Experiment of Using National Water Resource Management Information System (NWRMIS) in Yemen

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Overview

- Context and water sector in Yemen

- Background information on NWRMIS

- Current status

- Challenges

- Opportunities

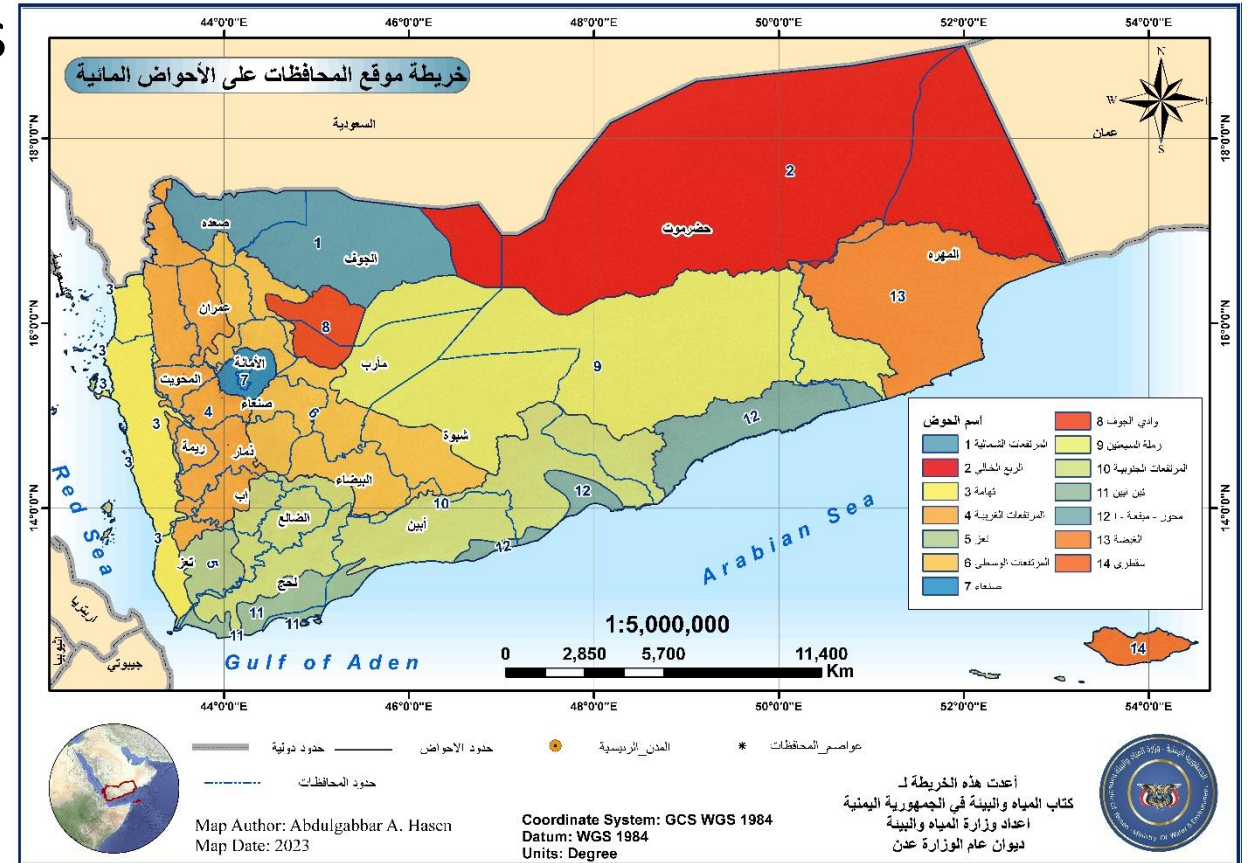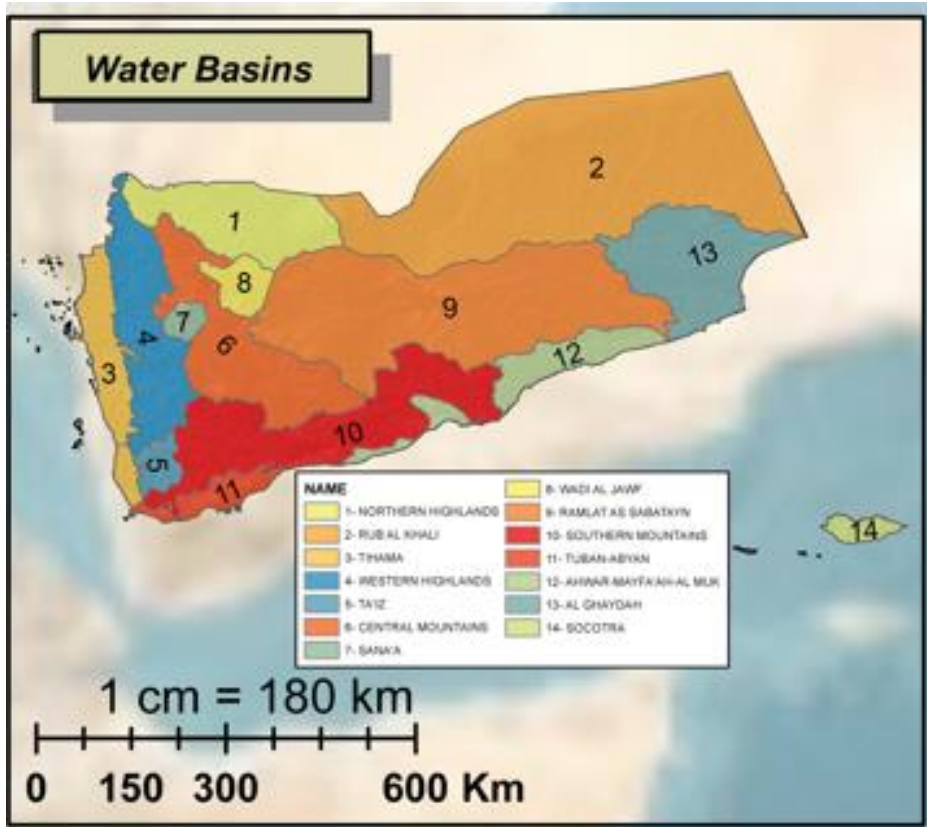# Context and water sector in Yemen

