



Water Security Risks and Opportunities

Hortgrow Technical Symposium

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3rd June 2024

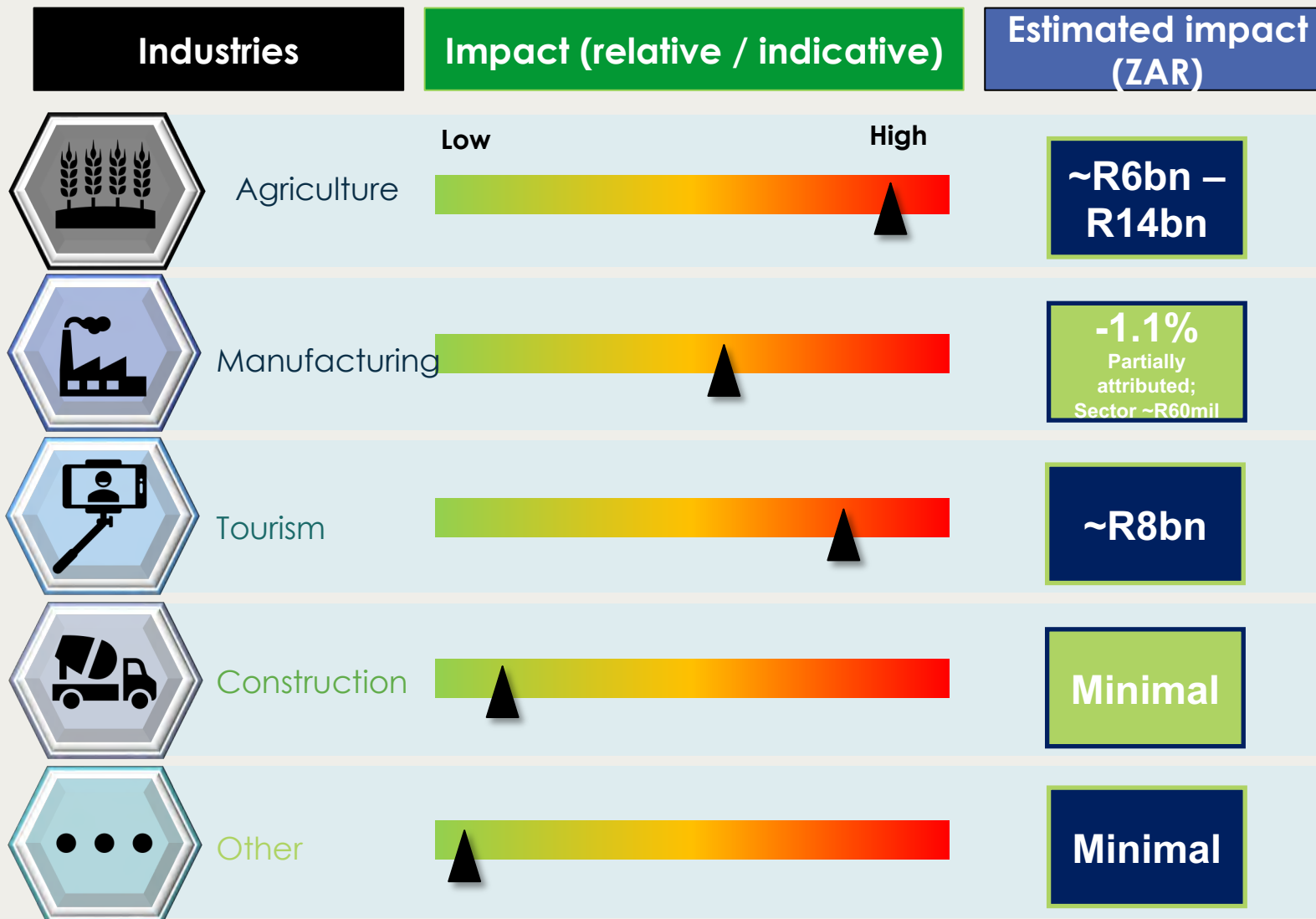
Water Security is critical to LIFE, the ECONOMY and the ENVIRONMENT

- Water is life ... but it is also death and destruction.
- Water security is critical for the economy (and the environment)
- Water security is one of the top global (and local) economic risk (WEF)
- Water security is critical in meeting the Sustainable Development Goals (SDGs)
- Water security is critical in supporting *Growth for Jobs* (and *Jobs for Growth*)



Western Cape Hydro-economic Study (World Bank, 2023)

Summary of Key Findings –Economic impact of the 2015-2017 drought and “day zero” crisis



Total economic impact of drought induced water shortages on the WC economy was estimated to be between R15-23bil

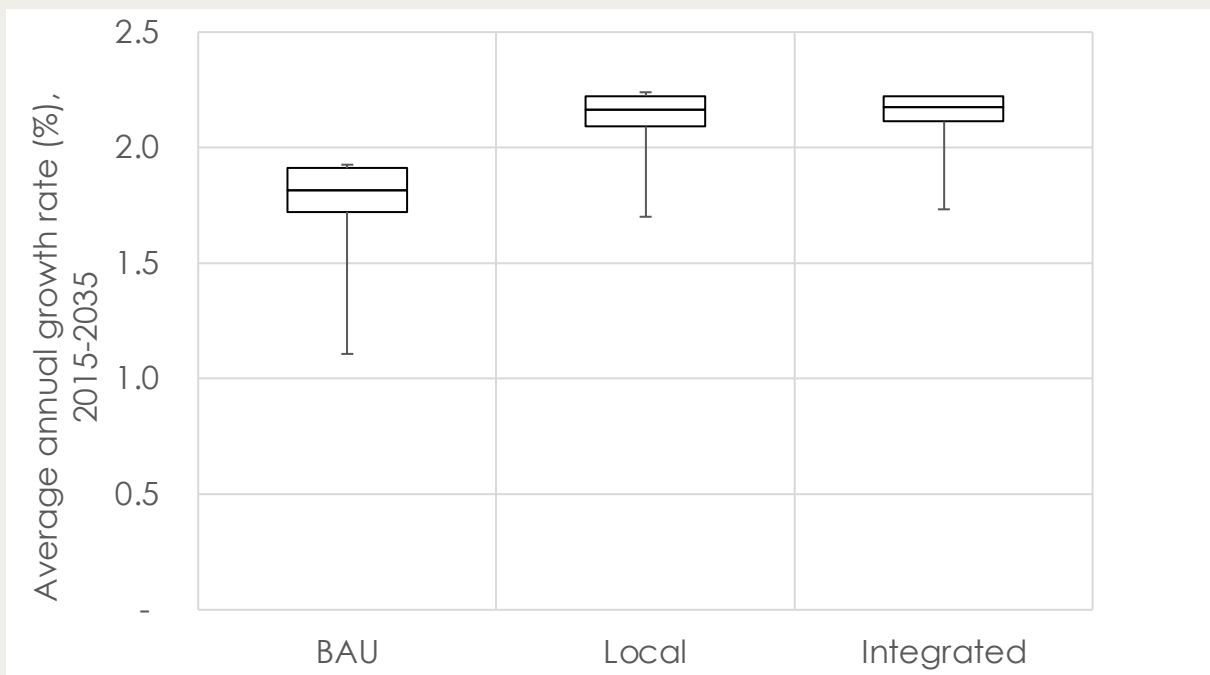
~R15bn
-23bn

Approximation of **direct economic impact** of drought induced water shortages on WC

