEA
Media/Civil society	Conferences, Journalists, Internet	Event based	MWRI

2.6. Data storage & analysis for water supply & sanitation

2.6.1. Algeria

Table 21. Data storage and analysis for WSS in Algeria

Data collected	Method of collection	Frequency of collection	Institution	Quality checks	Storage
Volume of water pumped, condition of pumps, condition of network, number of clients, water quality	ADE Operator collects data	Weekly & monthly	ANRH, ADE	Quality checks are not clear to be performed on collected data	Excel files and reports until they are sent to the central data unit to be stored in a database & GIS
Volume of waste water produced, condition of treatment plants, condition of network, number of clients, waste water quality	ONA Operator collects data, and engineers	Daily & weekly	ONA	Quality checks are performed regularly by the ONA according to the ISO14001	Excel files and reports until they are sent to the central data unit to be stored in a database

2.6.2. Mauritania

Table 22. Data storage and analysis for WSS in Mauritania

Data collected	Method of collection	Frequency of collection	Institution	Quality checks	Storage
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Operator collects data and sends to technical office in water company	Annually	ONSER, ANEPA	General simple checks in company technical office	Excel files and sometimes access database
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Operator collects data and sends to technical office in water company	Annually	SNDE, ANEPA	General simple checks in company technical office	Excel files and sometimes access database

2.6.3. Tunisia

Table 23. Data storage and analysis for WSS in Tunisia

Data collected	Method of collection	Frequency of collection	Institution	Quality checks	Storage
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Reviewers, technicians, and operator collects data and sends to technical office in water company	Annually	SONEDE	Good checks in company technical office	Excel files and access database
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Reviewers, technicians, and operator collects data and sends to technical office in wastewater company	Annually	ONAS	Good checks in company technical office	Excel files and access database

2.6.4. Libya

Table 24. Data storage and analysis for WSS in Libya

Data collected	Method of collection	Frequency of collection	Institution	Quality checks	Storage
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Operator collects data and sends to technical office	Weekly and monthly	GCWW	General simple checks in company technical office	Excel files and sometimes access database

2.6.5. Egypt

Table 25. Data storage and analysis for WSS in Egypt

Data collected	Method of collection	Frequency of collection	Institution	Quality checks	Storage
Volume of water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Operator collects data and sends to technical office in water company	Monthly and annual	MDWSF	General simple checks in company technical office	Excel files and sometimes access database
Volume of waste water pumped, condition of pumps, condition of network, number of clients, households accessible to water supply. water quality	Operator collects data and sends to technical office in waste water company	Monthly and annual	MDWSF	General simple checks in company technical office	Excel files and sometimes access database

2.7. Water supply & sanitation-Information dissemination

2.7.1. Algeria

Table 26. WSS Information Dissemination in Algeria

Target Groups	Method	Frequency	Responsibility of	For what purpose
Directorates at basin level	formal meetings, Letters, Reports	Frequently (daily & weekly)	ADE, ONA	Monitoring & evaluation for progress towards goals
Ministry of Water Resources	Informal meetings, Letters, Reports, database files	Frequently (daily & weekly)	ADE, ONA	Storage, Planning & Development
Media/Civil society	Conferences, Journalists, Internet	Very frequent and can be daily or weekly	Ministry of Water Resources	Dissemination for public

2.7.2. Mauritania

Table 27. WSS Information Dissemination in Mauritania

Target Groups	Method	Frequency	Responsibility of	For what purpose
Directorate of Hydraulics	Reports, Briefings, Letters, Presentations, institutional committees	Random, when needed and where info is available	ANEPA, ONSR, ONS	Management and assessing sector performance
Directorate of Planning Monitoring & Evaluation	Informal meetings, Letters, Reports	NA	ANEPA, ONSR	Monitoring & evaluation for progress towards goals
Ministry of Water & Sanitation	Informal meetings, Letters, Reports	Weekly & monthly and event-based	Directorate of Hydraulics	Planning & Development
Media/Civil society	Conferences, Journalists, Internet	Very frequent and can be daily or weekly	Ministry of Water& Sanitation	

2.7.3. Tunisia

Table 28. WSS Information Dissemination in Tunisia

Target Groups	Method	Frequency	Responsibility of	For what purpose
Directorates at regional level	formal meetings, Letters, Reports	Frequently (daily & weekly)	SASS	Monitoring & evaluation for progress towards goals
Ministry of Agriculture	Informal meetings, Letters, Reports, database files	Frequently (daily & weekly)	SONEDE, ONAS	Storage, Planning & Development
Media/Civil society	Conferences, Journalists, Internet	Rare	SONEDE, ONAS	Dissemination for public

2.7.4. Libya

Table 29. WSS Information Dissemination in Libya

Target Groups	Method	Frequency	Responsibility of	For what purpose
Directorates at basin level	formal meetings, Letters, Reports	Weekly and monthly	National operators	Monitoring & evaluation for progress towards goals
Ministry of Water Resources	Informal meetings, Letters, Reports, database files	Rare and on event basis	GCWW	Storage, Planning & Development
Media/Civil society	Conferences, Journalists, Internet	On event based as needed	Ministry of Water Resources	Dissemination for public

2.7.5. Egypt

Table 30. WSS Information Dissemination in Egypt

Target Groups	Method	Frequency	Responsibility of	For what purpose
Directorates at basin level	formal meetings, Letters, Reports	Frequently (daily & weekly)	MDWSF	Monitoring & evaluation for progress towards goals
Ministry of Water Resources	Informal meetings, Letters, Reports, database files	Frequently (daily & weekly)	MDWSF	Storage, Planning & Development
Media/Civil society	Conferences, Journalists, Internet	Less frequent and event based	MDWSF	Dissemination for public

2.8. Water supply & sanitation-Data management chain

An "x" is shown beside links that are not found in the water supply data chain in Algeria. Main problem in water supply data management chain is that; the chain is not a closed loop, the chain is not continuous but interrupted at some locations, information handling is mainly in form of excel data sheets.

