Water Resource Long Term Planning

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Structure of the presentation

• National Water Perspective
• Planning Process/ Methodology
• Limpopo Province Water Perspective (inc. Reconciliation Strategies)
• Key Messages
DWA: Current Operating Model

Lines of reporting through the DG to the Minister
Accountability to the Minister

*: Orasecom, Limcom, Inacomputocommittees, KOBWA;
International Rivers shared by South Africa
• Essential that water be of appropriate quality for intended uses
• Deteriorating water quality potential major threat in SA
  – can render water unfit for use
• Main sources of impact on water quality are:
  – discharge of urban and industrial effluent to rivers
  – high salinity irrigation return flows
  – wash-off and leachate from mining operations
  – wash-off from areas with insufficient sanitation
• Water quality fundamental element to water resource management
• Most problems could be solved at source
Overview of NWRS2

• South Africa’s Vision for 2030 demands sufficient water resources
• Water must provide for growth & development
• Our water resource is already stressed
• Water scarcity threatens energy production, food security, economic growth & quality of life
• This strategy addresses current & future water demands for 2030 vision and simultaneously ensure the sustainability of our water resource
NWRS2 Core Message

• Fresh water (surface) resource at its limit in most areas
• Sufficient alternative potential water available:
  – Improved efficiency & water loss management, re-use, local resource optimisation (groundwater), improved control, resource protection, desalination, transfers, systems optimisation;
• However, accessibility is conditional and at a cost:
  – Requires effort & timeous implementation
  – Spatial challenges (including re-allocation )
  – Use sector viability challenges
• Water quality & habitat a major concern;
• Need to “stretch” water, funding and infrastructure;
• Major social, economic, environmental risks .
Large System Reconciliation Strategy

Studies

• Develop future water requirement scenarios in consultation with users
• Investigate all possible water resources and other interventions
• Investigate all possible methods for reconciling the requirements with the available resources
• Make recommendations for development and implementation of interventions
Implementation of strategies

• Strategy Steering Committee for each area
  – Monitor implementation
  – Update strategies
  – Communicate

• Members
  – DWA, Province(s), Municipalities
  – CMAs, Water Boards, Water user associations
  – User groups

• Co-operative government in action

• Information from strategies supplied to Water Sector
  Infrastructure Investment Framework
Progress

• Completed
  1. Western Cape
  2. Amatole system
  3. Vaal River system
  4. Crocodile (West) system
  5. KZN Coastal Metropolitan areas
  6. Algoa system
  7. Bloemfontein area
  8. Olifants system

• Current
  9. Luvuvhu-Letaba system
  10. Orange River system
  11. Mbombela area
  12. Richards Bay area
  13. Limpopo Water Management Area North

• Information on DWA website – will be linked to NWRS web page
Next level – all other towns

- Studies started in 2009
- Three year programme to cover all towns
- Enormous and complex task
- Divided into four projects to do a total of 814 strategies for towns and villages (some clustered)
- Completed March 2012
- Available on DWA website
Portal allows for searching on a Provincial, District and Local municipality level.

Interactive map allows for the selection of a specific area.

Statistics and links to all available strategies are displayed for the selected area.
Reconciliation Strategy “in a nutshell”

Supply side intervention

Demand side intervention

What is the assurance of supply?
Typical Interventions

• **Management interventions:**
  – Water Conservation and Water Demand Management.
  – Optimal system operation.
  – Adjusting assurance of supply.
  – Trading of water use allocations.
  – Rainfall harvesting

• **Infrastructure developments:**
  – Water re-use
  – Augmentation Schemes
    • Surface
    • Groundwater
Marico
River
Catchment
Marico River Catchment Status

• The surface water runoff is highly variable and the available surface water resource has been fully developed in the catchment.
• Molatedi Dam over allocated
• Groundwater is a significant source of water, however, the use in the dolomitic areas has reached the limits of the resource
Marico River Catchment Options

- Mr1: Water Conservation & Water Demand Management.
- Mr2: Further groundwater resource development.
- Mr3: Reduced allocations from Molatedi Dam needed.
Crocodile West River Water Supply

- Mokolo Catchment
- Proposed Transfer
- Vaal Catchment
- Crocodile West Catchment
- Treated Urban Return Flows
- Transfer from Vaal River via Rand Water System

Growth areas:
- Urban
- Mining
Crocodile West River System balance including transfers to Lephalale

Mokolo Crocodile Water Augmentation Project - Phase 2
Water Requirements and Water Availability

Lephalale Water Requirements (Apr 2013)
Lephalale Water Requirements (July 2012)

