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SLIDES: The Construction of Water Scarcity and Its Management: Some Insights from South Africa's Vaal System 'Problemshed'

Mike Muller

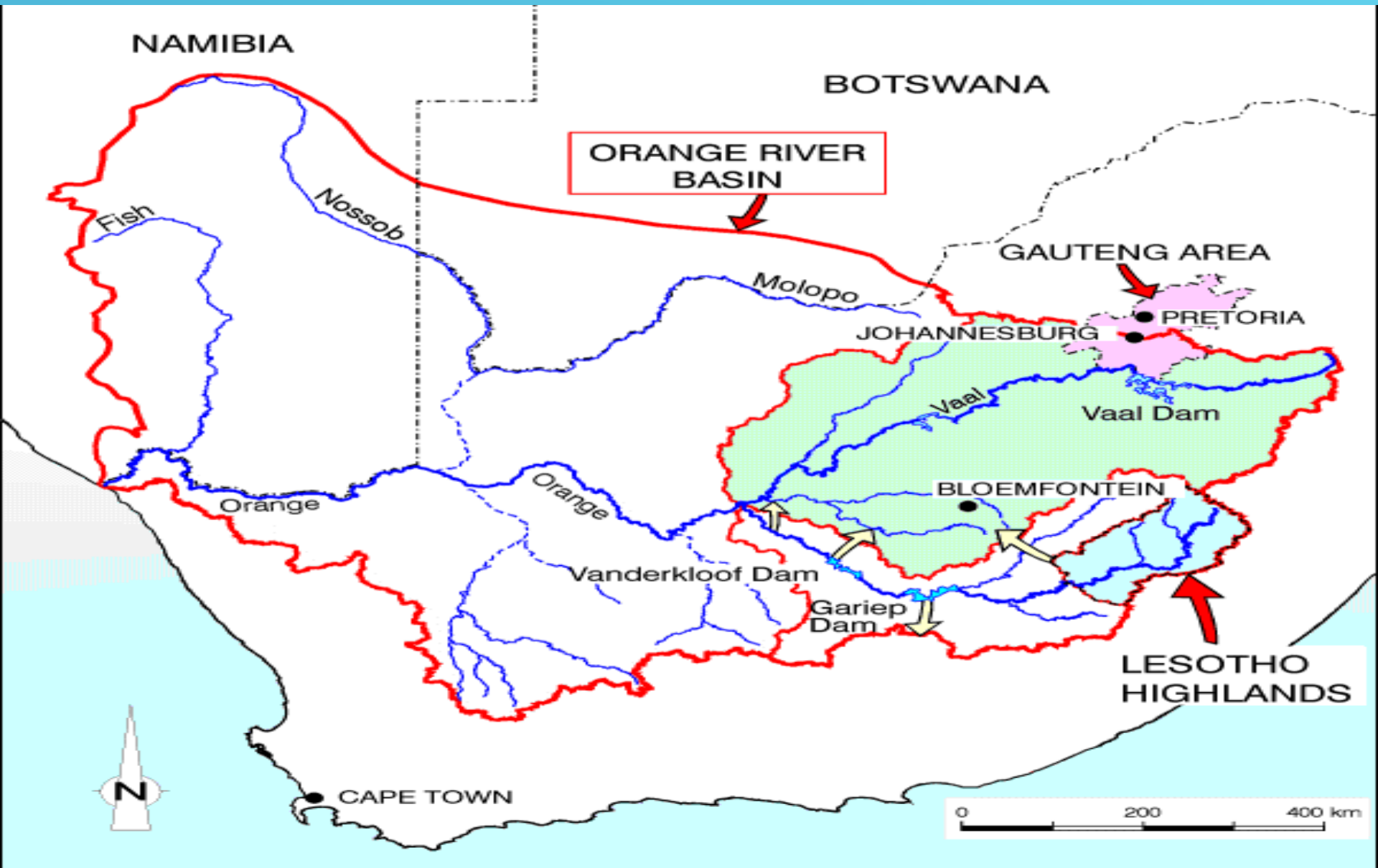
THE CONSTRUCTION OF WATER SCARCITY AND ITS MANAGEMENT SOME INSIGHTS FROM SOUTH AFRICA'S VAAL SYSTEM 'PROBLEMSHED'

Mike Muller
School of Governance
University of Witwatersrand
Johannesburg, South Africa

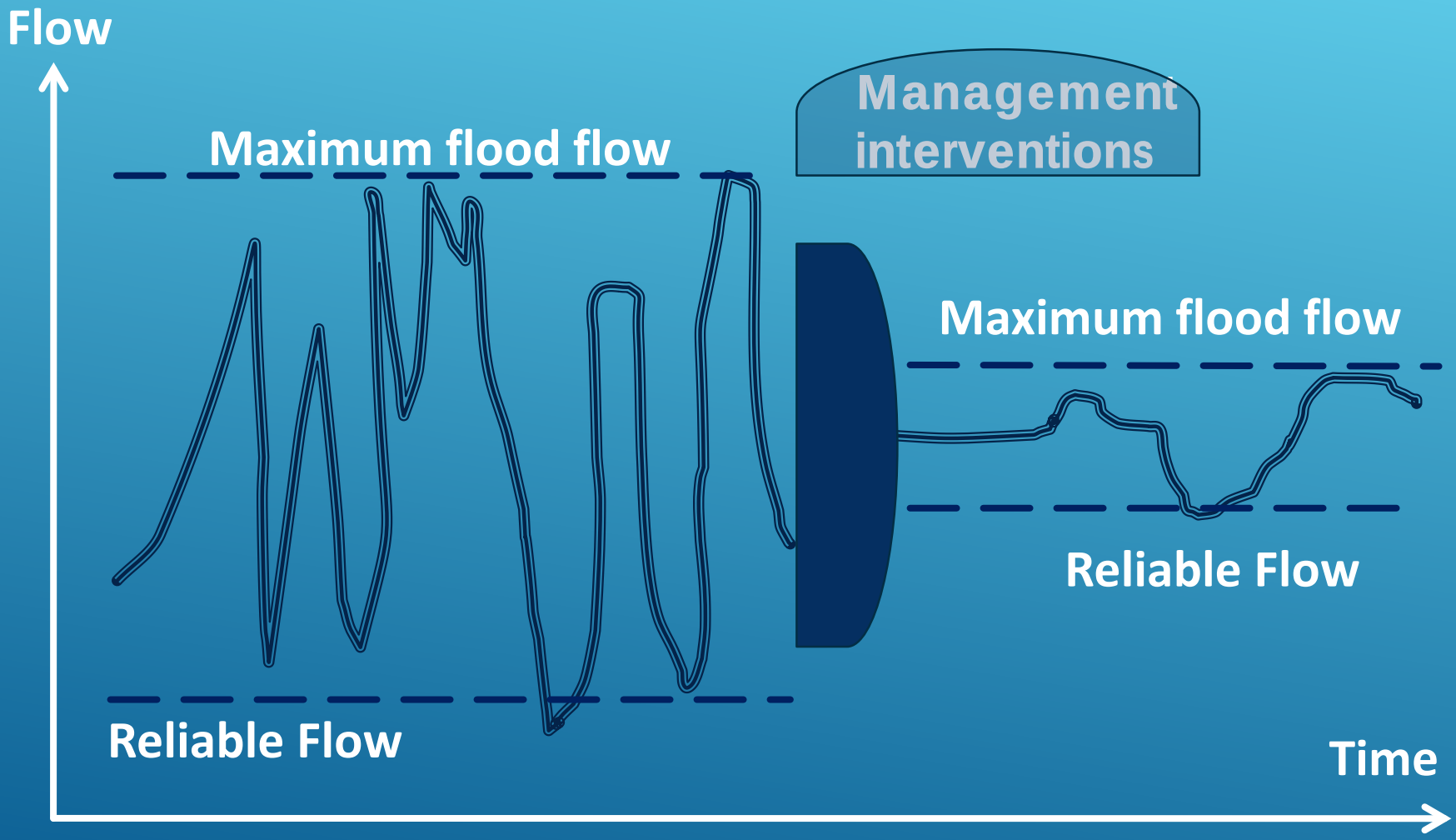
- Physical scarcity
- Variability induced economic scarcity
- Pollution, quality and scarcity
- Socially determined scarcity
- Operational determinants of scarcity
- Production, trade and the creation of scarcity