- **The total population:** 34 million (estimated), they distributed across its 22 governorates.

- **The total area:** 527,970 km².

- **Population Growth:** 3.5% (Rising demand for water driven by population growth)

The population is heavily concentrated in specific areas, putting pressure on resources and services simultaneously.
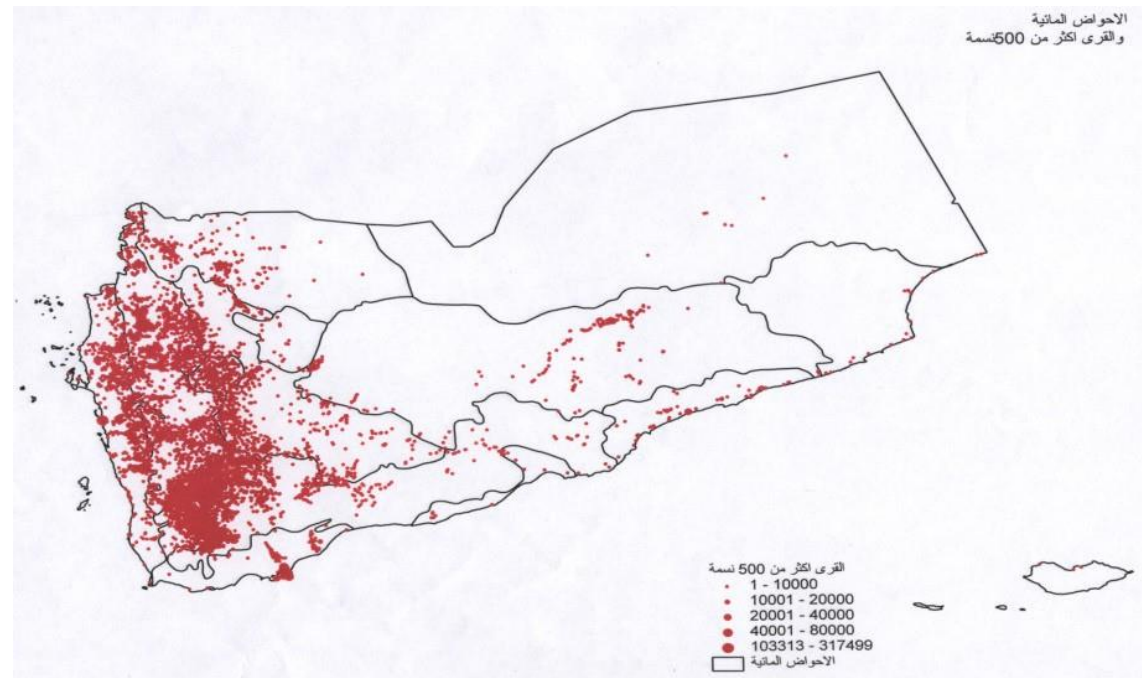
Context and water sector in Yemen
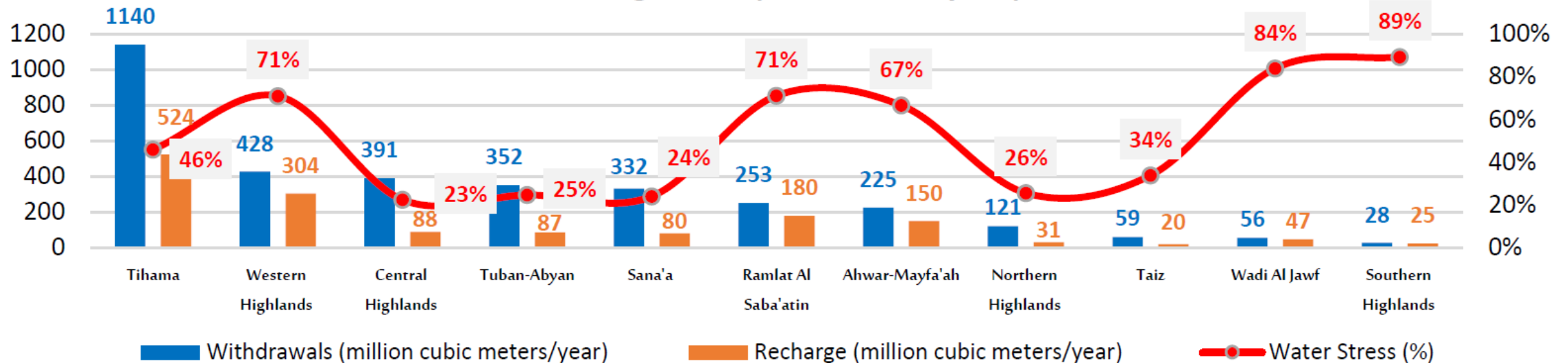
Water Resources Management Regions
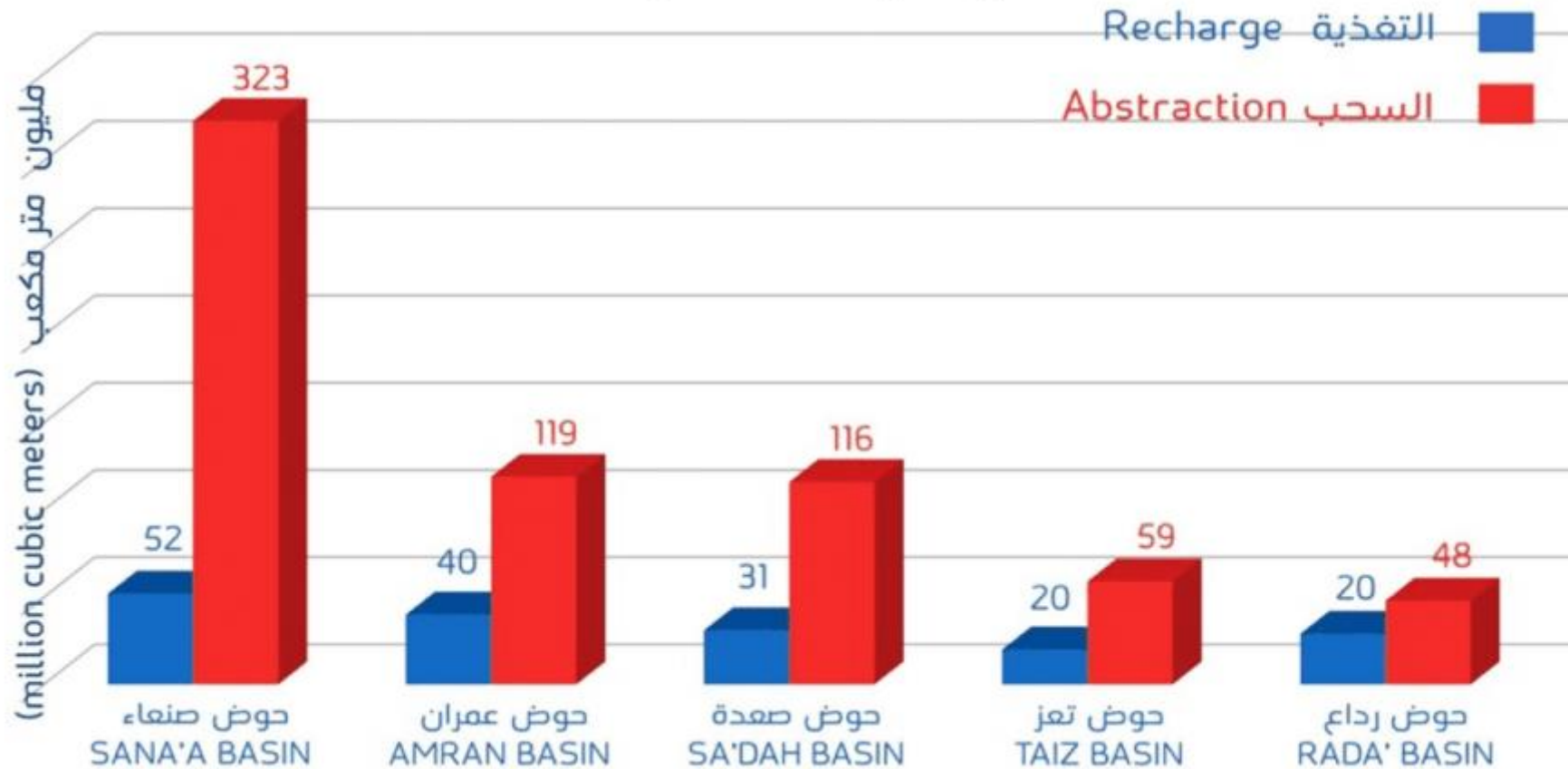
Context and water sector in Yemen