2.8.1. *Algeria*

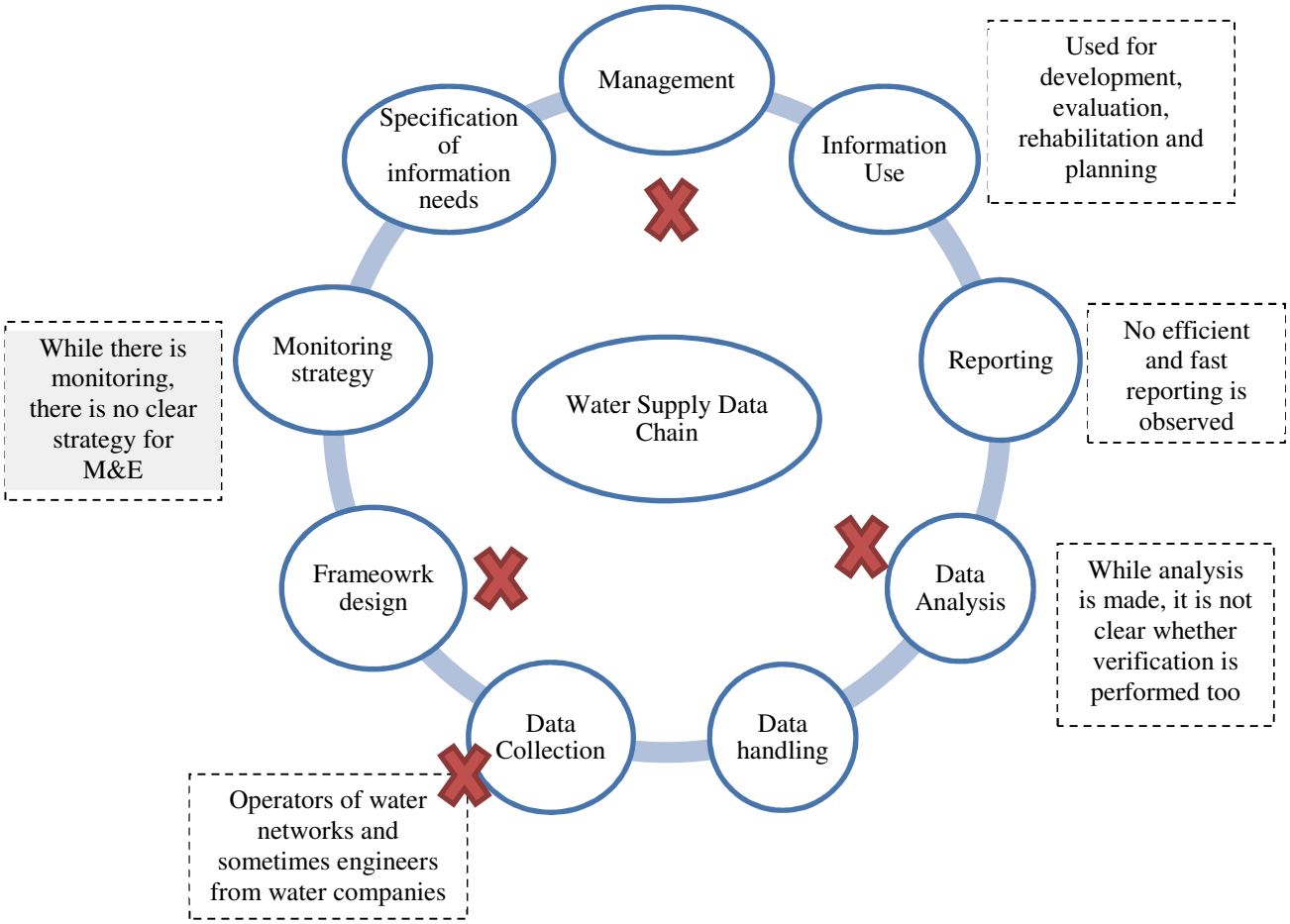

Figure 1. Data Management Info for WSS in Algeria

2.8.2. Mauritania

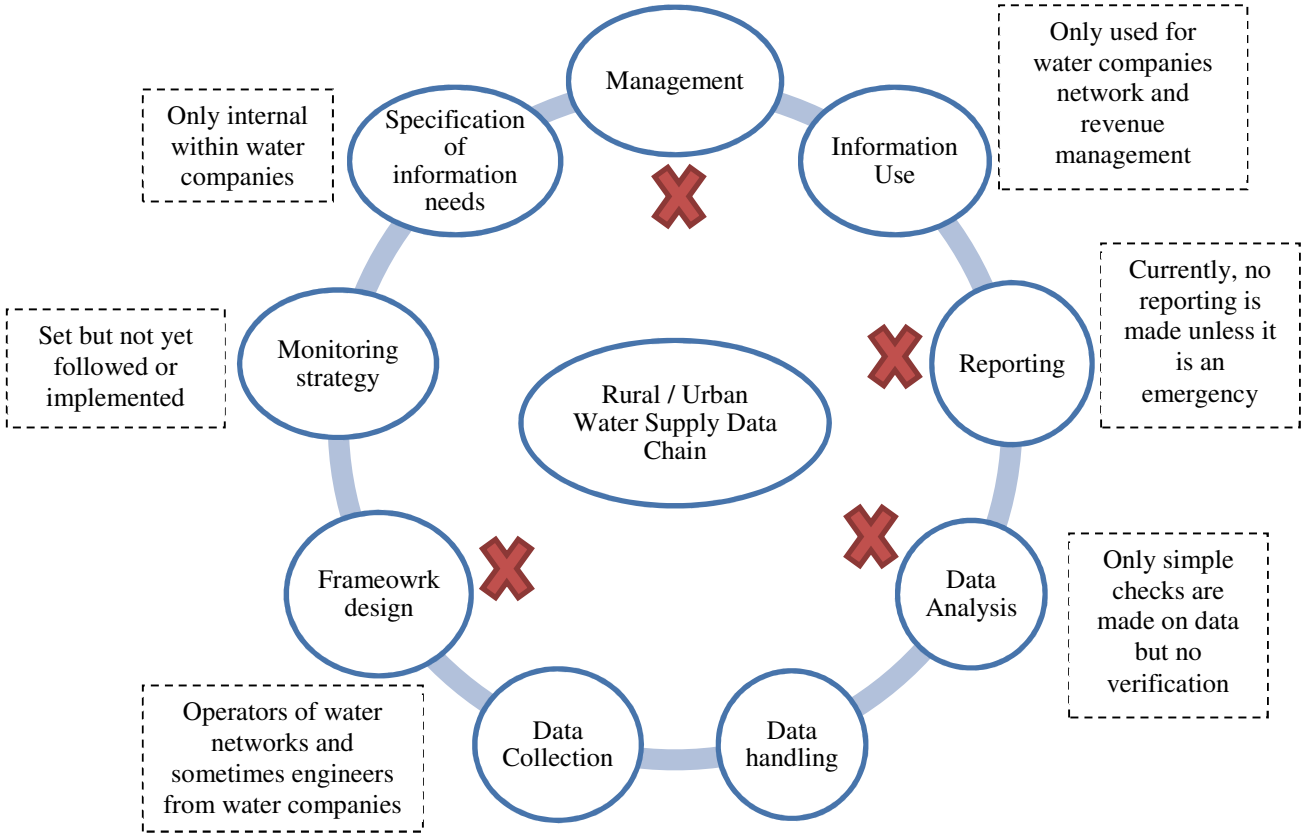

Figure 2. Data Management Info for WSS in Mauritania

2.8.3.Tunisia

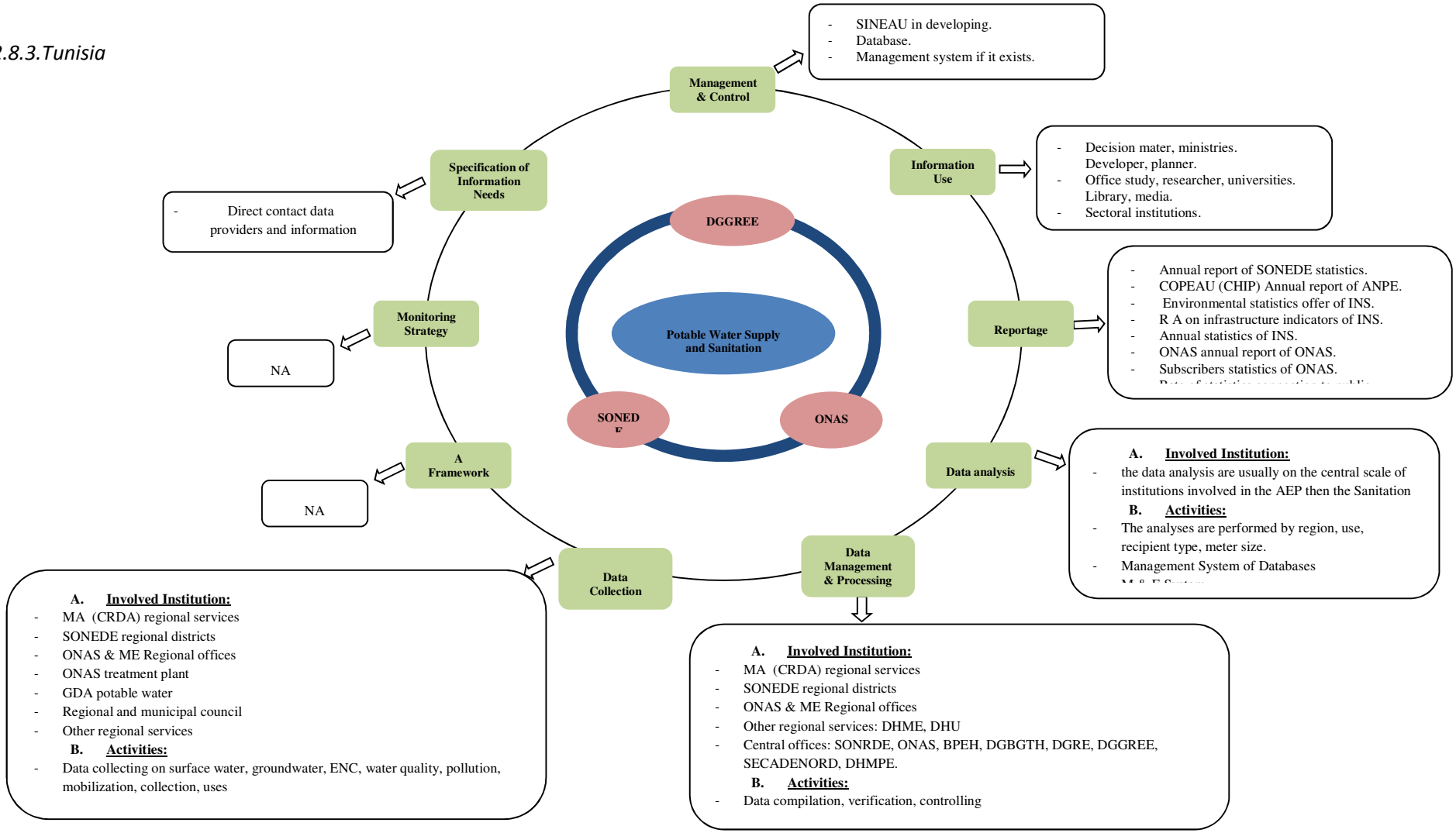

Figure 3. Data Management Info for WSS in Tunisia

2.8.4.Libya

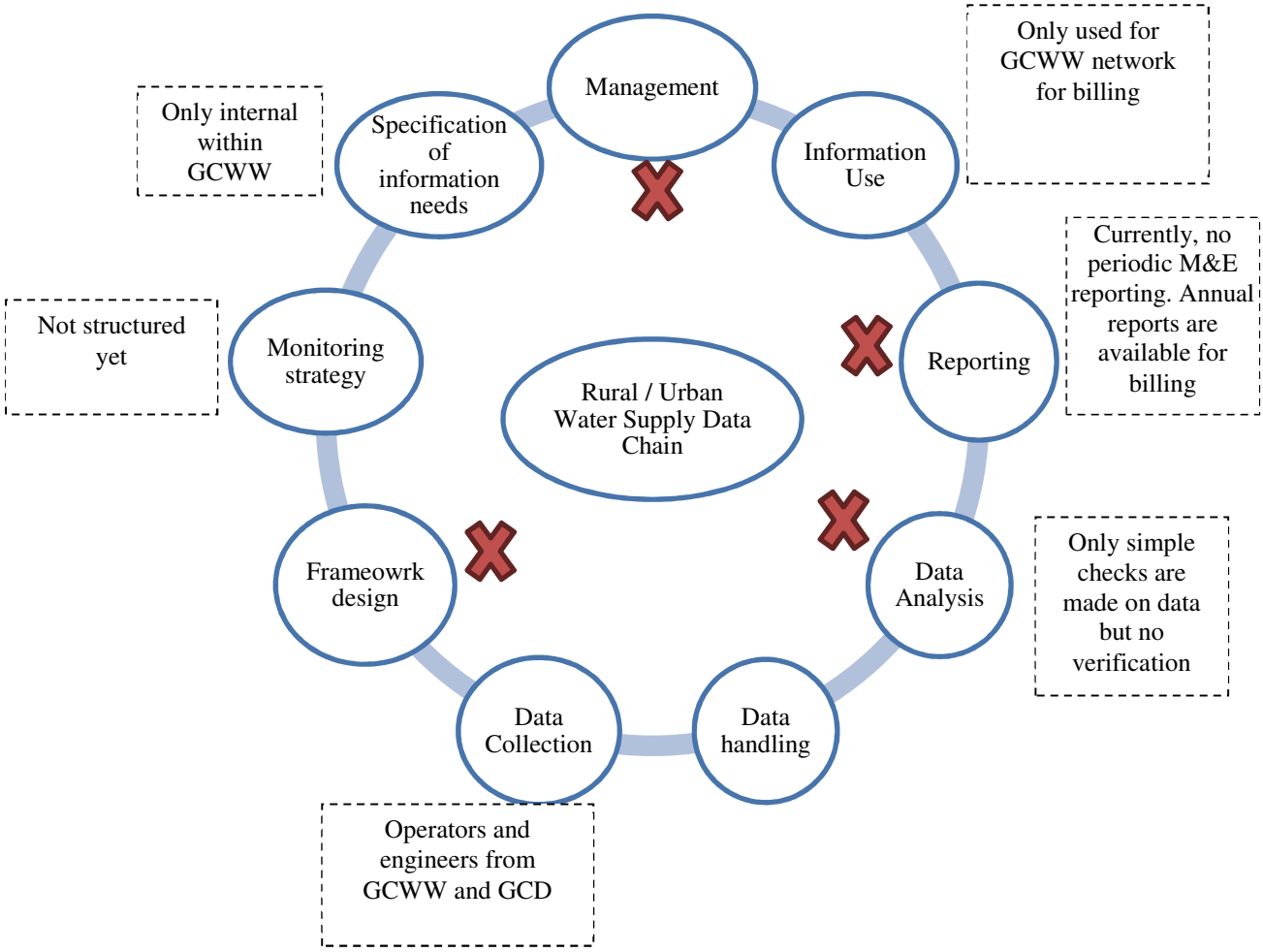

Figure 4. Data Management Info for WSS in Libya

2.8.5. Egypt

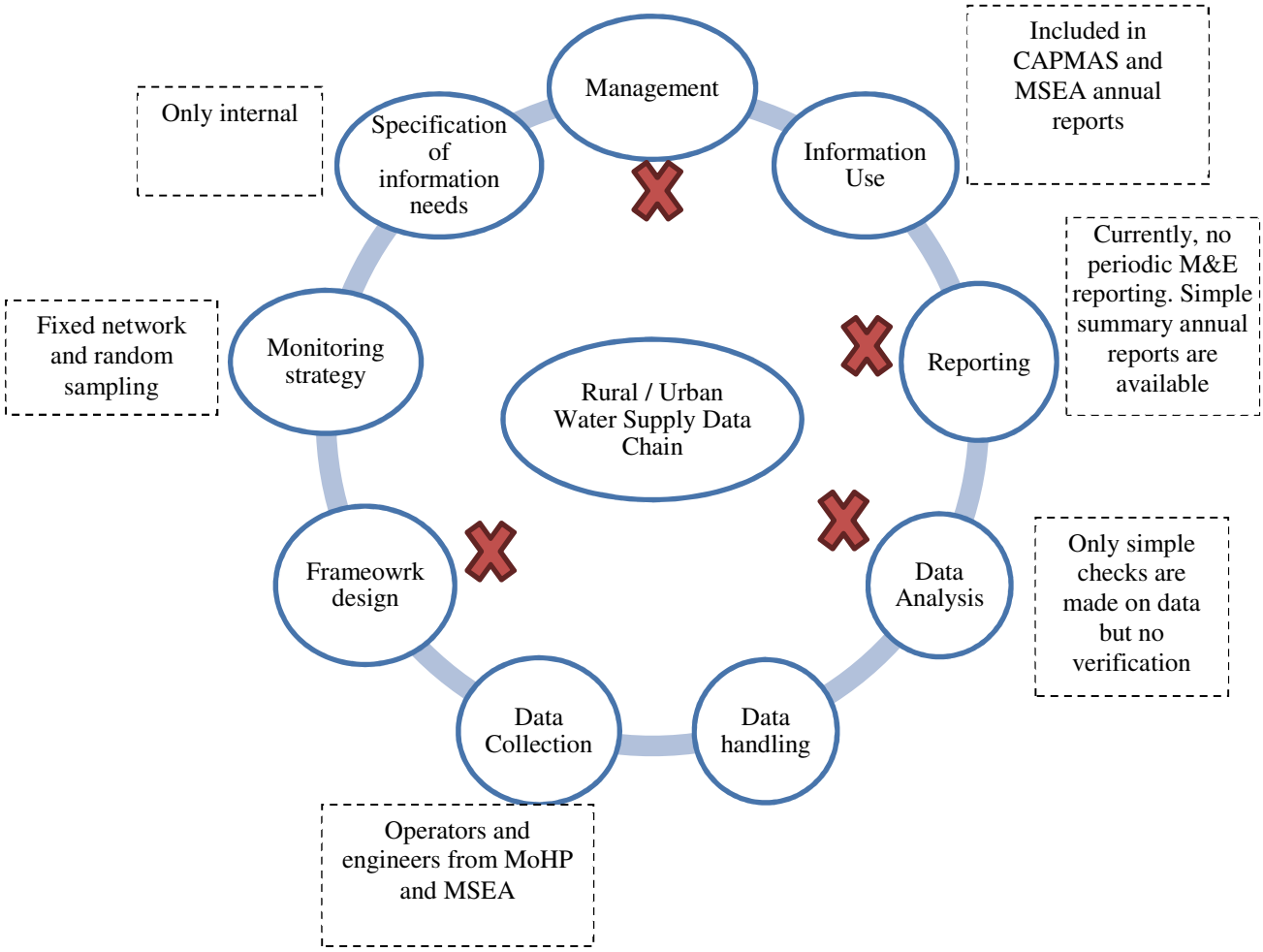

Figure 5. Data Management Info for WSS in Egypt (MoHP & MSEA)

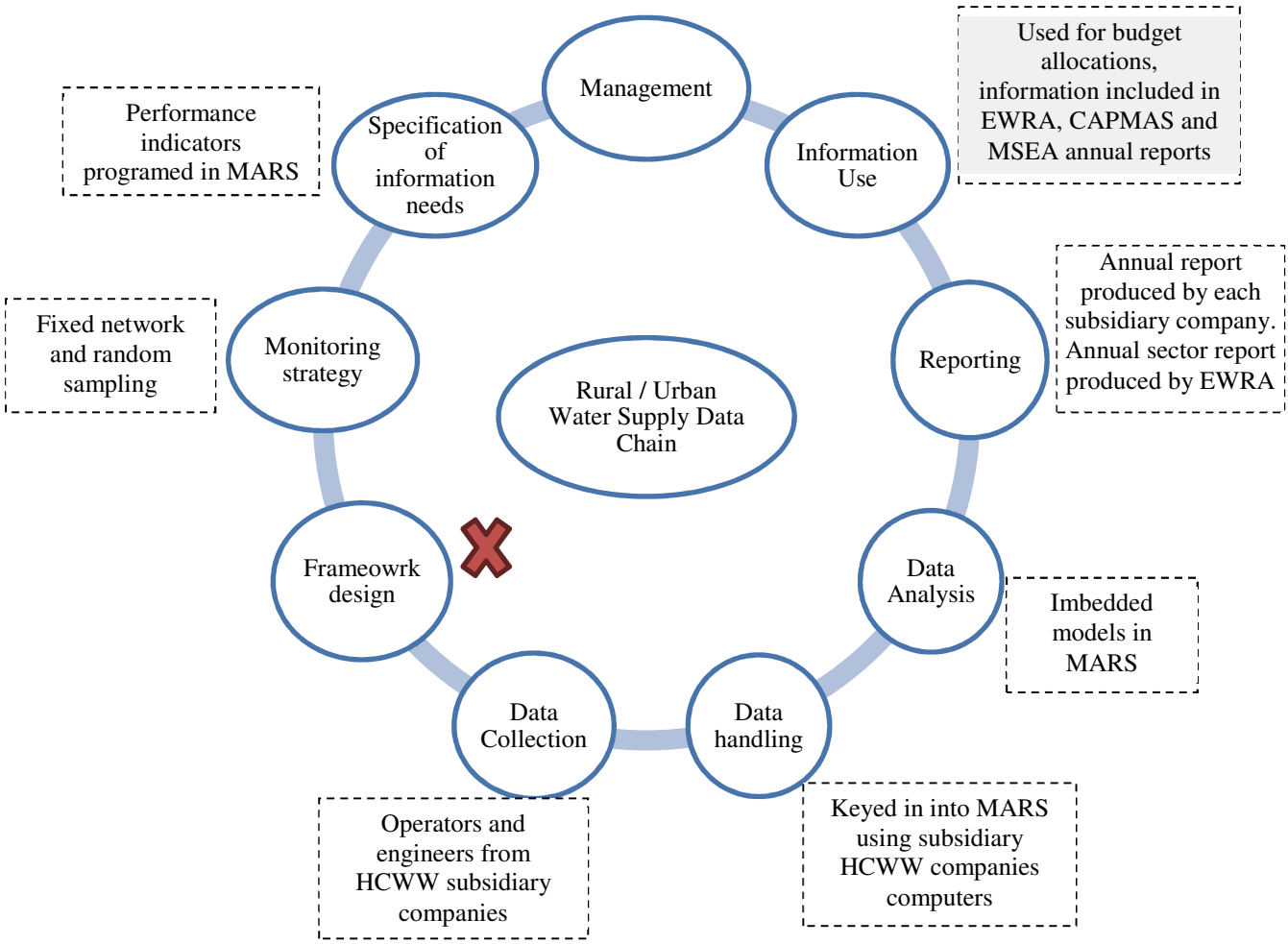

Figure 6. Data Management Info for WSS in Egypt (HCWW/EWRA)

2.9. Information Systems

2.9.1. *Algeria*

MRE-Data Center: As discussed the MRE hosts a database and central platform for storing various data related to water resources. This database is considered the final destination of all info related to water resources. It is an access database and contains 95,000 water point and related data. This data center is frequently updated and information is transferred continuously from small databases at wilaya level till reaching this data center at the MRE. But the information contained in this database is not available to public.

