Impacts of Climate Change on the Transformation of the Irrigation Sector in South Africa

Mr Thomani Manungufala

Presentation Outline

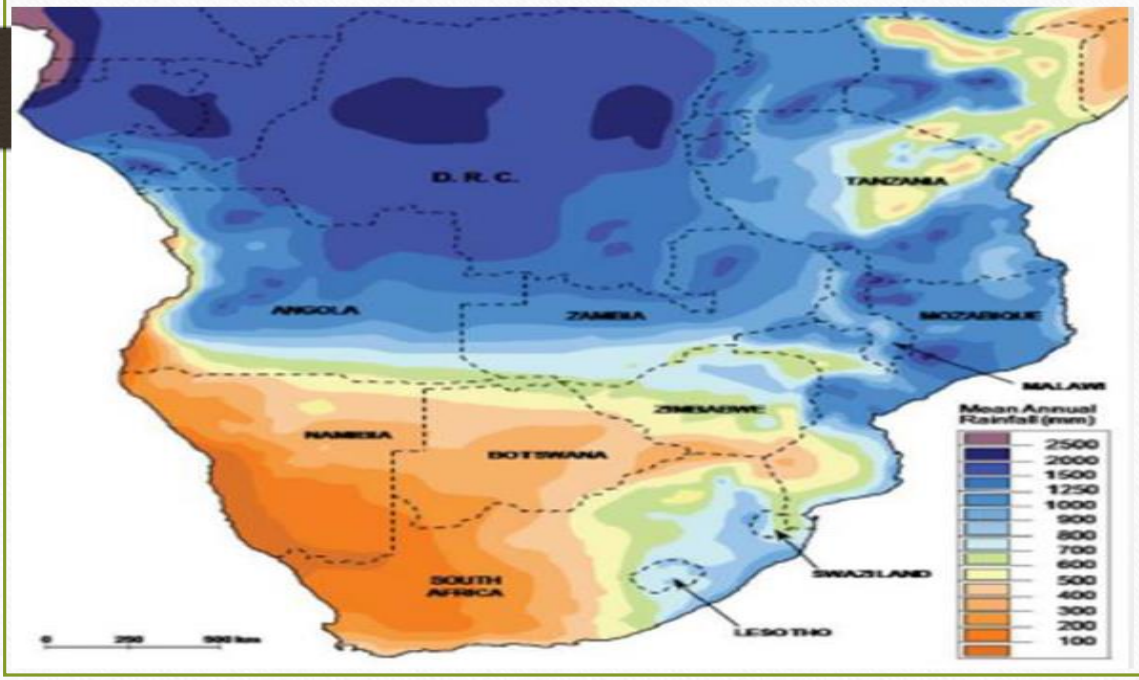
- Introduction
- Impacts of Climate Change on Water Resources
- Water Allocation Reform in South Africa
- Strategies and Tools for Transformation of the Irrigation Sector in the Face of Climate Change
- Concluding Remarks

Introduction

- Transformation of the irrigation sector – institutional rearrangement; promoting equitable access to water; (c) redressing the results of past racial and gender discrimination; (d) promoting the efficient, sustainable and beneficial use of water in the public interest. (e) facilitating social and economic development; (f) providing for the growing demand for water use; (g) protecting aquatic and associated ecosystems and their biological diversity; (h) reducing and preventing pollution and degradation of water resources;

Water Availability

Mean Annual Rainfall (SADC)

