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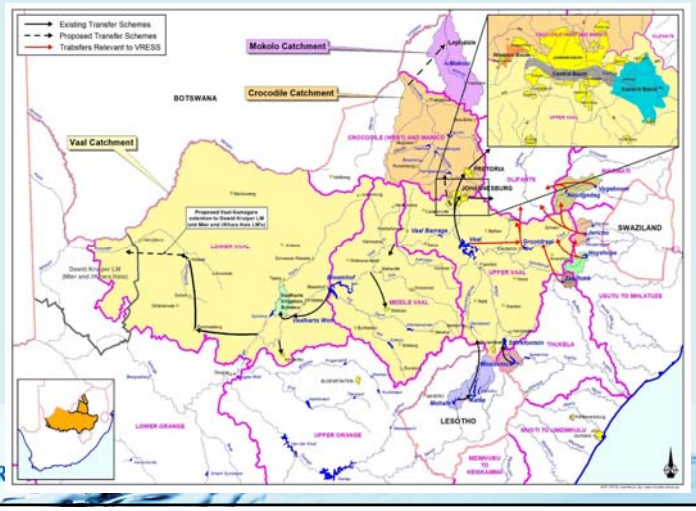
1. IVRS Background

- IVRS: Integrated Vaal River System
- Refers to Vaal River (Upper, Middle & Lower) plus links with other catchment areas
- Rand Water abstracts water from the IVRS



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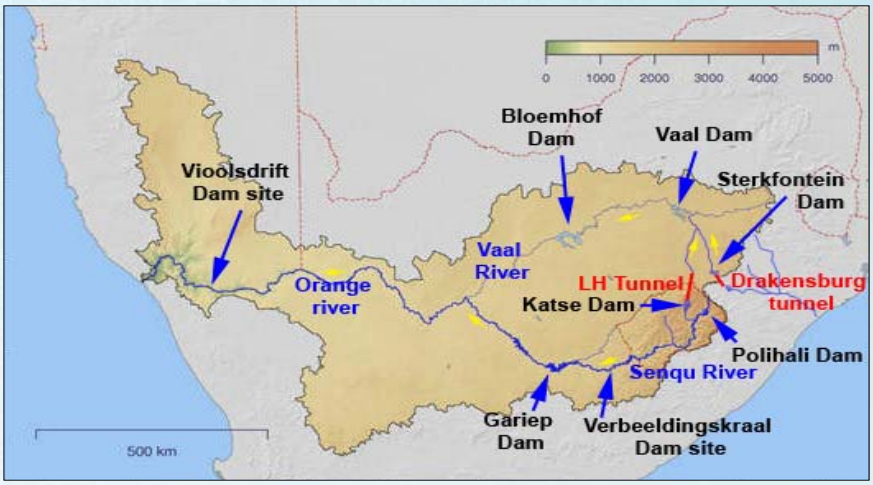

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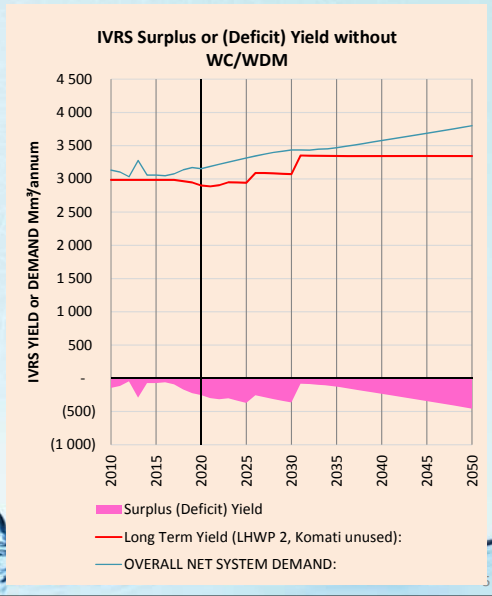
2. IVRS Supply and Demand Water Balance

- IVRS Demand (without WC/WDM) is expected to exceed supply all the time in future
- Rand Water has the greatest contribution to IVRS growth in demand