NWSAS-MIS: The NWSAS project aims to elaborate a common database for integrating and streamlining all the surveyed information, in addition to new data collection, integration and updating. Such an objective requires that the national databases be adapted and homogenized. This implies homogenized data structures and modifications, a GIS interface and the elaboration of an access module with the digital model. The Information System (IS) elaboration included the diagnosis, design and realization of a common database, with the objective of making IS accessible simultaneously in the project's headquarters and in each water administration of the three countries. The diversity and multiplicity of operations carried out on 9,000 inventoried water points appraise the amplitude of the task: collection, classification and identification system homogenization, criticism, aberrant data detection, correction, and validation. The obtained information system allows data updating and addition, statistical requests, graphs, and model connections. The system contains all the basic elements to establish the monitoring control panel and basin water exploitation. Now we have a very good quality management tool operating in each administration in the three countries. At the same time, we have elaborated a specific NWSAS cartographic server to ensure a geo-referenced representation of the available information. This multilayer and thematic representation acts as a decision support tool for planners and makes it possible to go beyond the national framework to appreciate better the exploitation development impact. The server is available on the Internet URL: http://www.oss-online.org/geoaquifer.

NWSAS-GEOSASS: The GEOSASS Map Server application is a map server intended to present Northern Sahara aquifer zones survey results lead by SASS project partners. These results lead to the publication of geographic and statistical data. The purpose of this site is to present and valorize these results. This site uses Java technologies for statistical results presentation and mapping navigation: Java Applet for navigation, with JavaScript components for the toolbar J2EE architecture based on Struts framework Dynamic JavaScript elements (tables, trees) for an enhanced browsing experience Advanced graphics (Java Applet) to present results (pie, charts, graphs). This geographical metadata and data server allows a reply to the main question asked day after day by the staff responsible for the management of natural and agricultural areas: what geographical data exist in the area?, and to the corollary question: what is, on ground, the extension on ground of the data?. Geographical or localized data presented in our server is dedicated to desertification and environmental monitoring and made with datasets including resources. Metadata describes both dataset and their resources. GEO-OSS is dedicated to: Dataset and resources retrieving, within our geo-catalogue, according to their extension and main attributes (search page), Check the extension of datasets and their main features and display a preview of datasets (result page), Display the resources of each dataset, if available in the geo-catalogue (display page), Display the entire metadata of a dataset and to download its resources, if they are available in the geo catalogue and free of charge.

NWSAS-SAGESSE: The SAGESSE database was created in 2000. It allows standardizing the hydrogeological data collected, so as to meet the needs for the hydrogeological modeling of SASS. It was initially intended to store data on SASS water resources and organize it according to suitable formats. The development of the SASS project, however, revealed the need to transform this database into an integrated information system including the database itself, a suit of mapping tools and the model. The system has been oriented towards the monitoring of the concerted management, both on the technical and political levels. It is updated by data collected periodically by national technical services from a monitoring network. The management of the data is performed by the database administrator based at OSS. Experts from Algeria are responsible for the collection, processing and editing of data supplied by the SASS common monitoring network, in compliance with the required formats. They are also requested to send new data to the database administrator who gathers and harmonizes them. The data sets are subsequently validated through an exchange between the national experts and the central administrator. It is finally up to the OSS scientific managers to analyze the information and to draw the relevant elements, which will then be submitted to the decision makers in Algeria.

MRE-PDARE: As discussed before, the German GTZ has conducted a joint project with the MRE in Algeria and funded the third phase of the PDARE project that included monitoring networks for groundwater hydraulics and quality. The third phase of this project has started to implement the basics for a management information system that can be used for the integration of Algerian water resources. The schematic of the information system is shown in the following figure. It is mainly a dynamic access database information system that is continuously updated with new monitored data. It is dedicated for basin level water resources management and located at the MRE PDARE management unit. It is not available for public access.

ANRH-Access Databases: ANRH hosts a group of database management information systems that are built using the access databases. They are in-house database systems and cover all aspects of water resources monitoring data. BASHYD200 is a climatology database; BADGE2000 is a hydrogeology database; and SIQUEAU2000 is a water quality database. It is not available for public access. These databases are connected to a geographical information system and contain 70,000 data point (boreholes, wells and springs) archived. These databases are continuously updated on regular intervals and made available to all institutions working in related areas to water and sanitation in the form of reports and published bulletins. They are used mainly by the ANRH for water resources assessment, management and monitoring in terms of quantity and quality. After being updated, the data is transferred to the MRE Data Center. Moreover, an access database has been developed in the ANRH in 2006 called HYDRACCESS. This access database has a user friendly interface that allows storing various types of hydrological data. It can be used to process data and also has the function of analyzing rainfall data for small and large catchments.

2.9.2. *Mauritania*

CNRE-SIPPE2: The center hosts an in-house SIPPE2 access database system that is used in storing all information related to groundwater using readings taken from wells from across the country. The SIPPE2 is linked to a geographical information system. While, the SIPPE2 cannot be described as an Information System, yet, it can form the nucleus of a very successful one if directed towards the right track with sustainable funding and a supportive wide monitoring network. It is a database inventory system of well water points with more than 14,000 data point staring from the 1980 till now. It generates a list of points (wells and boreholes) by wilaya and municipalities, as well as their geographical location (maps). It monitors piezometric groundwater used (water catchment areas and Trarza). Data is stored in Microsoft database and are only processed occasionally for specific needs (demand). Data is not verified and no quality control is available. It is not used for monitoring but rather for storage at this stage. It is operated by 3-4 center personnel and installed on 3 desktop computers in the center information unit. Most of the data stored is outdated and only taken the first time the well is drilled and never updated. The data for groundwater levels are not used for evaluation of ground water resources in Mauritania. While, it contains some info about population, the records go back to the year 2004. It is to be noted that there is a lack in the number of piezometers for recording groundwater table. The data available does not provide complete coverage for the whole country and there are no clarifications for the roles of both DAR and CNRE with respect to monitoring of surface water.

OMVS- Environmental Observatory Unit: The database of the Department of Rural Development (focal point of the Environmental Observatory/ OMVS) provides information on dams and their watersheds (surface water) and collects data on surface water. It has an inventory and characteristics of dams (creation date, basin area, volume, rivers...), hydrometric data; thematic maps by wilaya; IGN maps geo-referenced to1/200 000; satellite images are interpreted and analyzed.

BDD & PND: They provide some interesting but localized hydrological data. It has a set of records giving information about localities, fishing sites, occupation of Typha, water systems...). Also it gives water surface data and quality of surface water. BDD meteorological service of the department of Agriculture provides data on 30 parameters related to temperature, humidity and rainfall. It has database of satellite images that provide vegetation indices from 1884 stored in digital format.

IMROP: It provides hydrographic services and hydrological data.

EMIS Environmental Affairs Service of the Department of Mines and Geology (DMG): provides data still partial, which include: Water points, map of aquifers, Streams and lakes, Atmospheric data, Deposits and mining indices, Inventory of species of flora and fauna and some regulations on the environment.

DPSC Information System: Lately the Ministry of Water & Sanitation launched an implementation program for an information system in rural & urban water supply and sanitation. Due to insufficient funds, the program is not yet implemented and generalized throughout water sector institutions, but simple infrastructure for the system are available at the Department of Planning Monitoring & Evaluation. The Information System is written in MySQL programming language with ability to be linked with SIPPE of the CNRE and ability to be fed by the monitoring key indicators. It is designed as a tool for data management and decision support for planners. It has an enhanced reporting tool that allows organization of information in a summary relevant to facilitate data analysis. The system relies on a two-time reporting; executive summary quarterly and annual report. These summaries are intended to

present a decision support and monitoring for institutional performance, will demonstrate, beyond the simple observation, the weaknesses related to institutional and remedial measures to be adopted and annual monitoring of the pace of progress in the implementation of the MDGs. The following figures show the structure of the DSPC information system and a sample structure for the executive summary report.

2.9.3. *Libya*

MIS or DBMS is available in some institutions but not universally. It is available at the shared basins levels as well. Where it is used, it is mostly functional.

NSAS has the NARIS database functioning but only fed with historic records and still needs to be updated with new data sets (available at: http://www.nsasja.org).

NWSAS has an ACCESS database that is still under construction.

GWA uses An Online Information Management System (Schlumberger HydroManager) that is compatible with all other relational Database Management Systems (RDBMS).

All other departments utilize MS Excel for data storage.

2.9.4. *Tunisia*

MIS or DBMS is available in some institutions but not universally. It is available at the shared basins levels as well. Where it is used, it is mostly functional.

A system of management information system (MIS) or Database management system (DBMS) is often available, functional in use in most organizations and institutions involved. At DGRE, it is the SYGREAU, which is a sub-system of the SINEAU.

This DBMS is available, functional and usable. Initially, it was available for three governorates only: Jendouba, Kairouan and Gabes; today it has been generalized to all 24 governorates and all regional services of DGRE can access and use this system.

This system enables the management of data on water resources and more specifically: (i) management of surface water: rainfall data and flow data, (ii) groundwater management: shallow wells, boreholes (wells and piezometers), water quality, groundwater surveys, artificial recharge of groundwater. This system is shared by the CRDA and especially by the water resource districts and directions and departments of the central DGRE.

SYGREAU can manage databases of surface water and groundwater in real time between DGRE and the regional services. It offers the possibility to use the data from the regions, as well as the possibilities and opportunities for interfacing with existing software for collecting and processing information (HYDROM, PLUVIOM, SYCOHTRAC, EXPL, DRILLING, DIDCOT, etc…).

It also helps to harmonize the templates of the documents produced at the DGRE and its regional services (directories, sheets of water points, memos, and reports) and to facilitate the exchange, access and including information sharing with regional water resources.

The information is prepared in digital form, entered into a management system database, friendly (Hydraccess for rainfall), while for the piezometric data and water quality, data will reside SYGREAU, knowing that it needs to be better assimilated to become more user friendly.

Mapping resource was conducted in all regions in a digital format, but sometimes only in paper format, while inventories of resources are available for each governorate, but some of them deserve to be updated.

DGRE also has a collection of hydrological measurements in real time (SYCOHTRAC), which allows the acquisition, collection, processing and dissemination of information in real time, making it possible for rapid decision making during heavy rainfall, storm events, and floods. It is an operational early warning system for just apprehension of climatic events, launching early warnings to safeguard people and property against the devastating effects of extreme events. It includes: i) a network of 130 stations of rainfall and water levels for wadis and dams, powered by solar panels, storage and transmission of data through are automatic via mobile phone network (GSM); ii) Eleven call centers and consulting data, based on DGRE, the DGBGTH, and the CRDA); iii) A computer system (WINMONI) and alarm collection and validation of data in the database SYCOHTRAC.

The sycohtrac is also a tool for decision support that allows the consultation and data visualization in real time. Software (PHY) (Rainfall, Hydrometry) allows access to the database through web technology via the intranet (AGRINET) of MARH allowing operators and decision-makers: (i) to consult the database in forms tabular and / or graphical; (ii) to publish newsletters or hydrological rainfall situations; (iii) and take appropriate decisions in time.

All other departments utilize MS Excel for data storage.

2.9.5. *Egypt*

There are historic data for trend analyses for many years. OSI inventory consists of hydrologic, environmental, and socio-economic data, and is coordinated with modeling and information management activities conducted under Eastern Nile Planning Model (ENPM) and the Nile Basin Water Resources Planning and Management Project, particularly the Nile Basin Decision Support System (NB-DSS) Component, which includes development of databases and analytical tools for the Eastern Nile and overall Nile basin.

MIS or DBMS is available in some institutions but not universally. It is available at the shared basins levels as well. Where it is used, it is mostly functional.

NWRP has the NWRP database (just finished its development) that focuses in M&E&R of NWRP implementation. It is planned to develop links between other MWRI DBMS and models like (ASME, RIBASIM, and DELWAQ) to help in decision making. NWRP system receives the progress and impact data from dedicated units at the relevant ministries in Egypt. These units carry out the day to day work and in continuous contact with the NWRP at MWRI. The NWRP M&E system includes approximately 120 indicators to follow up the implementation of the 39 measures of the plan and 15 indicators to assess the impacts. All involved stakeholders have agreed upon those indictors but then there were left to each responsible stakeholder to define how it can be measured .The indicators are updated every 3-6 month and they are collected in paper format. This will change shortly as there is an online system that will be launched and users will be able to access the system to update and view the data.

NSAS has the NARIS database functioning but only fed with historic records and still needs to be updated with new data sets (available at: http://www.nsasja.org).

All other departments utilize MS Excel for data storage.

