



*Mekong+*

*New Frontiers in Sustainable Hydropower Development*

**Governance, Cooperation and Practice: Water and Hydropower  
Development – The Role of Transboundary Water  
Cooperation: Case of the Orange Senqu River Basin**

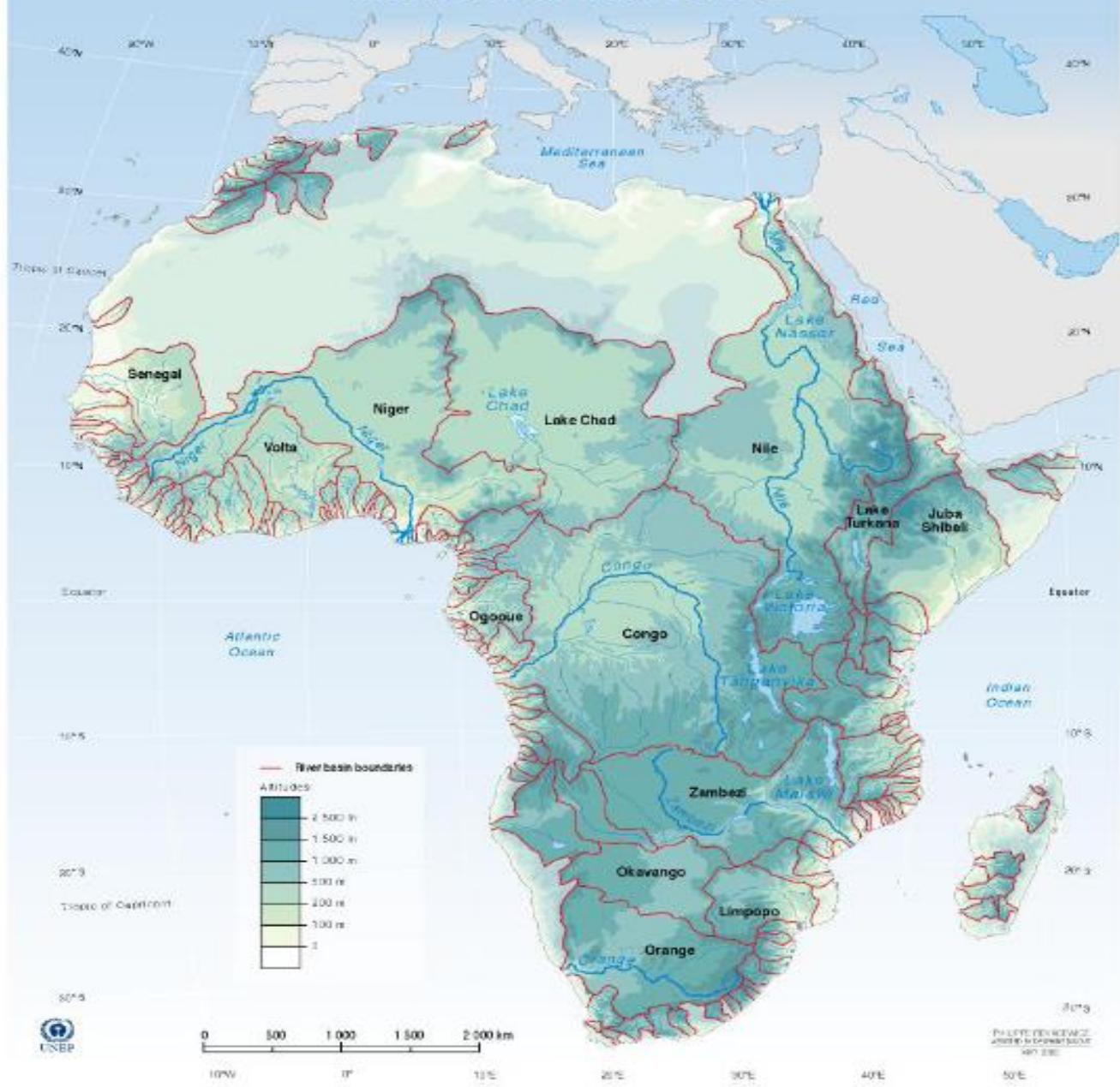
*Hydropower Sustainability Forum. Oslo, Norway.*

*4 – 6 September 2017.*

by: **Lenka Thamae.**  
**Executive Secretary**

**Orange Senqu River Commission (ORASECOM)**

# The Major River Basins of Africa



Source: Aaron T. Wolf et al., 1996; Revanga et al., Watersheds of the World, World Resources Institute (WRI), Washington DC, 1998; Philippe Rekawicz, *Atlas de poche*, Livre de poche, Librairie générale française, Paris, 1996 (revised in 2001).