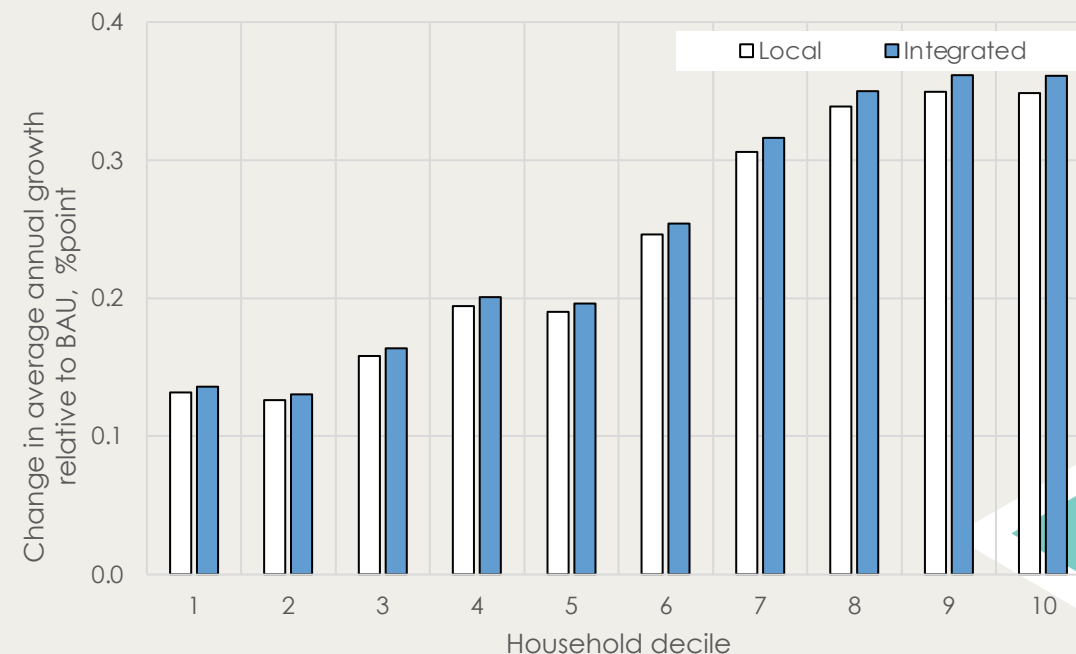
(World Bank, 2023)

Western Cape Hydro-economic Study (World Bank, 2023)

Summary of Key Findings – Economic benefits of water supply augmentation for the WCWSS



There is a 7% increase in Western Cape annual GDP and 195 000 jobs by 2035 with the augmentation compared with no augmentation, with a marginal benefit with integrated operation.



While all households benefit from the augmentation programme, the structure of the economy means that benefits are disproportionately distributed

Water Security Risks for the Western Cape (and the Fruit Industry)

- Increasing Water Use Requirements (Demand)
- Deteriorating Water Quality
- Limited options for additional surface water supply
- Aging Water and Sanitation Infrastructure
- Institutional/Government Capacity
- Environmental degradation (wetlands, estuaries, etc).
- Invasive Alien Plants
- Population Growth
- Migration (Regional and Rural to Urban Migration)
- Urban planning challenges – e.g. informal settlements
- Increased flooding and damage to critical infrastructure
- **Disease outbreaks and epidemics**
- **Increasing energy costs and load shedding**



Evidence of Increasing Climate Change Risks?



**Cape Town 'Day Zero'
NMBM Water Crisis**



**KZN/EC Floods
WC Floods**

Climate change is a contributing factor, but several other factors also contribute to an increasing risk.

The challenge of failing water supply and sanitation infrastructure (investment, operations, and maintenance).

- **Declining water quality** has a direct impact on **human health** and the **economy**.
- The current **poor state of water and wastewater treatment plants** and **polluted urban and agricultural runoff** will increase the **negative impacts of climate change** on water quality.
- This also negatively impacts on **Ecological Infrastructure** and the potential for **NbS solutions**.
- **Investment requirements for closing the gap on the SDGs = R 91 bn per year (DBSA, 2024)**



Water Risk = Physical Risk + Institutional Risk + Reputational Risk
(Source: WWF Water Risk Filter)

Climate Change Risks for Water Security in the Western Cape

Latest Global Climate Models from the IPCC:
CMIP6 models in the 6th Assessment Report (AR6)

Projected Annual Precipitation Anomaly;
SSP2-4.5; Global; 2035-2064 (center 2050)



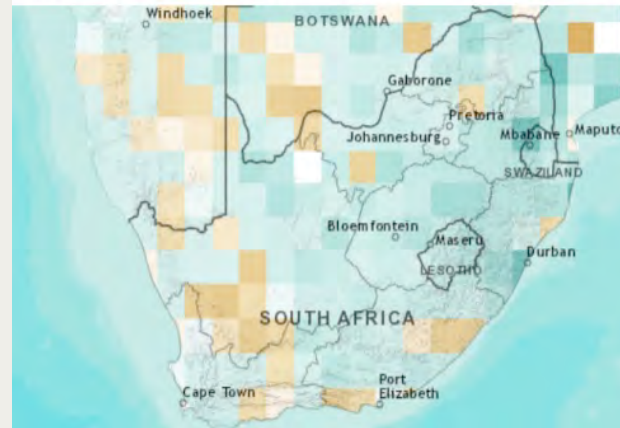
Projected Annual Precipitation Anomaly;
SSP5-8.5; Global; 2035-2064 (center 2050)



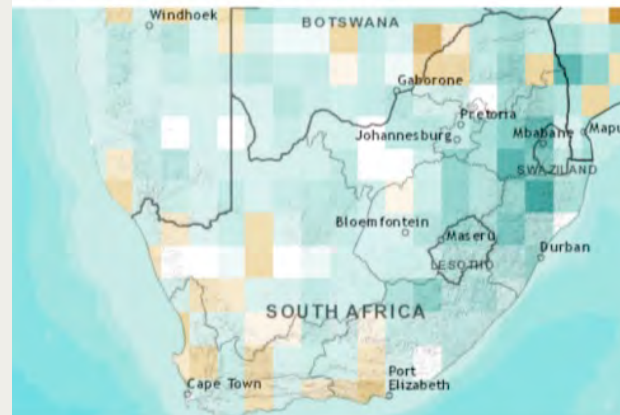
PRECIPITATION (MM)



