

## Roadmap and Action plan for adopted sectors in Namibia

---

### 1. Overview

Namibia is one of the most arid countries in Africa: the average rainfall is about 10 inches per year, but the heat causes 83 percent to evaporate and only 1 percent of rainwater infiltrates into the ground.<sup>23</sup> The country has experienced water stress and shortages throughout its history but has used water reuse approaches to improve its water security.

Namibia's climate is characterized by hot and dry conditions and sparse and erratic rainfall. Namibia is one of the world's most sparsely populated countries. It is highly dependent on neighbors South Africa and Angola to sustain its water supply, as a large portion of its population lives near or along the banks of rivers shared with these countries.

The current demographic explosion in Africa is projected to exacerbate water needs. By 2030, about 80 percent of the world's population will live on the African and Asian continents, regions likely to experience continued water stress.

Namibia is a young country, having gained independence in March of 1990, and has inherited water management policies that were designed before independence. Namibia has drinking water guidelines but no comprehensive policy for treated wastewater.

### 2. Background

Before the 1960s, Namibia's capital city of Windhoek received its water from local springs. After the springs dried up, though, Windhoek became the first city in the world to reuse wastewater. It quickly became known as a pioneer in implementing this water management strategy. The city's Goreangab water reclamation plant commenced operation in 1969. The plant was upgraded five times over its lifetime; in 2002, a new plant began operation. The New Goreangab Water Reclamation Plant (NGWRP) uses treatment technologies with selected combinations of oxidation processes, activated carbon filtration, biofiltration, and membrane filtration to transform secondary domestic effluent into high-quality drinking water.

Absent standards for reusing treated wastewater, the plant has adopted its own water quality standards, which are largely based on existing guidance and standards including those from the World Health Organization and the U.S. EPA. The standards are enforceable per the plant's operating agreement. Today, the NGWRP meets 35 percent of the city and its metropolitan area's drinking water needs, supplying high-quality drinking water for nearly 400,000 people.

Windhoek has been relying on reused water to augment its drinking water supply for 50 years, and has a record of delivering safe, clean water even during multi-year droughts. The NGWRP is considered a model for reuse operations and is consistently studied/visited by experts, governmental personnel, and foreign mission personnel. It is considered an international benchmark for water and reclamation program innovation.

### **3. Roadmap and action plan**

Integrated water resources management plan for Namibia(2010, Namibia) is the only one official plan suggesting strategy and action plan related to the water management. In this report to suggest road map and action plan for water recycling, this plan was reviewed and revised based on the current situation. Therefore, The action plan will follow the categories of aforementioned plan

#### **3.1 POLICY AND LEGISLATIVE**

##### **3.1.1 An enabling policy and legislative framework is established and enforced**

- Develop strategy on bulk and end-user tariffs;
- Develop strategy on subsidies and cross-subsidies;
- Develop strategy for Water Demand Management and water conservation;
- Develop strategy on the reduction of bush encroachment to enhance groundwater
- Analysis of recharge potential
- Develop operation plans that promote self-regulatory systems.
- Compile guidelines for harmonisation of decentralisation process.
- Develop strategies to introduce incentives for IWRM/WDM initiatives in communities,
- industry and Government.

##### **3.1.2 Water and Sanitation governance structures are established and functional**

- Establish the Water and Sanitation Advisory Council
- Establish the Water Regulator function to gather and manage relevant data, to evaluate
- and approve tariffs for water and sanitation services and to evaluate, using performance indicators, water and sanitation service delivery by service providers.
- Establish Basin Management Committees, Irrigation Water Efficiency Groups and other water area management institutions to promote ongoing efficient and effective engagement with other community-based and non-governmental organizations.
- Establish Performance Support Teams to assist Local Authorities and Regional Councils to provide water supply and sanitation services to meet performance indicators.
- Establish a Water Research Council.