# Shared River Basins in SADC

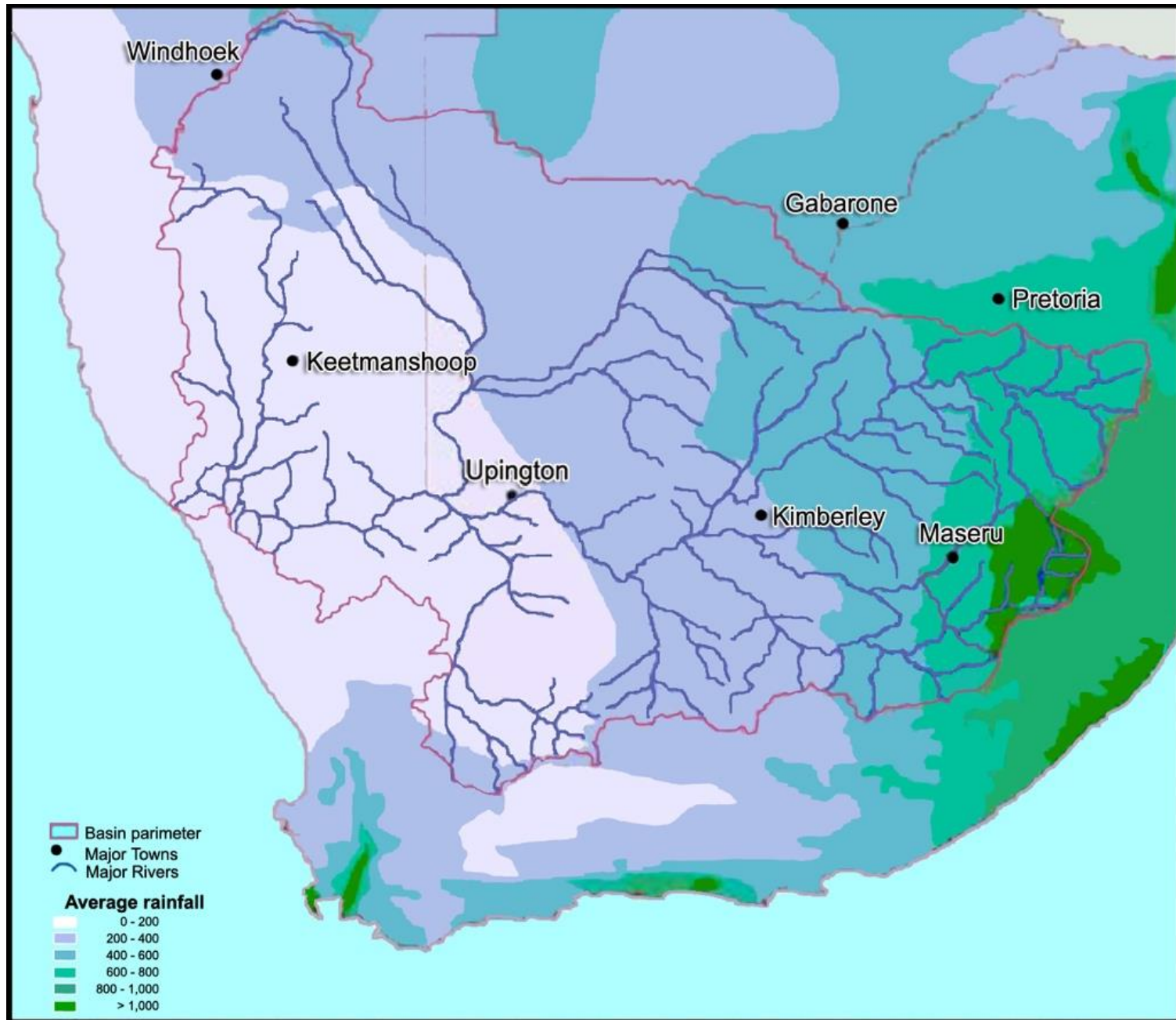
SADC Political Boundaries and Major River Basins



