



PIDA WEEK,
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Establishment of Monitoring networks for
Nubian Sandstone Aquifer system
(NSAS)

Ministry of Water Resources, Irrigation and Electricity

Water Resources Technical Organ

SUDAN

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- Water Resources Technical Organ (WRTO) is the institution responsible on Transboundary Water Resources in Sudan, the responsibility covers planning and supervision of all technical activities conducted on transboundary surface and Ground water Resources .
- Ground Water & Wades General Directorate is Ministry body concerned with the implementation of Project activities
- Nubian Sandstone is an Aquifer shared between 4 countries(SUDAN-LIBYA –EGYPT-CHAD

ESTABLISHMENT of Monitoring networks for Nubian sandstone aquifer system

- **Aquifer Extension**

The Nubian Sandstone Aquifer System (NSAS) underlies an area in excess of 2.2 million km² covers the eastern Sahara in North – East Africa and extends between latitude 14° and 33° N and longitude 19° and 34° E.



Nubian Aquifer Sudan

Total area of Transboundary Nubian in Sudan approximately 376000 km³.

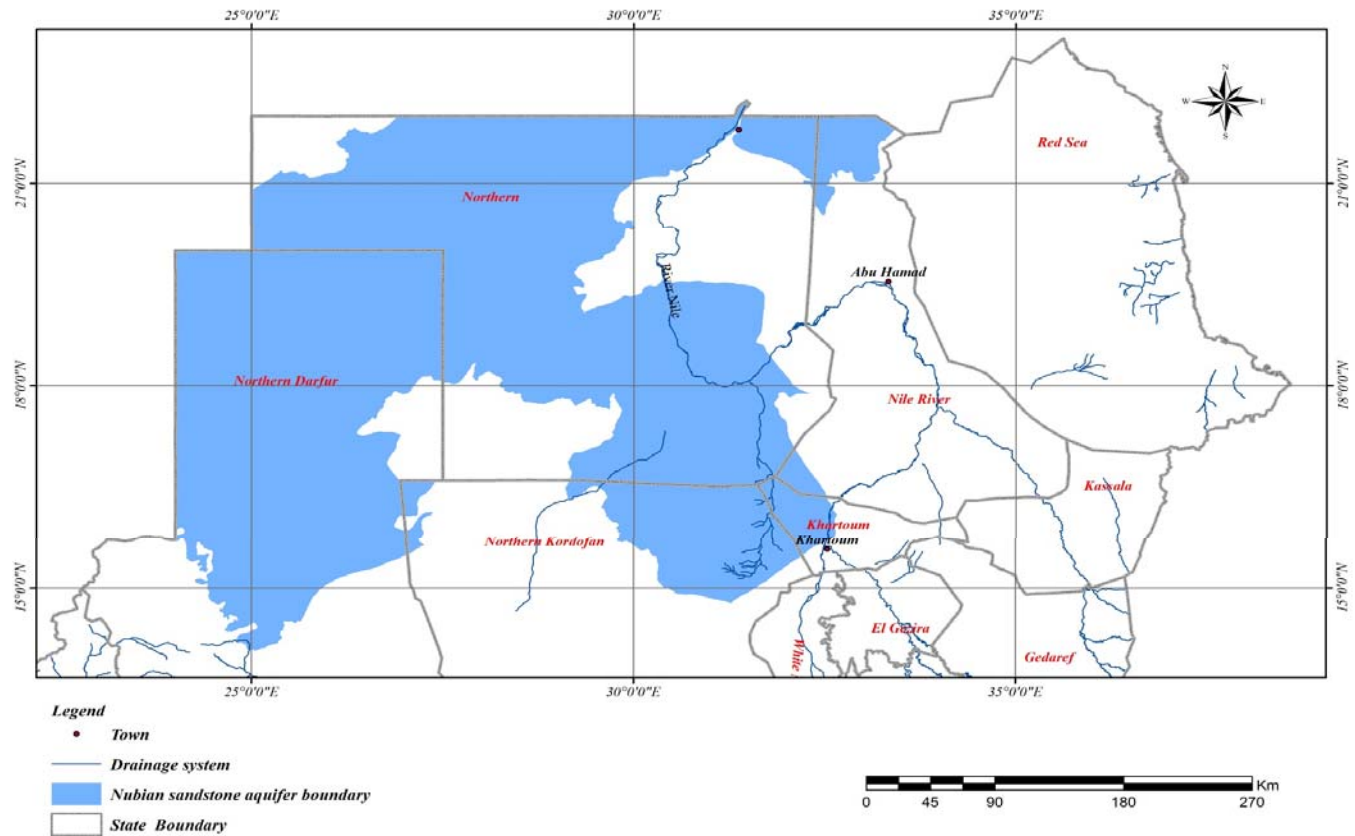
Estimated storage of Nubian 33877.70 km³ .