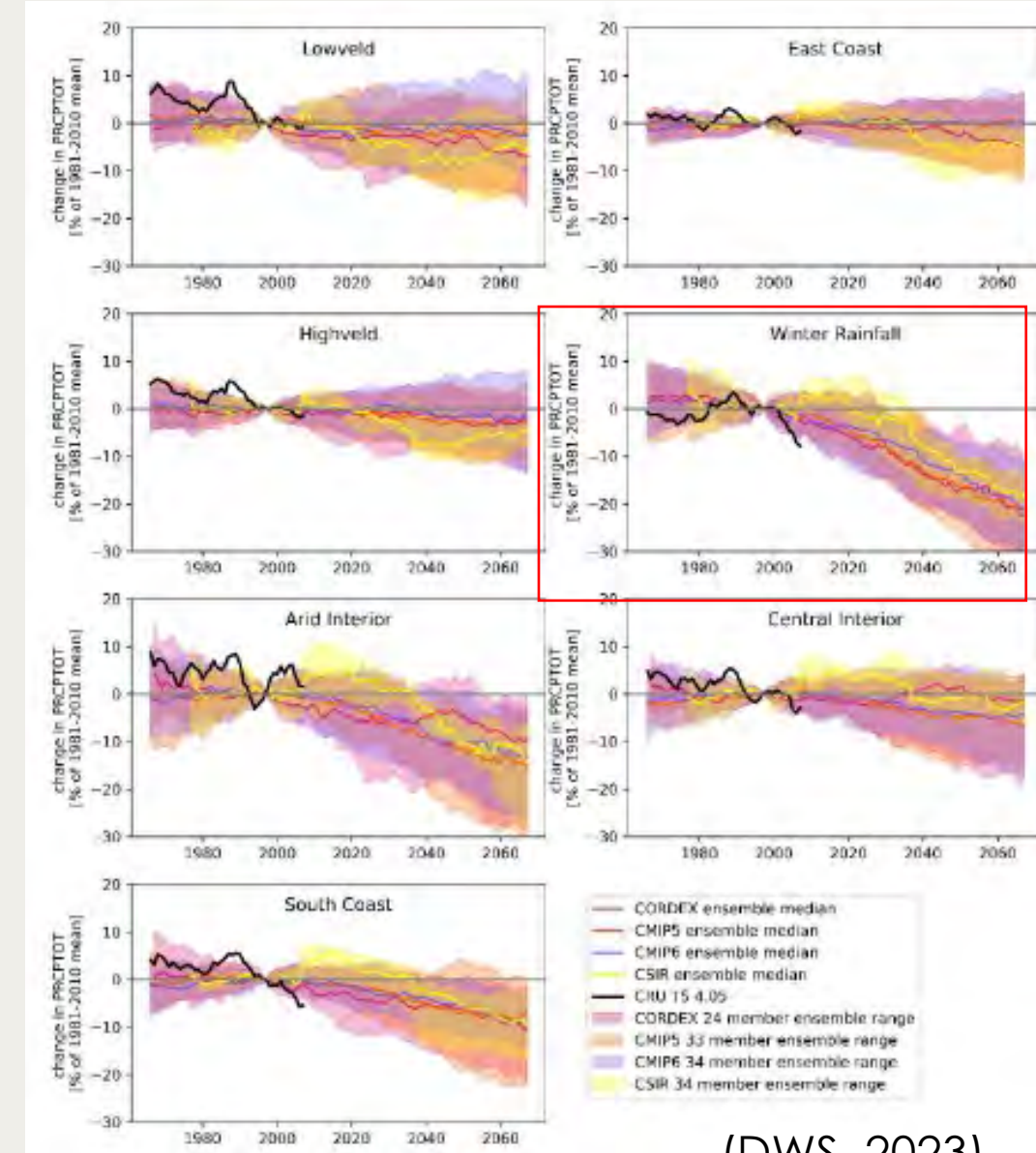
Projected Largest 1-Day Precipitation Anomaly;
SSP2-4.5; Global; 2035-2064 (center 2050)



Projected Largest 1-Day Precipitation Anomaly;
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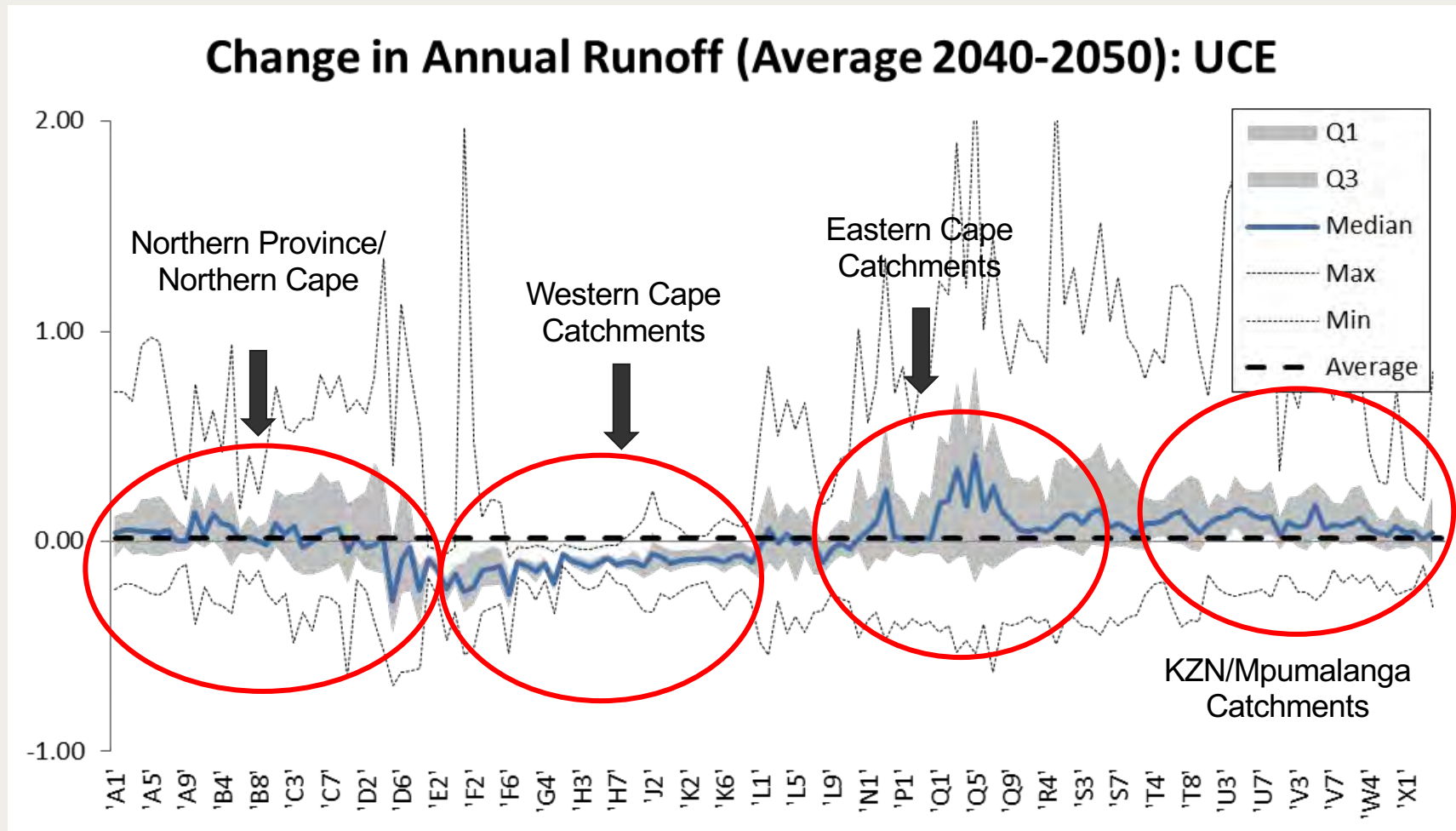