- **Increased water scarcity and reduced water quality**

- **Water availability per capita:** estimated at 82 cubic meters.

- **Total renewable water:** 2.5 billion cubic meter/year .

- **Total water use:** 5.1 billion cubic meter/year.

- **Deficit:** 2.6 billion cubic meter/year.

- **Groundwater over-exploitation:** Annual drops of 3-8 meters in most basins contribute to depletion.

- **Rainfall:** 50 mm - 800 mm /year average 200 mm /year

Estimates of withdrawal and recharge in critical water basins in Yemen (million m3/year)

Figure (5): Current Water Situation and Water Stress by Basin, withdrawals and Recharge Rate (million M3/year)

Estimates of withdrawal and recharge in critical water basins in Yemen (million m3/year).

Background information on NWRMIS

About of NWRMIS

- The National Water Resource Management Information System (NWRMIS) was designed to centrally manage important water sector data and to replace the former decentralized databases FIDMAS, NWRIS and GeoYemen. The NWRMIS database is under central management of the MWE head office.
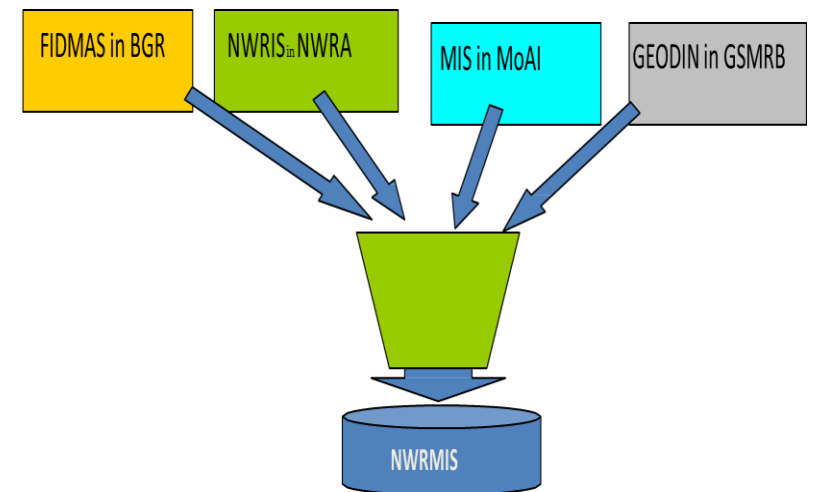
Purpose of NWRMIS

- The purpose of NWRMIS is to serve as the primary repository of water sector data for:
    - The Ministry of Water and Environment (MoWE), which centrally oversees the NWRMIS database from its head office.The National Water Resources Agency (NWRA) and its subordinated branches and units.
    - The Geological Survey and Mineral Resources Board (GSMRB) and its subordinated branches.
    - Other stakeholders that will have access to the system.