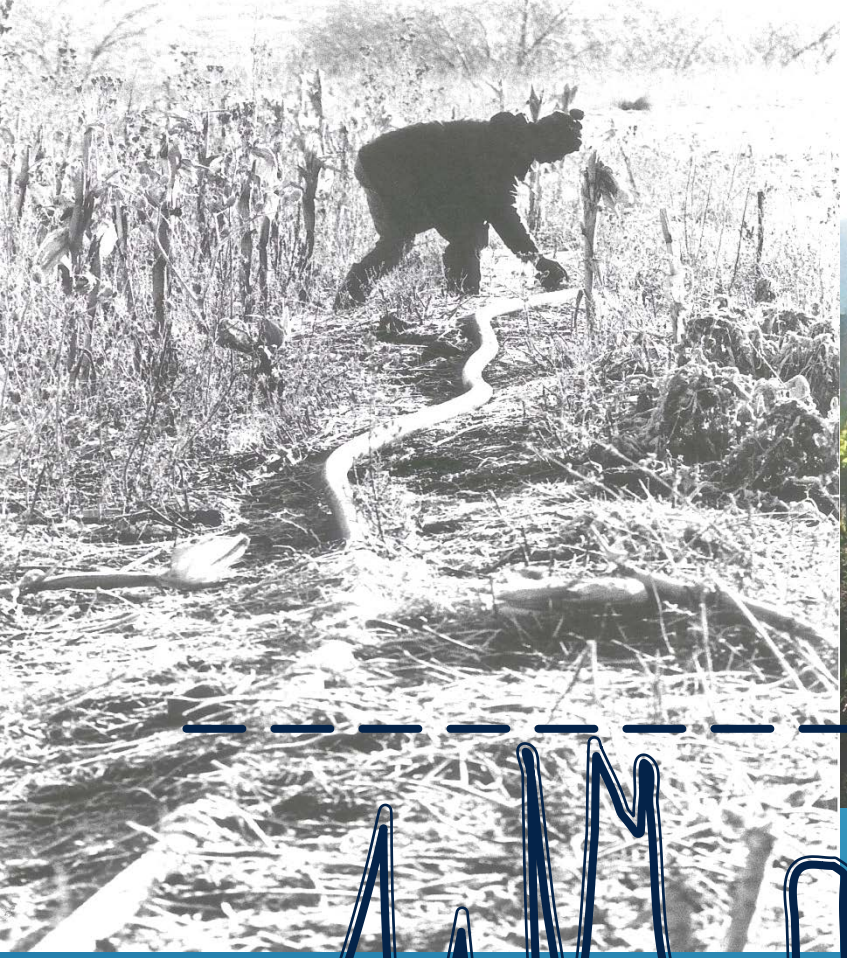
SCARCITY – DETERMINANTS AND RESPONSES

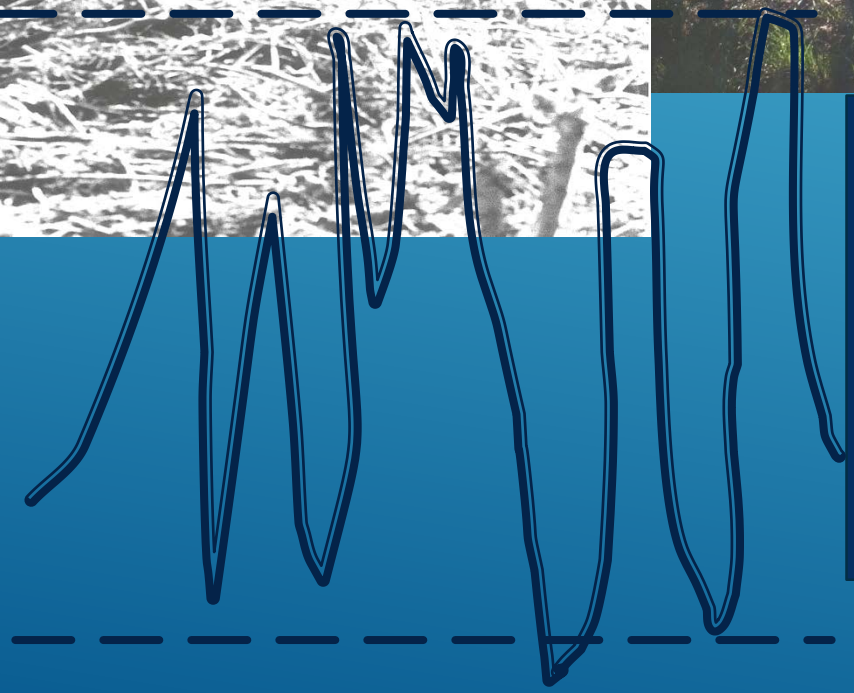
Vaal river system supports 60% SA's economy, 40% population, well beyond sub-basin boundary