Major River Basins		Other Features	
	Buzi		Rovuma
	Congo		Save
	Cuvelai		Umveluzi
	Incomati		Zambezi
	Kunene		Orange-Senqu
	Limpopo		Capital Cities
	Madagascar		Watercourses
	Maputo		Waterbodies
	Okavango		Political Boundaries

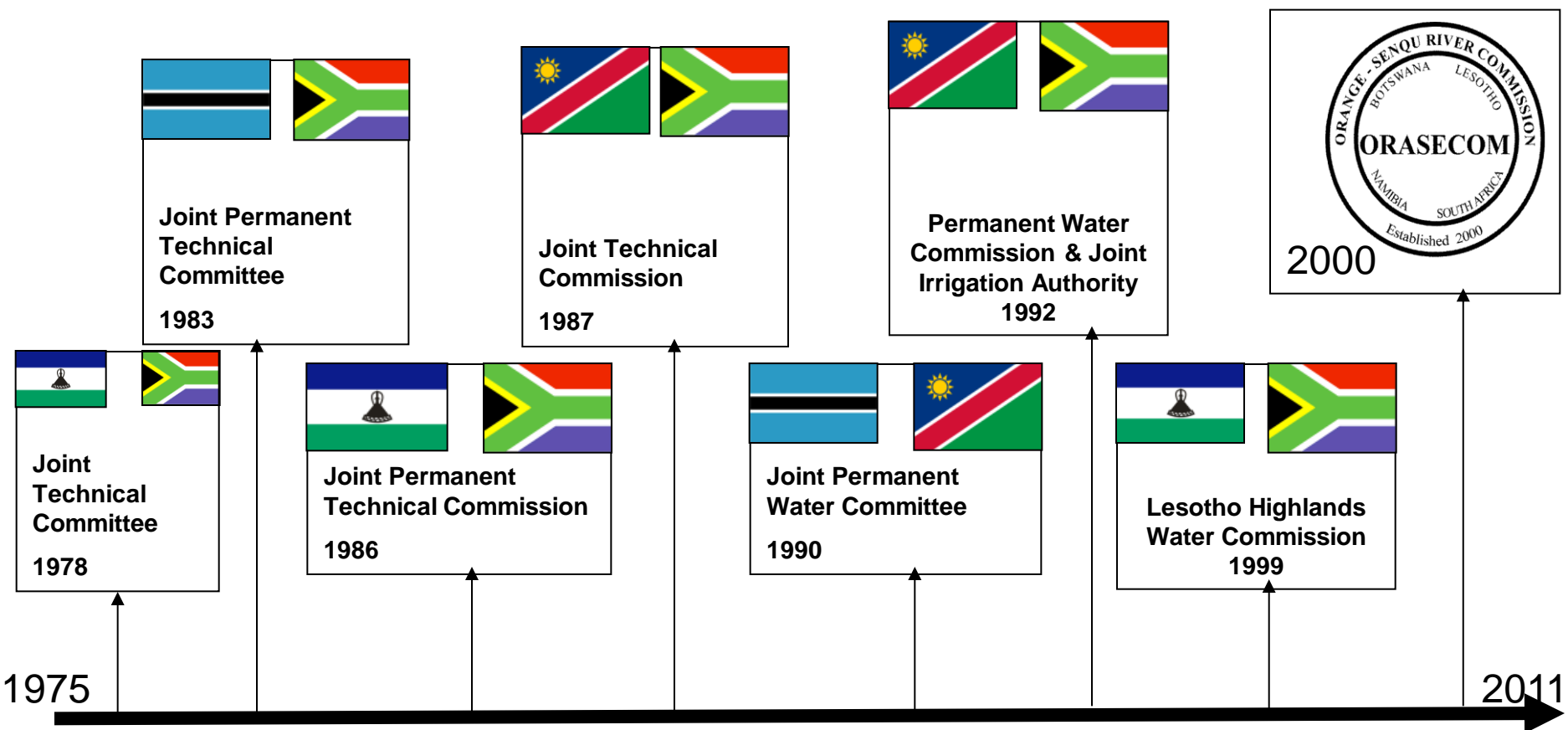
- South African Development Community (SADC) Treaty and Declaration was signed in 1992.
- The Treaty provides for member states to agree on areas of cooperation; (Article 22)
- Water established as stand alone area of cooperation (sector) in August 1996.
- The Water Protocol (revised) signed in 2000 was the first such protocol adopted by SADC Member states.
- ORASECOM agreement signed in 2000 seeks to implement the SADC Protocol in the Orange Senqu River Basin.

