

Wastewater Reuse and Supply Diversification:
Advancing Resilient IWRM in Namibia

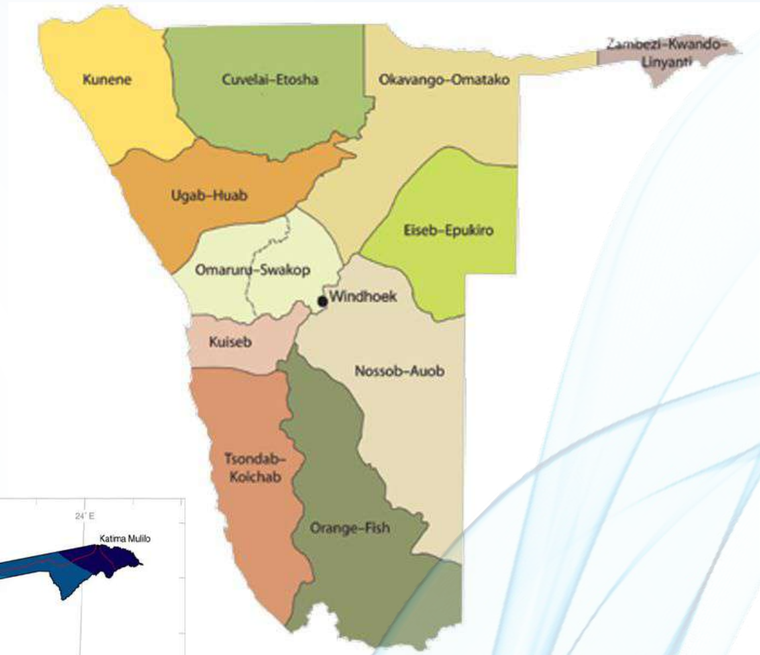
Maria Amakali

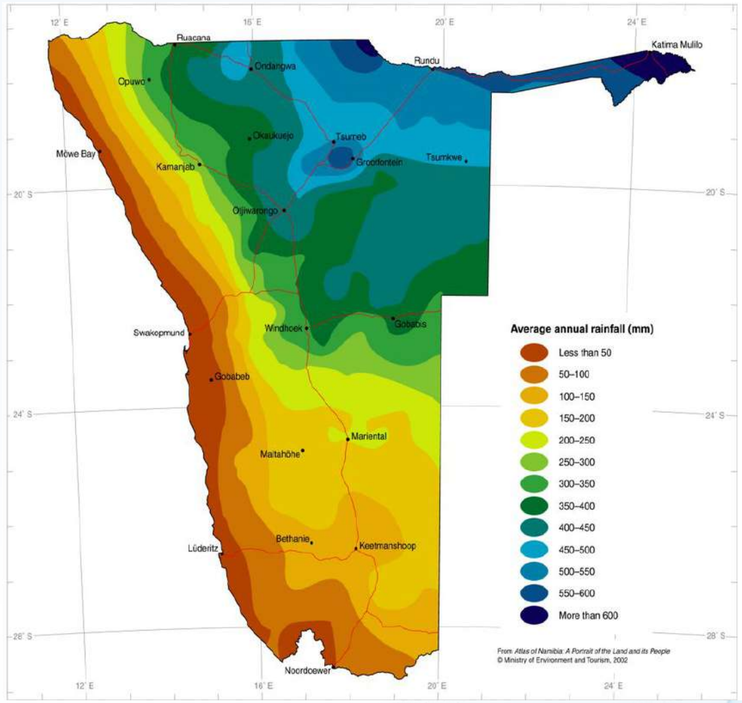
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INBO Water Mix webinar series 2026
Webinar 2: Wastewater reuse and IWRM

Addressing Water Scarcity Through a Diversified Approach

- Namibia’s arid and semi-arid climate limit freshwater availability across much of the country.
- Population growth, increased urbanisation, mining & industrial demand, intensifies pressure on water resources.
- Effective demand management is essential to support water supply diversification.
- Water Policy supports reuse and harvesting. 2013 Act frame authorisation, quality and safeguards.