### 3.2 INSTITUTIONAL SUPPORT AND CAPACITY BUILDING

- Institutional support programs established to strengthen management and governance structures**
  - Establish institutional capacity needs for all organizations in the water sector
  - Establish institutional capacity building program according to Water Policy
  - Provide management training to all levels as required
  - Establish mentoring program at institutional and individual levels
  - Establish forums for mentored exchange of information and experience (e.g. Emerging Farmers program, use Namibia Water Partnership as a forum for institutional support)
  - Implement performance assessment program
  - Implement career development programs for institutions in the water sector
  - Encourage and implement capacity building for IWRM implementation in all relevant instances and institutions
  
- IWRM integrated and implemented within the context decentralization**
  - Establish a task team to analyze and integrate goals, objectives, strategies and actions of decentralization and IWRM for operationalization
  - Establish training program for basin level stakeholders such as WPCs, Local Authorities and Regional Councils
  - Use available capacity, within and outside government, to implement the Act and IWRMP
  - Bring certain sections of the Act into force step-wise when and after capacity becomes available or has been developed
  
- BMC (Basin Management Committees) are formalized and functional**
  - Establish BMCs
  - Develop and implement a sustainable source of funding for BMCs
  - Encourage and facilitate community engagement in BMCs
  - Recognize advisory/statutory role of BMCs
  - Strengthen management capacity of BMCs
  - Review delineation of BMCs as need arises, with stakeholders, with focus on functional and effective management
  - Provide continuous support to BMCs and other relevant initiatives
  
- Basic, vocational and higher education institutions have included IWRM into their curricula and extracurricular education programs**
  - Seeking for training program provided by developed country's ODA program and MDB and promoting apply for these program.
  - Provide IWRM curriculum support to the basic education and teacher training institutions

- Review applicability of training program established under Namibia Water Resources Management Review
- Establish long-term education programs and delineate clear career paths in IWRM and encourage dual system training
- Establish regional and international partnerships for IWRM research and technology development
- Encourage implementing and educational institutions to undertake capacity building on all levels of IWRM implementation
- Offer continuous professional development in the fields of IWRM
- DWAF or a Water Research Council establish and manage a formal bursary scheme for young people to become professionals in water sciences, engineering, technology and policy analysis

### **3.2.1 CAPACITY BUILDING FOR MANAGEMENT OF IWRM INCLUDING Water Demand**

#### **Management (WDM)**

- Management capacity of stakeholders in the water sector is enhanced**
  - Conduct an organizational assessment and development of stakeholders in the water sector.
  - Develop and implement demand based management and managerial effectiveness training.
  - Establish mentorship programs.
  - Formalize contract between Nam Water and MAWF for water banking in Windhoek.
- DWAF (Department of Water Affairs and Forestry) management capacity for licensing and compliance control is in place and improved**
  - Develop guidelines for licensing and compliance routines.
  - Build human resources capacity for licensing and compliance monitoring within DWAF and all licensed water users (sufficient competent and skilled staff).

### **3.2.2 TECHNICAL SKILLS AND MANAGEMENT FOR Water supply**

- Capacity for effective and efficient infrastructure operation and maintenance is in place**
  - Develop guidelines for the management, of infrastructures operation and maintenance.
  - Implement permanent infrastructure maintenance programs for rural and urban domestic supply
  - Build hands-on capacity to do preventative maintenance
  - Develop Human Resources technical capacity for infrastructure O&M.
  - Develop and apply capacities of performance support team and program

**Technical capacity for integrated land management, sanitation and irrigation is developed**

- Establish and strengthen existing training programmes for land use planning and management, and their linkages to IWRM.
- Establish and strengthen existing training programmes for sanitation and its linkages to IWRM.
- Support higher education institutions to provide research support for optimized crop production
- Develop materials and train farmers in irrigation scheduling and improved crop Production

### **3.2.3 FINANCIAL SKILLS AND MANAGEMENT FOR IWRM INCLUDING WDM**

**Adequate capacity for efficient financial management in place**

- Develop operational manuals for financial management
- Develop and implement training and capacity building programs on financial management (including tariffs setting, pricing, cost recovery, etc)