MANAGING VARIABILITY





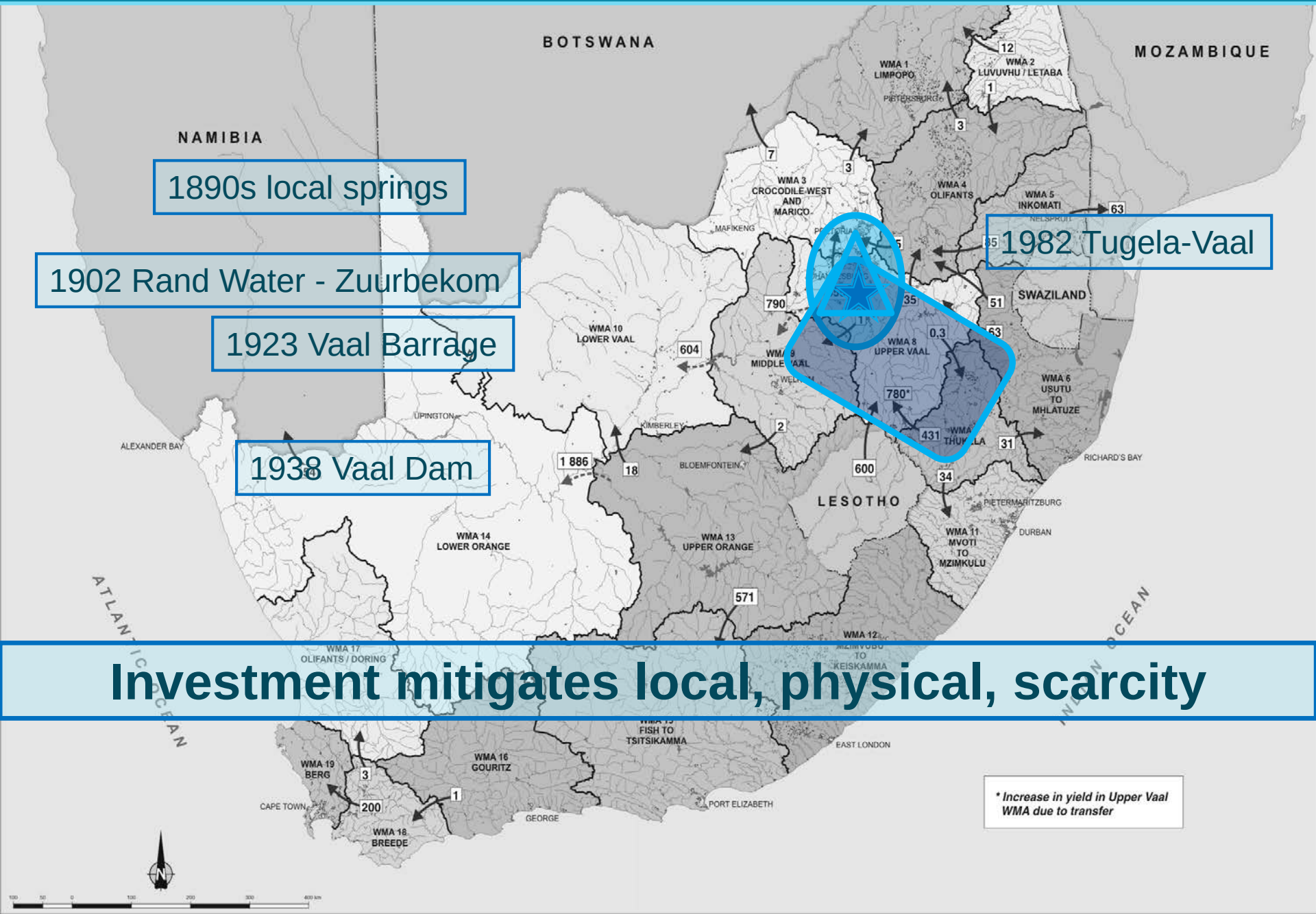


Reliable supplies =

More investment, greater productivity

Storage & links mitigate variability related scarcity
(investment constraint = economic scarcity)

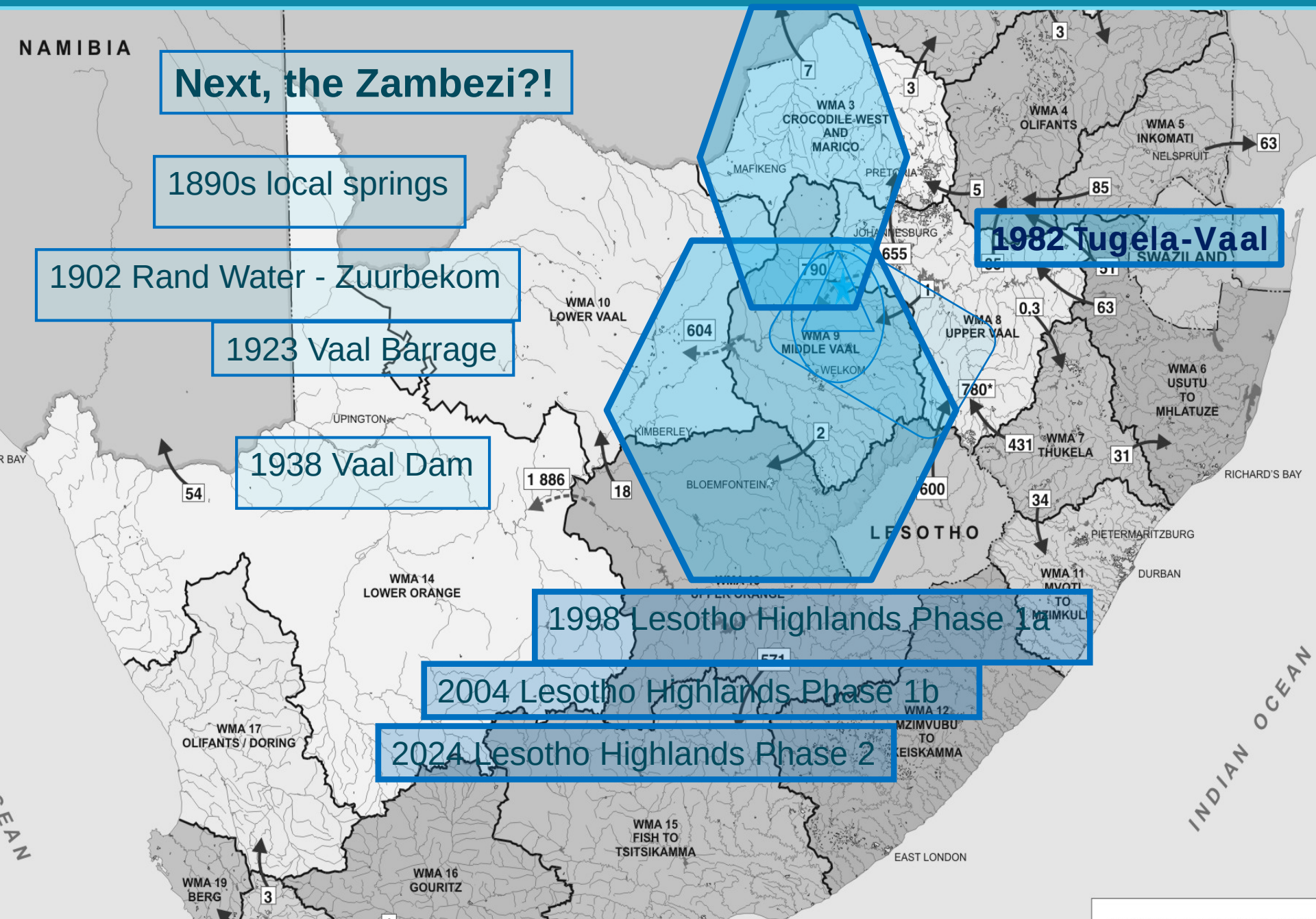
EVOLUTION OF VAAL SYSTEM'S "FOOTPRINT"