Estimated water can be abstracted 16500.00 km³,

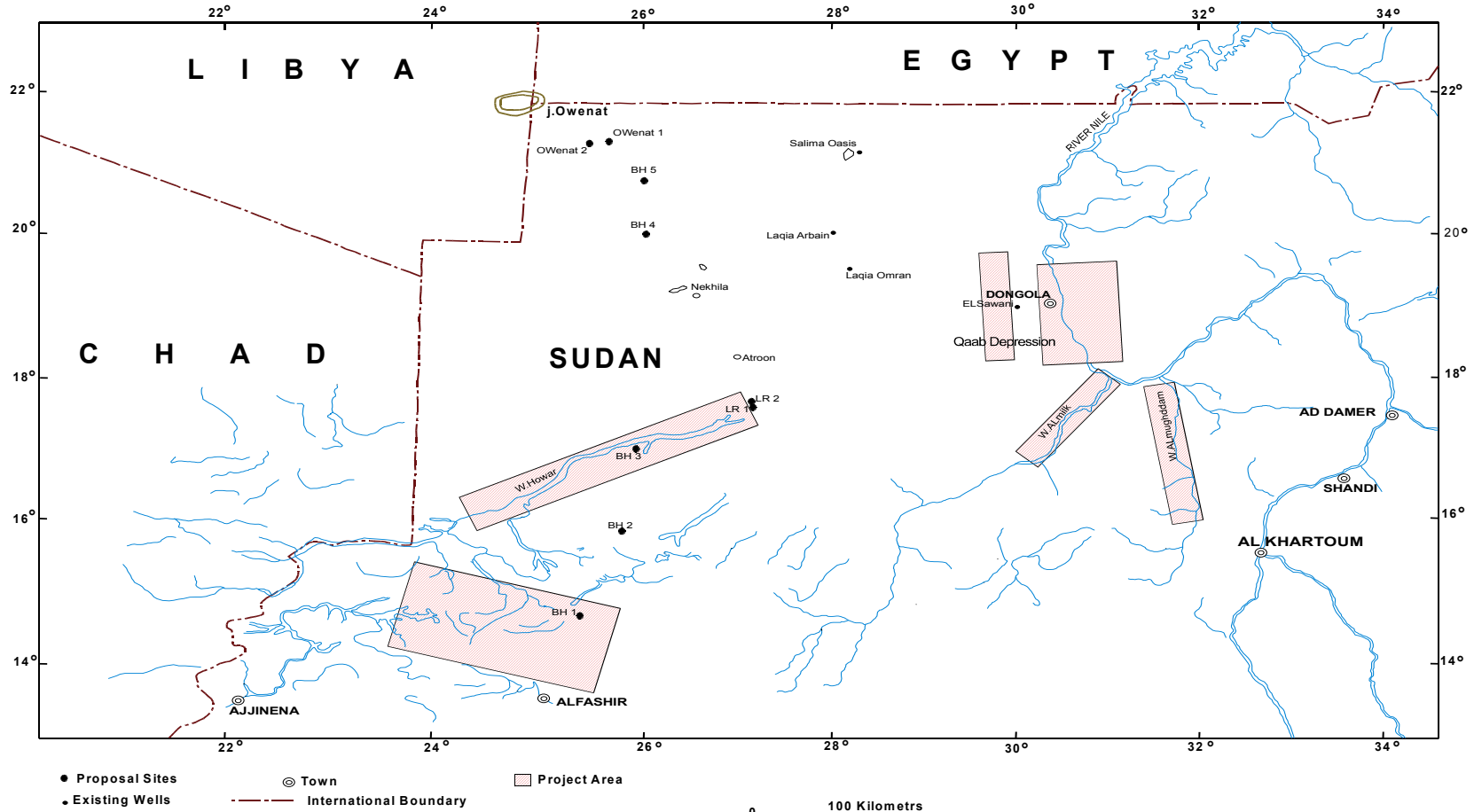
Now agricultural development projects are currently going on by huge investments in Nubian Aquifer Area without potential evaluation of GW or without monitoring of water levels.

Sudan now planning to cultivate Wheat in Northern and Nile State to cover the needs which will put pressure on Nubian Water Resources.

Transboundary Nubian Aquifer(SUDAN)



Project Area



- Proposal Sites
- Existing Wells
- ⊙ Town
- International Boundary
- Project Area

0 100 Kilometers

Ministry of Water Resources ,Irrigation and Electricity conducted many studies in Nubian aquifer through previous projects funded from government and some International Organizations', all this studies agreed on that we should strength and increase our monitoring network in Nubian Aquifer and the data that collected will update the existing studies and upgrade also the Nubian Model.

