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THE EFFECT OF CLIMATE CHANGE IN THE WATER SECTOR

- DR LESLIE HOY

- DECEMBER 2024

• Contents

- Climate change the new normal!
- Climate change effects, changes and challenges
- Possible solutions
- Final thoughts

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- Climate change the new normal!

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Climate change the new normal!

- Already a 1.2^{o}C average rise in temperatures (0,17^{o}C to 0.2^{o}C /decade)
- Southern Africa is a hotspot for droughts, floods and heatwave events
- Floods and droughts (hydrological extremes) are becoming common occurrence
- South Africa is already water stressed, and climate change will aggravate this
- These extreme events are impacting the urban environment, agricultural sector as well as the natural environment (including biodiversity)
- The impacts of climate change will increase should global emissions not be halted and reversed.
- Climate impacts are also observed to increase gender-based violence, poverty amongst woman and a greater burden of low paid and low skilled women (Parry & Gordon, 2021)

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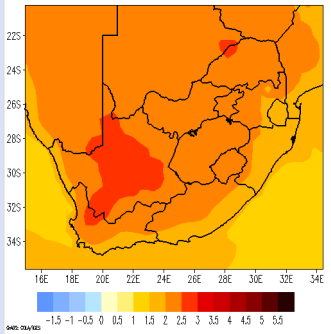
• TYPICAL SOUTH AFRICAN PROJECTIONS – 2036 to 2065

Seasonal temperature change (°C) for 2036 - 2065

RCP 8.5 (business as usual)

DJF



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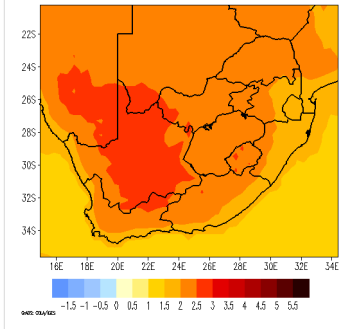

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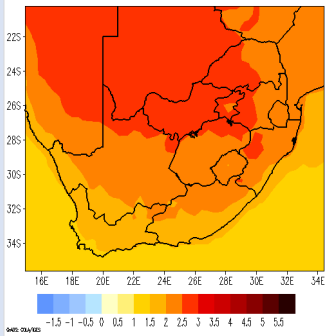

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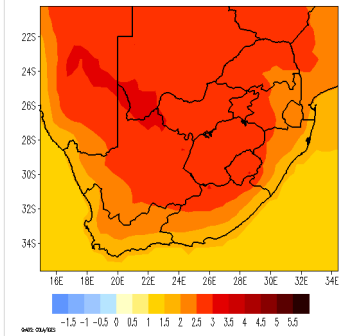

Seasonal rainfall change (mm) for 2036 - 2065

RCP 8.5 (business as usual)

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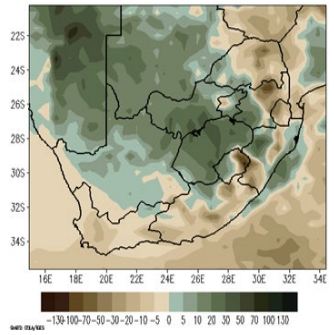

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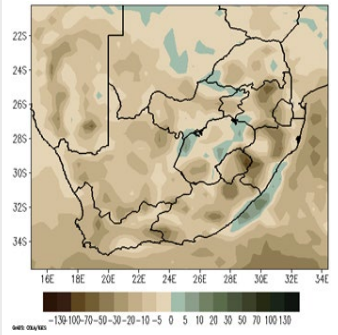

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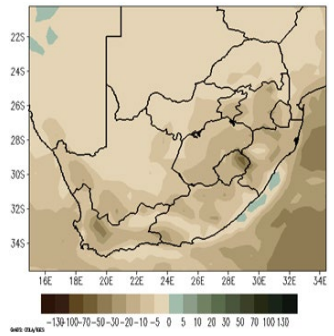

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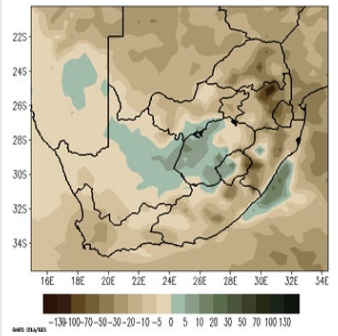