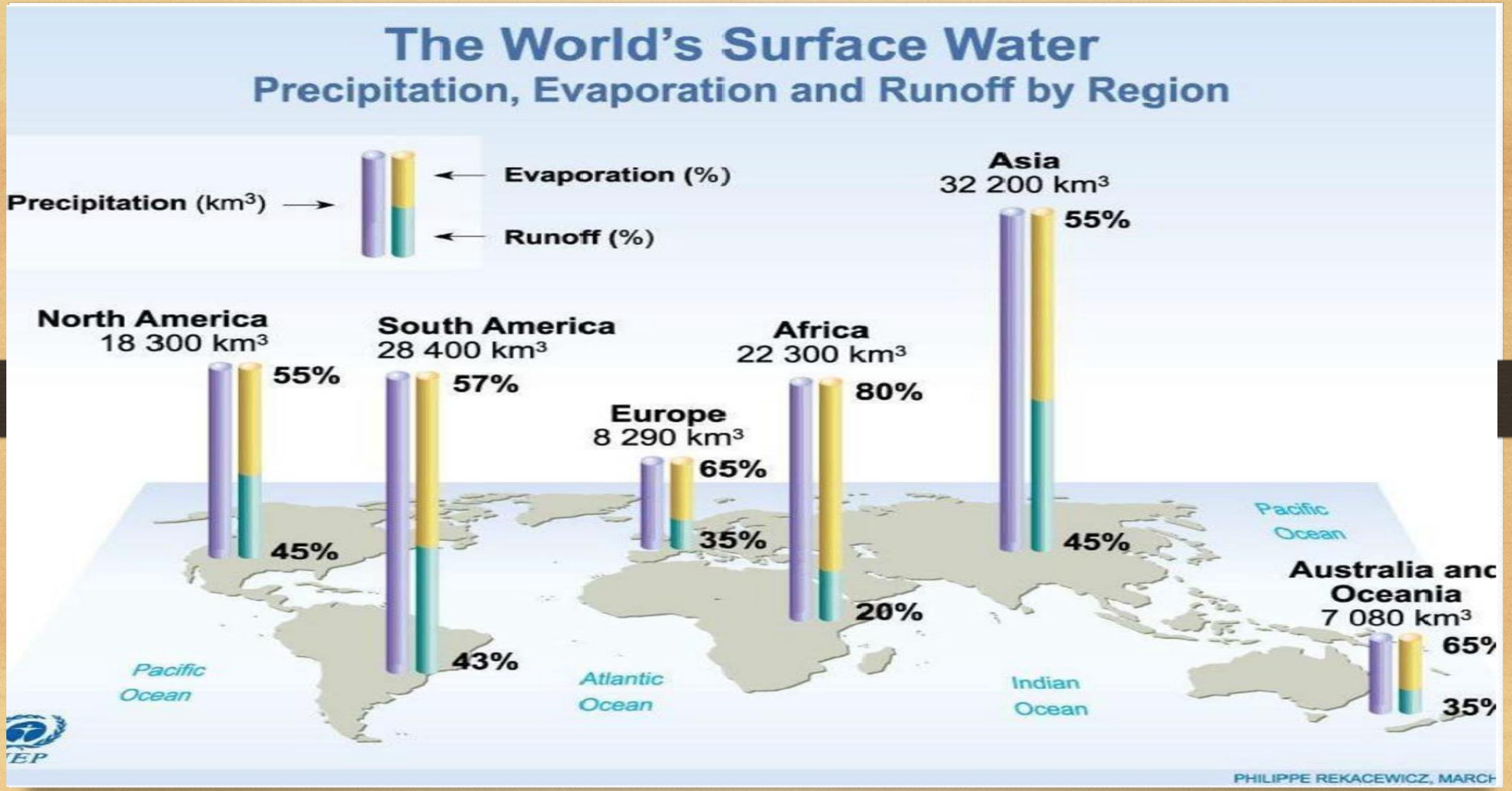


Water Use in SA

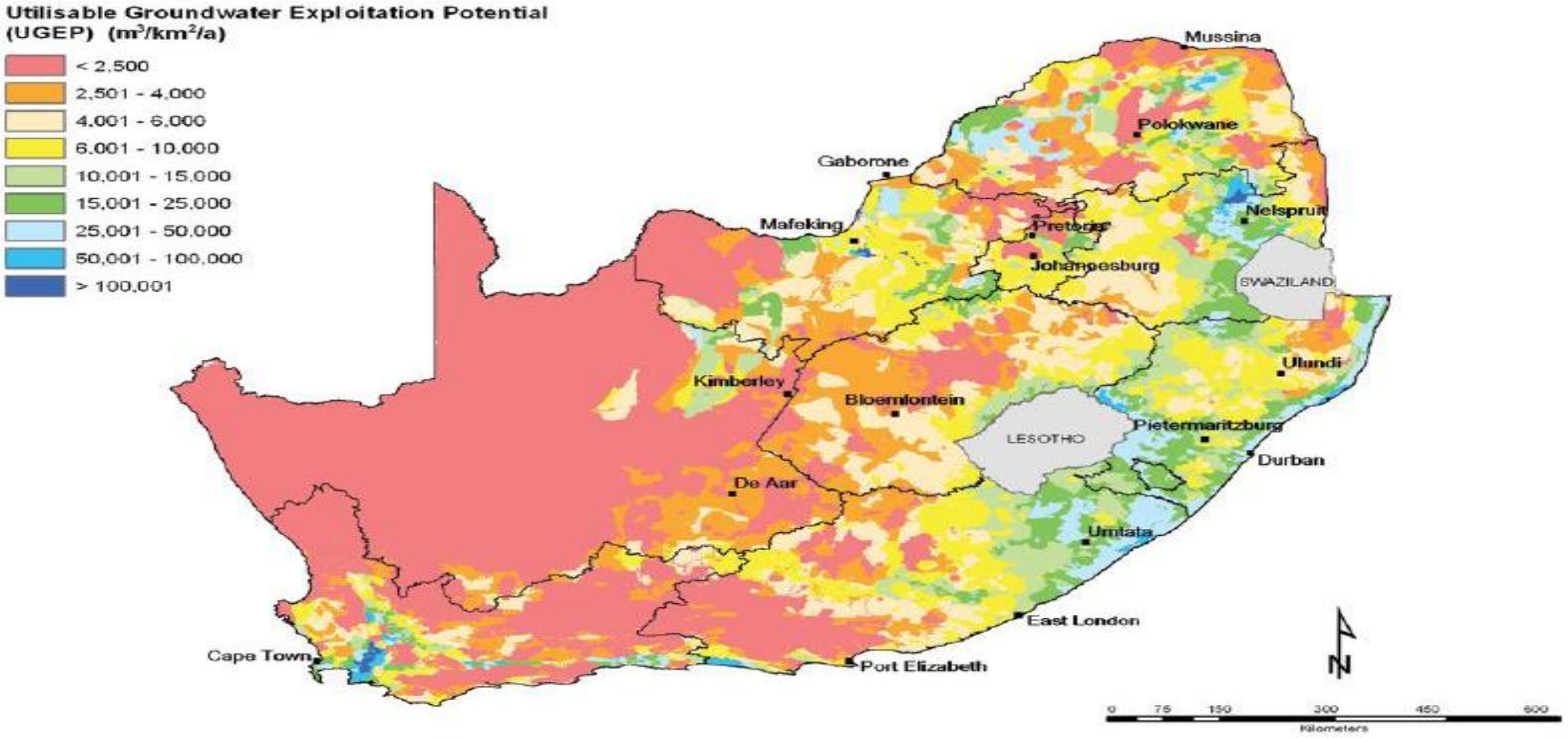
- Total natural runoff averages at 50 billion m^3 per annum
- Of the 50 billion only 14 billion m^3 is available for use through dams, basin transfers and other resource developments
- The total consumption for SA was reported to be 15 billion m^3 in 2016
- It is projected that the consumption would be around 18 billion m^3 in 2030 with 17% deficit