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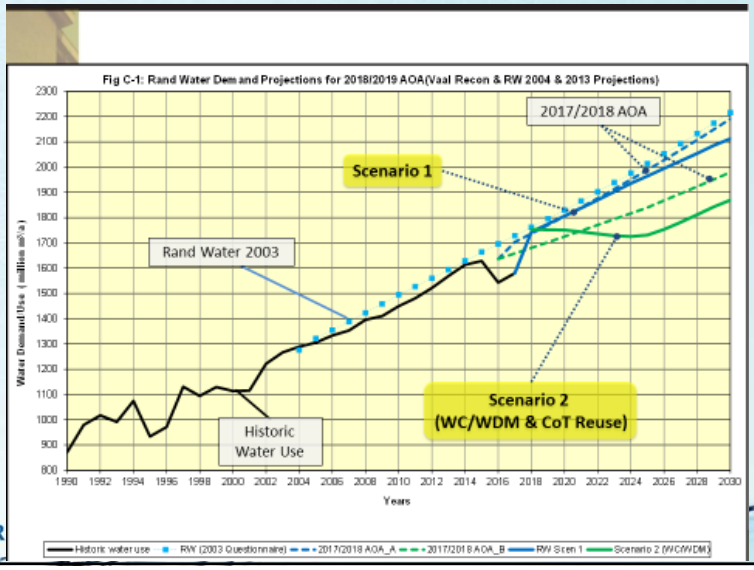
3. RW Water Requirements from IVRS

- Rand Water has been allocated 1600 Mm³/annum from IVRS
- Rand Water is the only growing raw water user in the IVRS



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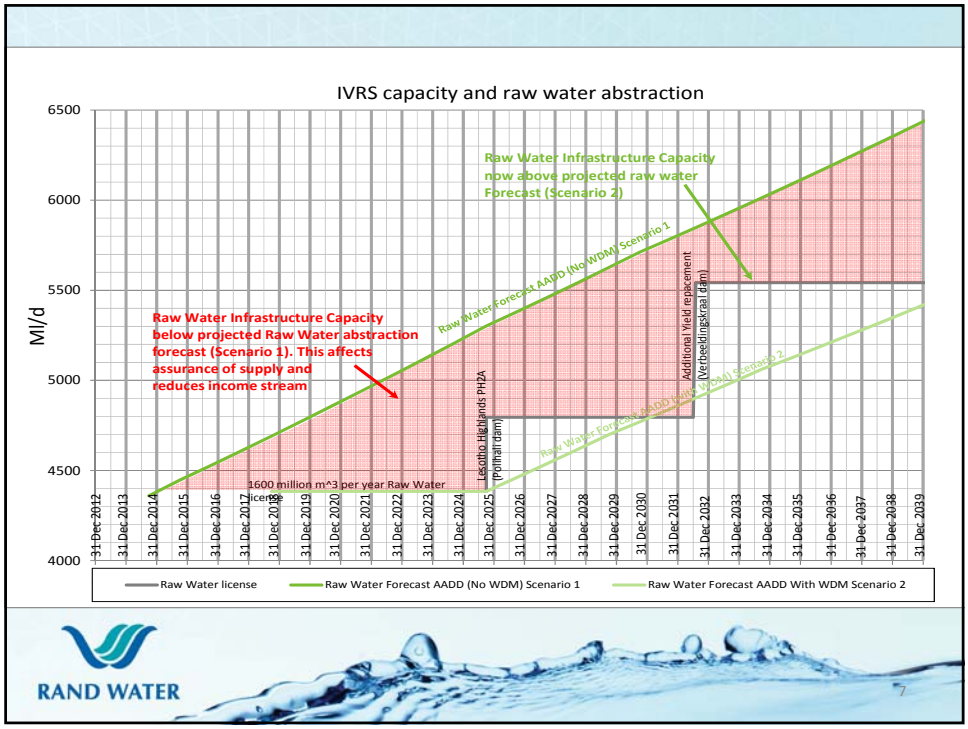

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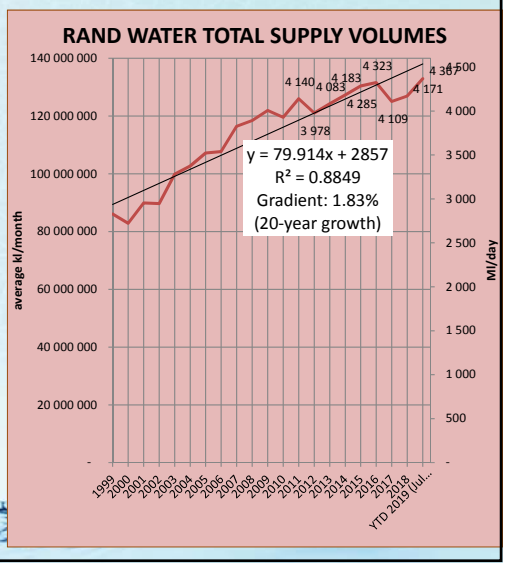
4. Recent Demand Reduction Interventions (Restrictions)