PRECIPITATION (MM)



(DWS, 2023)

Climate Change Risks for Water Security in the Western Cape

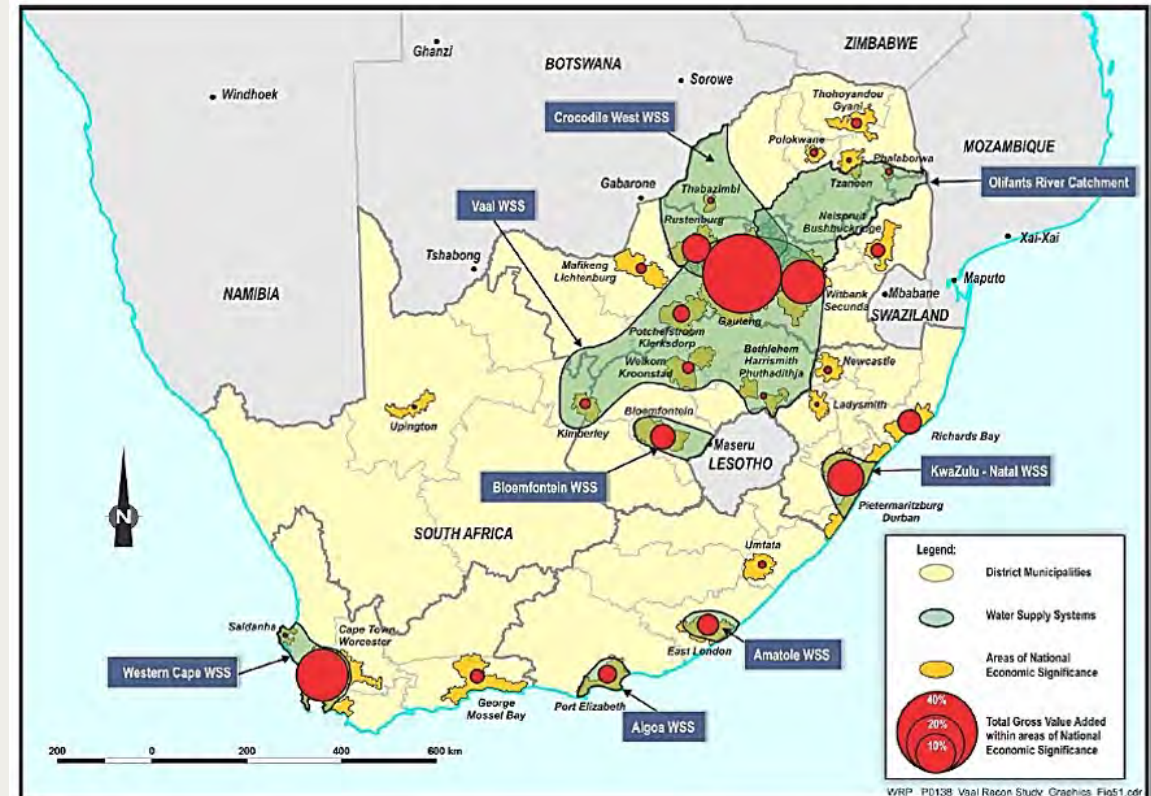
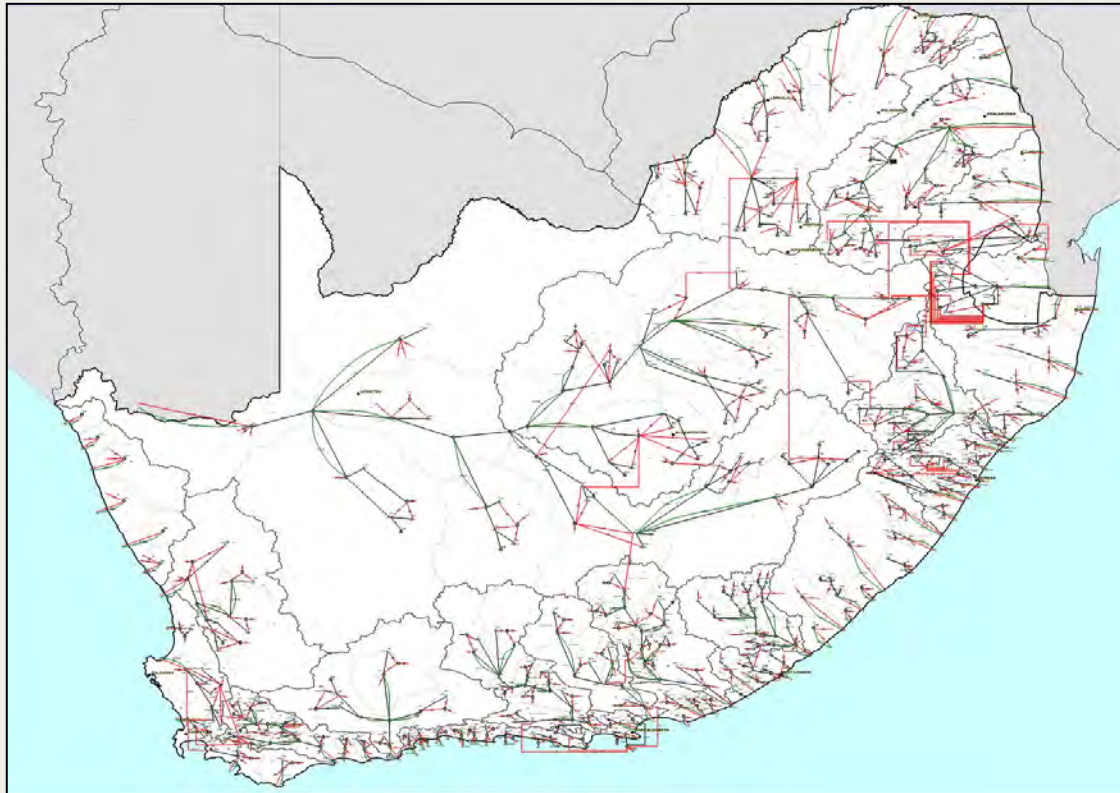


“Risk based approach to modelling the economic impacts of Climate Change in South Africa through key sectors including Water, Transport, and Agriculture” (Cullis et al, 2015)

<https://www.wider.unu.edu/publication/uncertainty-approach-modelling-climate-change-risk-south-africa>