- RCA4 Regional Climate Model simulations forced by 9 CMIP5 Global Models – 9 member ensemble mean. (RCA4 is a coupled ocean-atmosphere model that has been used to simulate climate change in South Africa. RCP8.5 , business as usual considers global mean temperature increase of 4.3°C relative to preindustrial levels by 2100)

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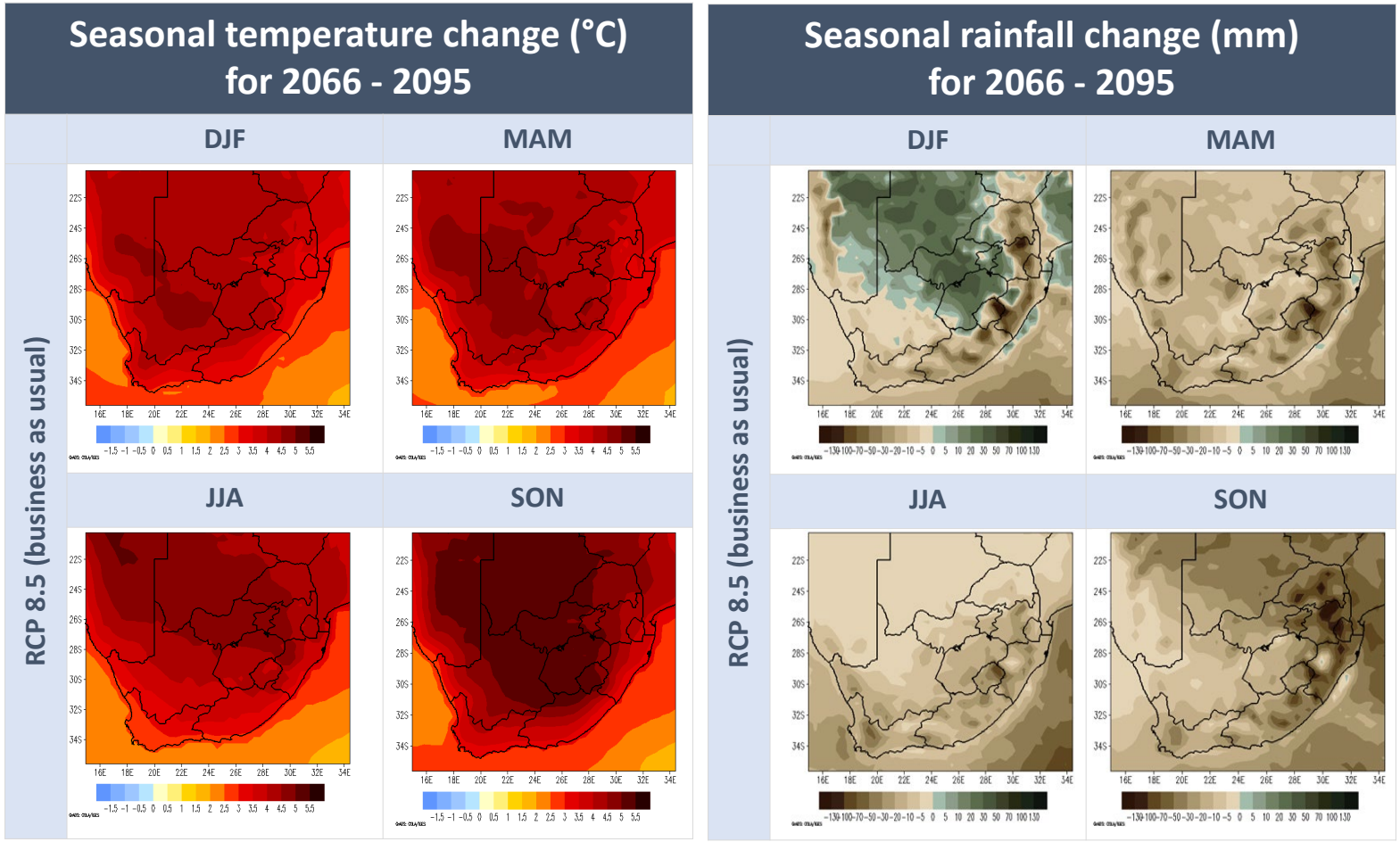
• TYPICAL SOUTH AFRICAN PROJECTIONS – 2036 to 2065