- 15% Restrictions Gazetted from Sep 2016 to Mar 2017 (6 months)
- 11% reduction achieved at peak; 8% average over restriction period



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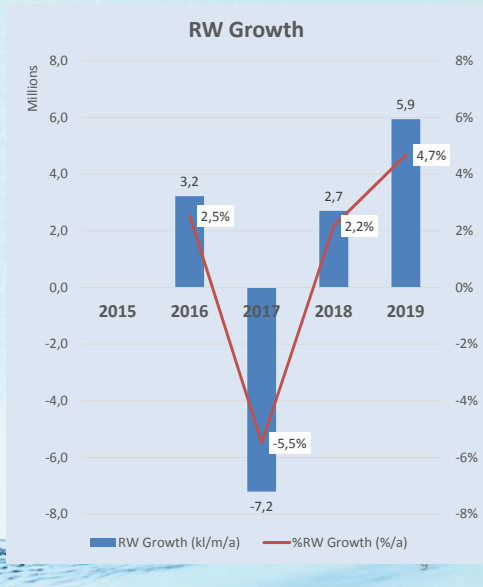
5. Recent Demand Increases (Post Restrictions)

- Steep growth rate of 4.7% after lifting of restrictions
- Demand expected to return to pre-restriction demand plus normal growth of 2% pa



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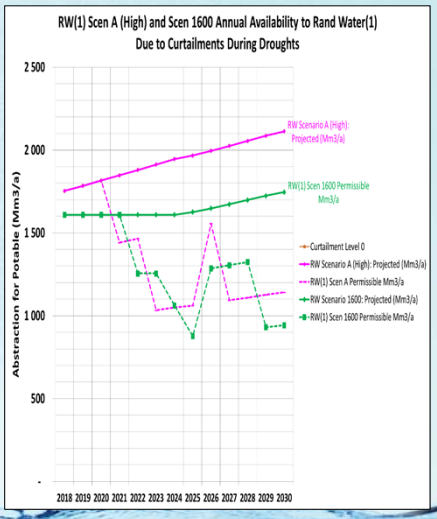
6. Potential Future Water Shortages

- IVRS Annual Operating Analysis (AOA) indicates potential restrictions
- If high scenario (pink) is followed: 24% (1440 Mm³/a) by 2021; 46% (1100 Mm³/a) by 2023
- If low scenario including 15% WC/WDM is followed: 24% (1250 Mm³/a) by 2022; 46% (900 Mm³/a) by 2025



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7. Water Use Efficiency

- Rand Water is required by DHSWS to be efficient regarding water use
- Rand Water needs to allocate its limited water use license to all its users in a fair and equitable manner
- Rand Water has developed a scientific model to assess the water use efficiency (WUE) of any sub-part in its area of supply
- Municipalities, especially residential users, have been dealt with for a number of years – Project 1600
- Now non-residential users such as the mines, industries and businesses need to be brought on board as well
- Rand Water's Normal demand is 1344 Mm^3/annum
- The current WUE Index (WUEI) for Rand Water in total is 1.30, implying that Rand Water and its customers are using 30% more water than is deemed to be normal, which is regarded as a LOW efficiency

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Water Use Efficiency Index

Water use efficiency index	Colour coding	Classification
> 0.7		To be investigated, supply constraints
0.7 - 0.9		High efficiency
0.91 - 1.1		Normal efficiency
1.1 - 1.5		Low efficiency
1.51 - 2.5		No efficiency
> 2.5		Grossly inefficient/data error, for further investigation

