Brief Outline of Regional Groundwater Management in NBA

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Outline of the Presentation

• Overview of River Niger and Niger Basin Authority (NBA)
• Status of Groundwater Management in NBA
• Outline of AGES Project Phases 1 to 3: 2010 – 2022
• Some outputs of AGES Project Phase 1: (Example) Niamey Project site
• Some challenges
• Some achievements of the project
• Lessons learnt
• Conclusion
Overview of River Niger & NBA

• Source from the Fouta-Djalon Plateau more than 1000m altitude in Guinea & successively flows through Mali, Niger, Benin and Nigeria where it empties into the Atlantic Ocean after a span of around 4200 km.

• Longest river in Africa (after the Nile and the Congo), the 14th in the world & the 9th by its drainage basin (2,170,500 km2).

• Active watershed covers an area of approximately 1,500,000 km2 shared by the nine (9) countries within the Niger Basin Authority catchments with over 120 million population:
  - Benin (2%), Burkina Faso (4%), Cameroon (4%), Côte d'Ivoire (1%), Guinea (6%), Mali (26%), Niger (23%), Nigeria (33%) and Chad (1%).

• The River Benue which rises from Adamawa Plateau, Cameroon, to join the main course of River Niger at Lokoja in Nigeria, this is one of its most important tributaries.

• The NBA, created in 1980 is one of the oldest inter-governmental river basin organization with the mandate to promote cooperation among the 9 member countries and to ensure the integrated development of the Niger basin across the domains of energy, water works, agriculture, livestock farming, fisheries and aquaculture, forestry and timber, transport and communication and industry and associated ecosystems

• Groundwater accounts over 90% of safe water sources in the Basin, which is used extensively in particular for households, agriculture and livestock and is forecast to increase substantially to combat growing food insecurity in the Basin

• The NBA is legalise institution with responsibility of coordinated management of transboundary groundwater management in the Basin.
The Networks of flow of River Niger / Groundwater Monitoring Networks from Guinea to Nigeria
Status of Groundwater Management in the Basin

• Since its inception in 1980, Groundwater activities/programmes/projects has been so redundant at the regional level.

• Concentration is on surface water, the River Niger & its tributaries.

• The development and implementation of NBA Water Charter and some activities in the Sustainable Development Action Plan and Investment Plan of NBA, has necessitated the integrated management of both surface and groundwater of the Basin.

• Hence the project for the management of groundwater in the Basin (AGES) was formulated by the support of the Government of Germany in the year 2010, still on-going.

• Also the project for Improving IWRM, knowledge-based management and governance of the Niger Basin and the Iullemeden-Taoudeni/Tanezrouft Aquifer System (ITTAS)” to support integrated water resources management (IWRM) for the benefit of communities and ecosystems’ resilience, 2018 is also on-going. This was with the support of UNDP, GEF, UNIDO, OSS.

• Two Groundwater Management Projects are in line with IWRM principles and NBA institutional sustainable action plan, currently on-going, lets mirror AGES Project!
Brief on ITTAS Project (2018 – 2022)

- Objective: improve knowledge-based management, governance & resource conservation of the River Niger Basin & the Iullemeden - Taoudeni/Tanezrouft Aquifers (ITTAS), to support IWRM for the benefit of communities & the resilience of ecosystem.

- 11 Countries are the beneficiaries (+ Algeria & Mauritania)

- Expected 4 general outcomes:
  a. IWRM supported by a sound understanding of ground water resources and their linkages with surface water systems
  b. Niger Basin Users Associations and National NGOs engaged in basin resources management and conservation for better control of flood/drought/pollution, reduction of pressure on land, forest and biodiversity while improving living conditions of households
  c. Introduce systematic and integrated approach of industrial competitiveness and environmental/social responsibility to reduce wastewater discharges & pollution loads in the River Niger.
  d. National Policies and Institutions, Civil Society Platforms support River Niger Ecosystem based management
Brief on the AGES Project

The AGES Project:

• As part of the NBA's "Integrated Water Resources Management" program & the German Development Cooperation, this project supports the Niger Basin Authority in the development of measures for groundwater protection and sustainable use within IWRM perspective.