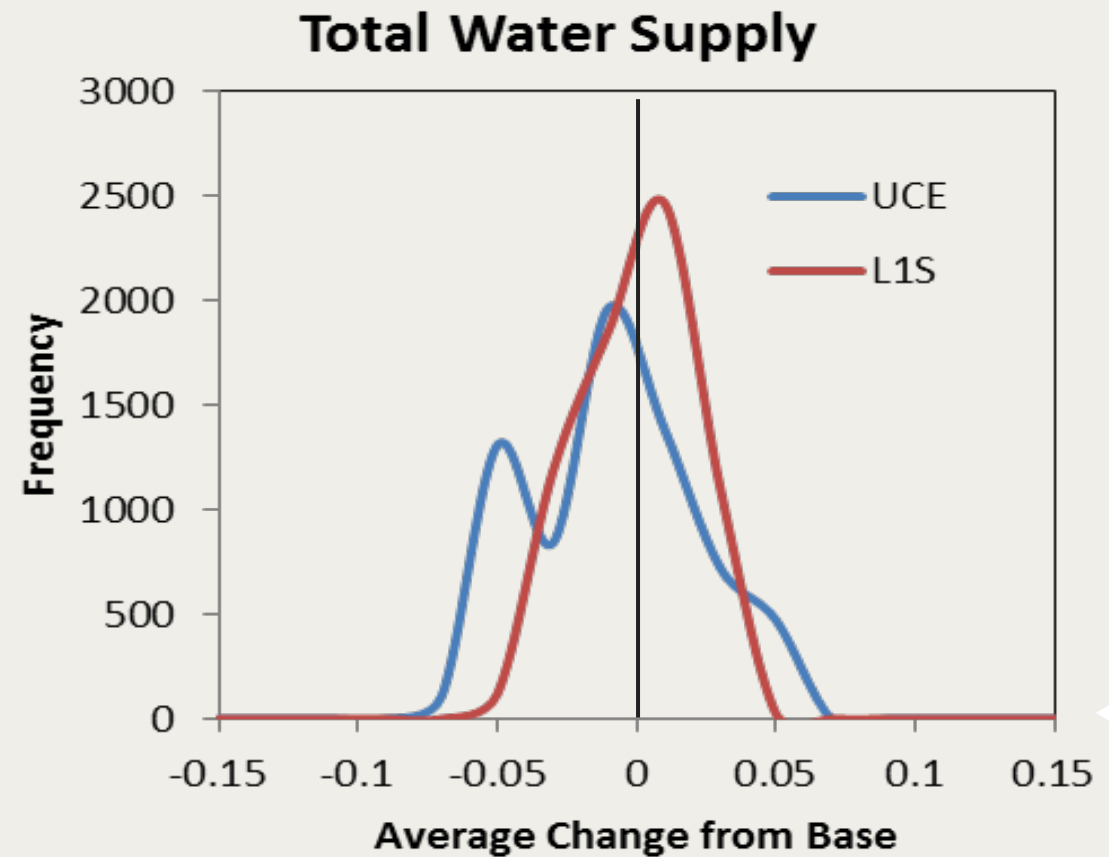
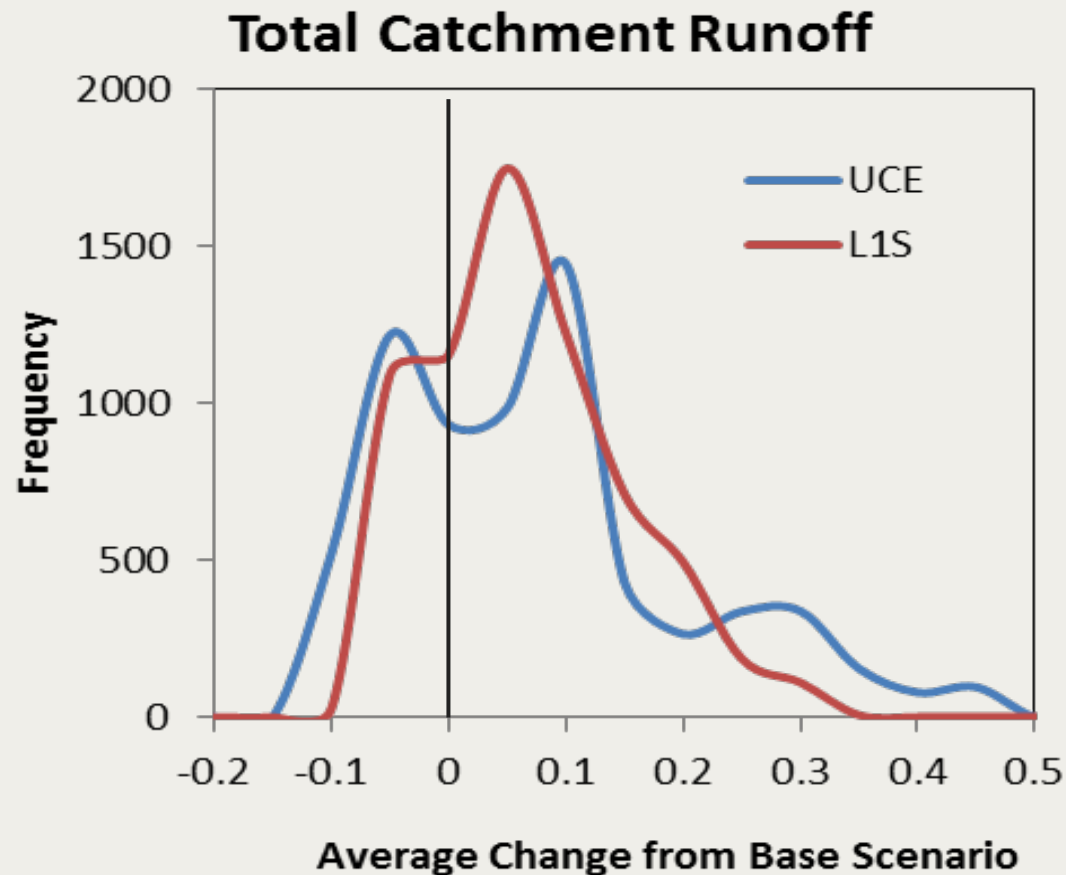
Modelling the Economic Impacts of Climate Change for South Africa

Demonstrating the benefits of South Africa's dams and integrated regional bulk water supply systems.



“Risk based approach to modelling the economic impacts of Climate Change in South Africa through key sectors including Water, Transport, and Agriculture” (Cullis et al, 2015)