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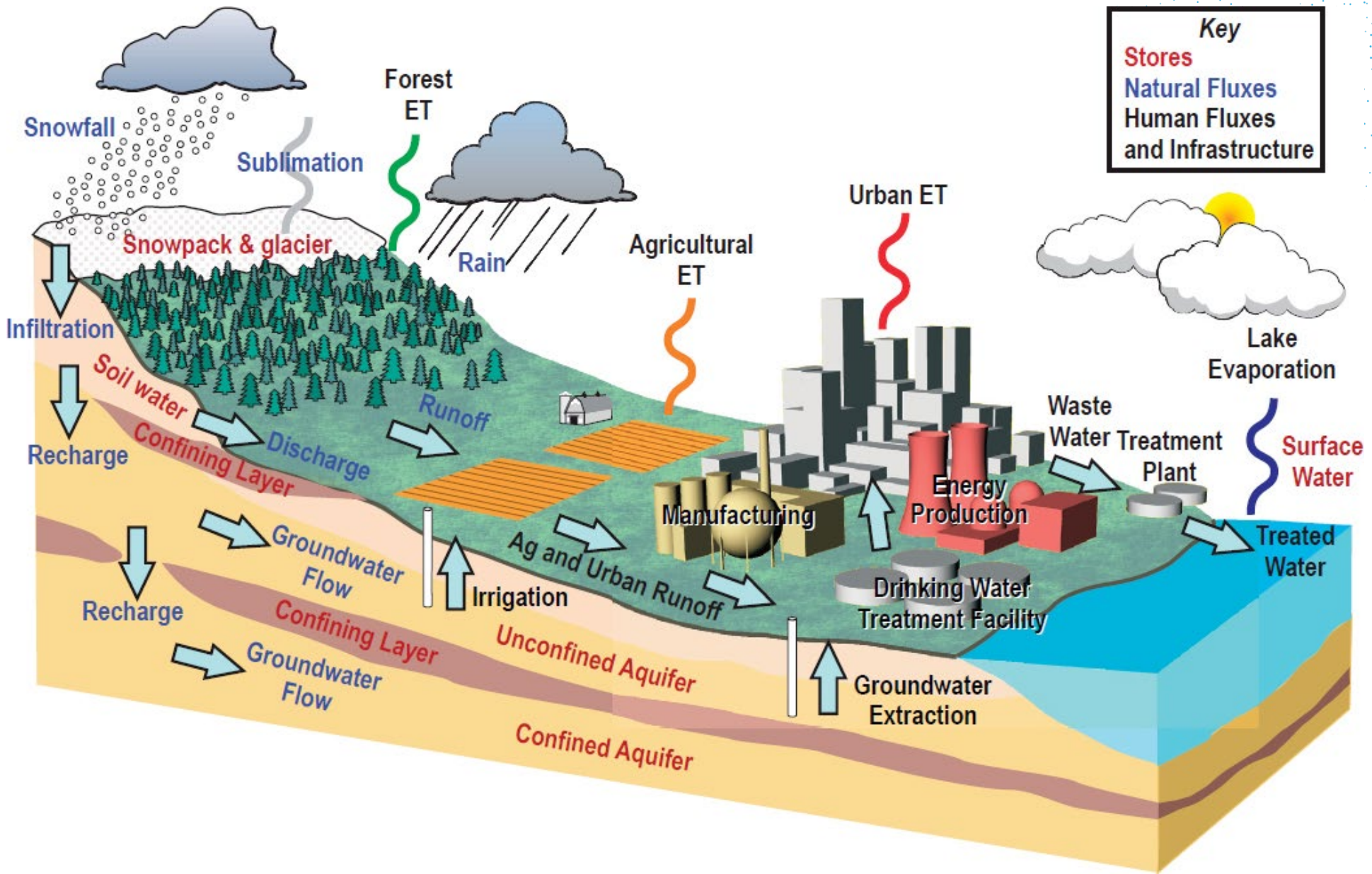
- **Earth's freshwater landscape.(Jerald Schnoor)**