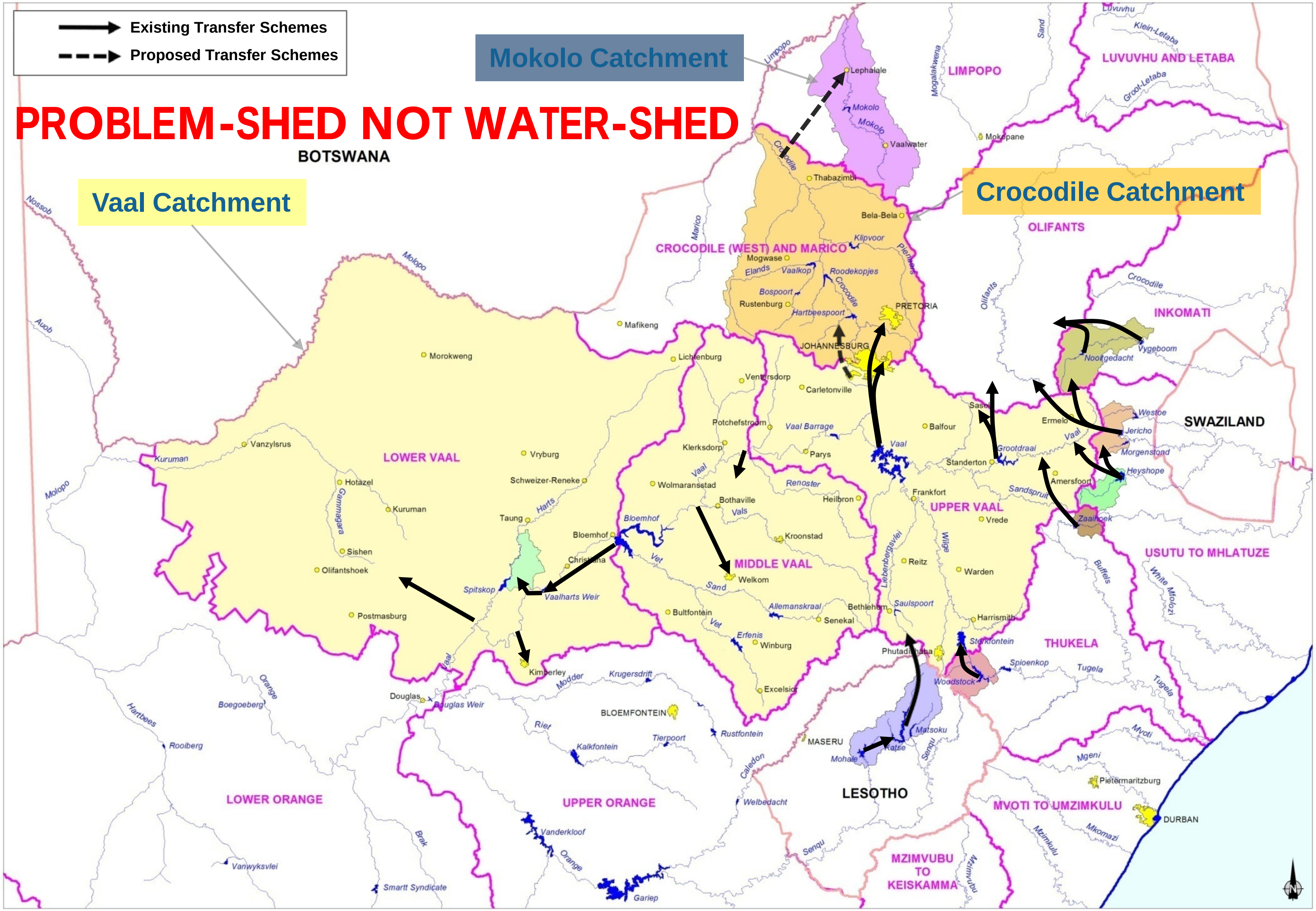
Investment mitigates local, physical, scarcity

Sterkfontein dam – 1st major inter-basin transfer into Vaal system

EVOLUTION OF VAAL SYSTEM'S "FOOTPRINT"



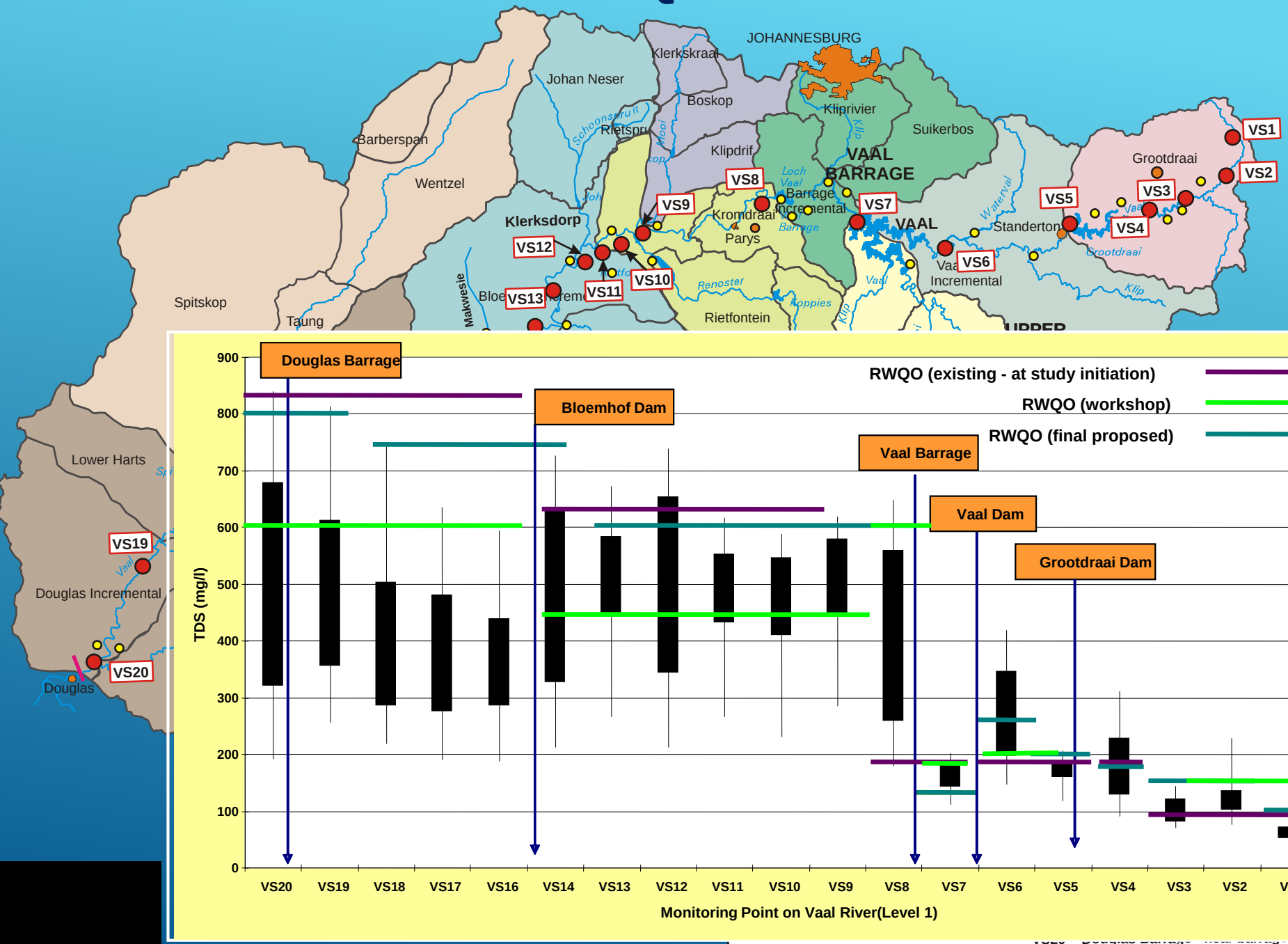
Integrated Vaal River System



POLLUTION ALSO CONTRIBUTES TO SCARCITY

ACID MINE DRAINAGE - GOLD'S HERITAGE

OVERVIEW OF WATER QUALITY: SALINITY STATUS



SALINITY MANAGEMENT STRATEGY

Short term actions:-

- **Implement source controls**
- **Upgrade monitoring programme**
- **Feasibility of saline effluent (AMD) treatment**
- **Pilot waste discharge charges**
- ***Dilution to keep TDS to 600 mg/L***