# Rainfall/Precipitation Distribution



Orange-Senqu sources in highlands of Lesotho at around 3000 metres above mean sea level (alpine wetlands “sponges”) – very important for sustaining flows especially in dry season and during drought periods.





Botswana



Lesotho



Namibia



South Africa

**History of Trans-boundary Cooperation in the Orange-Senqu Basin; & 2011 agreement on LHWP Phase II; 2013 MOU on Lesotho Botswana Water Transfer Project.**

# **Basin Context – Outcomes of Basin Planning Exercise**

- Water scarcity and system yield are key limiting factors for development of water resources in the basin.
- The largest demand centres are located on the escarpment including the Gauteng/Johannesburg area – population estimated at +4 million inhabitants, coupled with industry, irrigation and mining.
- A complex water transfer network has been established and is operated to supply the demand centres.
- Very substantial deposits of coal exist within RSA extending into the upper catchment, and also continuing into Botswana.
- Climate change projections at the basin scale indicate overall future increase in temperature, and decrease in precipitation (except for the source area where models are divergent in projections).



a world class African city

Johannesburg city – population estimated at +4 million inhabitants





*Sasol Petrochemical Plant Secunda*

*Produces >30% of SA's Petrol/Diesel  
from coal*



*Sishen Iron Ore Mine*

*One of the largest single open pit excavation in the World*



# Reservoir Storage in the Orange-Senqu Basin



**Legend**

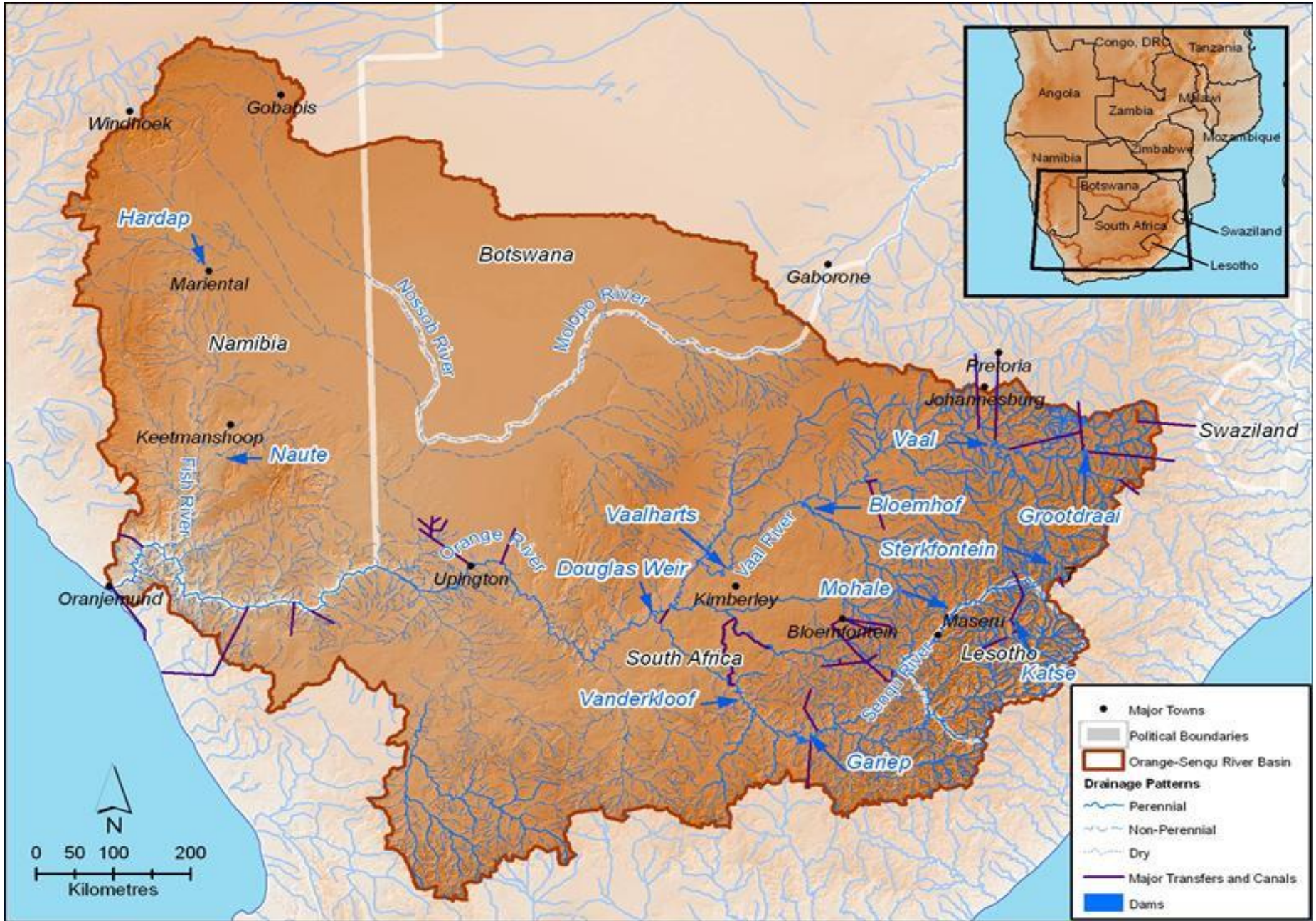
- Major town
- Orange-Senqu
- Main rivers
- Main reservoirs
- Live storage (>1 Mm<sup>3</sup>)
- Watershed
- Country
- Sub-catchment