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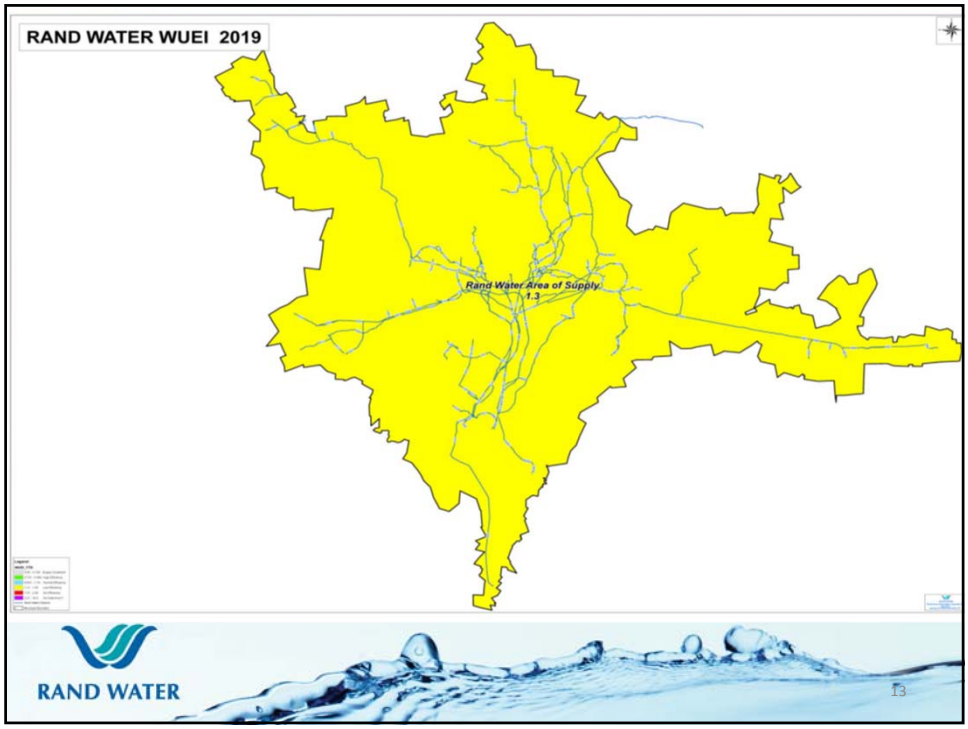
RAND WATER WUEI 2019
Rand Water Area of Supply
1.3
RAND WATER
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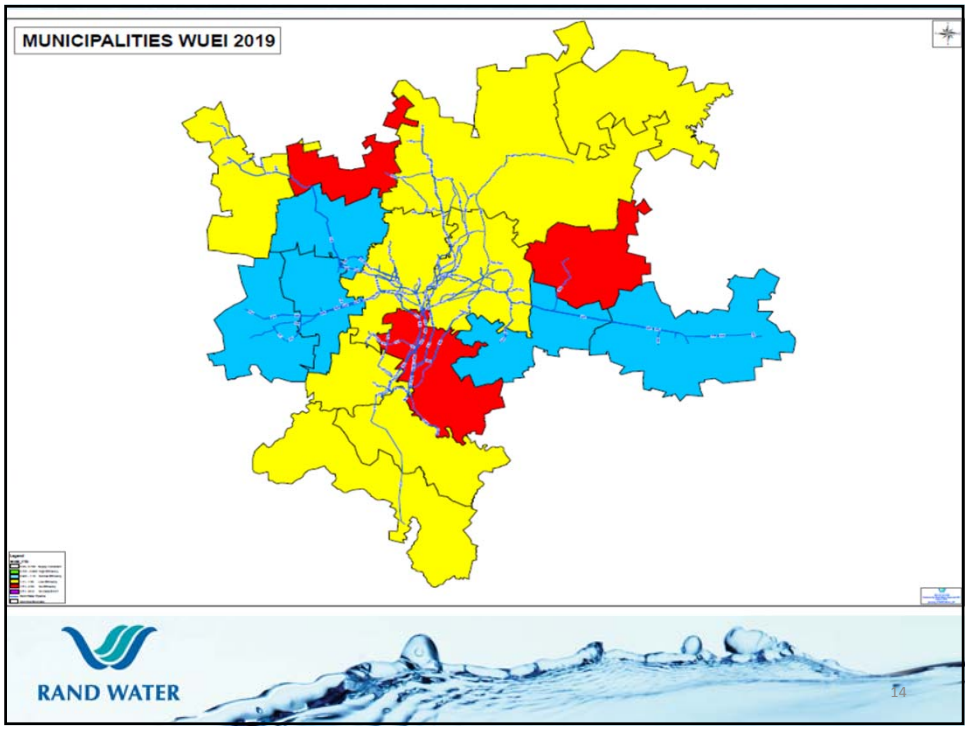
MUNICIPALITIES WUEI 2019
RAND WATER
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8. Water Use Efficiency as Proxy for Effort or Hardship

- The low efficiency is partly due to excessive or luxurious usage and partly due to excessive real losses
- The 1600 Mm³/a license target that is available to Rand Water is equivalent to a WUEI of 1.19, which implies that the current demand is 11% above license target [(1.30 – 1.19) * 100]. Therefore, in order to reduce its demand to equal the license target, it will have to either reduce luxurious usage and/or reduce excessive real losses
- Achieving a lower WUEI will require specific interventions or cause some form of sacrifice or hardship by all parties involved
- It can be deduced that water use efficiency can be used as a proxy for effort required or hardship to be endured