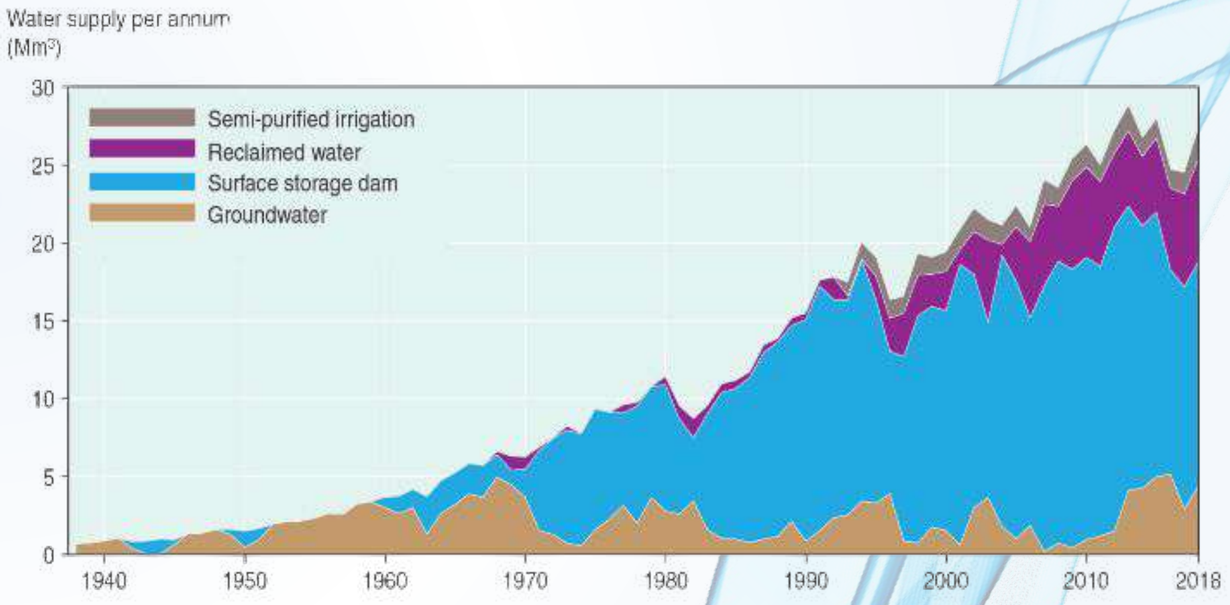


Average annual rainfall. Atlas of Namibia (2002),

Windhoek - Global Pioneer of Direct Potable Water Reuse (DPR)

Windhoek’s water scarcity and recurring droughts lead to the diversification of water supply sources.

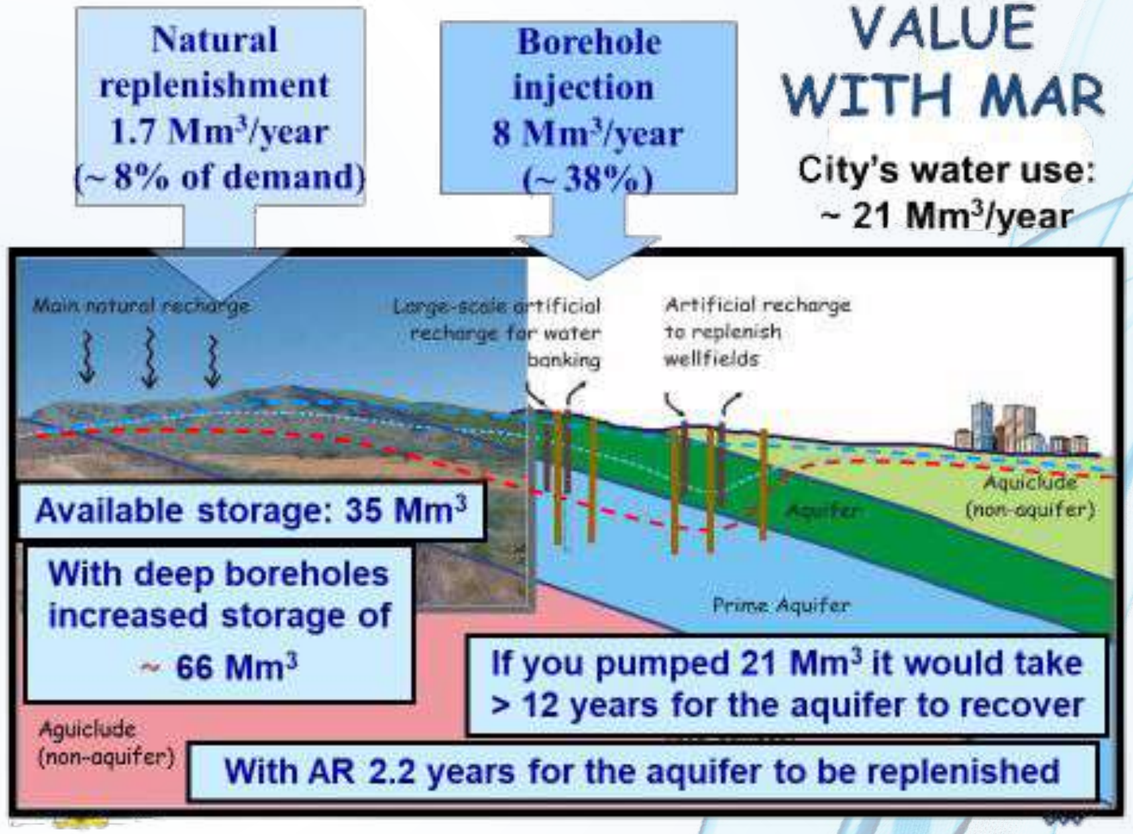
- **1968** Old Goreangab Reclamation Plant commissioned.
- **2001** New Goreangab Reclamation Plant (NGRP) commissioned.
- DPR2 planned for future reuse.