### **3.3 STAKEHOLDER INVOLVEMENT AND AWARENESS**

**All stakeholders are committed and actively engaged in Water Supply**

- Carry out a comprehensive Stakeholders analysis/mapping
- Raise awareness on Water supply
- Design scenarios showing benefits of IWRM to stakeholders. Showcase best practices and success stories of benefits gained through IWRM (national and international).
- Facilitate formation of appropriate stakeholder engagement platforms as identified
- Develop stakeholder forums for efficient and effective engagement among implementing agencies such as DWAF, NamWater, Regional and Local Authorities, line Ministries such as MET, MLR, NPC, MoF and MRLGHRD.
- Strengthen the Namibia Water Partnership (NWP) to facilitate awareness, participation and engagement in particular
- Provide BMCs with appropriate material for awareness raising and encourage engagement. (regarding sanitation, water use efficiency and conservation, waste minimization)
- Train people to do process and infrastructure maintenance within their communities.
- Integrate BMCs in outreach programs to urban and rural schools
- Provide funding mechanisms for the NWP and the BMCs to take lead role in promoting awareness, participation and engagement in IWRM particularly on

regional and local level

**Women and youth are equitably involved at all levels in water supply**

- Develop tailored information on IWRM for women and youth.
- Integrate women in committees on all levels
- Provide for IWRM skills training for women and youth
- Provide for general education options for women

**3.4 RESOURCES FOR Water supply**

**Providing the framework and orientation for land use/ management plans**

- Provide professional assistance to the responsible land planning institutions to produce land use/management plans based on IWRM principles
- Integrate land use and respective management plans in IWRM

**3.4.1 KNOWLEDGE MANAGEMENT**

**All necessary data for Water are available, accessible, translated to information and knowledge and appropriately managed**

- Conduct gap analysis of current and future data needs for mandated services by each institution in the water sector
- Establish a centralized knowledge management system, identify existing relevant databases, improve (operationalise) and harmonise them for inclusion.
- Identify existing hardcopy archives, re-organize and digitize them where appropriate.
- Identify viable options for data access by stakeholders on regional and local level.
- Make data, information and knowledge accessible to all water users.
- Produce informative reports and newsletters with key data processed and translated into a generally understandable format.

**Knowledge acquisition programs are established and results are accessible to all stakeholders**

- Establish a Water Research Council to actively promote research, to provide appropriate access to research information, Namibian case studies and IWRM information in general for all stakeholders
- Develop data collection strategies and action plans and carry out necessary research and investigation programs.
- Provide appropriate funding mechanisms for establishing research, knowledge and information systems

**3.4.2 WATER RESOURCES MANAGEMENT**

**Effective groundwater monitoring and control is fully established**

- Identify weaknesses and deficiencies of existing groundwater resources

- monitoring and control.
  - Develop and implement a nationwide groundwater level and quality monitoring strategy.
  - Improve the existing monitoring network.
  - Apply guidelines for groundwater abstraction licensing and compliance.
  - Establish a mandatory reporting scheme for service providers and users who abstract their own water (rest water levels and abstracted volumes) including water quality aspects
  - Install groundwater abstraction metering and establish appropriate reporting mechanisms.
  - Develop real-time monitoring and modelling systems with results accessible to all parties
  - (users, managers, service providers)
  - Train BMCs to conduct groundwater monitoring spot checks
- Groundwater resources sustainability and security is improved**
- Plan and implement artificial groundwater recharge schemes.
  - Develop and implement programs for the reduction of bush encroachment.
  - Investigate, quantify and manage groundwater resources of trans-boundary aquifers.
- Effective surface water (perennial and ephemeral) monitoring and control is fully established**
- Identify weaknesses and deficiencies of existing monitoring and control strategy and infrastructures.
  - Improve management of catchments to enhance both surface and groundwater sources Design and implement appropriate flood management plans
  - Integrate stakeholders in monitoring and reporting of changes to surface water resource availability
  - Implement existing Drought Policy and Strategy using national and community-based forums
  - Review and strengthen fully informed representation and engagement in relevant international basin commissions.