More than one DBMS is available for Egypt: NWRP DBMS, MSEA DBMS, CAPMAS DBMS, among others. That means that the required personal and technical capacity for managing and operating such powerful databases not only on the central level but also on the non-central level is available.

Access to the data can be controlled like any sound database. Any of these databases can offer limited access for data viewing and editing according to need.

MoHP and MSEA typically store collected information in paper sheets and the either archive the paper files or fill simple excel sheets with unclear documentation methodology. However, HCWW and EWRA utilize a web-based DBMS (termed MARS) for data entry. MARS can be accessed at: www.mars.hcww.com.eg.

MARS is GIS based, with employed models to calculate performance indicators, analyze systems (water networks losses, wastewater networks, wastewater treatment plants, cost recovery, etc..). The quality of analysis and storage is fair. Access of information is easy. However, data is not gender disaggregated.

Data are recorded and stored in special forms at sites and labs. They are submitted to the main office of each governorate to be digitized and emailed to the central office in Cairo for analysis. Digitized data analysis is carried out using simple programs (Excel). The processed data is used to form an annual report to be communicated to the Prime Minster office. Some information is sent to CAPMAS to be included in the annual yearbook (e.g. CAPMAS, 2012). In addition MSEA share some water quality information with MSEA to be included in the annual State of Environment Report. Violations are dealt with immediately in cooperation with the HCWW.

Data are recorded and stored in special forms at sites and labs. They are keyed in directly to MARS using the computer infrastructure of the HCWW subsidiary branches and labs. MARS is programmed to carry out data analysis and to calculate over 90 performance indicators. However, data presentation is lumped for the subsidiary company as a whole with no option to view more disaggregated data. The processed data is used to form an annual report by EWRA to be communicated to the Prime Minster office. Some information is sent to CAPMAS to be included in the annual yearbook (e.g. CAPMAS, 2012). In addition MSEA share some water quality information with MSEA to be included in the annual State of Environment Report.

3. Countries Progress in N-AMCOW Indicators

3.1. Water and energy

Increase of hydropower utilization by 10% from 2000 to 2015 is the target.

Country	2000	2008	2009	2010	2011
Algeria	0	430%	545%	670%	800%
Mauritania	0	0	0	0	133%
Tunisia	0	83%	-12%	38.7%	28.3%
Libya	NA	NA	NA	NA	NA
Egypt	0	2.13	2.31	2.31	2.92

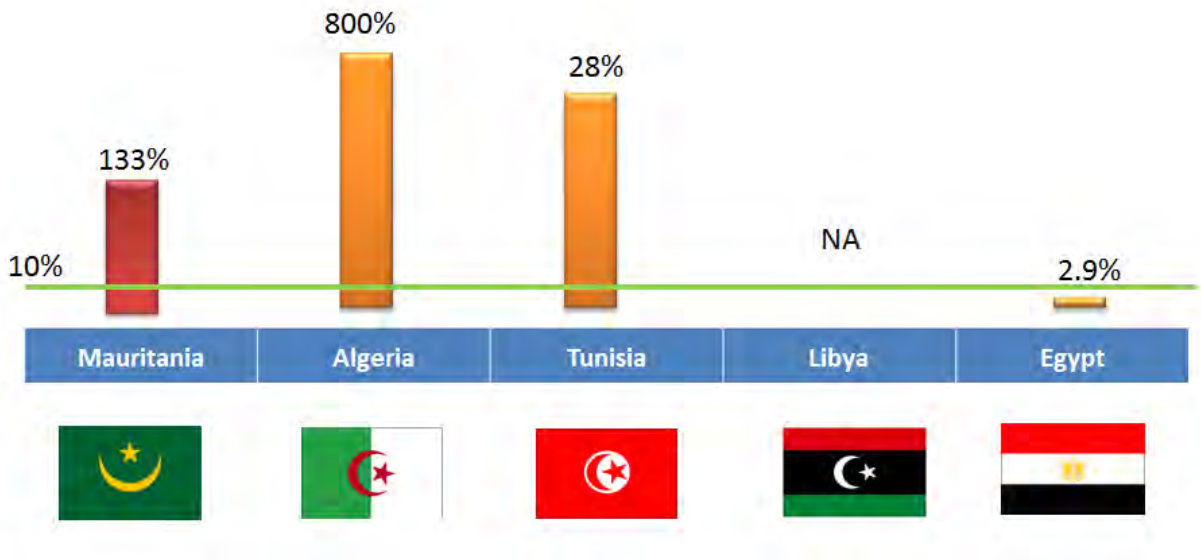

Figure 7. Water & Energy Indicators across the 5 North African countries

3.2. Water and agriculture

Increase of water productivity rain fed agriculture and irrigation by 30% from 2000 to 2015.

Country	2000	2008	2009	2010	2011
Algeria	0	0.8%	1.2%	18.4%	57.6%
Mauritania	0	20%	31%	34%	-26%
Tunisia	0	52.6%	22.2%	68%	50%
Libya	0	42%	38%	41%	NA
Egypt	0	58	102	91	95

Increase of size of irrigated areas by 50% from 2000 to 2015.

Country	2000	2008	2009	2010	2011
Algeria	0	100%	113%	133%	157%
Mauritania	0	8%	-37%	23%	50%
Tunisia	0	2.7%	2.9%	3.2%	3.95%
Libya	0	20%	23%	25%	28%
Egypt	0	7.61	12.1	11.55	10

Numbers are cumulative in the above table

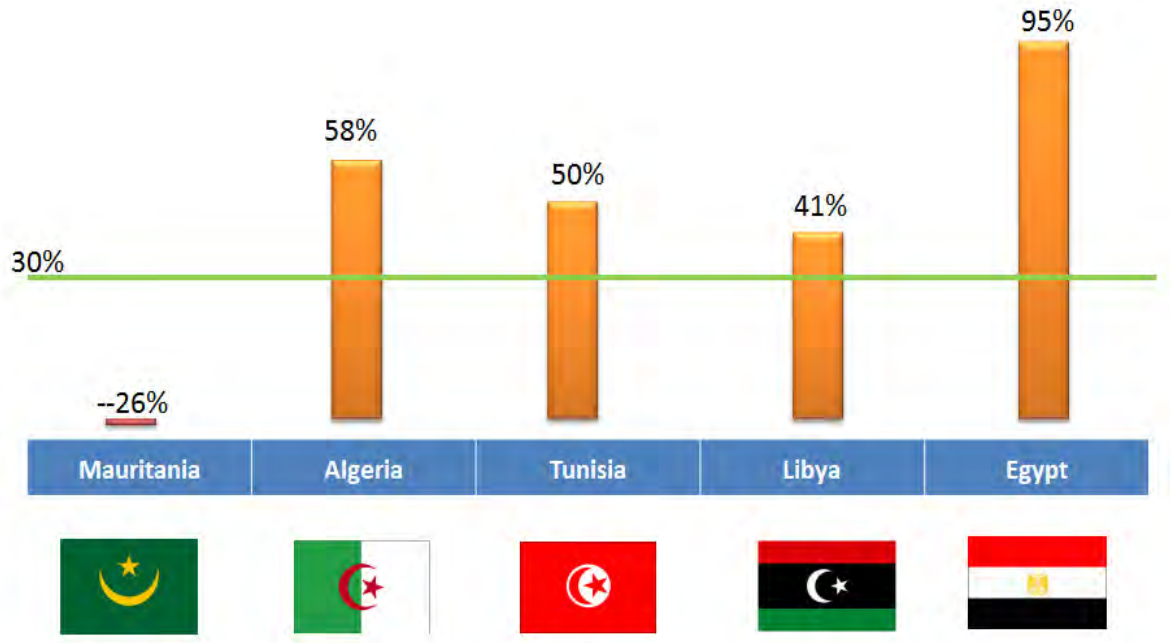

Figure 8. Water & Agriculture Indicators across the 5 North African countries

3.3. Water and multiple uses

Increase of water demand satisfaction index by 10% from 2000 to 2015.

Country	2000	2008	2009	2010	2011
Algeria	0	45.9%	53.6%	57.9%	62.6%
Mauritania	0	-3.6%	-6.9%	1.1%	-22%
Tunisia	0	4.34%	42.47%	2.9%	0
Libya	0	-6.8%	-8.5%	-10%	-11.6%
Egypt	0	-15	-17	-14	-16

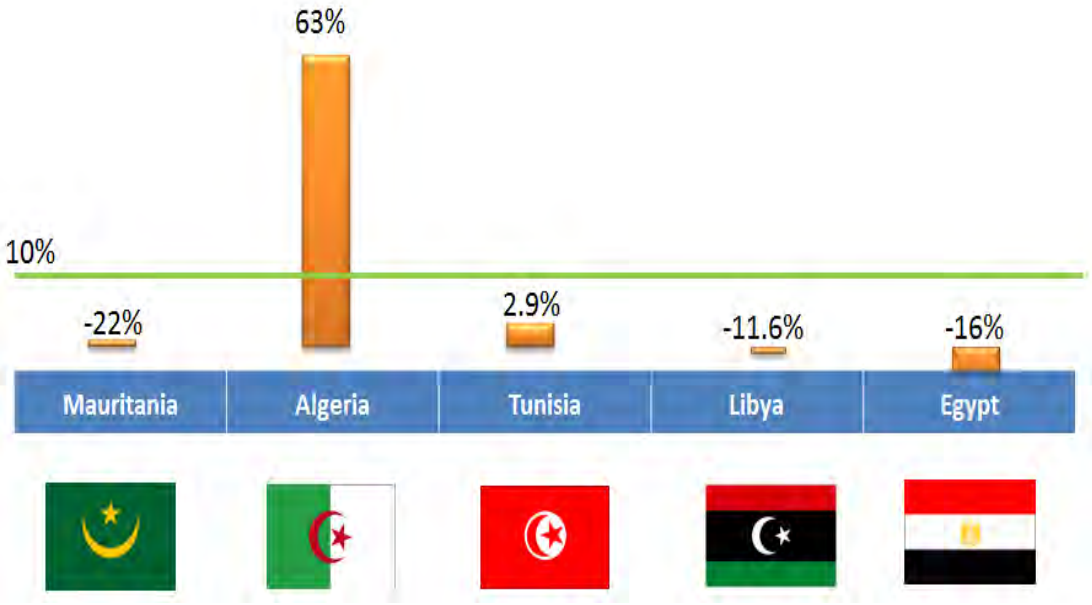

Figure 9. Water & Multiple Use Indicators across the 5 North African countries

3.4. Basin and Transboundary water resources management

Target is to develop a national water efficiency plan by 2015.

Algeria:

The Water Law of 4 August 2005 established a master plan of development of water resources which will determine the basis of supply and demand for water.

Mauritania:

Mauritanian Water Law (Law No. 2005-30 February 2, 2005, establishing the Code of water), calls for the completion and adoption of a National Management Plan Director and management of integrated water in the context of the IWRM.

Tunisia:

The water code developed in 1975 is being revised and / or consolidation, to update it and its adaptation to current conditions. It remains the most appropriate instrument for the preservation and protection of water resources. The recent Renaissance of the National Council of Water (Decree No. 407/2010 dated March 9, 2010) will assist the Minister to decide on strategic issues in the sector, while involving all stakeholders in the water, including civil society.

Libya:

Water Law (2) / 1982 and Environment Protection and Enhancement Law (15)/ 2006 are in place along with several decrees. The National Strategy for Integrated Water Resources Management (2000 – 2025). Water pollution control and water quality standards are in place. Existing policies and annual plans on level of ministries concerned with water supply and utilization.

Egypt:

The National Water Resources Plan (NWRP) for Egypt 2017 published in 2005. The main aim of the NWRP is to provide direction and guidelines to all ministries, agencies and institutes working in Egypt's water sector in one form or another, in order to achieve its particular objectives related to water.

3.5. Rainwater

Target is to increase the share of rainwater use in total municipal water consumption up to 10% by 2015.

Algeria:

In Algeria, the collection of rainwater from roofs for domestic use is virtually absent in urban areas. In rural areas, it is convenient for watering livestock or for irrigation of small plots very small.

Mauritania:

Rain water is not controlled in Mauritania.

Tunisia:

Encouraging the use of rainwater

Libya:

A national program on rainwater harvesting has been initiated. New dams are under construction along with reservoirs for collection of rainwater. Rainwater has been traditionally harvested by a very small number of people for domestic purposes. The amount harvested is negligible.

Egypt:

Rain water is not controlled.

3.6. Urban and rural water supply and sanitation

Target is to reduce by 50% the proportion of population without improved drinking water source and the proportion without improved sanitation facility 1999 to 2015.