The NWRMIS management
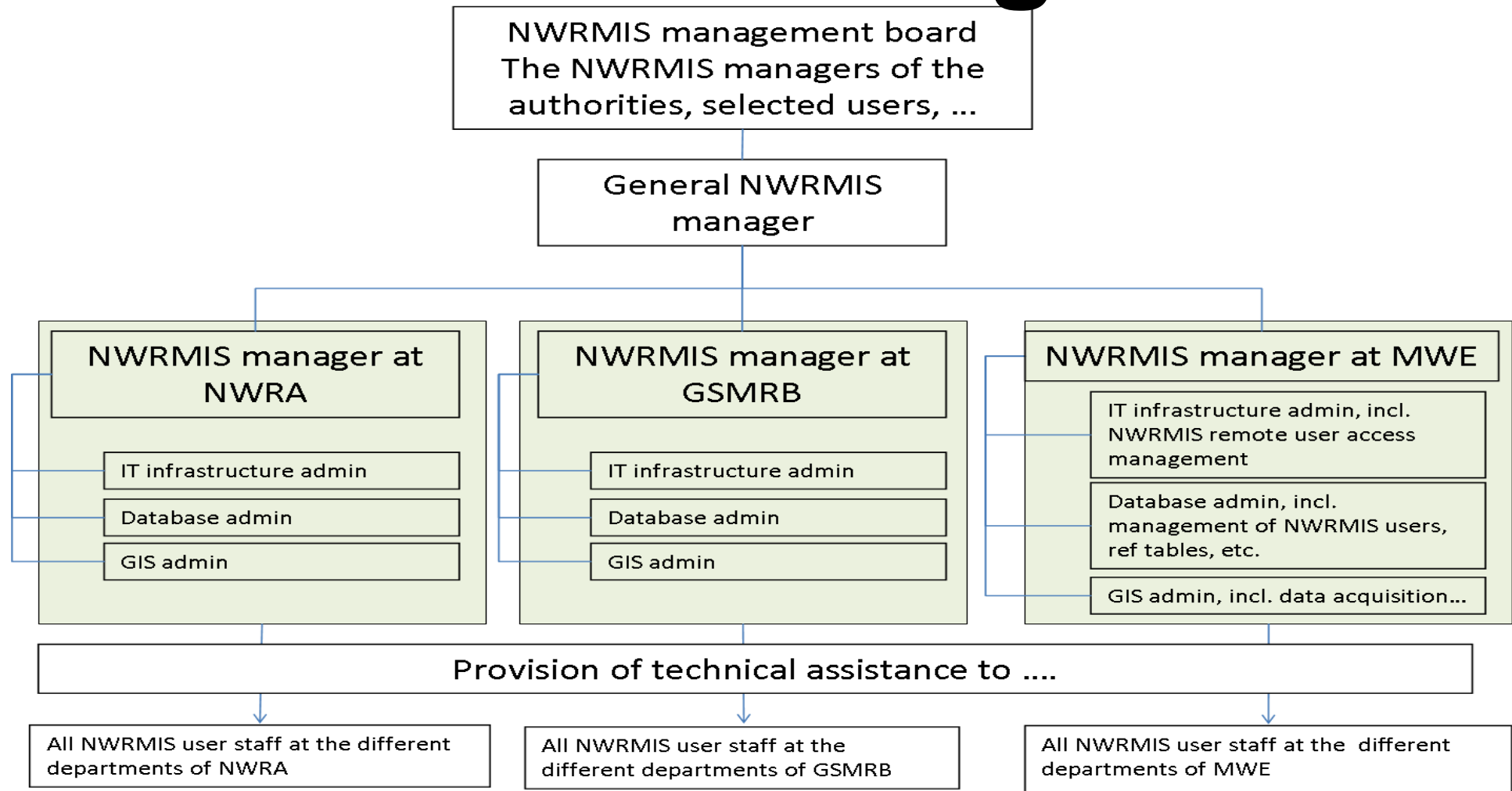
Structure of the NWRMIS application

A. NWRMIS has structured in Technical Modules following the structure of the entities of the database:

1. Groundwater Points and Boreholes.
2. Springs.
3. Dams.
4. Hydro-Meteorological Monitoring Stations.
5. Contamination Sites.
6. Geological Field Observations.
7. Water/Rock Sample and Analysis.