Historical Windhoek supply mix, 1940–2018.

Windhoek’s Managed Aquifer Recharge

- ‘Water Banking’ of surplus treated surface and reuse water into the Windhoek Aquifer for future use.
- Stored water supports drought recovery with minimal evaporation losses.
- Recharge and abstraction infrastructure operations is guided by hydrogeology and water quality.

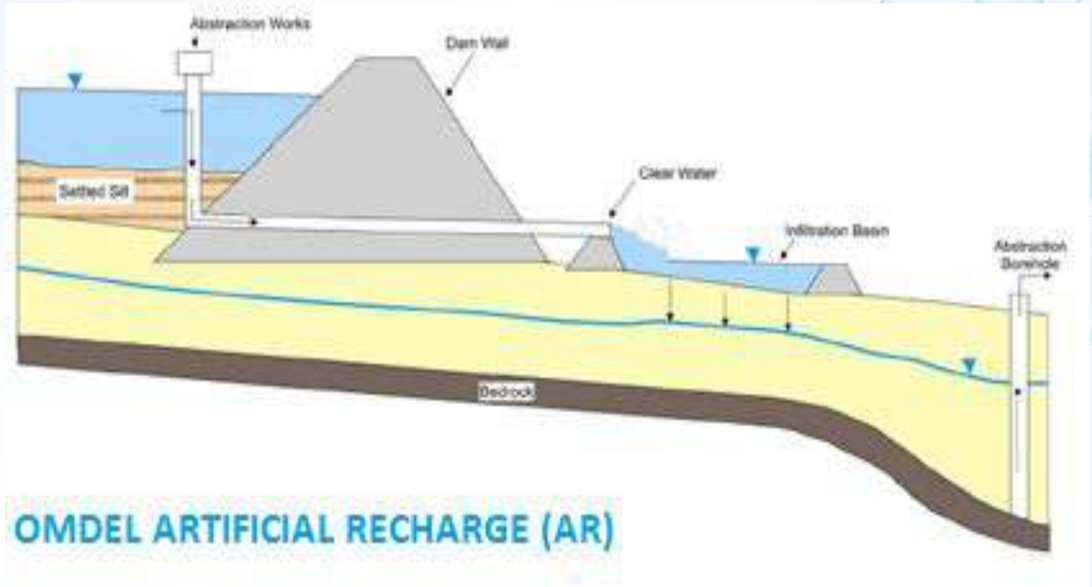


Historical MAR concept (Murray, 2007, modified).

Omdel: floodwater becomes groundwater storage

- Omdel dam captures episodic floodwater, which is stored underground.
- Downstream infiltration basins replenishes the underlying delta aquifer.
- The stored groundwater supports the coastal communities and improves water supply security in an arid environment.





Omdel artificial recharge: dam, infiltration basin and abstraction borehole.

Desalination for Water Supply Resilience in the Coastal Basin

- Provides a reliable alternative to rainfall-dependent water sources.
- Energy demand, marine environmental protection and bulk conveyance influence cost and reliability.
- Coordinated operating protocols can help safeguard groundwater reserves through integrated resource management.



Central coastal supply schematic (2026, MAFWLR)

Health Safety and Public Acceptance

Technical Safeguards:

- Source control and pretreatment of wastewater before advanced robust treatment process.
- Multiple barrier approach for each possible contaminant and stringent quality standards ensure safe reuse.
- Continuous monitoring and independent verification safeguard water quality, clear accountability for water safety.

Institutional confidence

- Build institutional confidence through skilled operators, strong laboratory capacity.
- Clear and transparent communication and accessible water-quality data.
- Community engagement strengthen institutional and public acceptance.