The World's Surface Water

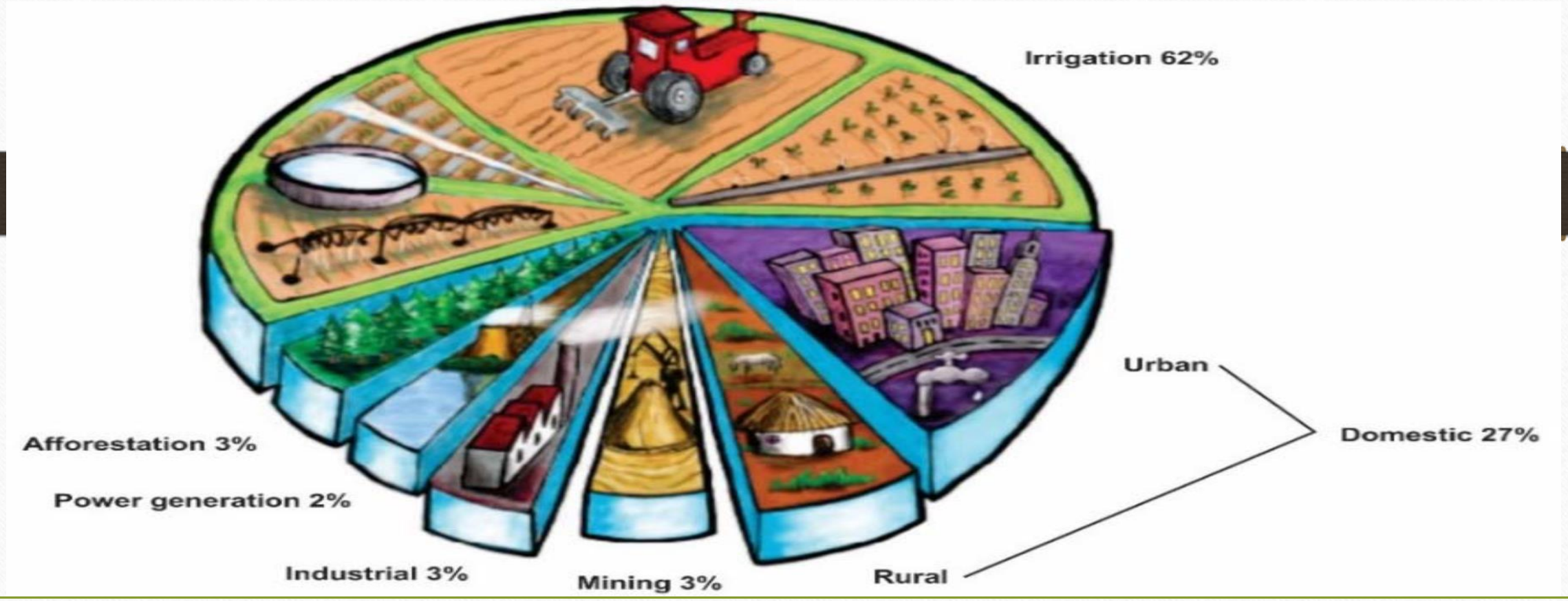
Precipitation, Evaporation and Runoff by Region



Utilisable Groundwater Exploitation Potential



Water Use in SA



Impacts of Climate Change on Water Resources

- Water is the primary medium through which the impacts of climate change are being felt in South Africa
- Changes in rainfall patterns, with more-intense storms, floods and droughts; soil moisture and runoff; and the effects of increasing evaporation and changing temperatures on aquatic systems negatively affects **water quality and quantity (availability) (scarcity)**
- (Secondary Impacts of CC) The 2015 drought resulted in crop losses, water restrictions, and impacts on food and water security.