B. GIS Module

C. Administration Module to manage user administration rights, access rights and Reference tables (to manage parameters and related value ranges).
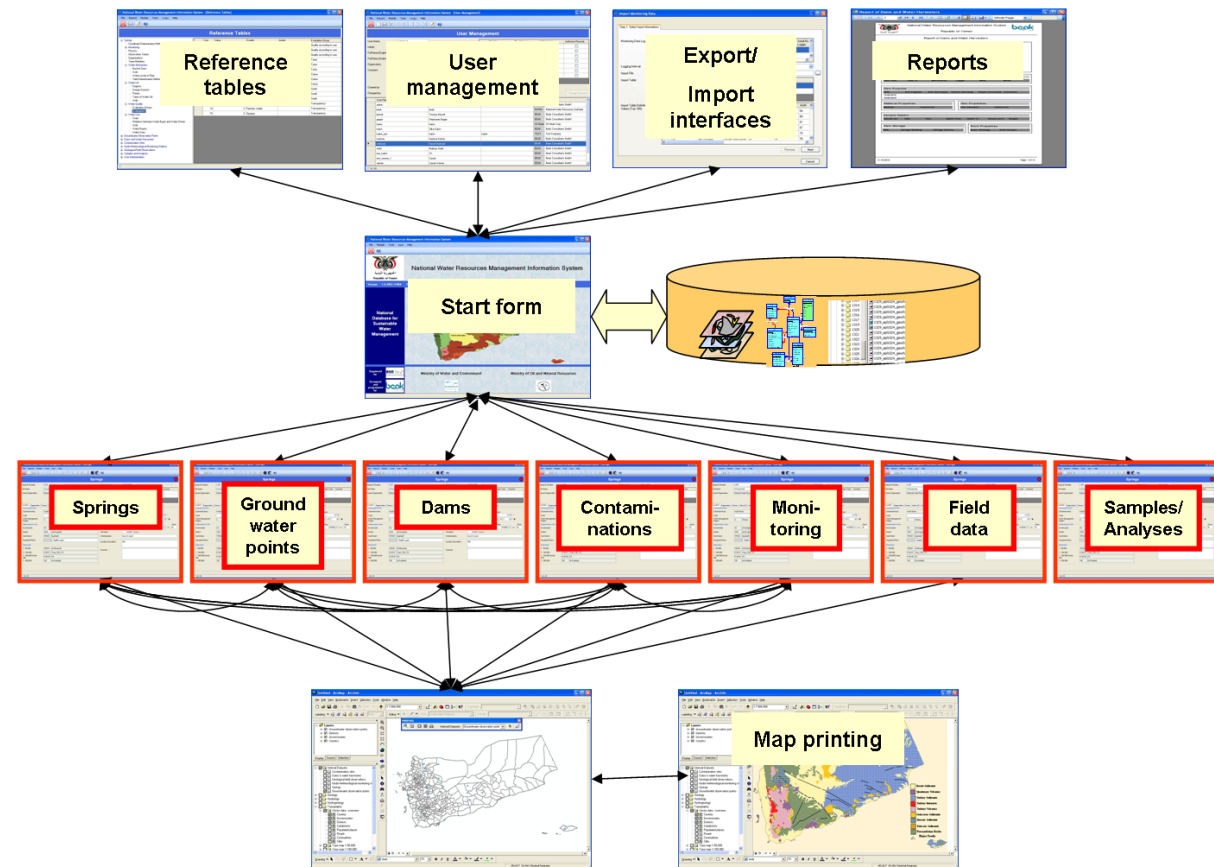
System Architecture

The IT infrastructure of the NWRMIS consists of 3 server sites

- MWE – central database server and terminal server
- NWRA – replicated database server
- GSMRB – replicated database server

- Data backups on daily and monthly basis.
- The general system design satisfies the requirement of integrating the existing decentralised databases FIDMAS, NWRIS and GeoYemen into one centralised NWRMIS.

Connection between the database servers via fiber optics, radio link or internet for replication purposes.