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- Climate change effects, changes and challenges

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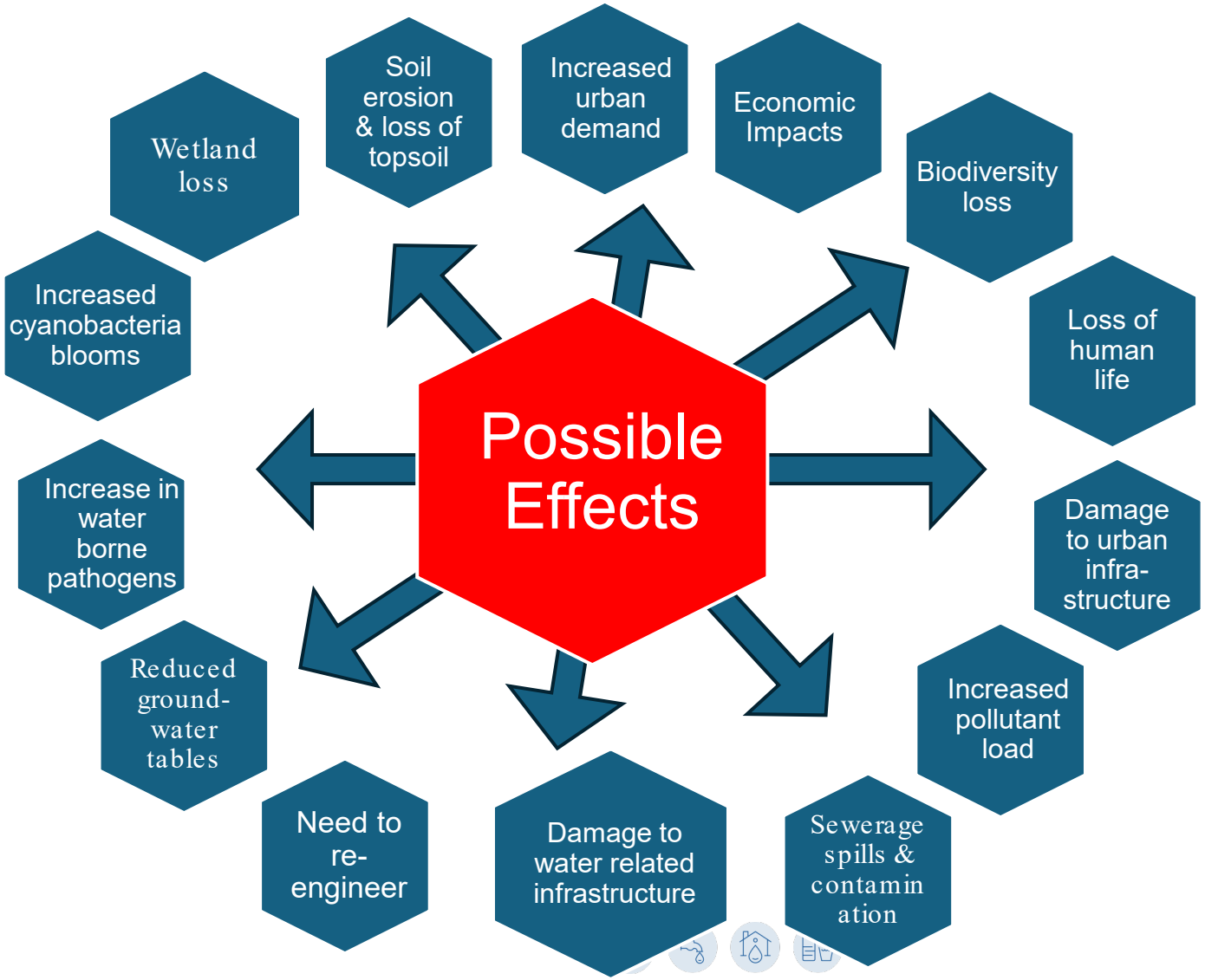
- **Some possible effects of climate change**



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• Some other changes that can be anticipated

South Africa is expected to experience:

- Increase in mean, maximum and minimum temperatures.
- Increase in very hot days – above 35 °C and the frequency of heat wave events.
- Drier conditions in the future, with regional variation.
- Overall South Africa will experience increased drying trend, over an above extreme floods and droughts. Eastern SA will experience increased rainfall.
- Slight increases in rainfall towards the north-eastern region.
- A strong drying signal over the southwestern region, which could result in reductions in rainfall of more than 40 mm per year.
- Increase in the frequency of extreme rainfall events (20 mm of rain falling within 24 hours) over eastern parts during the summer months.
- Sea level rise and an increase in the frequency and intensity of sea storms, accompanied by increases in wave heights
- Increase in the number of high fire danger days over north-eastern region and along the Cape south coast and the south-western Cape. (National Climate Change Information System 2021)
- Increased negative impacts in the urban and natural environment (farming and biodiversity) as well as aquatic systems.

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Some other challenges we as society face

- **Concurrently, the demand for water has surged by 600 %** across agricultural, industrial, and domestic domains, since the advent of the 20th century. (Ritchie, Roser, 2017)
- By 2050, the **global population will escalate** by 22–34 %, with more than half inhabiting regions facing water scarcity (Boretti, L. Rosa, 2019)
- With recent escalating demand for water, linked with ongoing climatic shifts, **increased the challenges of sustainable management of water resources, particularly in safeguarding ecosystems** amidst the temporal and spatial variability of water availability.
- **Increased urbanization and population shifts** - In Africa, the urban population has grown from 15% of the total population in 1960 to over 40% in 2010 and is predicted to exceed 60% by 2050 (SA to follow suit) (CSIR. 2019).
- **Increased demand for water** from limited resources **will place pressure on water service authorities and water service providers** to ensure a safe and secure water supply (www.Chris-wells.com)

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Not everything we experience must be attributed to climate change

- Increased urbanization (water demand) and associated loss of natural habitat
- Increased hard surfaces in the urban environment and associated runoff
- El Nino has been around for many years (it does however exacerbate the impacts of climate change)
- Poorly maintained infrastructure and insufficient forward planning in some cases
- Increased pollution loads into the environment
- Increased population and all the direct and indirect water demands and water footprints associated with this
- Inefficient water use practices
- Floods and droughts have also experienced long before climate change (but are now more intense and more frequent)

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- **Possible solutions**

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• Possible solutions

- Water conservation education – researched, targeted and change of habits and practices **(CHANGE HUMAN BEHAVIOUR)**
- Understanding and addressing the interconnectedness of all activities and events
- Increased repairs and maintenance of infrastructure (positively impacts potential human behavior)
- Changes and improvement in design of infrastructure to cope with events
- Reduction and improved responses to unaccounted for water and water losses
- Water demand management including water efficient devices and practices
- Water harvesting
- Water reuse e.g. grey water
- Affordable solutions for business and the homeowner/developer
- WWTW - water reuse and improved water quality outputs
- Ground water use, including appropriate monitoring and recharge
- Agriculture – drought tolerant crops and varieties, improved water efficient methods
- Improved forecasting, planning and preparedness of extreme events
- Reduction in carbon emissions

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Possible solutions … cont

- Nature based solutions in conjunction with engineering solutions
- Increase wetland and riparian zone conservation
- Increase biodiversity monitoring and management (indicators)
- Optimizing of ecological infrastructure functioning to help secure the hydrological integrity of river catchments
- It is not only bulk water service providers problem, but every sphere of government, and this matter should be addressed as such
- Our focus may need to include a greater external focus to include other roles players in the various solutions
- Public private partnerships to address amongst others improved asset management, operations and maintenance (ASSAF, 2023)
- South Africa has adopted a net zero target by 2050 in its low emission strategy (contingent on climate finance). **How can, and is the water "industry" working towards and contributing to this target?**

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- **Final thoughts**

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• Final thoughts

- *"Climate change is the single greatest threat to a sustainable future but, at the same time, **addressing the climate challenge presents a golden opportunity** to promote prosperity, security and a brighter future for all."*

  (Ban Ki-Moon, Former Secretary-General of UN)

- To address the effects of climate change on the water sector, we need to focus not only on our immediate functions and activities, but also on a more holistic environment as all aspects impacted and affected by climate change are interlinked and interdependent. It comes with many challenges but also opportunities to be innovative and embrace nature-based solutions more holistically.

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THANK YOU