“Mining” of Mokolo Dam

Water available at Vlieëpoort for transfer
Reconciliation Strategy in a Nutshell

(1 of 2)

- **Rand Water (RW) service area**
  - Continued supply from the Vaal River
  - Additional re-use only when surplus is available

- **Areas north of the Magaliesberg outside RW**
  - Increasing treated effluent from metropolitan area will be future source of water for mining and urban requirements north of the Magaliesberg (outside RW supply area)

- **Waterberg area (north of Crocodile West catchment)**
  - Optimal utilisation of local resources to be continued
  - Transfer water from the Crocodile River to Lephalale area
Reconciliation Strategy in a Nutshell

(2 of 2)

• Evaluate interventions to supply short-duration shortfall
  – Demand side management and/or,
  – Augmentation by transferring treated wastewater from Vaal River system to Crocodile River

• Utilise available groundwater in all areas and consider conjunctive use with surface resources
Matlabas River Catchment Status

- Dry catchment with non-perennial flow and hence no sustainable yield from surface water.
- Limited water use in this catchment is mostly from groundwater, which is under-exploited.
- No major water resources or water supply issues.
- New allocations can only be made from groundwater or from additional yield which could conceivably be created by the construction of farm dams.
Lephalalala River Catchment Status

• Catchment with limited water resources but surprisingly high water requirements.
• Catchment is stressed and no new allocations should be made for irrigation purposes.
• Additional water for domestic purposes should be sourced from groundwater.
• The middle reaches of the Lephalalala are of high conservation value.
• Development should be limited in the Lephalalala to maintain this important conservation area.
Mogalakwena River Catchment Status

- Catchment with very limited surface water resources.
- Large groundwater resources which have already been extensively exploited.
- Doorndraai Dam over allocated.
- Glen Alpine Dam over allocated.
- Relative low rainfall and runoff.
- Groundwater is an option for local supply.
Mogalakwena River Catchment Options

- Mg1: Water Conservation & Water Demand Management.
- Mg2: Groundwater developments.
- Mg3: Raise Glen Alpine Dam?
Sand River Catchment
Sand River Catchment Status

- Dry catchment with very limited surface water resources.
- Nzhelele Dam over allocated.
- Exceptional groundwater reserves which have been fully and possibly over-exploited.
- Area relies heavily on transfers from other WMAs to meet the urban and industrial demands of Polokwane and Makhado.
- Musina abstract their water from sand aquifers in the Limpopo River.
- Groundwater is an option for local supply.
Sand River Catchment Options

- Sn1: Water Conservation & Water Demand Management.
- Sn2: Groundwater developments.
- Sn3: Lu2: Albasini Dam in combination with Latonyanda Dam & other interventions for Makhado and Environs.
- Sn4: Treated effluent reuse.
- Sn5: Nandoni Transfer to Matoks.
- Sn6: Additional Limpopo abstraction??
- Sn7: ORS: Additional transfer in future for Polokwane
• Sn8: Development of a Water Reconciliation Strategy for the Limpopo North WMA
  
  – Identify current and potential water users
  
  – Identify Sources
  
  – Establish Study and Strategy Steering Committee
  
  – Specific action plans will need to be developed in conjunction with the various users.
Luvuvhu River Catchment Status

• Albasini Dam is over allocated, even if Makhado is supplied from Nandoni Dam.

• Vondo, Nandoni and Tshakuma sub-systems supply overlapping demand centers.

• Nandoni Dam to support transfer to Giyani.

• Transfer pipeline to Makhado in progress.

• Water needs exceed yield of Nandoni by 2018.
• **Lu1**: Water Conservation & Water Demand Management.

• Long term possible reconciliation options to supply Makhado and augment upper Luvuvhu:
  - **Lu2**: Albasini Dam in combination with Latonyanda Dam & other interventions.
  - **Lu3**: Nandoni Dam as primary source to Makhado.
  - **Lu4**: Nandoni & Albasini (combination of above).

• **Lu5**: Further groundwater use in Nandoni supply area

• **Lu6**: Raising of Vondo Dam

• **Lu7**: Mid Dzindi Dam

• **Lu8**: Latonyanda Dam or d/s to capture flows from Tshakuma

• **Lu9**: Paswane Dam or **Lu10**: Raising of Nandoni Dam?
Letaba River Catchment
Letaba River Catchment Status

• Groot Letaba: Surface water resources are extensively developed to meet domestic, irrigation and industrial water needs – low assurance of supply.

• Middle & Klein Letaba: Water use from Middle Letaba Dam is far in excess of the available yield.

• Transfer scheme from Nandoni Dam under construction to alleviate water shortages in Giyani.