Achievements in water supply

Country	1999	2008	2009	2010	2011
Algeria	0	59%	63.6%	68%	72.7%
Mauritania	0	28%	38%	41%	51%
Tunisia	0	89.4%	90.2%	91%	91.5%
Libya	0	18	20	21	19
Egypt	0	100	83	83	66

Achievements in sanitation

Country	1999	2008	2009	2010	2011
Algeria	0	42.8%	46.4%	50%	53%
Mauritania	0	13%	16%	23%	40%
Tunisia	0	39%	40%	41%	41.6%
Libya	0	10	11	12	11
Egypt	0	4	14	19	23

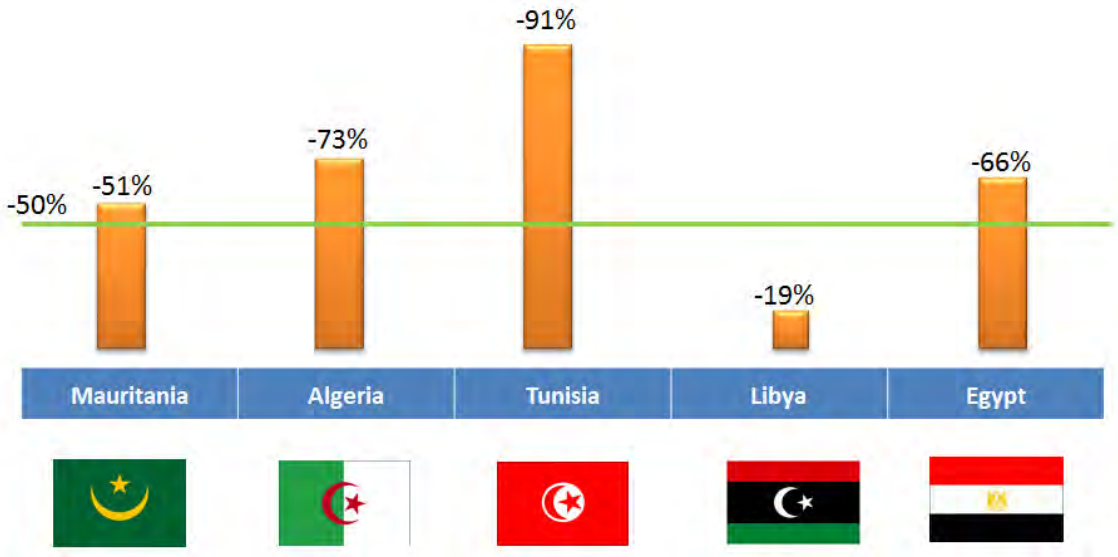

Figure 10. Achievements in Water Supply for the 5 North African countries

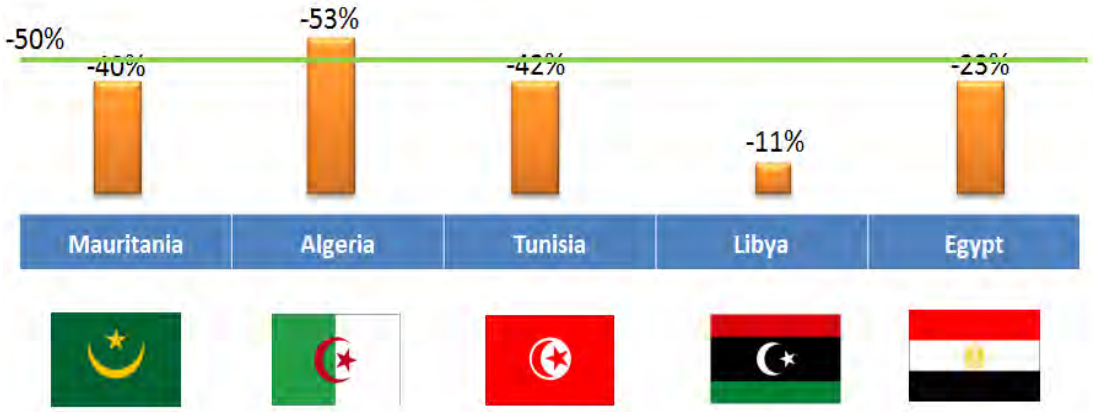

Figure 11. Achievements in Sanitation for the 5 North African countries

3.7. Adaptation to Climate Change

Algeria:

There exists a national climate adaptation plan. The Ministry of Environment and Territorial Planning coordinates the "National Climate Plan" and the scheme of National Regional Planning in which integrate all sectors and backgrounds 2025-2040. National Climate Change unit has been created to support the impact of climate change on water resources (Study available) and adaptation.

Mauritania:

The development in 2004 of the National Action Program for Climate Change adaptation is being updated since 2011. The creation in 2005 of the National Environment and Development (CNED) and its decentralized bodies called Regional Councils Environment and Development (CRED).

Tunisia:

A national adaptation strategy of Tunisian agriculture and ecosystems to climate change (MARH, 2006) and a study on the protection of ecosystems and adaptation to climate change (MEED, 2007), have been developed. This strategy is based on sectoral strategies related to water resources, ecosystems, agro-ecosystems and the agricultural sector as a whole.

Libya:
The National Committee for Climate Change (CC) has been formed; it is headed by the Environment General Authority with members from 14 concerned ministries and institutions. The Ministry of Water Resources is a member in this Committee.A National Project for Studies of Climate Change has been started by the National Authority for Scientific Research to study and research the phenomenon and its impacts on Libya. Libya has endorsed / ratified all CC conventions and participated in most Climate Change Panel Meetings. However, the overall institutional framework is still weak and little concrete results have been obtained.

Egypt:
Egypt launched a program called Climate Change Risk Management (CCRM) in 2008. The program aims at developing a two part strategy to help mitigate the effects of climate change and adapt to climate change.

3.8. Water-related Hazards

Target is to establish at least 1 Early warning System for disaster prevention at national level by 2015.

Algeria:
The State has created in 2010 a delegation to natural risks and Early Warning Disaster prevention System. Specific actions taken so far for the milestone:
Drought; Rainfall monitoring network and early warning system: The National Agency of Water Resources publishes a monthly newsletter about the evolution of rainfall and water deficits. The National Meteorological Office publishes a newsletter for seasonal forecasts to maturity of 03 months .Flood: - A special weather report is issued in case of heavy rains. Mapping of flooded areas and flood is available . Two warning systems and flood forecasting are operational. A generation operation of this system is going to all the national territory. Water Quality: A network of monitoring the quality of surface and groundwater is operational.Coastal Management: An agency under the Ministry of Environment has been created for this purpose .Wetlands: these are listed, classified (Ramsar Convention) and are subject to monitoring and conservation.

Mauritania:
Mauritania, like other countries, has included disaster risk management into its overall policy of sustainable development. Mapping of vulnerable areas and likely hazards and disasters in Mauritania extends over the Atlantic coast line by staying the Senegal River and overlaps and turns on the axis Nema-Nouakchott; Tintane is a prime example which demonstrates how a city becomes part of a wetland. Unfortunately, so far, it is the ex post security measures that are taken when needed, instead of policies and measures for the prevention of hazards and disasters. This sector management interventions inhibit the actions and limit the effectiveness of the policy managements of risks and disasters are closely related to prevention measures and emergency plans development both safe but also and especially preventive.

Tunisia:

For the prevention and management of flood risks, the DGRE has put in place in 2008, a system to collect hydrological measurements in real time and announcements of flood in Tunisian wadis (SYCOHTRAC). This system allows the acquisition, collection, processing and dissemination of information in real time, enabling a quick decision during heavy rainfall and floods. It is a network of operational alert for a good understanding of climatic events, providing early warnings for the protection of property and persons against the devastating effects of extreme events. In addition, the AMU countries have established a Maghrebian observatory for the drought, which is a part of the drought early warning system (SMAS) project. Similarly, the DHMPE of the Ministry of Health is also working very hard at the prevention and management of health risks associated with water and the environment in case of natural disasters. Regarding the monitoring of the state of drought in different meteorological stations in the country, INM develops cards of Standard Precipitation Index (SPI); the mapping of this index shows the areas that are affected by drought.

Libya:

The Establishment of the National Safety Authority in 2008 which is affiliated directly with the Prime Ministers Council was a significant step, its mandate includes water disaster management. Equally important was the establishment of the Environmental Emergencies Administration in the General Environment Authority whose mandate includes environmental monitoring and disaster mitigation.

Egypt:

The Flash Flood Manager (FlaFloM) project began in 2007 and was completed in 2009. It was coordinated by the Egyptian Water Resources Research Institute (WRRI) and the Belgian consultant company SORESMA together with the Vrije Universiteit of Brussels (VUB). The main result of the project was an accurate flash flood early warning system which can provide the necessary lead-time for local authorities to take emergency actions to minimize the number of victims and limit damage to property.

3.9. Institutional arrangements

Target is to update, by 2015, water sector policy reforms that reflect good governance principles of: (i) partnership commitment; (ii) ethics -transparency, equity and fairness; (iii) responsibility and accountability; (iv) inclusiveness, participation, predictability and responsiveness; and (v) coherence.

Algeria:

Elements on Partnership and commitment:

5 cities are managed according to the principle of Public Private Partnerships for Water and Sanitation, 13 Desalination performed according to the BOO, The hydraulic model are managed according to the concession (sewage or water treatment,..).

Elements on Ethics - transparency, equity and fairness:

Contracts are concluded in the principle of transparency and fairness. A law regulating public procurement (Presidential Decree No. 10-236 DU07 Oct. 2010) organizes this process. Submissions are subject to public opening.

Elements on Responsibility and accountability:

The same Decree 10-236 clarifies rules and sets sanctions.-.

Elements on Coherence:

Planning is carried out at the Ministry of Water Resources who appreciates the appropriateness of the transaction. It is then submitted to the Ministry of Finance for consideration and approval by the arbitration board.

Mauritania:

Elements of the legislative and legal environment:

The water code (Ordinance No. 85-144, July 4, 1986, as amended and repealed by Law No. 2005-30 February 2, 2005, water Code) which defines some principles database which, is, the responsibility of the operator of areas irrigated with the use rational water;

Elements of institutional arrangements:

Since 2005, a consultation with the various stakeholders involved in the water sector has been initiated to ensure better visibility of the sector and enhance coordination. A sectoral review of the rural sector was organized in June 2005 followed by a round table of donors in 2006 to mobilize financial resources for the achievement of the Millennium Development Goals (MDGs). In 2007, a review of public expenditure in the sector was organized and a National Water Council, established under the Water Code, held its first session in 2009.

Elements on the partnership and commitment:

The development and normal functioning of constitutional institutions, (ii) the organization of presidential, legislative and municipal pluralist and transparent, (iii) normal operation of political parties; (iv) settlement of the human liability following the events of 1989, the organization feedback and reintegration of Mauritanian who moved across national borders after these events, (v) the adoption of the Law on criminalization of slavery and punishing slavery paired with the implementation of a Program of Eradication of Slavery Late effects (vi) the continued work of codification and improving the operation of justice sector (vii) the establishment of a National Commission on Human Rights (viii) capacity development of Parliament and the establishment of a High Court of Justice (ix) the launch of process reorganization of the public service, the human resource development and the online inventory paperwork, service portals and public platform of Administration;

Tunisia:

Elements of the legislative and legal environment:

Restructuring of BPEH, revision of the Water Code, establishment of the national Water Council ,workshop to launch and implement the development project of SINEAU (26/03/2013) ,national consultation workshop on the review and analysis of the state of implementation of strategies and / or action plans for wastewater in Tunisia (05/03/2013)

Elements on Partnership and commitment:

ONAS has already initiated activities in partnership with the private sector for the operation of sanitation facilities (network, pumping stations and treatment plants). The rate of private sector involvement in the operation of the infrastructure was 12% in 2005, rose to 16% in 2011. Similarly SONEDE intends financing, building and operating sea water desalination plant of Djerba by BOT concession contract.

Elements on Ethics - transparency, equity and fairness:

Existence of legislative and regulatory frameworks

Elements on responsibility and accountability:

Each institution knows and accepts responsibility for his actions, existence of legislative and regulatory frameworks

Libya:

Elements on Partnership and commitment:

Policies of institutions don't address partnership explicitly while partners' roles are not well defined and exclusive. Overlapping exists in roles. Coordination and cooperation are unstructured. Commitment varies with institutions and their capacities. Lack of monitoring and accountability leaves the door open for institutions to be completely committed or not committed at all.

Elements on Ethics - transparency, equity and fairness:

Establishment of the National Congress as a representative system whose members are accountable to their constituents. Establishment of a transparency Committee within the Higher Judicial system of Libya. Establishment of several water/environment non-government organizations. Establishment of many mass media organizations (papers, radio and television stations)with a multi-faceted role of informing and uncovering of government actions.

Elements on responsibility and accountability:

These elements are not always stated clearly in regulations; moreover, their applications are very limited.

Elements on inclusiveness, participation, predictability and responsiveness:

These elements are not well defined. Role of stakeholders is evolving slowly and is "unseen" presently. Use of private water sources and independence of users from the government may be the cause of this poor participation. Predictability and responsiveness are neither well defined nor addressed in water policies.

Egypt:

NA

3.10. Financing Local Authorities

Target is to allocate immediately 0.5% of GDP to water and sanitation

Country	2008	2009	2010	2011
Algeria	NA	NA	NA	NA
Mauritania	0	0.01%	0.026%	0.5%
Tunisia	0.25%	0.26%	0.22%	0.27%
Libya	4.8%	5%	4.4%	NA
Egypt	0.42	0.48	0.37	0.22

Target is to allocate immediately 5% of national budget for water and sanitation

Country	2008	2009	2010	2011
Algeria	NA	NA	NA	NA
Mauritania	1.93%	3.5%	2.49%	1.35%
Tunisia	2.17%	2.3%	2.35%	2.4%
Libya	14.4%	14.9%	13.1%	NA
Egypt	1.41	1.53	1.20	0.67

3.11. Pricing Strategies

Target is Set by 2015, water tariff system that addresses cross-subsidy and the need of poor.

Algeria:

Existing

Tariff Structure:

Consumption categories	Rate (local currency)
< 25 m^3	1 6.30 DZD / m^3
26 m^3 to 55 m^3	2 20.47 DZD / m^3
56 m^3 to 82 m^3	3 34.65 DZD/ m^3
> 82 m^3	4 40.95 DZD / m^3

1DZD=0.00896EUR

Adjustments for cross-subsidy:

Adjustments	Rate
Industrial	40.95 DZD/m^3
Commercial	34.65 DZD/m^3
Regional Adjustment	Very minimal

1DZD=0.00896EUR

Mauritania:

Tariff Structure:

Operator	SNDE	ONSER	Delegate	Other
Pricing UM / m^3	99-367	100 to 260	168 - 300 up to 800	70 to 500

1UM=0.00244EUR

Adjustments for cross-subsidy:

Consumption categories (m^3)	Rate (local currency)
<20 m^3	99 UM/ m^3
> 20 m^3	367 UM/ m^3
fee of the water provided to NWRC	3 lUM/ m^3

1UM=0.00244EUR

Tunisia:

Tariff Structure:

Consumption categories (m^3/trimestre)	Rate (local currency mls/m^3 and USD/m^3)
0-20	145 mls/m^3 which is 0,09 USD/m^3
21-40	250 which is 0,156
41-70	315 which is 0,198
71-100	575 which is 0,360
101-150	700 which is 0,439
151-500	975 which is 0,611

≥ 501	1025 which is 0,643

Adjustments for cross-subsidy:

Adjustments	Rate
Hydrant (Standpipes)	145 mls/m^3 = 0,09 USD/m^3
Tourism	1025 mls/m^3 = 0,643 USD/m^3

Fixed charges are in addition to this fee, the value is determined by the diameter of the counters: D15 (DT 3,800 / quarter), D20 (7.050), D30 (13,030), D40 (23,900), D60 and D80 (60,800), D100 (97,700) and D150 (255,000). This tariff reflects the equalization and access for the poor (social group) and encourages saving water.