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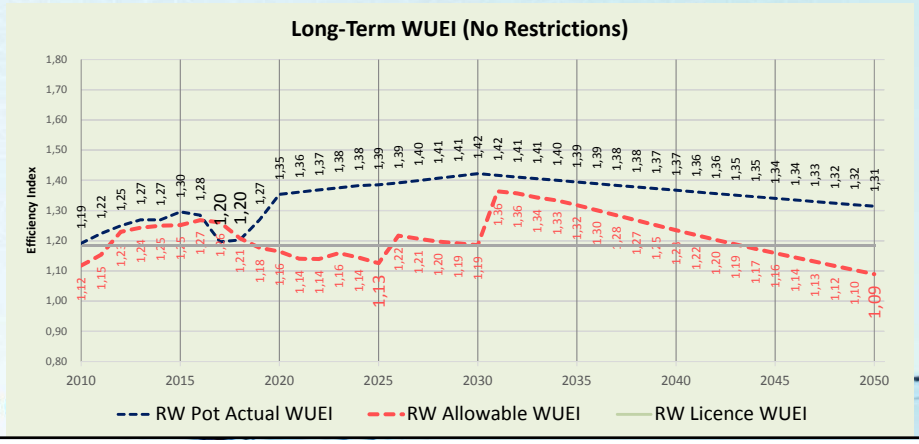
9. Expected Future Water Use Efficiency Requirements

- Assuming no water shortages
- Taking into account
  - the expected increasing demand from Rand Water and its users in the IVRS
  - the expected yield of the IVRS until 2030
- It is clear that high water use efficiencies will be required as shown in the graph below (peaking at 1.13 in 2025 and 1.09 in 2050) compared to an actual of 1.2 at the peak of the 2016-17 restrictions



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9. (continued) Expected Future Water Use Efficiency Requirements

- Assuming various levels of water restrictions
- Taking into account
  - the expected increasing demand from Rand Water and its users in the IVRS
  - the expected yield of the IVRS until 2030
- It is clear that even higher water use efficiencies will be required as shown below:
  - 15% restrictions in 2021 will require a WUEI of 1.01
  - 24% restrictions in 2025 will require a WUEI of 0.93
  - 46% restrictions after 2030 will require a WUEI of 0.63
- There are very few BM_DMAs in Rand Water's AoS that perform at a WUEI of 1.00 and those few performing better than 0.70 are suspected of data errors or are due to supply constraints

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10.Proposed Demand Reduction Interventions

- Bottom-up approach (gradual, long-term)
  - Pressure reduction
  - Leak repair in Reticulation
  - Leak repair in Plumbing
- Top-down approach (sudden, short-term)
  - Gazetted restrictions (15% @ 60% storage; 24% @ 40%; 46% @20%)
  - Usage reduction (general appeal for voluntary reduction)
  - Banning of hosepipes, car washing, etc
  - Intentional limitation of supply volumes:
    - Intermittent supply to individual consumers
    - Intermittent supply to municipal zones
    - Intermittent supply to municipal bulk meter DMAs
    - Intermittent supply of raw water to Rand Water

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11.Challenges

- No planned approach to meet potential very high requirements of IVRS
- Limited resources for interventions
- Growing demand
- Complacency at all levels
- Lack of skills in private and public spaces

=> Requires improved efficiencies

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12.Conclusion

- We are (ab)using water we don't have
- Our systems are highly inefficient. There is a clear need for the determination of water use efficiency of all residential and non-residential users
- Water use efficiency could be used as an indicator for priority interventions
- Serious attention should be given to planning how the potential high efficiency requirements will be met

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> You don't drown by falling into water. You only drown if you stay there.
>
> Zig Ziglar

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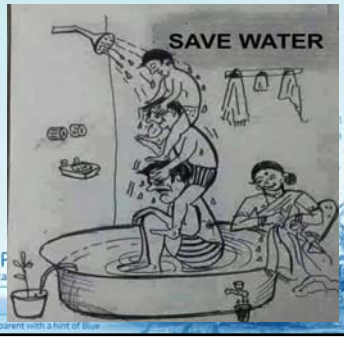
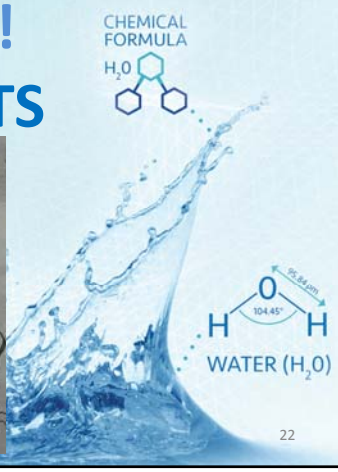
QUESTIONS?

COMMENTS!

COMPLIMENTS





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