Global Risks 2018

- **Water crises** - A significant decline in the available quality and quantity of fresh water, resulting in harmful effects on human health and/or economic activity
- **Food crises** - Inadequate, unaffordable, or unreliable access to appropriate quantities and quality of food and nutrition on a major scale
- **Failure of climate-change mitigation and adaptation** - The failure of governments and businesses to enforce or enact effective measures to mitigate climate change, protect populations and help businesses impacted by climate change to adapt
- **Extreme weather events** (e.g. floods, storms, etc.) Major property, infrastructure and/or environmental damage as well as loss of human life caused by extreme weather events

Top 5 Global Risks in Terms of Likelihood

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1st	Asset price collapse	Asset price collapse	Asset price collapse	Storms and cyclones	Severe income disparity	Severe income disparity	Income disparity	Interstate conflict with regional consequences	Large-scale involuntary migration	Extreme weather events	Extreme weather events
2nd	Middle East instability	Slowing Chinese economy (<8%)	Slowing Chinese economy (<8%)	Flooding	Chronic fiscal imbalances	Chronic fiscal imbalances	Extreme weather events	Extreme weather events	Extreme weather events	Large-scale involuntary migration	Natural disasters
3rd	Failed and failing states	Chronic disease	Chronic disease	Corruption	Rising greenhouse gas emissions	Rising greenhouse gas emissions	Unemployment and underemployment	Failure of national governance	Failure of climate-change mitigation and adaptation	Major natural disasters	Cyberattacks
4th	Oil and gas price spike	Global governance gaps	Fiscal crises	Biodiversity loss	Cyber attacks	Water supply crises	Climate change	State collapse or crisis	Interstate conflict with regional consequences	Large-scale terrorist attacks	Data fraud or theft
5th	Chronic disease, developed world	Retrenchment from globalization (emerging)	Global governance gaps	Climate change	Water supply crises	Mismanagement of population ageing	Cyber attacks	High structural unemployment or underemployment	Major natural catastrophes	Massive incident of data fraud/theft	Failure of climate-change mitigation and adaptation

Top 5 Global Risks in Terms of Impact

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1st	Asset price collapse	Asset price collapse	Asset price collapse	Fiscal crises	Major systemic financial failure	Major systemic financial failure	Fiscal crises	Water crises	Failure of climate-change mitigation and adaptation	Weapons of mass destruction	Weapons of mass destruction
2nd	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Climate change	Water supply crises	Water supply crises	Climate change	Rapid and massive spread of infectious diseases	Weapons of mass destruction	Extreme weather events	Extreme weather events
3rd	Slowing Chinese economy (<8%)	Oil and gas price spike	Oil price spikes	Geopolitical conflict	Food shortage crises	Chronic fiscal imbalances	Water crises	Weapons of mass destruction	Water crises	Water crises	Natural disasters
4th	Oil and gas price spike	Chronic disease	Chronic disease	Asset price collapse	Chronic fiscal imbalances	Diffusion of weapons of mass destruction	Unemployment and underemployment	Interstate conflict with regional consequences	Large-scale involuntary migration	Major natural disasters	Failure of climate-change mitigation and adaptation
5th	Pandemics	Fiscal crises	Fiscal crises	Extreme energy price volatility	Extreme volatility in energy and agriculture prices	Failure of climate-change mitigation and adaptation	Critical information infrastructure breakdown	Failure of climate-change mitigation and adaptation	Severe energy price shock	Failure of climate-change mitigation and adaptation	Water crises

Economic Environmental Geopolitical Societal Technological

Water Allocation Reform in SA

- The Water Allocation Reform Strategy 2008
- The purpose of the WARS is to give effect to the legislative imperative to achieve redress and equity as stipulated in the NWA.
- The overall impact of this reform should be water allocation that promotes equitable social and economic development in a WMA with a special focus on women and Blacks.