Sanitation services pricing

Consumption categories (m^3/quarter)	Rate in millimes/m^3 and USD/m^3	Fixed charges in millimes and in USD
0-20	17 mls/m^3 = 0,010 USD/m^3	1310 mls = 0,821 USD
21-40	28 (entre 0-20) then 170 (entre 21-40) soit 0,017 then 0,107 USD/m^3	1310 mls = 0,821 USD
41-70	170 then 269 (entre 21-70) soit 0,107 then,169 USD/m^3	3860 mls = 2,420 USD
71-100	269 (entre 0-70) and 445 (entre 71 et 100) = 0,169 then 0,279 USD /m^3	7600 mls = 4,765 USD
101-150	282 puis 467 (entre 71-150) soit 0,177 puis 0,293 USD/m^3	7980 mlssoit 5,003 USD
>= 151	282 puis 572 (à partir de 71) soit 0,177 puis 0,359 USD/m^3	8211 mlssoit 5,148 USD

Libya:

Tariff Structure:

Consumption categories (m^3)	Rate (local currency)
No category	0.25 LYD/ m^3

1LLCC=0.5933EUR

Adjustments for cross-subsidy:

Adjustments	Rate
Industrial	0.796 LYD/ m^3

Commercial	0.25 LYD/ m^3
Regional Adjustment	None
Other? Agricultural	0.47 LYD/ m^3
Companies and public sector	1.30 LYD/ m^3

1LLCC=0.5933EUR

Tariff for rural areas if any:

None

Egypt:

Tariff Structure:

Consumption categories (m^3)	Rate (local currency)
< 10 m^3	0.23 LE/ m^3
0 m^3 to 20 m^3	0.3 LE/ m^3
0 m^3 to 30 m^3	0.43 LE/ m^3
0 m^3 to 40 m^3	0.45 LE/ m^3
> 40 m^3	0.5 LE/ m^3

Adjustments for cross-subsidy:

Adjustments	Rate
Industrial	0.95 LE/ m^2
Commercial	0.95 LE/ m^3
Regional Adjustment	NA
Other? Hotels	2.3 LE/ m^3

Tariff for rural areas if any:

None

3.12. Information

Target is to enhance by 2016, the national water and sanitation Monitoring, Evaluation and Reporting (M&E) Systems in a way to be in line with the pan African M&E.

Algeria:

The National water and Sanitation M&E plan has always existed. The planning branch ensures the coordination and dissemination between different suppliers and producers of data.

Elements of the pan African M&E incorporated:

The Northern African region initiates on financing by the African Development Bank/FAE and with the support of AMCOW, a follow-up project and Evaluation to enhance 06 across existing systems.

Mauritania:
The existence of a database on groundwater coupled with GIS, managed by the SERC and since 1998 for the Department of Hydraulics and transferred to NERC in 2001 and a underground water monitoring system water through monitoring wells installed in 18 fields with 14 feeding capturing some cities of Mauritania and 4 other well field installed on the Oasis of the Adrar, well field Tasiast the catchments area of the well field and SNIM the OMVS installed in the Mauritanian side.

The existence of a database of hydrometric major rivers; managed by the DAR and the gauging stations in the Senegal River. • The existence of a mechanism for monitoring large impoundments (Diama Foum Gleita, Tamourt Naaje)

The existence of a system for monitoring and reporting agro-hydro-meteorological promoting the development of rain fed crops managed by the DA;
The existence of a piezometric monitoring network of the Senegal River Valley
For surface water, the Directorate of Rural Development has a database on dams in Excel format and gauging stations in the Senegal River.

Tunisia:
Tunisia launched the development project and establishment of SINEAU 26/03/2013 for strengthening of the existing monitoring and evaluation and reporting systems to be in line with the Pan African M&E. There is no ''declared'' M&E water and sanitation national system, on the other hand, some institutions have sub management systems for the data from the water sector such as the SYGREAU for the DGRE, the COPEAU for the ANPE, the Sisol for the DGACTA and the aggregate monitoring system of the water sector under implementation at the BPEH, while other institutions have simple databases.

Libya:
M&E systems have been incorporated into most organs involved with water supply although at subsectoral levels only. M&E systems don't evolve from Africa-wide systems as such systems have only been in use recently. A national Water & Sanitation M&E & R system does not exist. However, annual plans are made by the General Company for Water and Wastewater, a sub-organ of the Ministry of Housing and Utilities with basic M&E&R operations.

Egypt:
An M&E and R has been established in has been established in the Holding Company of Water and Wastewater (HCWW). "The Monitoring Analysis and Reporting System (MARS) is used for the monitoring and Evaluation of the performance of the companies that are under the HCWW. The system at the beginning was used to collect the laboratory results of the water samples and was extended with time to be an online system.

4. Existing Water Related Indicators

4.1. Water Resources Indicators

4.1.1. Algeria

Table 31. Algeria Water Resources Indictors

Theme	Monitoring Indicator	2011	2014
Water Resources (MRE & NWSAS)	Volume of national water available	17billion m^3/year	17billion m^3/year
	Per capita water share	600m^3/year	600m^3/year
	Number of dams in operations	68	93
	Mobilization capacity of surface water	7.4 billion m^3/year	--
	Major irrigated area	227,000ha	270,000ha
	Number of embankments	423	581
	Aridity index**	21.8	--
Water Quality (MRE & NWSAS)	Segregated measurements for various water quality parameters, but there is no overall water quality index calculated from these measurements. Water quality parameters include: - BOD (Biochemical Oxygen Demand) in rivers: River and tributaries - Concentrations of persistent organic pollutants (POPs) in streams: pesticides, organochlorines, dioxins, etc… - Annual average concentrations of total phosphorus (river and tributaries) - Annual average concentrations of total nitrogen (rivers and tributaries) - Changes in concentrations of O2 - Concentration of E. Coli and fecal streptococci (drinking water) - Balance sheet total ionic (drinking water) - Salinity (water + water river) - Rate of siltation of dams	No available measurements	

**the Aridity index is calculated across Algeria as follow (MRE-ANRH);

Region	Precipitation (mm)	Temp (°C)	Index= P/(T+10)
Côtière(Tipaza)	600	17.5	21.8
Tellienne (Médéa)	755	14.7	30.6
HautsPlateaux (Djelfa)	296	13.4	12.6
Sahara (In Salah)	50	30	1.25

4.1.2. Mauritania

Table 32. Mauritania Water Resources Indictors

Theme	Monitoring Indicator	Type	Relevance
Water Resources	Volume of surface water available	E	+
	Volume of groundwater available	E	+
	Heights and flow aquifers (piezometric measurements)	E	+
Water Quality	Segregated measurements for various water quality parameters, but there is no overall water quality index calculated from these measurements. Water quality parameters include: - BOD (Biochemical Oxygen Demand) in rivers: River and tributaries - Concentrations of persistent organic pollutants (POPs) in streams: pesticides, organochlorines, dioxins, etc.. - Annual average concentrations of total phosphorus (river and tributaries) - Annual average concentrations of total nitrogen (rivers and tributaries) - Changes in concentrations of O2 - Concentration of E. Coli and fecal streptococci (drinking water) - Balance sheet total ionic (drinking water) - Salinity (water + water river) - Rate of siltation of dams	E	+++

+++ are the most relevant, ++ relevant, and + less relevant

E is a status indicator

4.1.3. Tunisia

Table 33. Tunisia Water Resources Indictors

Theme	Monitoring Indicator
Water Resources	Water Level
	Drawdowns
	Water resources utilization
	Surface water withdrawal rate
	Ground water withdrawal rate
	Renewable water resource
	Rainfed agricultural water
	Volumes of annual usage of non-conventional water resources
	Rainfall intensity and duration
	Water levels and volumes for dams
	Areas of rainfed agricultural and irrigated agricultured land
	Agricultural land areas with water saving irrigation equipment
Water Quality	Water quality parameters in hot spots

4.1.4. Libya

Table 34. Libya Water Resources Indictors

Theme	Monitoring Indicator
Water Resources	Water Level
	Drawdowns
Water Quality	Quality parameters (Salinity (or TDS), E-Conductivity, Sodium, Potassium, Calcium, Magnesium, Iron, Carbonate, Bicarbonate, Sulphate, Nitrate, Nitrogen Dioxide, Boron, Silicon Dioxide, pH, and total harness)

4.1.5. Egypt

Table 35. Egypt Water Resources Indictors

Theme	Monitoring Indicator
Water Resources	Annual Volume of Nile Water Available to Egypt
	# of operational wells
	Annual Volume of abstracted deep groundwater
	# of retention dams
	#of ground reservoirs
	Capacity of the rainfall and flash floods harvesting storage reservoirs
	Annual Volume of Water Harvested
	Annual Volume of brackish groundwater utilized
	Annual volume of shallow groundwater abstracted
	Total area of agricultural lands

	Total areas with improved irrigation
	Volume of Reused Drainage Water
	Area served with rehabilitated open drains
	Area of agricultural land provided with functional tile (subsurface) drainage
	Total length of endangered shoreline
	Length of coastline protected and maintained
	#of BCWUAs established
	#of WUAs established
	Branch canals command areas where IAS is providing advice
	Length of canal networks where biological or manual weed control is applied
	Length of drain networks where biological or manual weed control is applied
	# of pumping stations rehabilitated
	#of well pumps rehabilitated
	#of floating pumps rehabilitated
	Pumping Performance Efficiency achieved(%)
	Drawdowns
Water Quality	Quality parameters (Salinity (or TDS), E-Conductivity, Sodium, Potassium, Calcium, Magnesium, Iron, Carbonate, Bicarbonate, Sulphate, Nitrate, Nitrogen Dioxide, Boron, Silicon Dioxide, pH, and total harness)

Regional Water Resources

It can be noticed from the above figures that the five North African countries, except for Egypt, have succeeded in allocating available surface water for increase of hydropower production, which reached as high as 800% in Algeria. On the other hand, Egypt had utilized all available surface water for hydropower production which is limited to 55Billion cubic meters per year. Similar numbers are reported for the water utilization in rain-fed agriculture, which has increased over the year to reach 57% in Algeria and decreased in only Mauritania due to impacts of climate change on precipitation of its arid land. Volumes of national available water varied amongst the five countries reaching a maximum of 55.5billion m^3/year surface water in Egypt and 17billion m^3/year ground water in Algeria.

4.2. Water Supply & Sanitation Related Indicators

4.2.1. Algeria

Table 36. Algeria WSS Indictors

Theme	Monitoring Indicator	2011	2014
Accessibility of water	Volume of Drinking Water Produced	2.9billion m^3	3.6billion m^3
	Linear length of drinking water networks	102,000Km	105,000Km
	Connection rate to drinking water networks	94%	98%
	Per capita water consumption	170lit/day	175lit/day
	Distribution frequency of drinking water to main towns of the countries municipalities (daily)	73%	80%
Water Quality	Index of overall water quality	--	--

Theme	Definition	Frequency	Institution
Connection rate to drinking water networks	Number of households connected to water / total number of households	monthly	ADE
Per capita water consumption	Volume of water consumed / population	monthly	ADE

Theme	Monitoring Indicator	2011	2014
Sewerage and wastewater treatment	Volume of wastewater produced annually	750million m^3	--
	Number of wastewater treatment plants	61	132
	Number of stabilization ponds plants	67	107
	Treated waste water volume	600million m^3	1,200million m^3
	Length of sewage & wastewater networks	42,000km	45,000km
	Connection rate to wastewater networks	87%	95%

Theme	Definition	Frequency	Institution
Connection rate to waste water networks	Number of households connected to sanitation/ total number of households	monthly	ONA

4.2.2. Mauritania

Table 37. Mauritania WSS Indicators

Theme	Monitoring Indicator	Type	Relevance
Accessibility of water	% Population with sustainable access to safe drinking water	R	++
	% Of population connected to the public distribution network	R	++
	% Of non-functional water infrastructure	R	++
Water use and overexploitation of groundwater	Per capita consumption mobilized (per year)	P	+
	% Domestic consumption	P	+
	% Industrial consumption	P	+
	Annual water consumption of mining sites	P	+
	% Agricultural use (irrigation)	P	+

Theme	Definition	Frequency	Institution
Accessibility to drinking water in rural areas	Number of households connected to water / total number of households in rural areas	Annually	ANEPA, ONSER, ONS
Per Capita water consumption in rural areas	Volume of water consumed / population of rural areas	Annually	ANEPA, ONSER, ONS

4.2.3. Tunisia

Table 38. Tunisia WSS Indicators

Indicators	Responsible institutions
Efficiency of water distribution	ANPE
Structural index leakage	DGGREE, SONEDE, ONAS
Number of inhabitants connected to sewerage municipalities supported by ONAS	DGGREE, SONEDE
Rate of connection to public sewerage	SONEDE
Volume of treated sewage	ONAS
Volume of treated wastewater reuse	ONAS

4.2.4. Libya

Table 39. Libya WSS Indicators

Theme	Definition	Frequency	Institution
Accessibility to improved drinking water in urban and rural areas	Number of households with improved access to water or provided with potable water by government tanker trucks / total number of households	Annually	GCWW
% of population served by piped water	Number of households with piped access to water / total number of households	Annually	GCWW
% of population served by truck tankers	Number of households provided with potable water by government tanker trucks / total number of households	Annually	GCWW
Per Capita water consumption	Volume of wastewater (domestic and industrial)	Annually	GCWW
Total amount of water provided for domestic applications	m^3 sold per year	Annually	GCWW
Coverage of improved sanitation	Number of households with improved access to sanitation / total number of households	Annually	GCWW
Wastewater treated by WWTPs	m^3 treated per year	Annually	GCWW