• The project activities aim to develop the necessary institutional capacities in groundwater management with the participation of NBA staffs playing an important role. During the project the NBA and its focal structures should be sensitized on groundwater management issues, while the authority should start implementing measures with transboundary effects.

The general project activities include:

• Collection and assessment of groundwater data and maps in the Niger basin in order to develop a groundwater database as well as a basis for the preparation of a hydrogeological modelling, maps for the basin

• Identification of transboundary regions with conflict-ridden groundwater problems

• Support of first measures to improve groundwater management in selected project areas

• Capacity building at all levels (education, training programs, know-how-transfer)
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<td>Budget: 2.5M Euros</td>
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<td>Budget: 2.2M Euros</td>
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<td>Location: transborder between Niger/Benin/Nigeria</td>
<td>Location: (Benin-Niger-Nigeria) and pilot zone 2 (Guinea-Côte -Mali)</td>
<td>Location: same as phase 2</td>
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<td><strong>Main activities carried out</strong></td>
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<td>Inventory of groundwater information in the Niger River Basin.</td>
<td>Groundwater monitoring network (piezometry &amp; quality) established in project areas</td>
<td>Establishment of cross-border expert working groups; hydrogeologists, computer scientists, etc.), who will participate in all stages of the work (on-the-job training) in pilot areas</td>
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<td>The cross-border study of pilot areas, Identification of priority areas &amp; definition of pilot areas</td>
<td>26 piezometers with all equipment established including 18 in pilot zone 1 and one in pilot zone 2</td>
<td>Development of a strategy for improving monitoring networks in member countries, analysis of networks &amp; quality of existing piezometers</td>
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<td>Identification of the institutional structures concerned in the members countries and more data collection.</td>
<td>Production of quality (WHO pollutants), piezometric maps, with reporting of the six-monthly monitoring plus more information (precipitation, etc.)</td>
<td>Continuation of field campaigns in the 2 pilot areas, with MN (Benin, Niger, Mali &amp; Ivory Coast), initiation of field in the pilot areas in Nigeria (1) &amp; Guinea (2), reading the recorders, groundwater sampling (quality &amp; isotopes),pumping, data collection &amp; processing, monitoring etc. with (on-the-job) training of cross-border working groups (MC &amp; SE ABN)</td>
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<td>Capacity building at all levels - parallel program (NBA personnel &amp; members countries)</td>
<td>Field training in pumping tests, hydrogeochemical sampling, programming, installation, reading of automatic recorders for ABN staff (SE and SFN), regional offices, etc</td>
<td>Identification, selection &amp; treatment of concrete hydrogeological problems in the pilot areas (such as natural pollution, vulnerability and natural recharge of groundwater) and development of thematic maps</td>
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<td>Development of Regional &amp; National Data Base System, Complement &amp; update additional data, data evaluation, development of a model designed, Digital model &amp; scenario development, Identification and characterization of aquifers</td>
<td>Finalization of thematic maps for pilot zone (1) lithology / geology, (2) productivity of aquifers, (3) seasonal map of surface water based on satellite images, (4) groundwater recharge, (5) artificial recharge of aquifers, (6) piezometry (level and direction of flow) and (7) water quality and preparation of thematic maps for pilot zone 2 (e.g. piezometry, quality etc.) Development of recommendations for a sustainable management of groundwater in pilot zone 1</td>
<td>Development of an overview map representing &quot;stress&quot; factors on the state of groundwater resources in the Niger basin, such as population growth, intensive agriculture, mining activities etc.</td>
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Some Outputs of AGES Project Phase 1: Example: Niamey Project site