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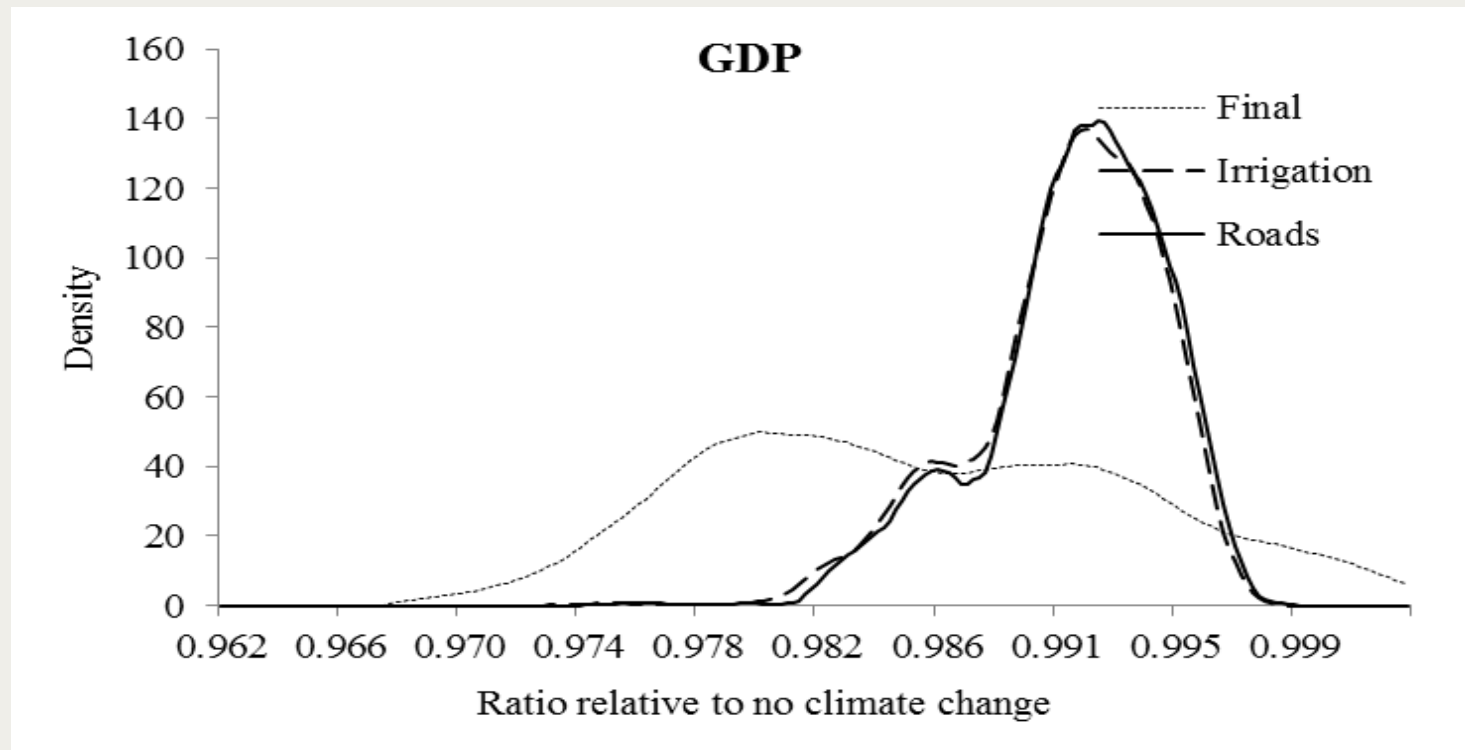


Comparison of the potential impacts of climate change under the UCE and L1S scenarios in terms of total catchment runoff for the country and the change in the ability to meet the total national water supply demands for the period 2040 to 2050. (Cullis et al, 2015)

<https://www.wider.unu.edu/publication/uncertainty-approach-modelling-climate-change-risk-south-africa>

Economic Impacts of Climate Change in South Africa

- Total median impact on GDP by 2050 = **-1.5%** (-3.8% to +0.3%)
- Net Present Value (NPV) of annual impact on GDP by 2050
 - Roads = **-R160bn** (-R15bn to -R550bn)
 - Roads + Water Supply = **-R170bn** (-R27bn to -R580bn)
 - Roads + Water + Agriculture = **-R370bn** (-R930bn to +R31bn)
- Significant variability in impact between sectors and regions.



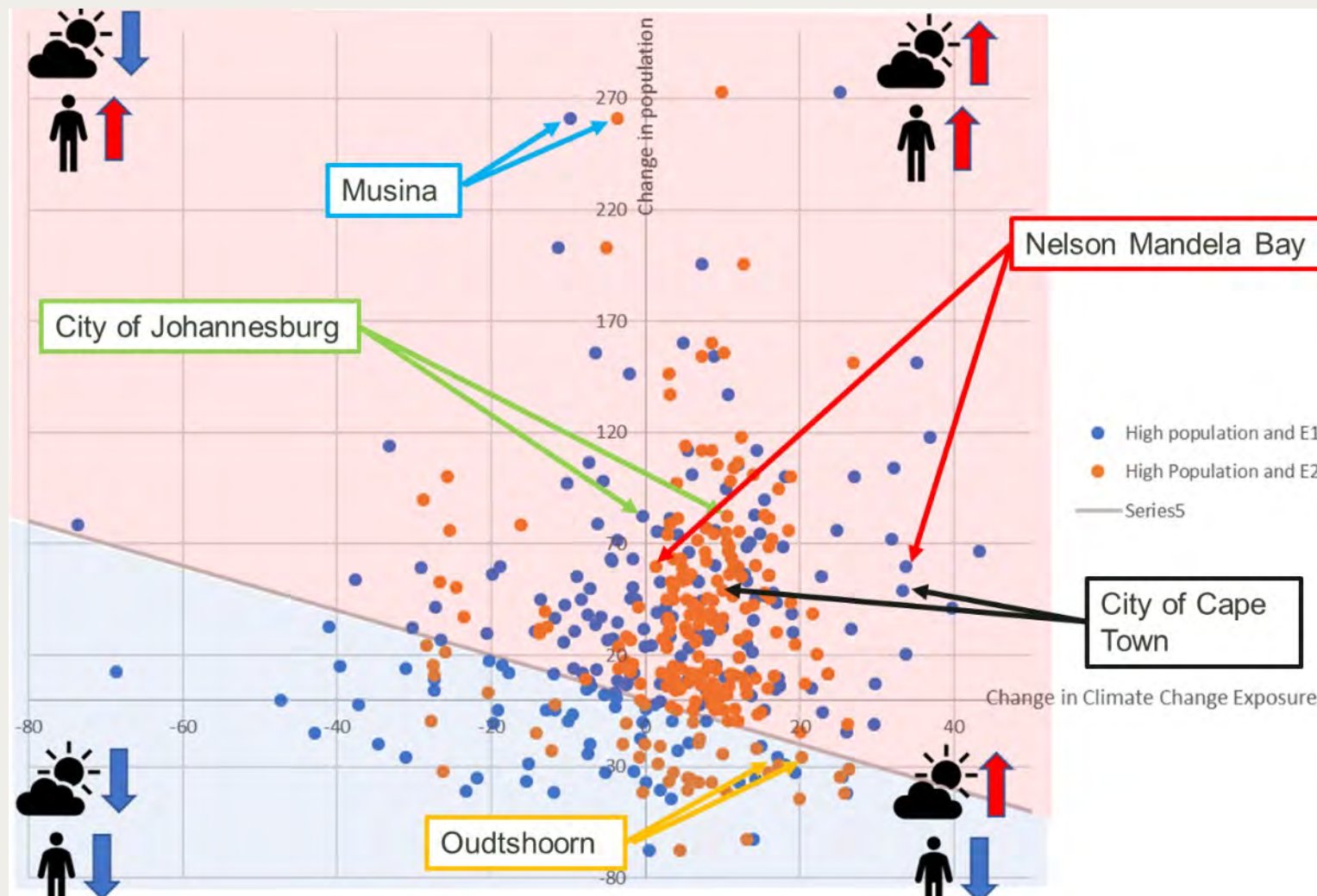
(Source: Cullis et al, 2015)

Future Water Security Risks for Municipalities across South Africa.