4.2.5. Egypt

Table 40. Egypt WSS Indicators

Theme	Performance Indicator	Frequency	Institution
Accessibility to improved drinking water in urban and rural areas	Number of households with improved access to water or provided with potable water by government tanker trucks / total number of households	Annually	MDWSF
% of population served by piped water	Number of households with piped access to water / total number of households	Annually	MDWSF
Per Capita water consumption	Volume of wastewater (domestic and industrial)	Annually	MDWSF
Total amount of water provided for domestic applications	m^3 sold per year	Annually	MDWSF
% water losses	Percent of water produced but unbilled	Annually	MDWSF
Coverage of improved sanitation	Number of households with improved access to sanitation / total number of households	Annually	MDWSF
Wastewater treated by WWTPs	m^3 treated per year	Annually	MDWSF
Other indicators	Progress in developing, implementing, and assessing performance against service standards (milestone indicator)	Annually	MDWSF
Other indicators	Percent of total costs recovered by targeted subsidiaries	Annually	MDWSF
Other indicators	Percent of O&M costs recovered by targeted subsidiaries*	Annually	MDWSF
Other indicators	Percent change in volume of unaccounted for water	Annually	MDWSF

Theme	Performance Indicator	Frequency	Institution
Other indicators	Days sales in accounts receivable (aging)	Annually	MDWSF
Other indicators	Percent of collection from period's bills	Annually	MDWSF
Other indicators	Percent of collection from arrears	Annually	MDWSF
Other indicators	Progress in developing and implementing subsidiary business plans(milestone indicator)	Annually	MDWSF
Other indicators	Percent change in the volume of leakage	Annually	MDWSF
Other indicators	Percent change in chemical costs	Annually	MDWSF
Other indicators	Percent change in energy costs	Annually	MDWSF
Other indicators	Percent of samples meeting Egyptian water quality standards	Annually	MDWSF
Other indicators	Percent of samples meeting Egyptian effluent wastewater quality standards	Annually	MDWSF
Other indicators	Number of project-targeted subsidiaries producing quarterly financial and accounting statements	Annually	MDWSF
Other indicators	Percent of meters functioning in targeted areas	Annually	MDWSF
Other indicators	Percent of customers billed in targeted areas	Annually	MDWSF
Other indicators	Percent of the volume of water produced that is billed	Annually	MDWSF
Other indicators	Number of project-targeted subsidiaries producing quarterly MARS Reports	Annually	MDWSF
Other indicators	Quality of information generated by MARS*	Annually	MDWSF
Other indicators	Percent of annual R&R budget expended	Annually	MDWSF
Other indicators	Number of standard contracting documents completed	Annually	MDWSF
Other indicators	Percent of Agency Chairman receiving PM reports on a monthly basis	Annually	MDWSF
Other indicators	Percent of overall sector O&M financing which comes from customer tariffs	Annually	MDWSF
Other indicators	Percent of overall sector O&M financing which comes from subsidy	Annually	MDWSF
Other indicators	Percent of utilities submitting annual information returns	Annually	MDWSF
Other indicators	Percent of utilities submitting three year tariff studies	Annually	MDWSF
Other indicators	Number of plant operators who take a certification exam	Annually	MDWSF
Other indicators	Percent of plant operators taking the exam who are certified (pass rate)	Annually	MDWSF
Other indicators	Number of PPP transactions contracted	Annually	MDWSF
Other indicators	Value of private sector investment through PPPs	Annually	MDWSF
Other indicators	Number of people trained	Annually	MDWSF
Other indicators	Number of subsidiaries developing or updating HRD plans	Annually	MDWSF
Other indicators	Number of subsidiaries using an automated HR management system	Annually	MDWSF

4.3. National vs. JMP Water Supply & Sanitation Assessment

4.3.1. Algeria

Table 41. Water Supply coverage as calculated by MRE & JMP for Algeria

Indicator	Connection rate to drinking water networks	2011	Comments
Ministère des Ressources en Eau, MRE Algérie	Number of households connected to water networks / total number of households	94%	
Joint Monitoring Program, JMP	Number of people having piped water into dwelling, into yard, public tap or standpipe, tube well or borehole, dug well, protected spring & rainwater / total number of people	83%	JMP update 2012 is for 2010 coverage rates

Table 42. Sanitation coverage as calculated by MRE & JMP for Algeria

Indicator	Connection rate to drinking water networks	2011	Comments
Ministère des Ressources en Eau, MRE Algérie	Number of households connected to sewage networks / total number of households	87%	
Joint Monitoring Program, JMP	Number of people having flush toilet, piped sewer system, flush to pit latrine, ventilated improved pit latrine, pit latrine with slab & composting toilet / total number of people	95%	JMP update 2012 is for 2010 coverage rates

4.3.2. Mauritania

Table 43. Water Supply coverage as calculated by ONSER & JMP for Mauritania

Indicator	Connection rate to drinking water networks	2011	Comments
ONSER	Number of households connected to water networks / total number of households	94%	
Joint Monitoring Program, JMP	Number of people having piped water into dwelling, into yard, public tap or standpipe, tubewell or borehole, dug well, protected spring & rainwater / total number of people	83%	JMP update 2012 is for 2010 coverage rates

Table 44. Sanitation coverage as calculated by ONA& JMP for Mauritania

Indicator	Connection rate to drinking water networks	2011	Comments
ONA	Number of households connected to sewage networks/ total number of households	NA	
Joint Monitoring Program, JMP	Number of people having flush toilet, piped sewer system, flush to pit latrine, ventilated improved pit latrine, pit latrine with slab & composting toilet / total number of people	95%	JMP update 2012 is for 2010 coverage rates

4.3.3. Tunisia

Table 45. Water Supply coverage as calculated by SONEDE & JMP for Tunisia

Indicator	Connection rate to drinking water networks	2011	Comments
SONEDE	Number of households connected to water networks / total number of households	98%	
Joint Monitoring Program, JMP	Number of people having piped water into dwelling, into yard, public tap or standpipe, tube well or borehole, dug well, protected spring & rainwater / total number of people	96%	JMP update 2012 is for 2010 coverage rates

Table 46. Sanitation coverage as calculated by ONAS & JMP for Tunisia

Indicator	Connection rate to drinking water networks	2011	Comments
ONAS	Number of households connected to sewage networks/ total number of households	94%	
Joint Monitoring Program, JMP	Number of people having flush toilet, piped sewer system, flush to pit latrine, ventilated improved pit latrine, pit latrine with slab & composting toilet / total number of people	90%	JMP update 2012 is for 2010 coverage rates

4.3.4. Libya

Table 47. Water Supply coverage as calculated by GCWW & JMP for Libya

Indicator	Connection rate to drinking water networks	2011	Comments
GCWW	Number of households connected to water networks / total number of households	97%	
Joint Monitoring Program, JMP	Number of people having piped water into dwelling, into yard, public tap or standpipe, tubewell or borehole, dug well, protected spring & rainwater / total number of people	60%	JMP update 2012 is for 2010 coverage rates

Table 48. Sanitation coverage as calculated by GCWW & JMP for Libya

Indicator	Connection rate to drinking water networks	2011	Comments
GCWW	Number of households connected to sewage networks / total number of households	97%	
Joint Monitoring Program, JMP	Number of people having flush toilet, piped sewer system, flush to pit latrine, ventilated improved pit latrine, pit latrine with slab & composting toilet / total number of people	97%	JMP update 2012 is for 2010 coverage rates

4.3.5. Egypt

Table 49. Water Supply coverage as calculated by MDWSF & JMP for Egypt

Indicator	Connection rate to drinking water networks	2011	Comments
MDWSF	Number of households connected to water networks / total number of households	85%	
Joint Monitoring Program, JMP	Number of people having piped water into dwelling, into yard, public tap or standpipe, tubewell or borehole, dug well, protected spring & rainwater / total number of people	99%	JMP update 2012 is for 2010 coverage rates

Table 50. Sanitation coverage as calculated by MDWSF & JMP for *Egypt*

Indicator	Connection rate to drinking water networks	2011	Comments
MDWSF	Number of households connected to sewage networks / total number of households	11%	
Joint Monitoring Program, JMP	Number of people having flush toilet, piped sewer system, flush to pit latrine, ventilated improved pit latrine, pit latrine with slab & composting toilet / total number of people	95%	JMP update 2012 is for 2010 coverage rates

4.3.6. Regional WSS coverage (according to country national estimated coverage)

Table 51. Regional WSS coverage according to country national estimated coverage

Number of people in million	Egypt	Libya	Tunisia	Algeria	Mauritania	Regional	
						Population	%
Population connected to potable water	69.7	6.091	10.486	34.874	3.43	124.3748	89.15
Population connected to sanitation	9.02	6.091	10.058	32.277	3.2242	57.44563	41.17

4.4. Transboundary Indicators

4.4.1. ***Nile Basin Countries Indicators***

Water resources indicators as specified by the Nile Basin Initiative 2012 are;

Total internal renewable water (billion m^3/year), % of total actual renewable latest 2000-10, % of total withdrawal in Nile region Latest 2000-10, Agricultural as % of total withdrawal latest 2000-10, and Dam capacity m^3 per person latest available 2012.

4.4.2. ***NWSAS Countries Indicators***

The signed agreement #2 (Joint Authority Agreement, 2000b), "Terms of reference for Monitoring and Data Sharing" acknowledged that monitoring of the NSAS is essential to achieve sustainable development and management of the aquifer system. The four countries agreed to monitor and share the following parameters:

Yearly extraction specifies geographical location and number of producing wells and springs in each site.

Representative Electrical Conductivity measurements (EC), taken once a year in each extraction site, followed by a complete chemical analysis if drastic changes in salinity are observed.

Water level measurements are taken twice a year in the locations shown in the attached maps and tables. The proposed monitoring network is subject to changes upon the feedback of the National Coordinators of the concerned countries.

The SADA process has led to the selection of the following high priority transboundary parameters and indicators:

- Declining water levels;
- Water quality deterioration;
- Changes in groundwater regime;
- Damage or loss to ecosystems and biodiversity; and
- Climate change impacts.

4.4.3. ***NSAS Countries Indicators***

The multi-phased NWSAS project has been developed by the OSS with partnership from international and regional organizations (UNDP-GEF, 2011), comprising 3 phases. The following parameters are considered to be monitored:

Water table; abstractions, piezometric depressions; safe yield; loss of artesian pressure; and saltwater intrusion from 10 lakes.

4.4.4. *OMVS Countries Indicators*

Table 52. List of OMVS water indicators

Target Area	Category	Target Indicator(s)
Climatology	Rainfall	Index of decadal or monthly cumulative average gross rainfall by zone of catchment area
		Index of the average annual total gross rainfall by zone of catchment area
Surface Water (Quantity)	Flow	Flow variation
		Monthly index level of the Manantali dam
		Monthly index level of the Diama dam
	Flooding	Index of area of flooded zones
		Duration and dates of flooding
	Consumption	Monthly intensity of use of water resources of the river
		Monthly satisfaction of needs of surface water by department
		Departmental monthly rate of population using surface water as drinking water
	Prevention	Departmental index of information and user awareness of management of structures
	Dam management (Usages)	Index of satisfaction of reference support of domestic flow retained

5. Conclusions-Comparative Analysis

5.1. M&E Aspects

Table 53. Comparative analysis of M&E aspects

M&E Aspect	Algeria	Mauritania	Tunisia	Libya	Egypt
IWRM M&E frame work	Not formally available	Not formally available	Not formally available	Not formally available	Not formally available
M&E policies	embedded in the various institutional missions and are already being performed on many aspects	Not clearly embedded	Not clearly embedded	embedded in the various institutional missions and are already being performed on many aspects	Not clearly embedded
Monitoring networks	1850	14000, but mostly un-operational	5500	450	374
Water resources data collection	National Algerian experts. No data analysis is made at this stage.	National Mauritanian experts. No data analysis is made at this stage.	National Tunisian experts. No data analysis is made at this stage.	National Libyan experts. No data analysis is made at this stage.	National Egyptian experts. No data analysis is made at this stage.
Water resources data analysis	The data collected is analyzed and verified by the technical committee after being provided by national experts.	The data collected is not analyzed and not verified after being provided by national experts.	The data collected is analyzed and verified by the technical committee after being provided by national experts.	The data collected is not analyzed and not verified after being provided by national experts.	The data collected is not frequently analyzed and not frequently verified after being provided by national experts.
Water Resources data management	Data is measurable and reliable	There is a question of reliability of measured data	Data is measurable but not fully reliable	There is a question of reliability of measured data	There is a question of reliability of measured data
Water Resources information dissemination methods	Reports, Briefings, Letters, Presentations, institutional committees, webpages	Informal meetings, letters, reports	Reports, Briefings, Letters, Presentations, institutional committees, webpages	Informal meetings, letters, reports	Reports, Briefings, Letters, Presentations, institutional committees, webpages
Water Resources information	Mostly frequent	Mostly random, when needed and	Mostly frequent	Mostly random, when needed and where info is	Mostly frequent

M&E Aspect	Algeria	Mauritania	Tunisia	Libya	Egypt
dissemination frequency		where info is available		available	
WSS data collection frequency	Daily, weekly, and monthly	Annually	Annually	Weekly and monthly	Monthly and annual
WSS data quality checks WSS information dissemination method	Quality checks are not clear to be performed on collected data	General simple checks in company technical office	Good checks in company technical office	Quality checks are not clear to be performed on collected data	General simple checks in company technical office
WSS information dissemination frequency	Frequently (daily & weekly)	Random, when needed and where info is available	Frequently (daily & weekly)	Weekly and monthly	Frequently (daily & weekly)
WSS data management chain loop	Open loop with four missing links, management, data analysis, framework design, monitoring strategy	Open loop with four missing links, management, data analysis, framework design, monitoring strategy	Open loop since not all links are implemented yet	Open loop with four missing links, management, data analysis, framework design, monitoring strategy	Open loop with one missing link, framework design
WSS data management chain missing links	Above average	Below average	average	Below average	average
Database availability	Yes, MRE Database, MRE PDARE, NWSAS SAGESSE, ANRH Database, BADGE2000, SIQUEAU2000, BASHYD2000, HYDRAACESS	Yes, SIPPE2, OMVS Observatory unit, BDD & PND, DPSC	Yes, SYGREAU, SINEAU, SYCOHTRAC,	Limited, only NWSAS NARIS	Yes, NWRP database, NSAS NARISNWRP, MSEA, CAPMAS
Database used for monitoring?	Only NWSAS SAGESSE	No	No	NO	No
Database management system	Yes	No	Yes but not universal for all institutions	Under construction	Yes
Database type	Access	Access and MySQL	Excel and access	Access	Excel and access