Water Allocation Reform in SA

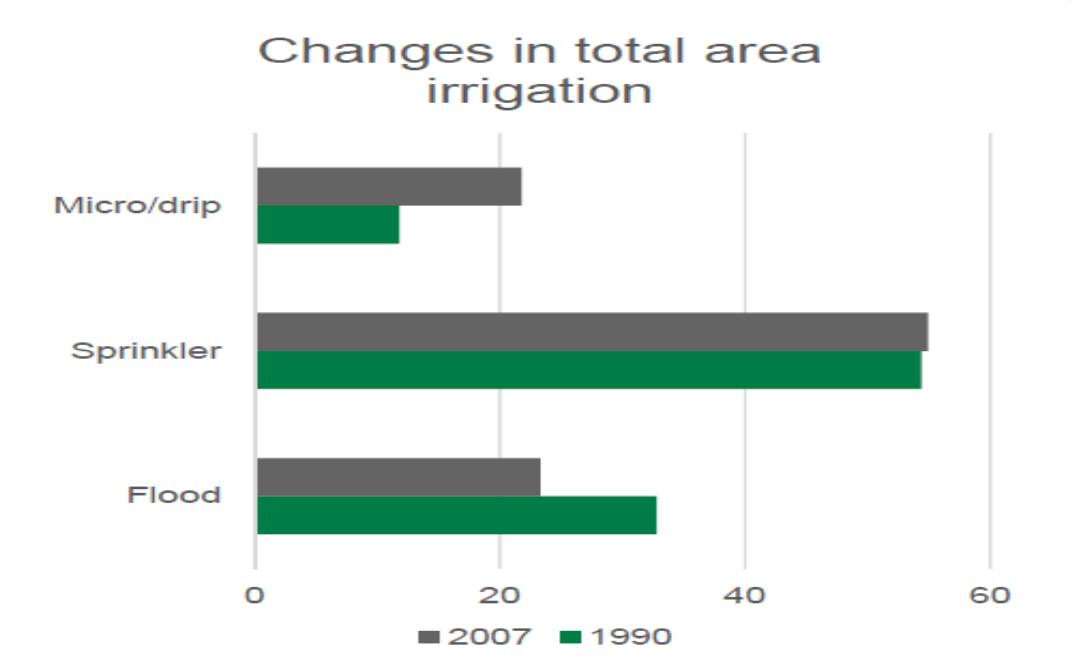
Water Allocation Targets		
Year	Target for black people (%)	Target with respect to women (%)
2014	35	30
2019	45	40
2024	60	50

Strategies and Tools for Transformation

- **Compulsory licence** (43)- any aspect of water use in respect of one or more water resources within a specific geographic area. It is intended to be used in areas which are, or are soon likely to be, under "water stress" (for example, where the demands for water are approaching or exceed the available supply, where water quality problems are imminent or already exist, or where the water resource quality is under threat), or where it is necessary to review prevailing water use (existing lawful use) to achieve equity of access to water. (Implementation of the Water Allocation Reform Strategy)
- **Water Use Efficiency** - Extension, capacity building of smallholders and their access to investment in farm-level irrigation (despite land tenure constraints), and support for access to irrigation technological packages at farm level will be needed to address the low development and preparation of land for irrigation.

Statistics on Water Use Efficiency from AgriSA

- One of the ways that farmers are improving their water use efficiency is by switching over to more efficient methods of irrigation.
- **In 1990, approximately:**
- - 32.8% of irrigation was flood irrigation;
- - 54.4% sprinkler irrigation; and
- - 11.8% micro/drip irrigation
- **By 2007, marked shift towards efficient methods as:**
- - 23.3% practiced flood irrigation;
- - 54.9% sprinkler irrigation; and
- - 21.8% drip irrigation.