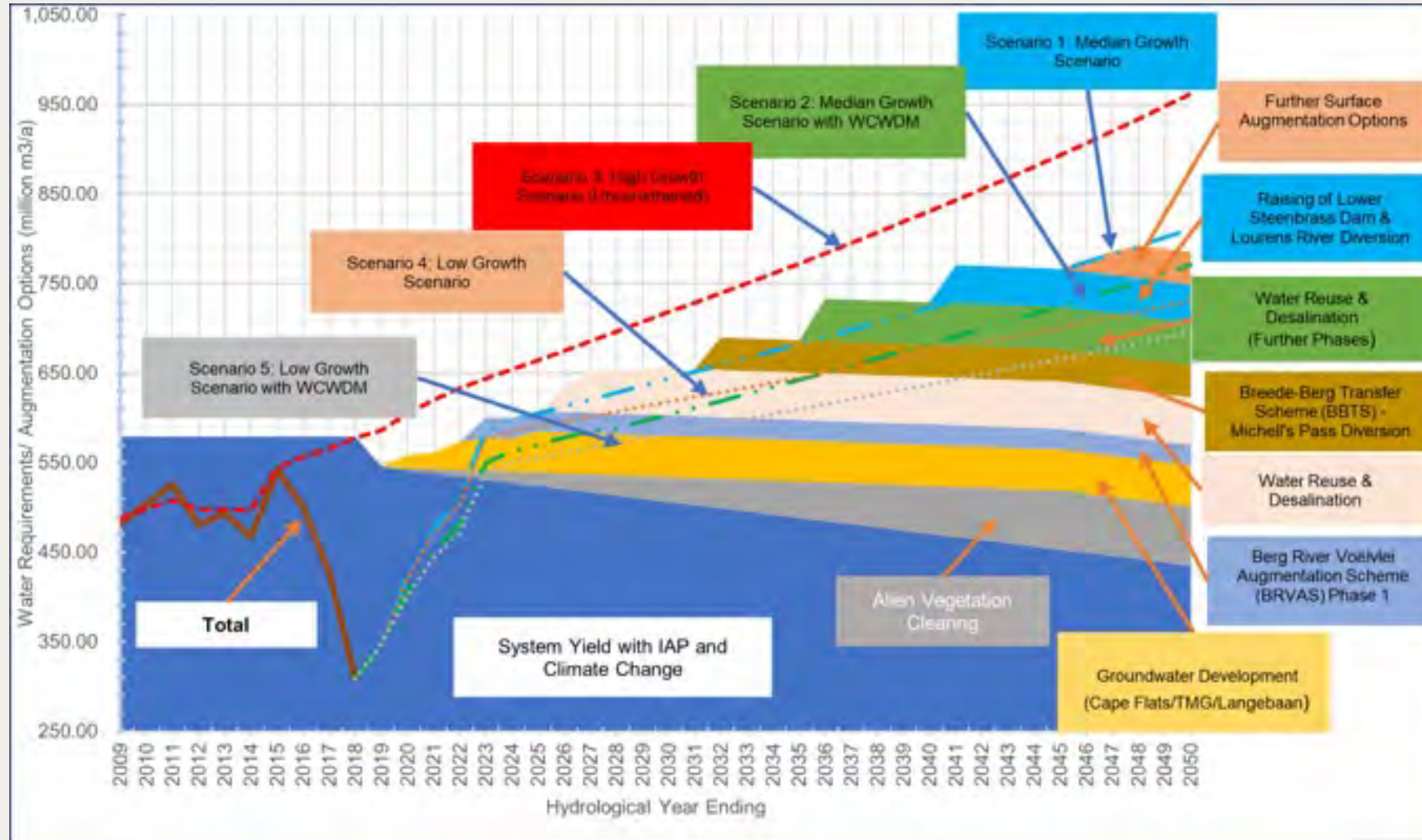
Combining the impacts of Climate Change and Population Change to determine future Water Security Risks.

The relative impacts of **climate change** and **population growth** on water supply risks by **2050** for all local municipalities in RSA.

Source: CSIR Greenbook (Cullis and Phillips, 2019)

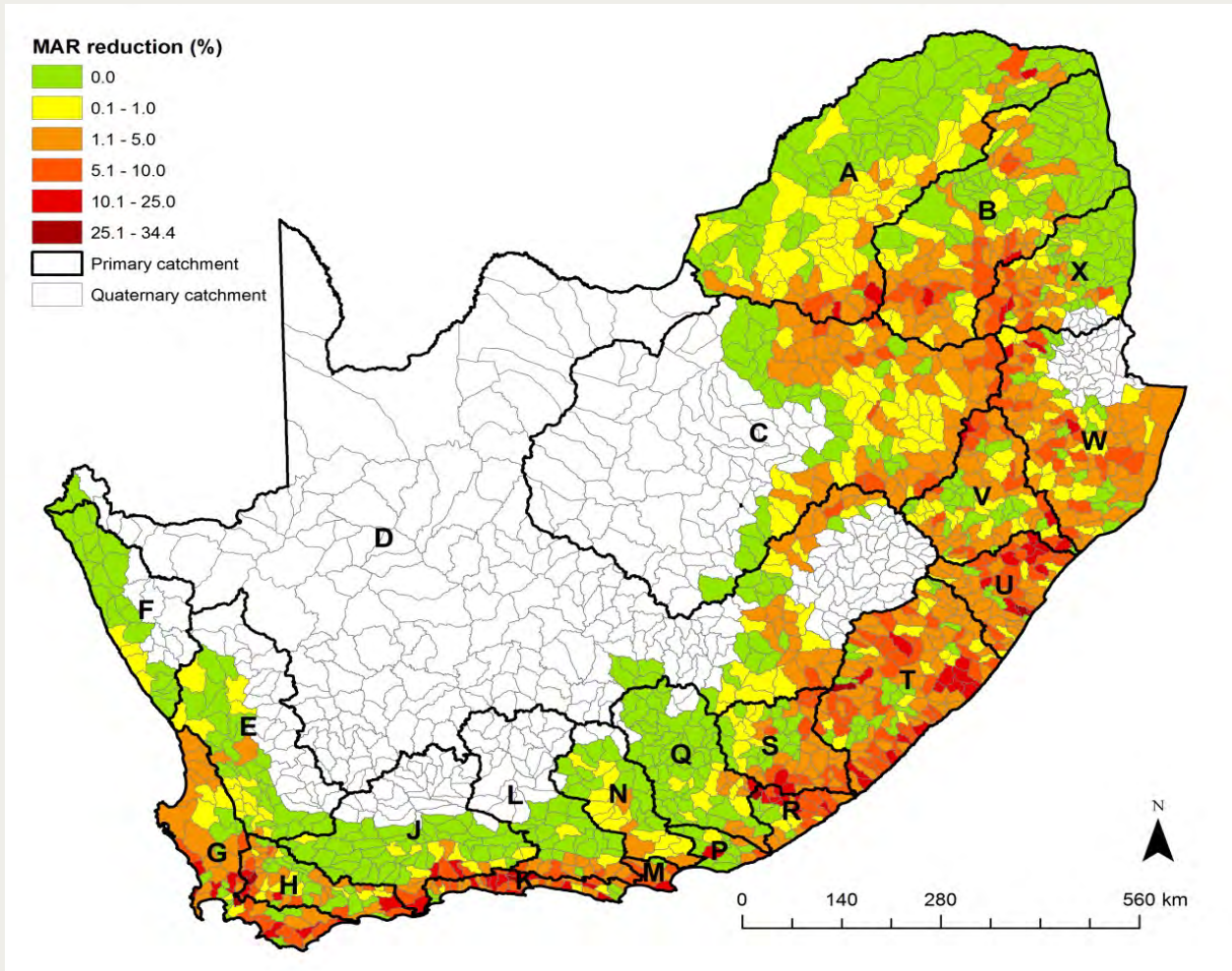


Updated Reconciliation Study for the Western Cape Water Supply System



Source: DWS, 2019. Currently being updated.