M&E Aspect	Algeria	Mauritania	Tunisia	Libya	Egypt
User friendly	Yes	Yes	No	No	Yes
Available to public	No	No	No	No	No
Management information system, MIS	Yes, NWSAS GeoSASS	NO	Yes, SYGREAU	No	yes
GIS interface	Yes, GEOSASS	No, but OMVS database has geo-referenced maps	No	No	Yes, MARS
Internet based MIS	Yes, GEOSASS	No	Yes, but only AGRINET	Yes, GWA Database	No

5.2. Progress in N-AMCOW templates indicators

Table 54. Comparative analysis of country progress in AMCOW target indicators

AMCOW Indicator	Target	Algeria	Mauritania	Tunisia	Libya	Egypt
Water and energy	Increase of hydropower utilization by 10% from 2000 to 2015 is the target % Rate of increase = (hydropower utilization at and year – utilization at year 200) / utilization at year 2000	90% in 2011 Will be achieved by 2015	0% in 2011 Less likely achieved by 2015	28% in 2011 Mostly likely achieved by 2015	NA	Less likely to be achieved
Water and agriculture	Increase of water productivity rain fed agriculture and irrigation by 30% from 2000 to 2015. % rate of increase = (water productivity at any year – water productivity at year 2000)/ water productivity at year 2000 Water productivity=Agricultural GDP in 10^9USD/(*-total agricultural withdrawal-water returned to Environment)	58% in 2011 Will be achieved by 2015	-26% in 2011 Will not be achieved	50% in 2011 Mostly likely achieved by 2015	41% in 2011 Will be achieved	Mostly likely achieved by 2015
Water and multiple uses	Increase of water demand satisfaction index WDSI by 10% from 2000 to 2015. Target is to develop a national water efficiency plan by 2015. % increase = (WDSI at any year – WDSI at year 2000)/WDSI at year 2000 WDSI=water supply/water demand	63% in 2011 Will be achieved by 2015	-0.22% Will not be achieved	2.9% in 2010 Will not be achieved	-11.6% in 2011 Will not be achieved	Will not be achieved
Urban and rural water supply and sanitation	Target is to reduce by 50% the proportion of population without improved drinking water source and the proportion without improved sanitation facility 1999 to 2015. % of inaccessibility reduction = (access at any year – access at year 1990)/(100-access at year 1990)	73% for water and 53% for sanitation Will be achieved by 2015	51% for water and 40% for sanitation Mostly likely achieved by 2015	91% for water and 42% for sanitation Will be achieved by 2015	19% for water and 11% for sanitation Less likely to be achieved	Less likely to be achieved
Adaptation to climate change	Target is to develop and implement, at least 1 Climate Change Adaptation Strategy by 2015.	Plan exists	Plan exists but not fully implemented	Plan exists but not fully implemented	Plan exists but not fully implemented	Plan exists but not fully implemented
Water related Hazards	Target is to establish at least 1 Early warning System for disaster prevention at national level by 2015.	System established	Not yet established and implemented	Established	Not yet established and implemented	Established
Institutional arrangements	Target is to update, by 2015, water sector policy reforms that reflect good governance principles of: (i) partnership commitment; (ii)	Well arranged	Institutional arrangement is not clear	Well arranged	Institutional arrange	Well arranged

AMCOW Indicator	Target	Algeria	Mauritania	Tunisia	Libya	Egypt
	ethics -transparency, equity and fairness; (iii) responsibility and accountability; (iv) inclusiveness, participation, predictability and responsiveness; and (v) coherence.				ment is not clear	
Pricing strategies	Target is to allocate immediately 0.5% of GDP to water and sanitation	No available data	Mostly likely achieved by 2015	Mostly likely achieved by 2015	No available data	Mostly likely achieved by 2015
Financing and Local Authorities	Target is Set by 2015, water tariff system that addresses cross-subsidy and the need of poor.	Achieved	Achieved	Achieved	Achieved	Achieved
Information	Target is to enhance by 2016, the national water and sanitation Monitoring, Evaluation and Reporting (M&E) Systems in a way to be in line with the pan African M&E	Enhancements are being made and implementation is being undertaken, but no clear whether the required actions will be taken by the year 2016 to have a M&E national reporting system	Not clear what actions might be taken to reach the target	Enhancements are being made and implementation is being undertaken, but no clear whether the required actions will be taken by the year 2016 to have a M&E national reporting system	Not clear what actions might be taken to reach the target	Not clear what actions might be taken to reach the target

It is found that the water supply and sanitation coverage in all studied five countries is in a very good condition and will definitely achieve the millennium development goals by 2015 except for Libya, which is the lowest country in the water supply and sanitation coverage.

Based on the above assessment and experience gained during RAR report preparations, it is strongly recommended to revise the AMCOW indicators in order to assess the following points:

- Differentiating between the country hydropower utilization and transboundary utilization ratios
- Possibility of re-defining hydropower target indicator to account for various usages in various countries
- Differentiating between Pan African targets and Country targets and regional targets, in line with Sharm El Sheikh Declaration
- Including water efficiency plans as dictated by Johannesburg summit
- Need to include and clearly define a transboundary IWRM plan as a country target
- Clarifying the rain water use in agriculture
- The need for a clear definition for amended indicators
- The need to include IWRM as a tool for adaptation to climate change

5.3. Water Supply and Sanitation Indicators

Table 55. Comparative analysis of country water indicators

Water Indicators	Algeria	Mauritania	Tunisia	Libya	Egypt
# of water resources indicators	8	4	14	3	More than 30
Water quality indicators	measured	measured	measured	measured	measured
Water supply indicators	6	8	6	7	40
Def. of indicators vs JMP	Different from JMP and there are discrepancies between national and JMP reported rates				

For Water Supply and Sanitation indicators, it is found that all five countries use a very similar form of definition for the coverage of service, whether it is connection to drinking water or connection to sanitary sewer. This definition depends on the number of households connected to water or sanitation networks and is completely different from that of the JMP definition used. Thus, it is recommended to:

1. Make sure that harmonized WSS indicator definitions are agreed upon amongst 5 countries.
2. Definition of household and average number of people per household need to be adjusted and differentiated between 5 countries.
3. Obtain one harmonized definition for water supply and one for sanitation.
4. Utilize the DHS and MCIS performed by the JMP to fit within country data collected for WSS chosen indicator.
5. This way, the harmonized country indicators for WSS will be analogues to the JMP indicator part that collects number of households in connection to improved drinking and sanitary networks.
6. Other part of JMP indicators considering un-improved sources of water and sanitation does not need to be included since they are not considered in 5 countries.

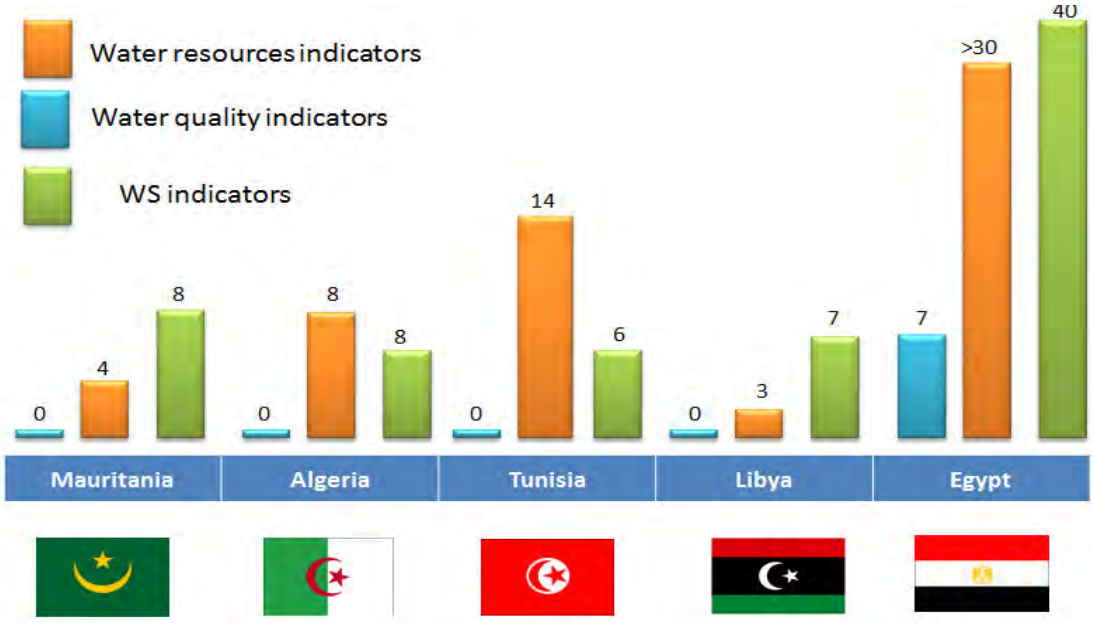

Figure 12. Indicators comparison amongst the 5 North African countries

Table 56. Comparative analysis of country categorized indicators

CEDARE/ AWC SOW indicators Report	Indicators Currently used				
	Mauritania	Algeria	Tunisia	Libya	Egypt
Water & Availability	Volume of surface water available, Volume of groundwater available, Heights and flow aquifers	Volume of national water available, Number of dams in operations, major irrigated area, number of embankments, Mobilization capacity of surface water, Volume of Drinking Water Produced, Linear length of drinking water networks, Connection rate to drinking water networks,	volume of water produced, water level, drawdowns, Renewable water resources, Volumes of annual usage of non-conventional water resources, Efficiency of water distribution, percentage coverage for urban and rural communities, pipe structural index for leaks detection, Rate of access to drinking water in rural areas, Agricultural land areas with water saving irrigation equipment,	Drawdowns, water level, Accessibility to improved drinking water in urban and rural areas,	# of operational wells, Annual Volume of abstracted deep groundwater, # of retention dams, #of ground reservoirs, Capacity of the rainfall and flash floods harvesting storage reservoirs, Annual Volume of Water Harvested, Annual Volume of brackish groundwater utilized, Annual volume of shallow groundwater abstracted, Length of canals network maintained annually, # of Control Structures improved for efficient water distribution, #of grand barrages replaced or rehabilitated, % of maintenance and rehabilitation works completed for the dam complex vs. needs, Re-planned water supply schemes to replace waterways passing through residential areas with alternative water sources,
Water and Land use change	NA	NA	NA	NA	Total area of agricultural lands, Total irrigated lands in oases, Area of oasis lands applying modern irrigation, Area of agricultural land provided with functional tile (subsurface) drainage, Area of agricultural land covered by the Matching Irrigation Supply and Demand (MISD) program,
Water and Population	Population with sustainable access to safe drinking water, population connected to	Per capita water share,	NA	% of population served by truck tankers, by pipes water	Number of households with improved access to water or provided with potable water by government tanker trucks / total number of households,

CEDARE/ AWC SOW indicators Report	Indicators Currently used				
	Mauritania	Algeria	Tunisia	Libya	Egypt
	the public distribution network,				
Water and Finance	NA	NA	NA	NA	Cumulative value of Cooperation Projects and Programs Implemented, m^3 sold per year, Percent of total costs recovered by targeted subsidiaries, Percent of the volume of water produced that is billed, Value of private sector investment through PPPs
Water and Consumption	Per capita consumption mobilized, Domestic consumption, Industrial consumption, Agricultural use	total consumption, Distribution frequency of drinking water to main towns of the countries municipalities,		total consumption	total consumption
Water and Health	Population with access to sewerage network, Population with individual sanitation, Volume of wastewater (domestic and industrial)	Volume of wastewater produced annually, Number of wastewater treatment plants, Number of stabilization ponds plants, Treated waste water volume, Length of sewage & wastewater networks, Connection rate to wastewater networks	Rate of connection to public sewerage, Volume of treated sewage, Volume of treated wastewater reuse,	Coverage of improved sanitation, treated wastewater by WWTP,	Volume of Reused Drainage Water, Volume of wastewater (domestic and industrial), Number of households with improved access to sanitation / total number of households, m^3 treated per year
Water and Climate	NA	Aridity index	Rainfall intensity and duration,	NA	NA

CEDARE/ AWC SOW indicators Report	Indicators Currently used				
	Mauritania	Algeria	Tunisia	Libya	Egypt
Water and Socio-economics	NA	NA	NA	NA	NA
Water and Politics	NA	NA	NA	NA	Annual Volume of Nile Water Available to Egypt
Water and Trade	NA	NA	NA	NA	NA
Water and Quality	NA	NA	quality parameters (Salinity (or TDS), E-Conductivity, Sodium, Potassium, Calcium, Magnesium, Iron, Carbonate, Bicarbonate, Sulphate, Nitrate, Nitrogen Dioxide, Boron, Silicon Dioxide, pH, and total harness)	NA	quality parameters (Salinity (or TDS), E-Conductivity, Sodium, Potassium, Calcium, Magnesium, Iron, Carbonate, Bicarbonate, Sulphate, Nitrate, Nitrogen Dioxide, Boron, Silicon Dioxide, pH, and total harness) Percent of samples meeting Egyptian water quality standards
Water and Governance	NA	NA	NA	NA	Ratification of the Legal and Institutional Framework, Remove illegal cage cultures in fresh water courses (Nile, Branches, Canals, …),

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