• Groot Letaba River Water Development Project (GLRWDP) - planning is underway.
Letaba River Catchment Options

- GL1: Raising of Tzaneen Dam (given option).
- GL2: Construction of Nwamitwa Dam (given option).
- GL3: Bulk Water Supply Infrastructure from Nwamitwa Dam (link with GL6) (given option)
- GL5: Artificial recharge at Mulele on Molototsi River.
- GL6: Groundwater regional scheme in conjunction with surface scheme.
Letaba River Catchment Options

- MKL1: Water Conservation & Water Demand Management.
- MKL2: Development of groundwater resource.
- MKL3: Replacement of Middle Letaba canal with pipeline.
- MKL4: Transfer Scheme from Nandoni Dam (in process).
- MKL5: Construction of new dam on Klein Letaba River:
  - Majosi Dam
  - Crystalfontein Dam
Olifants River Supply System Area

Map of the Olifants River Supply System Area with various water bodies, rivers, and boundaries indicated. The map includes labels for different water management areas such as Luvulhu and Letaba WMA, Limpopo WMA, and Crocodile (West) and Marico WMA. The map also highlights the Olifants WMA and other relevant water management areas.

Water is Life - Respect it, Conserve it, Enjoy it.
Recon Strategy (2012): 50% Success Scenario

Additional Yield due to De Hoop Dam Construction
Reconciliation Strategy (2012): In a Nutshell

All Strategy documents can be found at: http://www.dwa.gov.za/Projects/OlifantsRecon/default.aspx

- Operationalize the Reserve as soon as practical.
- Water to power stations will continue to be supplied from the Usuthu, Komati and Vaal systems.
- Water required to supply the current and future requirements for social and economic activities in the Olifants catchment will have to come from the catchment’s local resources.
- Water required by the Polokwane and Mokopane supply areas will be augmented from the Olifants catchment.
Reconciliation Strategy (2012): In a Nutshell (2)

- Reconciliation achieved through:
  - Eliminating unlawful water use
  - Introducing water conservation and water demand management (WC/WDM) in all sectors
  - Utilisation of treated acid mine drainage water.
  - Removing of invasive alien plants
  - Developing groundwater
  - Additional reuse of return flows from Polokwane and Mokopane

- Solutions management rather development orientated
  - Orchestrated effort is necessary.
  - If not fully achieved, water will have to be reallocated
Assessment of the Ultimate Potential and Future Marginal Cost of Water Resources in South Africa

SEPTEMBER 2019
Olifants River system

Legend
- 0.85 - Unit energy requirement kWh/m³ of raw water

- Transfer of Zambezi Water
- Desalination of seawater
- Use of acid mine drainage
- Transfer from Vaal River system
- Olifants Dam

Marginal Cost - URV (R/m³)

Volume (Mm³/a)
Key strategic messages (1)

• Detailed work confirmed NWRS 1 broad strategies, but added desalination as a strategy
• Water management is complex
• Solutions entail much more than just addition of dams
• WC/WDM extremely important in all areas – SA - Limpopo can not afford to waste water, anywhere, anytime
• Groundwater important, currently under-valued and under-used
• Huge potential for increase in re-use, at coast but also in inland systems i.e. Vaal River system
Key strategic messages (2)

• Limited opportunity for more dams
• Dams and interbasin transfers inevitable in certain areas – very expensive
• Desalination
  – Small scale seawater desalination already being done
  – Mine water desalination important
  – Large scale seawater desalination imminent
• Possible to make more water available anywhere in the country in the future, but at steeply rising costs
• Zambezi water too costly
Key strategic messages (3)

• Water for increase in irrigation in SA - Limpopo very limited
• Reallocation of some water must already be considered in certain areas
• Catchment rehabilitation, clearing of invasive alien plants and rainwater harvesting can be undertaken to optimise rainfall (both at catchment and household level)
Key messages from All Town Studies

• Improved management will solve largest portion of immediate problems
  – No metering – WSAs have no idea how much water is used or wasted
  – Large wastage of water evident
  – Per capita use much too high
  – Free water provided far above indigent level obligations
  – Poor cost recovery
  – Lack of proper maintenance and skilled operators
  – Technical competency low

• Groundwater a very important resource for towns
In summary

- Water management is complex
- But it is possible for SA – Limpopo to have water security
- We can use water more efficiently and we can make more water available
- **But we must implement the plans and the water sector needs**
  - Much more financial resources
  - Appropriate human resources
  - Unpopular decisions to be made from time to time
  - Fully functioning institutions
- And water is going to cost more and more as we go into the future
- Trade-offs will be necessary
- Water will have to be central in all planning
Thank you