Medium/Long term Actions:-

- **Implement saline effluent (AMD) treatment**
- **Implement waste discharge charges**

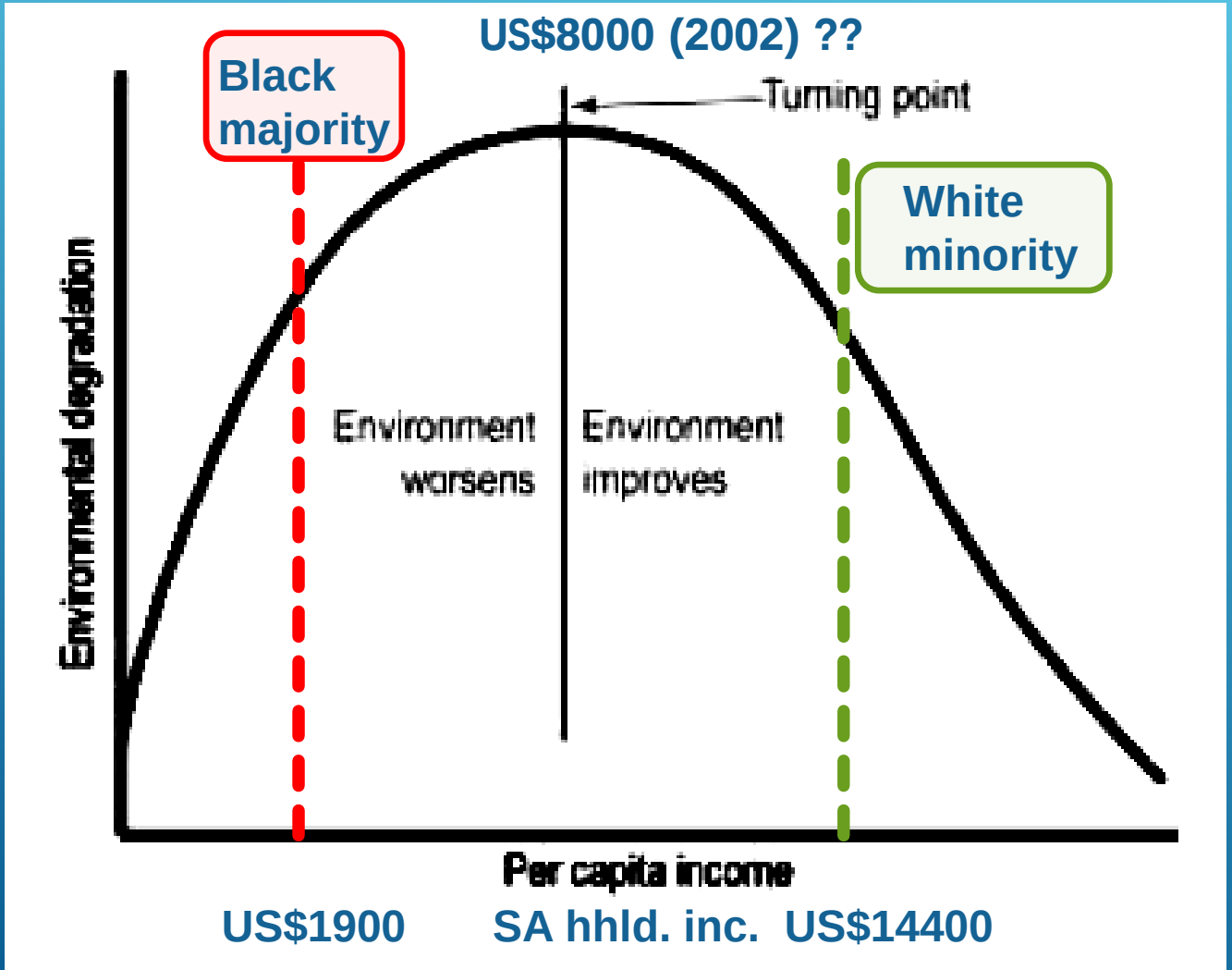
UPSIDE OF ACID MINE DRAINAGE

- AMD only 15% of ‘salt’ pollution in Vaal
  - But concentrated, point sources
  - Cheaper to clean up than treating the river
  - Or using scarce & expensive water for dilution
- Will also provide small additional supply stream

POLLUTION ALSO REFLECTS CHANGING SOCIAL PRIORITIES

SA'S ENVIRONMENTAL KUZNETS CURVE

Empirically, environmental priorities change with the income of the politically dominant group

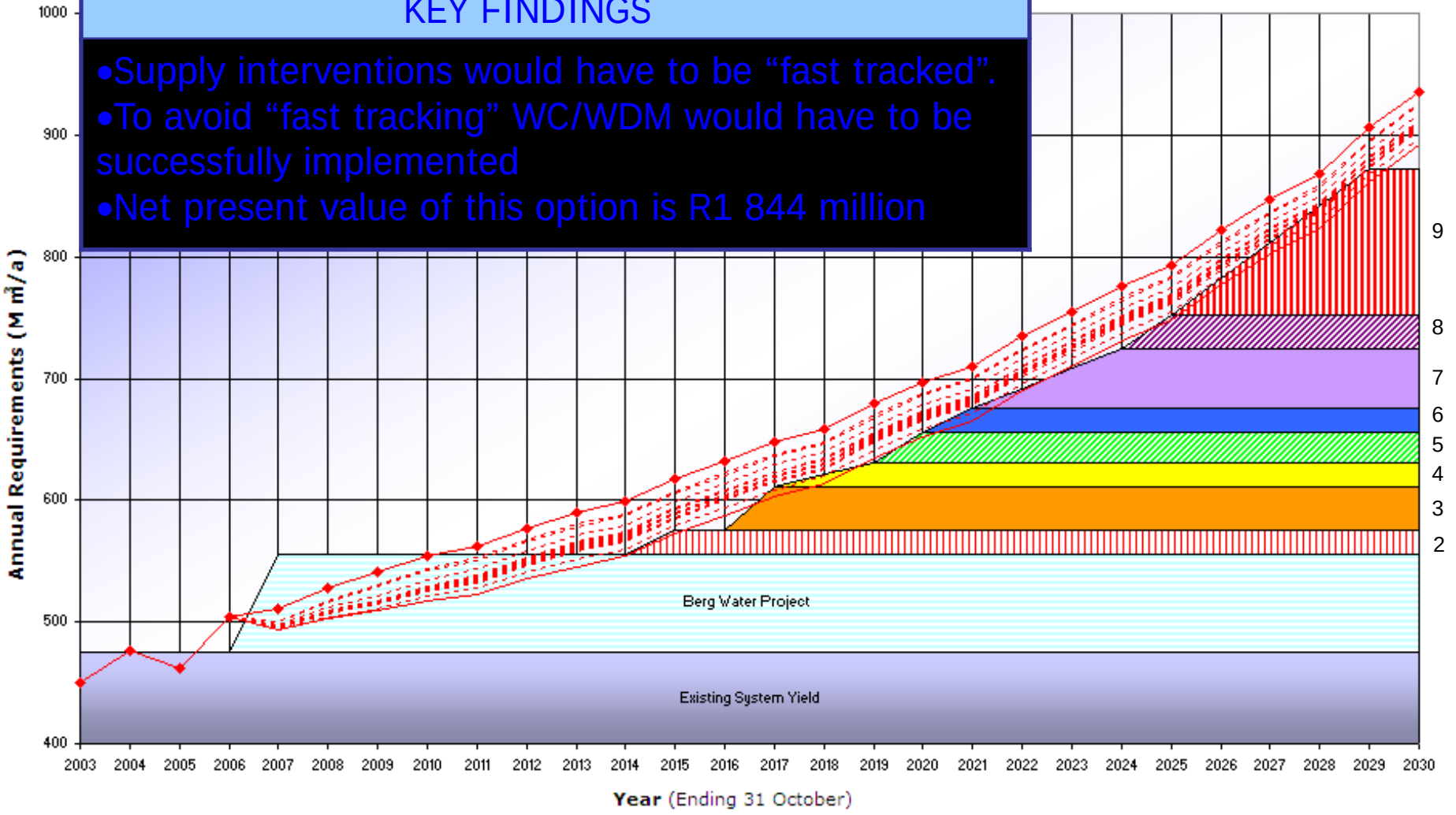


Climate change:
A future ‘source’ of scarcity?