NWRMIS Server 2

GSMRB

Replication

MWE

NWRMIS Central server & Terminal server

Radio connection

Replication

NWRMIS Server 1

NWRA

Remote access via terminal server

Other remote sites

WBC 1
WBC 2
WBC 3
GSMRB 1...

Inter-net

NWRA remote offices

Aden
Taizz
Sana'a
…

Connection of remote clients (NWRA branches and units, GSMRB branches) using terminal server technology via internet.

NWRMIS Current status

- **The MoWE is actively working to revitalize the NWRMIS and strengthen water resource management in Yemen.** This initiative involves:

- **Upgrading infrastructure:** prioritizing improvements to the NWRMIS's hardware and software infrastructure.

- **Building a robust data foundation:** This includes efforts to enhance data collection and management practices, such as monitoring groundwater levels and quality.

- **Enhancing data exchange:** working to establish reliable data flows between government institutions within the water sector.
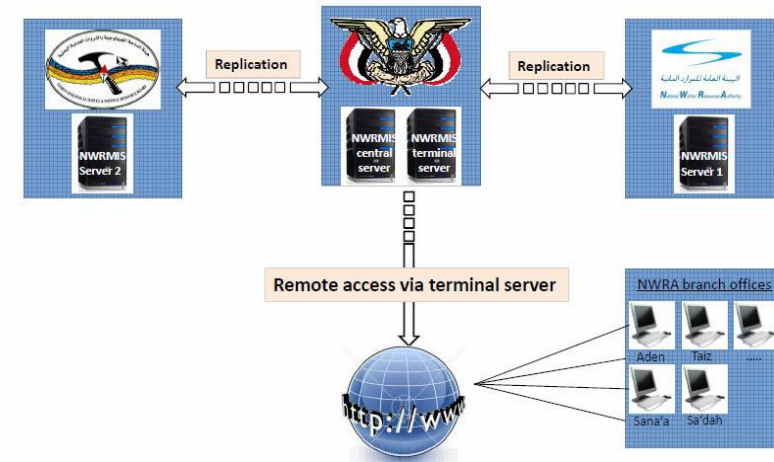
Challenges:

These challenges can be categorized into four main areas: political, administrative, financial, and technological, such as:

- Since 2011, political instability has led to incomplete and unreliable groundwater monitoring efforts, resulting in scattered data across agencies in varying formats, hindering effective utilization.

- Weak institutional structure and coordination mechanisms hinder comprehensive data collection and management across all water basins and areas. Additionally, inadequate coordination among water sector entities and other stakeholders exacerbates the issue.

- Limited budgets and hinder NWRMIS development and implementation in public institutions like MoWE, NWRA, MoI, ...etc. while inadequate funding for operation and maintenance affects its sustainability.

- Technical infrastructure challenges, including unreliable connectivity, domain registration issues, and electricity supply instability, hamper NWRMIS implementation, compounded by a shortage of trained personnel and inadequate IT support, further complicated by the dismantling of the previous IT environment.

Recommendation:

Conducting a comprehensive assessment of NWRMIS to identify critical areas for activation and data management, focusing on collaboration, review, and communication.

- Feasibility of activating the system in all designated entities.
- Assessment of necessary operational requirements and resource gaps.
- Evaluation of available unentered data and data verification needs.
- Data collection plan for relevant hydro-meteorological stations.
- Conduct a workshop with experts and technicians to review progress made in previous stages and discuss the proposed advancement plan for NWRMIS.

Prioritization, Capacity Building, and Advancement:

- Prioritize the swift implementation and utilization of the NWRMIS database.
- Leverage the expertise of qualified Yemeni personnel and encourage their continued involvement through training and capacity building programs.
- Provide essential resources and incentives to expedite the NWRMIS implementation and consider long-term advancements. This includes:
- Developing new capacities and expertise in 3D groundwater modelling and analytical functions.
- Mapping technical and socio-economic information for integrated water resource management.
- Exploring the integration of flow and management models, and simulation models for resource allocation optimization.

Long-Term Vision and Communication Strategy:

- Maintain the primary objective of establishing a comprehensive, specialized national database encompassing all aspects of IWRM.
- Develop and regularly update the MoWE and NWRA websites to improve transparency and accessibility to water resource information.
- Consider a phased approach for presenting water resources data on the internet, including visualizations and interactive features.

THANK YOU