### 3.4.3 CLIMATE AND CLIMATE CHANGE

- Water resources are managed with full consideration of climate variability and climate change**
- Develop climate variability and climate change adaptation and mitigation strategies
  - Integrate key potential impacts from climate variability and climate change into water supply Plans
  - Include climate variability and change parameters into the design and implementation of droughts and flood management plans



- Establish linkages between water resources and climate monitoring.
- Establish multi-directional communication platform to process data and information and interpret results
- Strengthen and maintain the capacity of the Directorate of Emergency Management

#### **3.4.4 WATER SUPPLY**

- Access to quality water supply for all users is ensured**
  - Assess weaknesses and shortages of water supply coverage
  - Develop and implement water supply management master plans. (Identify water supply management related gaps by assessing existing water resources related policies and regional and national development and land use plans. Adjust water supply planning to regional land use and development plans).
  - Define water supply targets and performance indicators (including quality standards and guidelines, and coverage).
  - Develop and implement country wide quality monitoring strategy and network.
  - Develop desalination plants for coastal water supply.
  
- Water supply is affordable and economically viable**
  - Define tariffs according to the existing Water Tariff Policy.
  - Establish subsidies and cross-subsidies structures for low income groups.
  - Develop and implement fair and effective credit control policies for service providers
  - Determine financial performance indicators for economically viable service provision.
  - Develop an effective system to collect payment for water services from Rural communities.
  
- Water resources from perennial rivers are sustainably allocated**
  - Establish priorities for water allocation during periods of shortage or extended periods of drought.
  - Develop master plans for water allocation from international rivers.
  - Establish parameters for water allocation from the perennial rivers.
  - Make water abstraction metering from perennial rivers and reporting mandatory for big water users
  
- Water supply infrastructure is adequately maintained, replaced, upgraded and extended**
  - Identify weaknesses and deficiencies of existing schemes and infrastructures.
  - Develop and implement infrastructure maintenance, replacement and extension plans
  - Allocate adequate funding for the implementation of the plans



### **3.4.5 WATER DEMAND MANAGEMENT AND WATER USE EFFICIENCY**

- **Water use efficiency is increased through WDM**
  - Assess the existing practices in water demand management and identify gaps and best practices
  - Assess current water use efficiency of key water users in industry, agriculture, tourism, mining, Investigate, develop and implement unconventional resources, and reuse of treated wastewater
  - Provide research funding to develop water saving technologies
  - Facilitate forums for participation, engagement and knowledge sharing in WDM
  - Facilitate and implement water metering and recording of results
  - Educate the public in water saving strategies and promote water saving devices.
  - Implement water infrastructure maintenance programs through WDM urban and rural areas with sufficient funding through a revolving fund and other instruments.
  
- **WDM Master Plans for urban and rural areas, the irrigation sector, industry, mining and tourism are developed and implemented.**
  - Identify WDM related gaps by assessing existing sectoral policies (urban and rural areas, the irrigation sector, industry, mining and tourism)
  - Carry out water use and conservation, historic water requirements, water use efficiency, infrastructure characteristics, non-revenue water, customers profile management practices and pollution potential of the activity/entity;
  - Prepare a demand forecast without water savings to estimate the extent of supply augmentation required to satisfy the water demand including the estimated capital and operational costs;
  - Identify WDM initiatives, expected water savings and price them based on Unit Reference Values;
  - Determine required capital & human resources for implementation;
  - Evaluate effect of savings on both the service provider & consumer; and The effect of sanitation provision in area of jurisdiction if applicable
  - Develop WDM master plans including goals and indicators.
  - Develop an implementation and monitoring program.
  