SCENARIO	DESCRIPTION
Scenario 10 (a)	CCT WC/WDM strategy, thereafter selection based on a conservativ selection of interventions
	Objective: To determine the impact of selecting a “conservative portfolio”

KEY FINDINGS

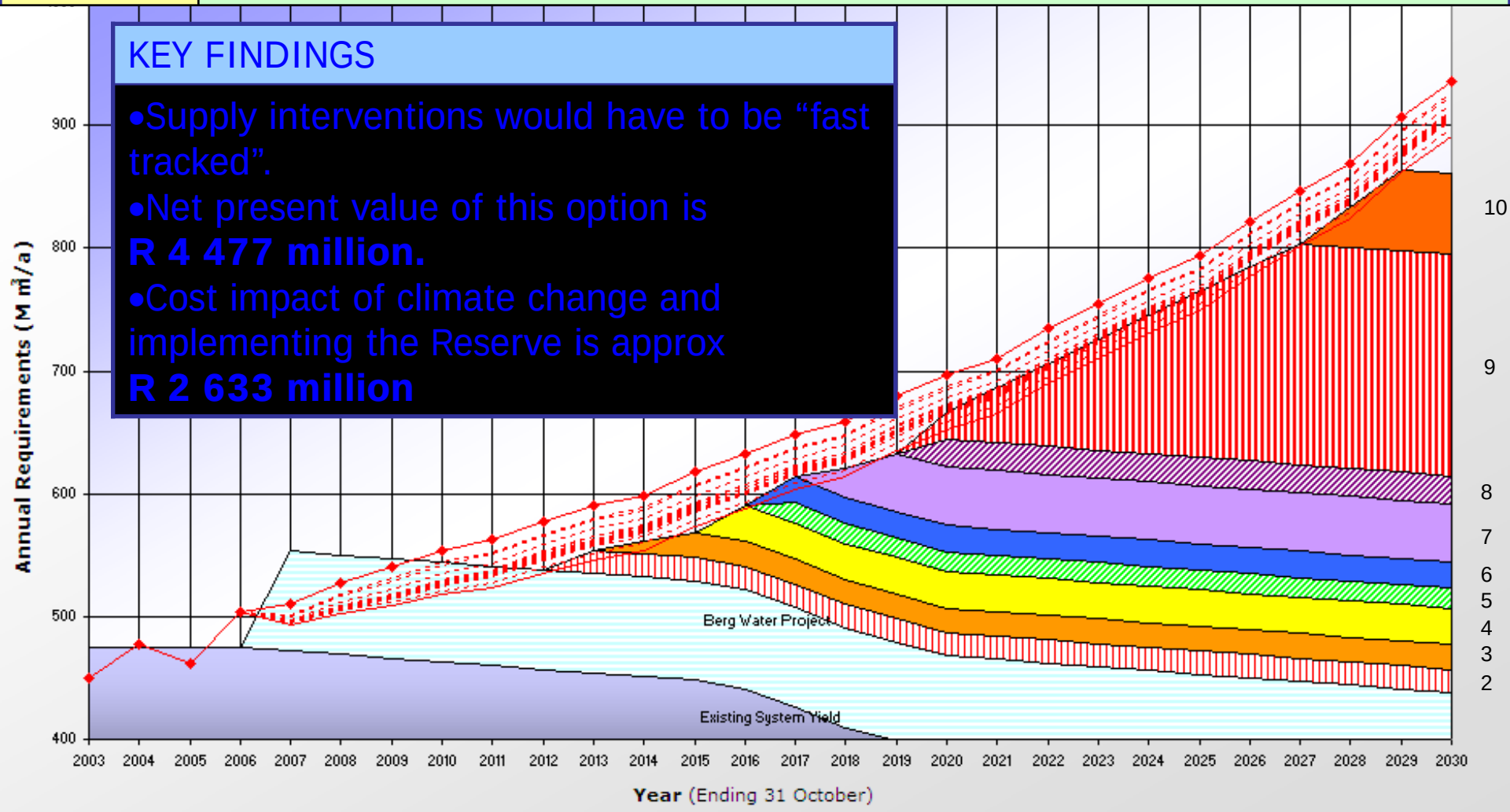
- Supply interventions would have to be “fast tracked”.
- To avoid “fast tracking” WC/WDM would have to be successfully implemented
- Net present value of this option is R1 844 million



SCENARIO	DESCRIPTION
Scenario 10 (b)	**CCT WC/WDM strategy, thereafter selection based on a conservative selection of interventions including potential impacts of ecological Reserve and climate change**
	Objective: To determine how the implementation of the Reserve and the potential for climate change could impact on the selection of interventions

KEY FINDINGS

- Supply interventions would have to be "fast tracked".
- Net present value of this option is **R 4 477 million.**
- Cost impact of climate change and implementing the Reserve is approx **R 2 633 million**



Poor municipal management contributes to scarcity

POOR MUNICIPAL MANAGEMENT CONTRIBUTES TO SCARCITY

- **South African cities 'lose' 36.7% of its water?**
- **'non-revenue' water**
  - Physical losses?
  - Financial losses?
- **Remedies:-**
  - Know your system
  - Find and fix leaks
  - Maintain infrastructure
  - Identify and chase debtors
  - (aka establish effective operating systems)