The impact of Invasive Alien Trees on water security in South Africa



Le Maitre et al (2013)

WMA	Current levels of infestation		Future levels of infestation	
	Mm ³	% of registered water use	Mm ³	% of registered water use
Berg	19	2.6	66	9.2
Breede	35	5.3	136	20.7
Crocodile (West) and Marico	15	1.7	51	5.8
Fish to Tsitsikamma	61	4.4	121	8.7
Gouritz	23	5.8	79	20.1
Inkomati	49	3.7	166	12.5
Limpopo	18	2.9	63	10.1
Lower Orange	8	0.7	88	7.8
Lower Vaal	3	0.4	34	4.2
Luvuvhu and Letaba	11	2.1	67	13.2
Middle Vaal	32	5.3	56	9.2
Mvoti to Umzimkulu	126	14.8	420	49.3
Mzimvubu to Keiskamma	49	5.6	249	28.4
Olifants	69	6.8	133	13.1
Olifants-Doorn	5	1.5	52	16.1
Thukela	48	12.1	261	66.6
Upper Orange	8	0.5	190	13.1
Upper Vaal	33	1.8	121	6.6
Usutu to Mhlathuze	86	7.6	371	32.7
South Africa	695	4.1	2 724	16.1

(Cullis et al. 2007)

Case Study: The Greater Cape Town Water Fund (GCTWF)

The benefits of clearing of IAPs from the priority catchments for the Western Cape Water Supply System (WCWSS)

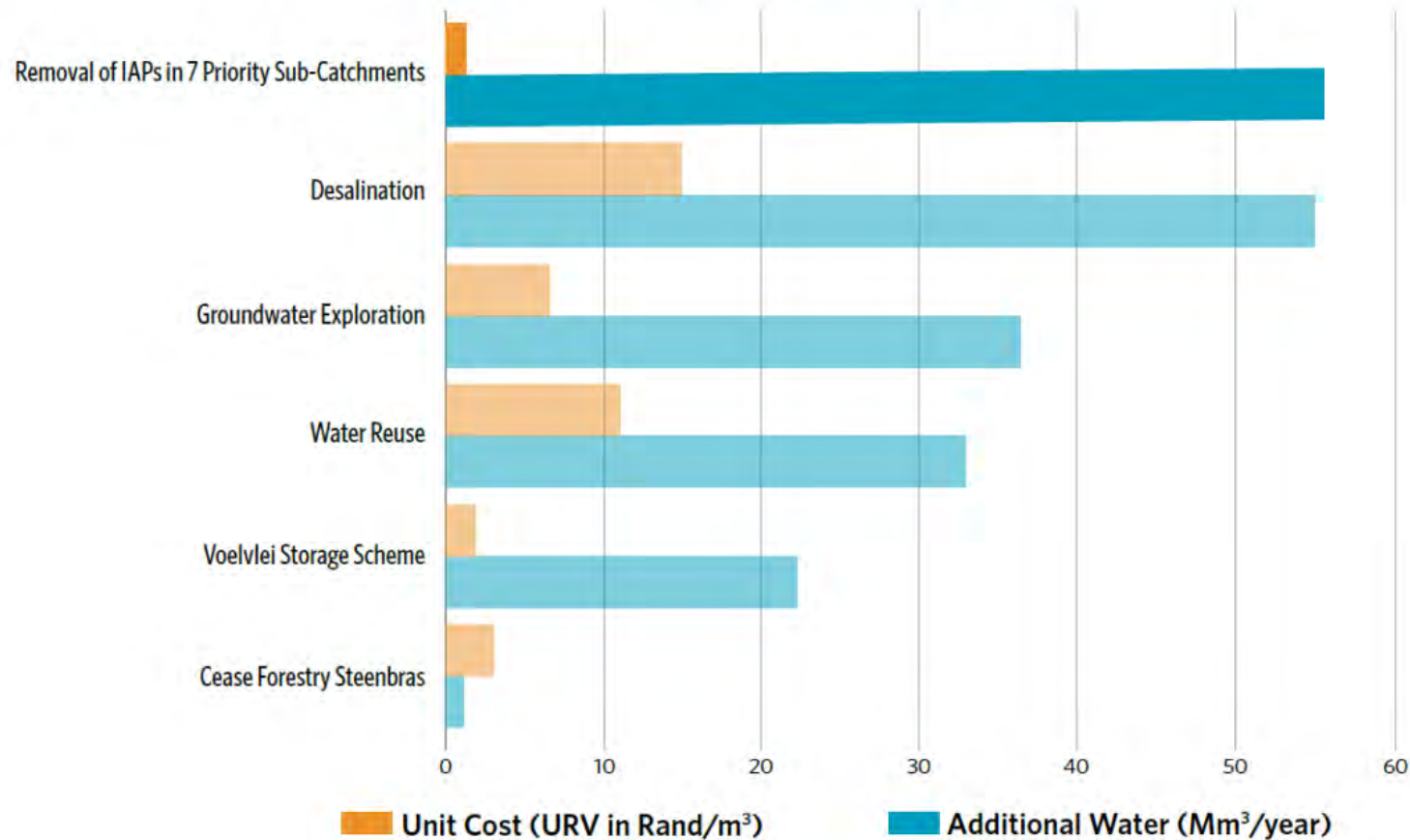


Figure E 1. Water supply gain and unit cost (URV) comparison between different catchment restoration and other supply options (costs include raw water treatment cost where applicable).



THE GREATER CAPE TOWN WATER FUND

ASSESSING THE RETURN ON INVESTMENT FOR ECOLOGICAL INFRASTRUCTURE RESTORATION
BUSINESS CASE

NOVEMBER 2018

Nature-Based Solutions Can Build Resilience to Multiple Climate Hazards



Source: Global Commission on Adaptation, *Adapt Now* report, 2019.

20/05/20



WORLD RESOURCES INSTITUTE



Continued investments in the planning, operation, and maintenance of water and sanitation infrastructure as well as protection of ecological infrastructure is critical in terms of ensuring future water security in RSA.

Summary of Key Messages for Improved Water Security

- Acknowledge that the future will not likely be the same as the past, and design accordingly (but learn from history).
- Consider bottom-up solutions – think like a designer.
- Don't blame climate change – build resilient systems.
- Recognise the opportunity for a “resilience dividend”.
- Don't put all your eggs in one basket.
- Build on adaptive capacity and flexible pathways.
- Invest in ecological infrastructure (and people).
- Support the Transition to Water Sensitive Cities.
- Maintain and increase investment in the three M's: **monitoring, maintenance and management.**



Thank you!

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The future belongs to those who believe
in the beauty of their dreams.

ELEANOR ROOSEVELT

ZUTARI
IMPACT. ENGINEERED.