- **Irrigation management plans for improved efficiency are established and implemented**
  - Fully implement metering for irrigation.
  - Promote and introduce water saving technologies.
  - Introduce and implement water recycling and reuse of treated wastewater for irrigation near urban areas
  - Promote and conduct research on optimized crop selection and production.
  - Develop irrigation management plans including setting of appropriate tariffs and

fees, and M & E parameters

- Innovative conjunctive water use and use of unconventional water sources is enhanced**
  - Investigate and elaborate potential for conjunctive water use in all basins and regions
  - Allocate adequate funding to implement conjunctive water use
  - Investigate the application of diverse technologies for the treatment of wastewater (e.g. artificial wetland treatment systems for wastewater treatment, rapid oxygenation) and share best practices.
  - Train water users in grey water recycling technology
  - Build capacity for installation, operation and maintenance of grey water recycling technologies
  - Further develop artificial aquifer recharge initiatives
  - Test and implement appropriate water treatment technologies, such as desalination and membrane.
  - Further implement desalination as solution for coastal water supply

#### **3.4.6 SANITATION, POLLUTION CONTROL AND PROTECTION**

- Water resources are adequately protected**
  - Assess water resources vulnerability and identify needs and measures for their protection.
  - Develop special water resources protection and conservation rules.
  - Implement and enforce water and effluent quality regulations.
  - Promote understanding of interpretation and application of 'polluter pays' principle and precautionary principle
  - Facilitate training in monitoring and enforcement of water resources protection and pollution prevention
  - Design and implement water resources conservation program
  - Maintain water resources protection on the agenda of international basin commissions
  
- Sanitation facilities improved and management plans established and implemented**
  - Define sanitation targets based on NDPs
  - Assess rural and peri-urban conditions,
  - Identify appropriate sanitation technologies.
  - Develop and implement sanitation management plan and its M&E parameters.
  - Provide information on benefits of sanitation and options for facilities, to inform users and managers at all levels
  - Educate decision makers in different sanitation options to understand the benefits of sanitation and water resources conservation
  - Establish training program for rural and peri-urban sanitation installation and maintenance

- Develop manuals for construction and maintenance of sanitation facilities, including description of regulations on design and location of sanitation facilities.
  - Train rural people in installation, operation and maintenance of sanitation facilities
  - Provide research funding for sanitation technology
  - Provide funding for sanitation option installations and maintenance of sanitation facilities for Government owned infrastructure
- **Adequate solid and liquid waste management practices are established and enforced**
- Assess existing solid/liquid waste management policies.
  - Assess existing solid/liquid waste management practices of key water users
  - Provide support to regional and local authorities to develop solid/liquid management plans.
  - Develop and implement national guideline for the disposal of solid waste by land filling. Develop and implement national guidelines for the treatment and disposal of hazardous waste.
  - Make available good solid waste management practices to the public
  - Integrate good solid waste management practices in all resource plans
  - Promote and enforce the 'polluter pays' principle.
  - Educate users in all sectors in good solid waste management practices such as waste minimization and recycling
- **Wastewater and solid waste infrastructure is adequately maintained, replaced, upgraded and extended**
- Identify weaknesses and deficiencies of existing infrastructures.
  - Develop and implement infrastructure maintenance, replacement and extension plans Train water users in infrastructure maintenance
  - Allocate adequate funding for the implementation of the maintenance plans

### 3.5 INVESTMENT

- **Sustainable investment for sustainable water supply**
- Retain revenue from water services in the water services cost centre
  - Develop a long-term investment plan with alternative investment inputs, including a revolving fund to facilitate the implementation of WDM projects
  - Harmonize investment plan with water and sanitation related policies and strategies
  - Communicate the investment plan to all stakeholders.
  - Integrate investment plan into all relevant sector plans
  - Establish a mentorship programme to support investment decisions and activities (WaSAC, PSTs, NIWEG)
  - Connect the investment plan to the monitoring and evaluation systems to support timely feedback

- Integrate capacity building and capacity maintenance programmes into the investment plan
- Integrate resources for IWRM into all MTEF and NDPs