- **Non revenue water programmes address scarcity**

SYSTEMIC IMPACT OF MUNICIPAL (AND OTHER) LOSSES IN VAAL

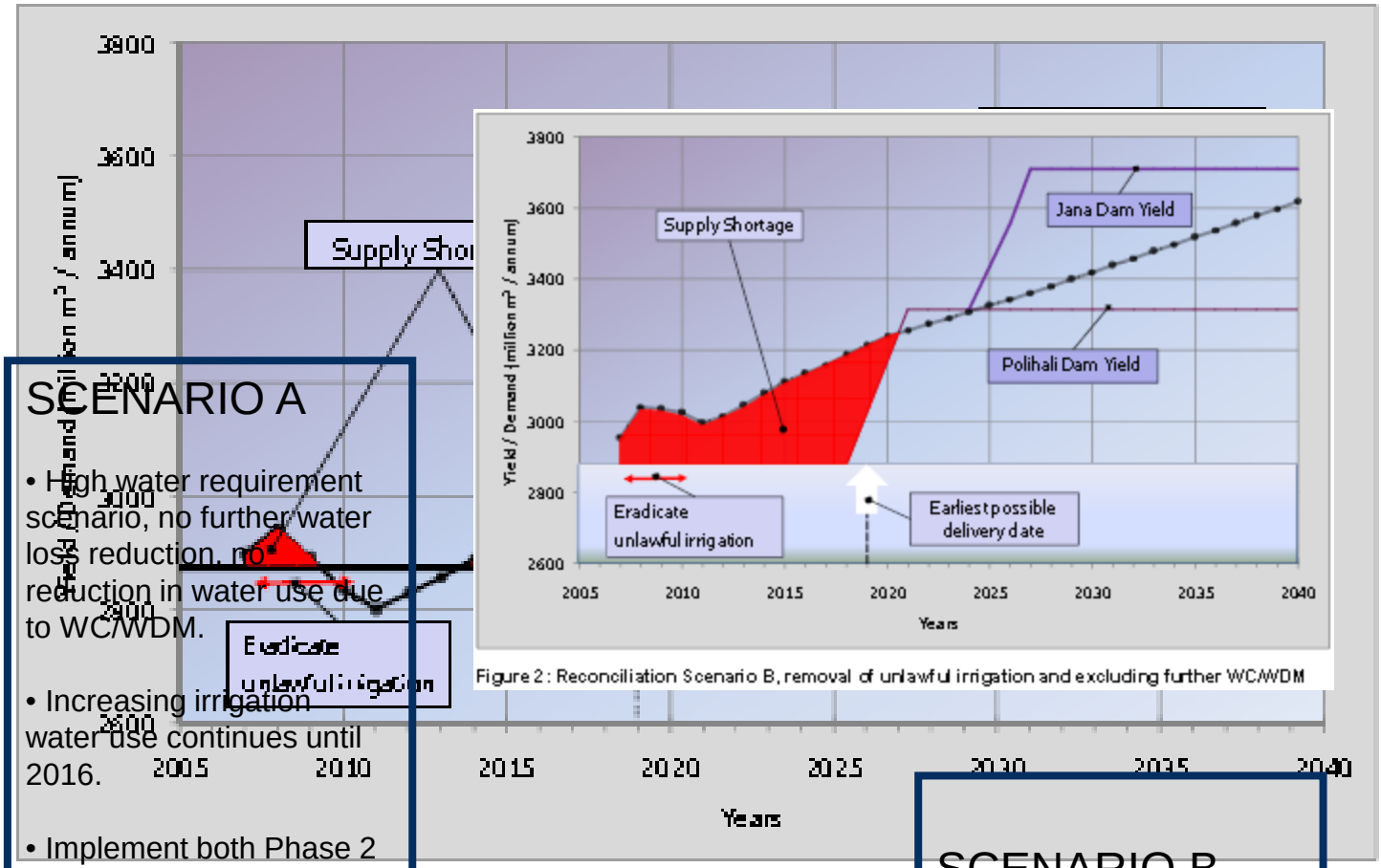


Figure 2 : Reconciliation Scenario B, removal of unlawful irrigation and excluding further WC/WDM

SCENARIO A

- High water requirement scenario, no further water loss reduction, no reduction in water use due to WC/WDM.
- Increasing irrigation water use continues until 2016.
- Implement both Phase 2 of the Lesotho Highlands Water Project (Polihali Dam) and the Thukela Water Project (Jana Dam and Mielietuin Dam)

Figure 3 : Reconciliation Scenario C, unlawful irrigation removed and 15% savings through WC/WDM

SCENARIO B

- Unlawful irrigation water use eradicated in 2011 and controlled thereafter

Figure 1: Water balance for Reconciliation Scenario A

SCENARIO C

- 15% reduction in water use due to water conservation and demand management (WC/WDM)
- Unlawful irrigation water use eradicated in 2011 and controlled thereafter
- Phase 2 Lesotho Highlands Water Project (Polihali Dam) and Thukela Water Project (Jana Dam and Mielietuin Dam)

PRODUCTION, TRADE, SCARCITY & ‘VIRTUAL WATER’

Southern Africa's global agricultural trade

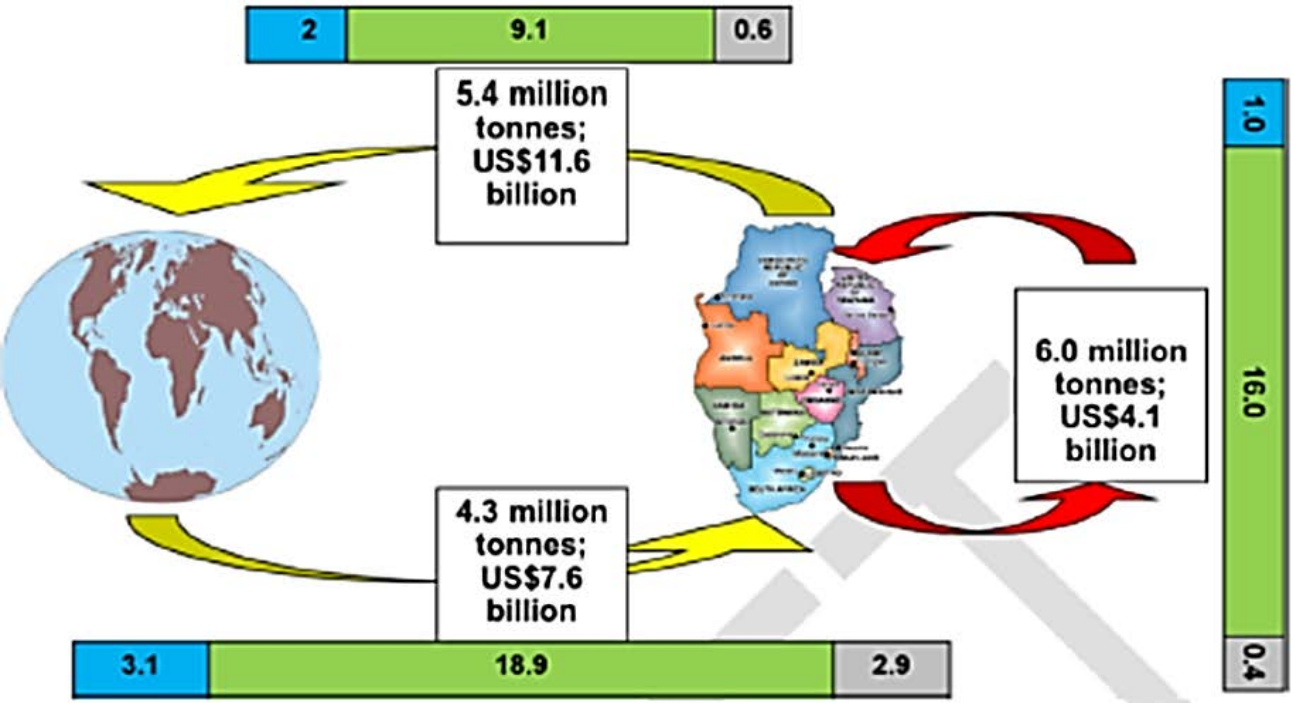


Figure 3.2 The imports and exports of agricultural products (in total) in 2012 amongst the continental SADC countries, and between these and the rest of the world. Tonnages and values are shown in text boxes; the accompanying blue, green and grey virtual water transfers are shown by 'colour' in cubic kilometres

Water rich to water poor

SADC'S GLOBAL TRADE

CURRENTLY,
SADC IMPORTS RICE,
EXPORTS FRUIT AND
TOBACCO ....