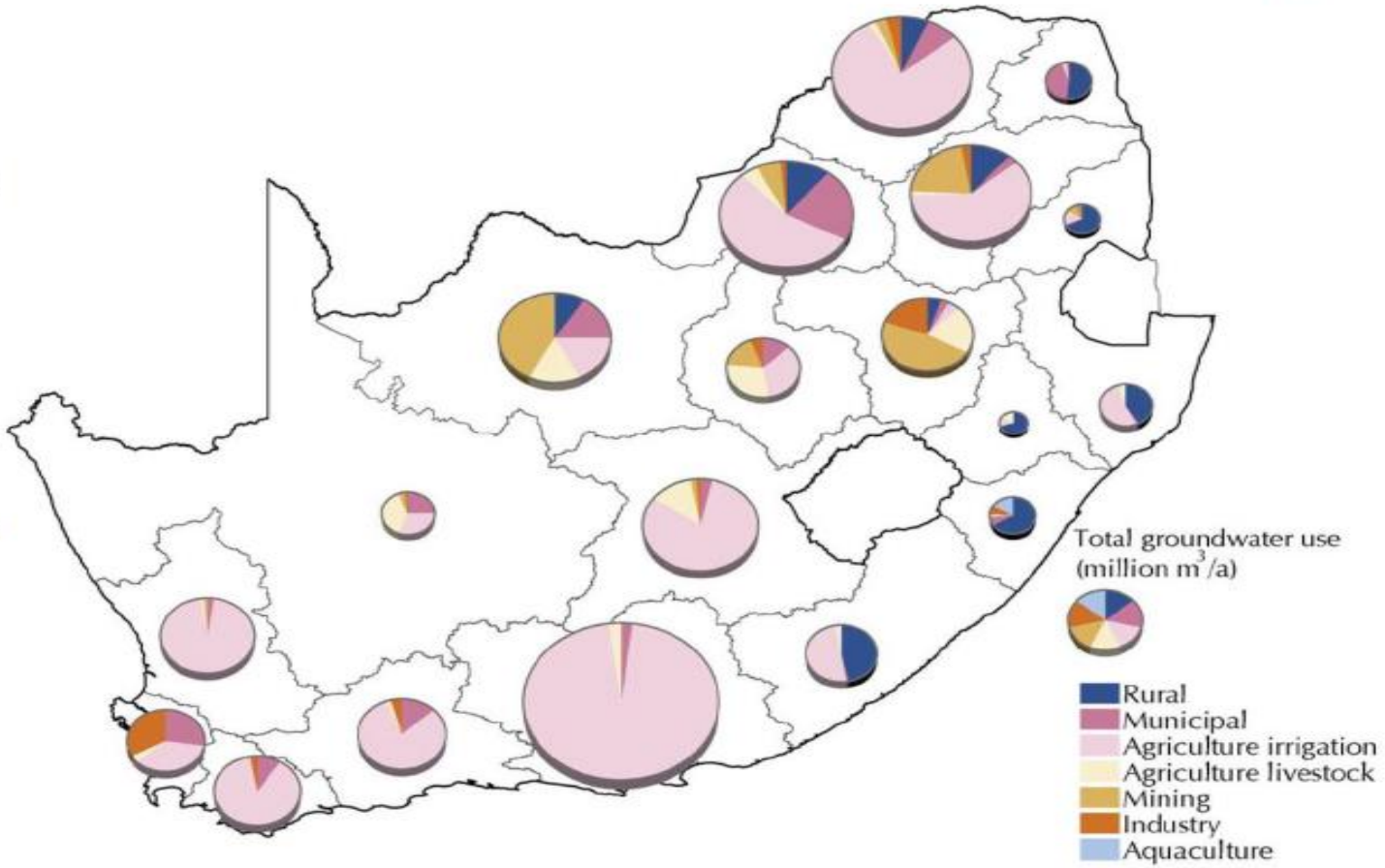


Strategies and Tools for Transformation

- Integration of surface and groundwater use - There is a need to develop groundwater knowledge and its use for agricultural purposes as 78 % of irrigated land is currently irrigated from surface water, refer to a slide on Groundwater

Statistics on Groundwater

- It is estimated South Africa's utilizable groundwater exploitation potential is 10 343 km³ per year on average(IWMI: Country Report SA)
- Currently, the country uses between 2000 km³ and 4000 km³ (IWMI: Country Report SA).
- According to Stats SA, 64% of South Africa's groundwater use is attributable to irrigation.
- The groundwater use does however differ dramatically as can be seem in the following figure supplied by Stats SA (2010).



Concluding Remarks

- Climate Change will negatively affects the transformation of the irrigation sector
- Water Use Efficiency should be encouraged in the sector
- Groundwater use for irrigation should be prioritised across the sector
- Transformation activities should be reviewed to include climate change impacts on water resources.

Thank you