**BRL**  
Bureau of River and Water Management

August 2014  
Source :

Scale: 0 100 200 300 km

# System of Water Transfers to Supply Demand Centres



# Climate – temperature change

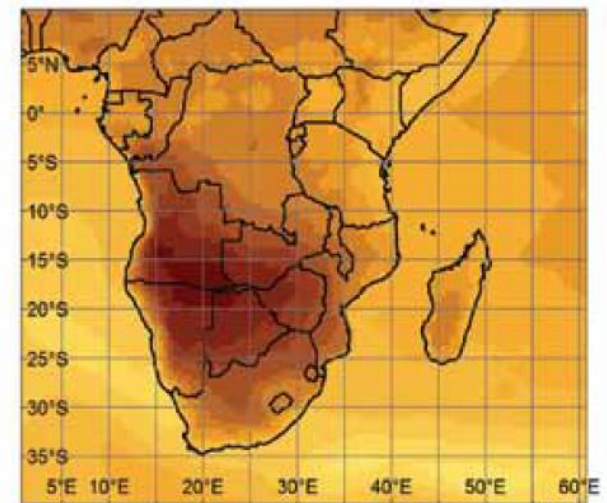
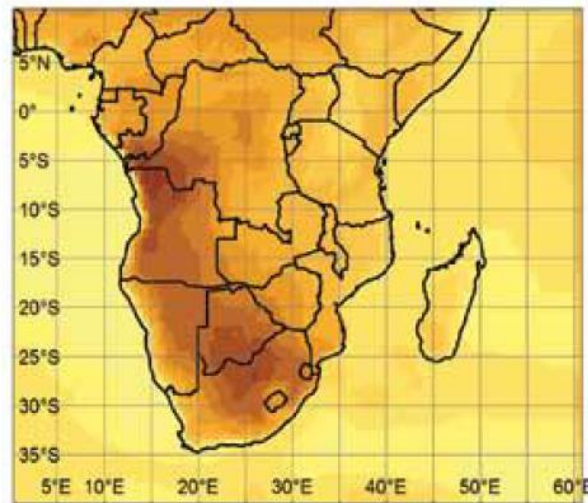
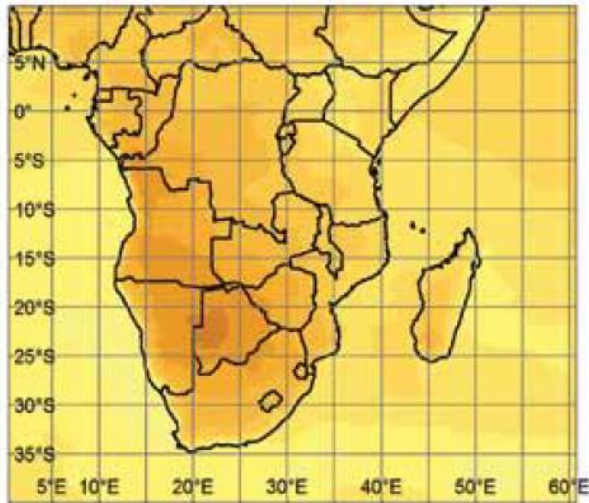
## By 2050