GWWD is willing to handle the process of developing, upgrading and enhancement of this monitoring network by this activities :-

- Preliminary study to select the sites
- Drilling observation wells with small diameter to monitor aquifer conditions.
- Installation of groundwater level recorders (same type loggers) in selected sites.
- Capacity building for the staff of concerned cadre responsible of monitoring on - installation and Maintenance of loggers and on database analysis and modeling.
- Expert mission (External expert).
- Equipment's and analysis facilities
- Continuance monitoring for quantity and quality (water level, abstraction, recharge, discharge) in wet and dry seasons

Objectives:-

Detect changes in groundwater storage, flow and quality

- Assess specific risks to the aquifer

- Assess aquifer recharge and discharge

- In order to provide a complete picture, monitoring systems need to also assess Abstraction rates

- to enhance and improve decisions on water policy and water resources management in the NSAS.

- Requiring water users to collect and report high-quality information about water Levels and water use

- Address the users (clients) and their needs

- Organization of water actors and their information systems.

- Build the capacity of concerned Staff responsible of; an installation and maintenance of loggers, and monitoring stations; structures of monitoring network database; monitoring information exchange and analysis; and groundwater modeling

Approach and Scope of Work:

The design of monitoring network is usually taken in stages, with the emphasis placed on each step depending on the hydrological and geological conditions, water use etc.

The establishment and upgrading of the monitoring network must put in mind to install the same type of loggers in selected site after preliminary study to select the site types of the collected data and information as mentioned below:-

-Monitoring station-data :

-location, type of the recorders installed, type of boreholes.

-Bore holes data, Hydrochemistry data, (chemical- isotopic)

-Ground water basins data (monitoring data , hydro geological data)

- Basins distribution and characteristic.

- Aquifer characteristic.

Expected Outcomes:-

-ESTABLISH NUBIAN MONITORING NETWORK.

-ESTABLISH Proper continues system of routine monitoring of quantity and quality of water. measurement should be in wet and dry season in both shallow and deep aquifers

-INSTALLATION OF WATER LEVEL RECORDERS & MONITORING GAUGES.

-Establishing system of the monitoring network DATABASE and Link with Geographic Information System (GIS), modflow, and any related software in this field to update Nubian aquifer studies.

-UPDATE XISTING NUBIAN MODEL.

System of analysis and evaluation using UP TO DATE technology used in this field.

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- Update hydrogeological properties of the aquifer.
- Locate a favorable site for drilling of successful water well (borehole) for production of portable groundwater in term of quality and quantity.
- Construct a system to enhance, smooth and harmonize data sharing and exchange between stakeholders.
Safe yield, and hence Construct a system for Good manage of water resources in the Nubian aquifer and sustainable supplies for future generations .
- The database will provide the necessary technical requirements to improve the knowledge and managed capabilities of water sector (government or non-government institutions).
- Enhance analysis of the water resources information by developing the appropriate systems of monitoring network

Estimated Budget:-

Total Budget estimated 1002000 URO (one million two thousand URO)

details of Budget Activities as follow:-

Activities	UNIT COST (URO)	TOTAL
Preliminary study to select the sites	-	10000
Nubian Aquifer) 20 Digital Data Logger Northern AND Nile State	4500	90000
Nubian Aquifer 10 Digital Data Logger Khartoum State (Investment Activities)	4500	45000
Nubian Aquifer Oasis Areas(Salima ,Lagua Omeran ,Lagua Arbeen) 3 Digital Data Logger	4500	13500
Installation Cost(33)	1500	49500

Drilling of 3 WLL (Piezometer 4 inch Diameter) Oasis Areas(Salima ,Lagua Omeran,lagua Arbeen)	20000	60000
Drilling of 30 ((Piezometer 4 inch Diameter) Northern ,Nile state and Khartoum State	15000	450000
Expert mission (External expert). 3 mission	10000	30000
Training (Installation and Interpretation)		30000
Total (1)		778000 (URO)

Analytical Field Monitoring Equipment's +Training		
PH METERS (Portable) 4	2000	8000
E.C METERS (Portable) 4	2000	8000
Water Level Indicator 4	3000	12000
4 Field GPS	2000	8000
Software(Data analysis ,Modelling ,Database and GIS)	60000	60000 (URO)
Total (2)	96000	

Office equipments Equipment's		
COMPUTERS (DESKTOP)plus printers 3sets	3000	9000
LABTOPS 3 SETS	3000	9000
Transport facilities: 1 vehicles	50000	50000
3 Branch local laboratories	2000	60000
Total (3)		128000
Total Cost (1+2+3)		1002000 (URO)

Artesian Well (Northern Sudan)