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<th>Basement &quot;Méta-Liptako&quot;: a granite-gneiss complex of Precambrian age; it is a fractured aquifer,</th>
<th>Five groundwater monitoring sampling on quarterly basis have been carried out so far.</th>
<th>High bacterial loads (&gt; 1,000 CFU/100 mL) were mainly encountered in open hand-dug wells.</th>
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<td>&quot;Continental Terminal&quot; (CT): a sandstone formation of Eocene - Pliocene age generated over a long sedimentation period; the CT acts as a porous aquifer</td>
<td>Groundwater appears to flow differently depending on the aquifer considered.</td>
<td>Closed wells show in average lower bacteria loads (0 – 100 CFU/100 mL).</td>
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<td>Alluvial sands: low compacted sands of Quaternary age deposited by the Niger River; the alluvial sands act as porous aquifer of local expansion.</td>
<td>For nitrate however, not only the open wells but also the closed ones are affected. The presence of latrines close by are suspected to be the source of nitrate</td>
<td>The analyzed bacteria are of human or animal origin and enter into the open wells with the plastic cans that are permanently used to fetch the water.</td>
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Outputs from Phase 1: Development of Groundwater monitoring net, contour map, pollutants trace for the Continental Terminal aquifer of Niamey considering three different aquifers (Fig 3, 4,5). Source: BGR
Groundwater sampling with NBA staff in the project area of Niamey.
Source: BGR (Fig. 4)
Some Challenges Experienced

- Poor response from some member countries on provision of available groundwater data
- Weak facilitation from some member countries on the accessibility and status of existed groundwater monitoring network
- Slow response in translation of project document from Germany, French and English languages
- Some failure were experienced in the project groundwater observation networks due to human tampering / vandalism, mechanical and electronic faults
- Poor monitoring of observation networks from member countries
- Lack of taken responsibility for ownership by some member countries
- Poor awareness, sensitization and advocacy by member countries on the importance of groundwater sustainable management
- Weak coordination from NBA due to insufficient personnel, equipment
- Some delay in the implementation due to COVID-19 Pandemic
- Some set back due to security challenge in some parts of member countries regions along the pilot areas
- Observation/monitoring networks are not enough
- Governance, policy, budget, personnel, equipment issues at country levels
Some Achievements of the Project at the Regional Level

• Development of Groundwater management data base system
• Development of regional observation/monitoring network maps
• Potential aquifers productivity maps
• Harmonization of geological maps
• Mapping of groundwater recharge areas
• Production of stream flow networks
• Flooding dynamics simulation
• Water body extraction through Landsat & Modified Normalized Difference Water Index
• Delineation of most important flooding areas
• Identification of local recharge areas
• Improved discrimination of water & land through image enhancement
• Some levels of advocacy and sensitization has been made among members countries for sustainable magt. of groundwater resources, but more are still needed.
• Better cooperation & interaction among members countries/groundwater data sharing etc
Some Lessons Learnt

• Correlation between capacities building and improved groundwater observation networks of some members countries through the AGES project.

• Correlation between capacities building & groundwater data collection, interpretation, storage, exchange and interaction.

• Availability of budget from member countries has (+ve) impact on data collection, maintenance, monitoring and safe guarding the observation networks.

• Availability of groundwater policy document, laws and guidelines in some member countries improved accountability, control, development and management.

• Technical know-how/Knowledge at Regional level is critical for the sustainable management of groundwater at members countries.

• The interference of human activities on land/ surface water bodies has impact on the quality of groundwater.

• The interlinkages and interdependency of surface and groundwater clearly highlight the need to manage both in an integrated manner.
Conclusion

• This is a laudable project that should be sustain and upscale in the region.
• Members countries should do more on groundwater development and sustainable management through enacting appropriate laws, setting up of institutional arrangement, policy document & enforcement of such law.
• NBA need to do more advocacy and sensitization to member countries on safe guarding of observation networks & be a regional organization for the data harmonization, storage, interpretation and dissemination.
• AGES project and NBA should try as much as possible to consolidate the observation networks through partnerships with other development partners working in the region.
• AGES project and NBA should formulate a sustainable action plan among member countries for the sustainability of all the observation networks in the region.
• More advocacy, sensitization, awareness, enlightenment and projects/programmes are needed at NBA and members countries for sustainable magt. of groundwater resources.
• Need for more studies on River Niger & associated groundwater aquifers inter-connection in the Basin
• Need more presence of IGRAC & UNESCO-IHP in NBA
THANK YOU FOR YOUR PRECIOUS TIME!!

MERCI POUR VOTRE PRECIEUX TEMPS!!!