MAKES SENSE?

SADC Trade in Selected Agricultural Products, Inputs

Product / Input	Year	IMPORTS	EXPORTS	BALANCE
Cassava	2009	0	0	0
	2010	0	0	0
Maize	2009	210	410	200
	2010	130	278	148
Rice	2009	800	34	-766
	2010	737	36	-701
Soya Bean	2009	6	76	70
	2010	14	60	46
Sugar Beans	2009	62	76	15
	2010	67	91	24
Fruit	2009	152	1822	1671
	2010	182	2367	2185
Cotton	2009	10	30	20
	2010	1	37	36
Tobacco	2009	299	1422	1123
	2010	343	771	427
Fertilizers, m	2009	1006	270	-735
	2010	1013	345	-668
Pesticides	2009	188	67	-121
	2010	206	47	-159

Million $US

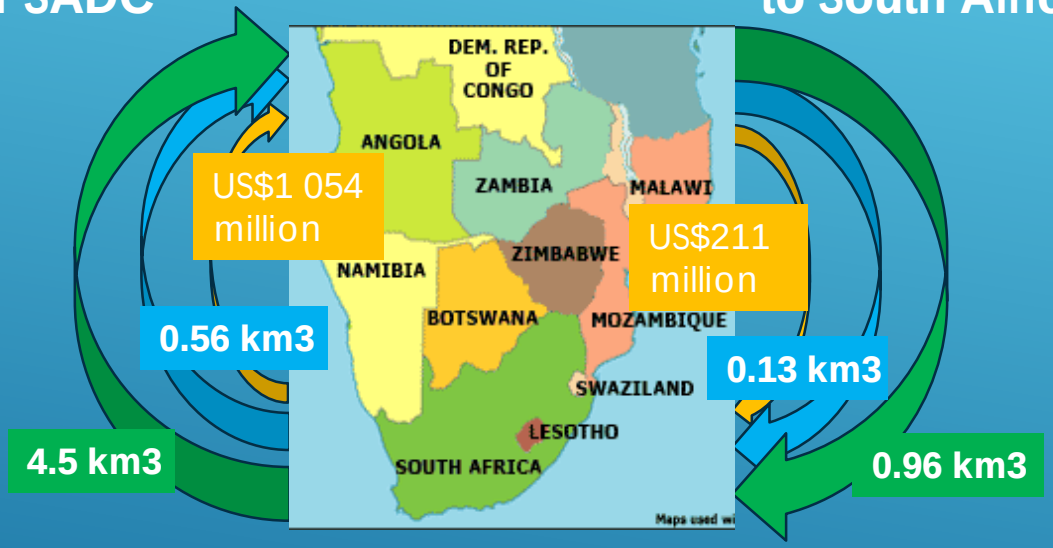
SOUTHERN AFRICA - WHO HAS THE WATER?

Country	Metres^3/person
South Africa	1110
Malawi	1400
Zimbabwe	1550
Lesotho	1680
Swaziland	4160
Botswana	6820
Namibia	8810
Zambia	9630
Angola	10510
Mozambique	11320

INTRA-SADC AGRICULTURAL TRADE

South Africa to other SADC

Other SADC to South Africa



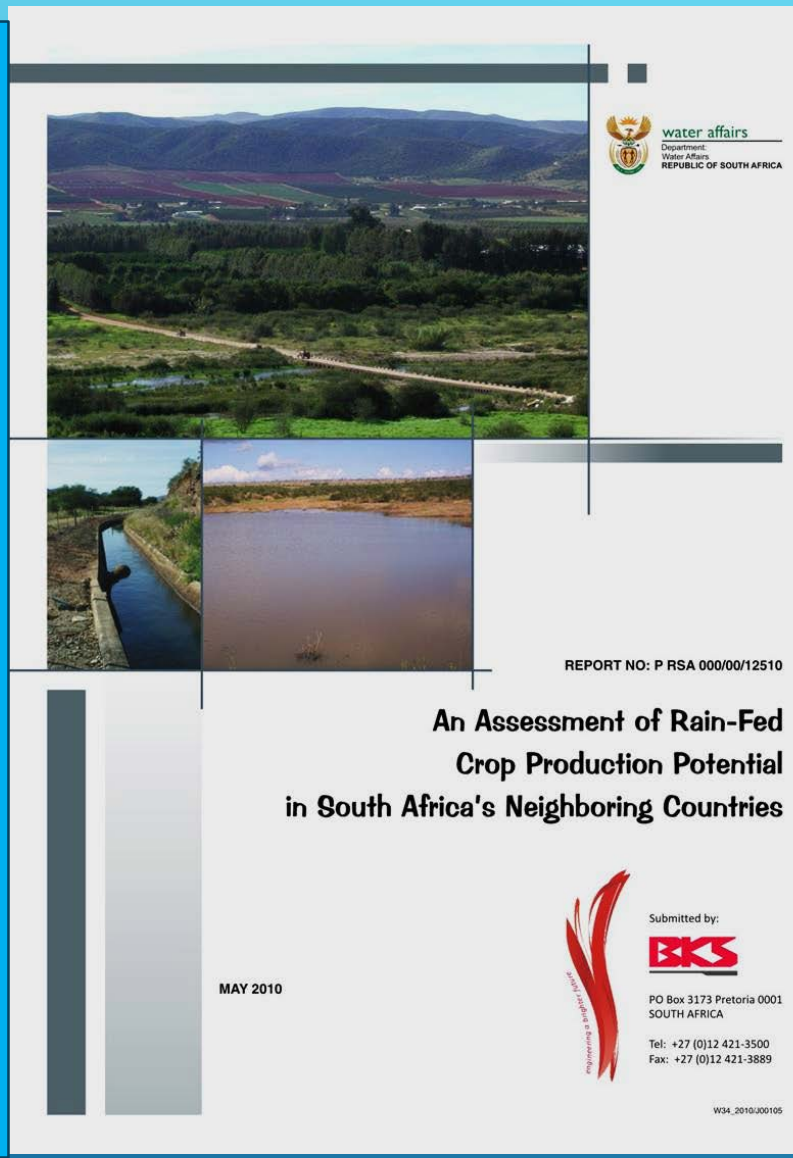
Water poor to water rich

South Africa's net exports:
3.50km3 green water
0.43km3 blue water
US$843 million

Regional agricultural cooperation is a no-brainer (in water terms!)

- **Irrigation in SA uses 60% of water**
- **Much for internationally "rain-fed" crops**
- **"High-potential, rain-fed cropping land":-**

Zambia	-	11,1 million ha
Mozambique	-	8,8 million ha
Zimbabwe	-	6,3 million ha
Malawi	-	0,4 million ha
Total	**-**	**26,6 million ha**



ADDRESS SOCIAL IMPACT OF PRODUCTION SHIFT BY ‘SUSTAINABLE INTENSIFICATION’ OF LOCAL FARMING?

CHALLENGE:- THE LONG WATER RESOURCE MANAGEMENT CYCLE

- Policy cycle – multi decades
- Technical planning & strategy cycle (20 years?)
- Investment implementation (10 years)
- Drought cycle (10 – 20 years) – key planning focus
- Major drought event (5 – 10 years) – action trigger
- Operational response (multi-seasonal)
- Operations (ongoing)

Primary challenge – sustaining coherence through the cycle!