Capacity Development, Financing and Regulatory Frameworks

Municipal service capacity:

- Strengthen municipal technical expertise, operational management, laboratory capacity through training.
- Improve maintenance systems and climate reslience in intergrated water resource diversification and planning.
- Develop clear standards, operating procedures, monitoring and reporting.

Sustainable implementation:

- Establish long-term funding mechanisms for investment, operation, maintenance and renewal of infrastructure.
- Ensure regulatory alignment and compliance to build public confidence and awareness is essential for supply protection.
- Cost sharing supported by appropriate tariffs, cost recovery, public investment and strategic partnerships.

Integration at basin level: Namibia's key messages

One dynamic water balance

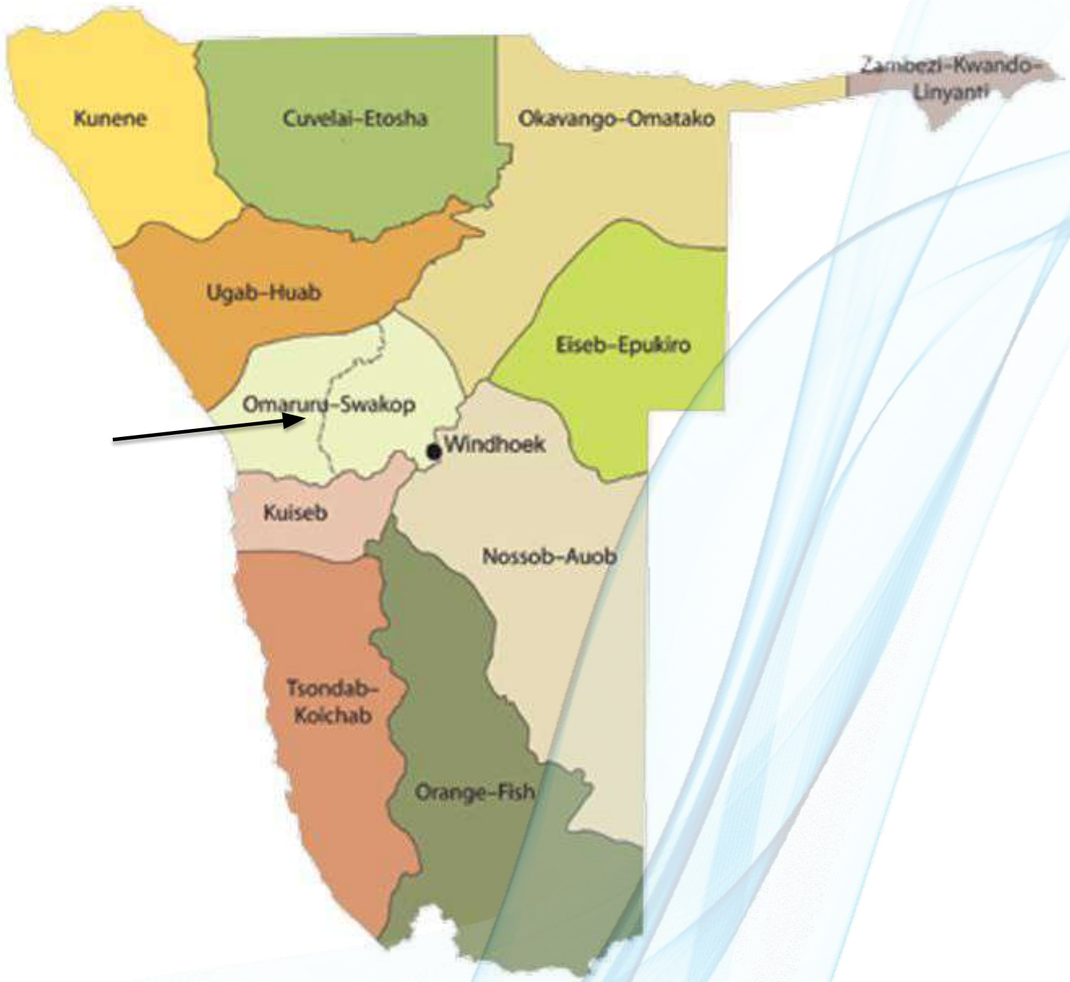
- Demand forecasts and reliable yields connect dams, recurring reuse, aquifer storage, flood recharge and desalination.

Coordinated operating rules

- Storage, drought outlook, marginal cost, quality and environmental triggers guide abstraction and source switching.

Demand management and shared learning

- Efficiency and resource protection underpin the mix. INBO exchange can support monitoring, operator training and public engagement.



THANK YOU...