Projected change in mean annual maximum temperature based on 6 dynamically downscaled GCMs

10<sup>th</sup> percentile

Median

90<sup>th</sup> percentile



degrees C per annum



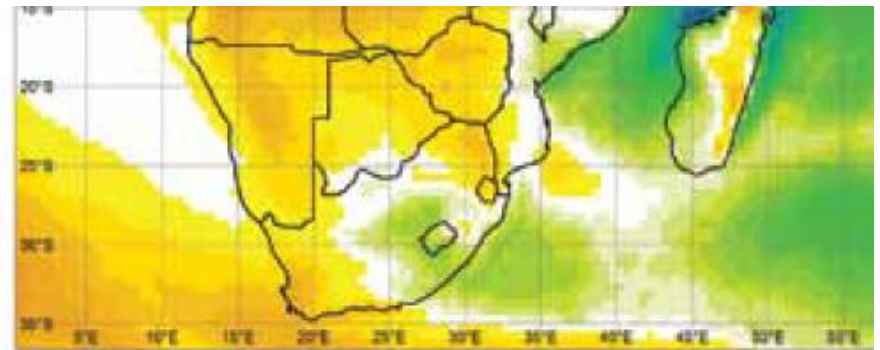
**CSIR**

our future through science

Created by Claire Davis, 2011

# Climate – precipitation change

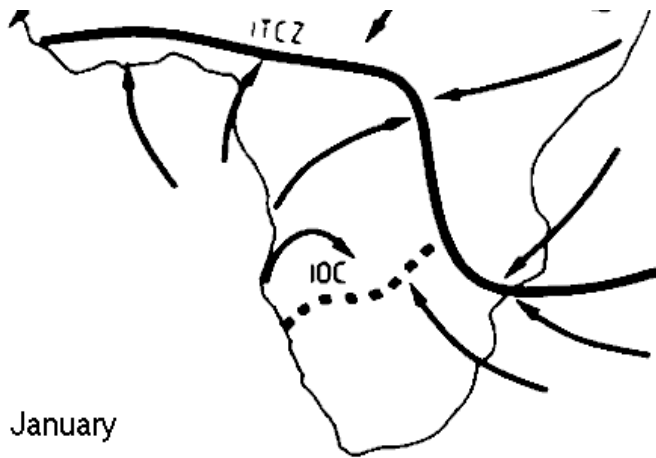
By 2050



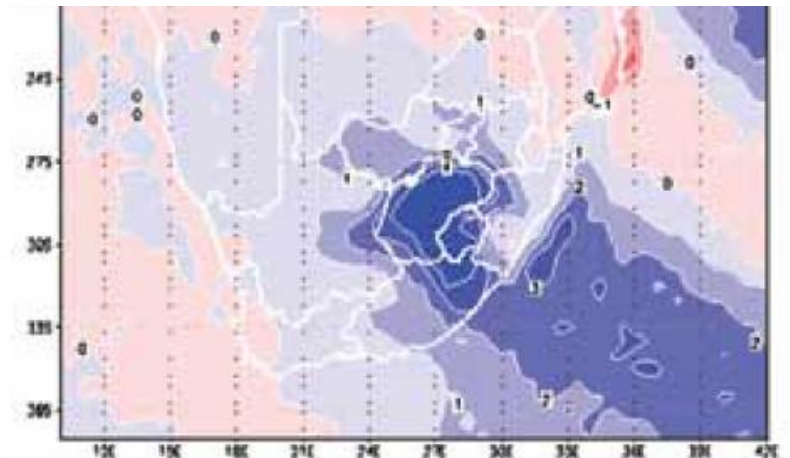
mm per annum



CSIR

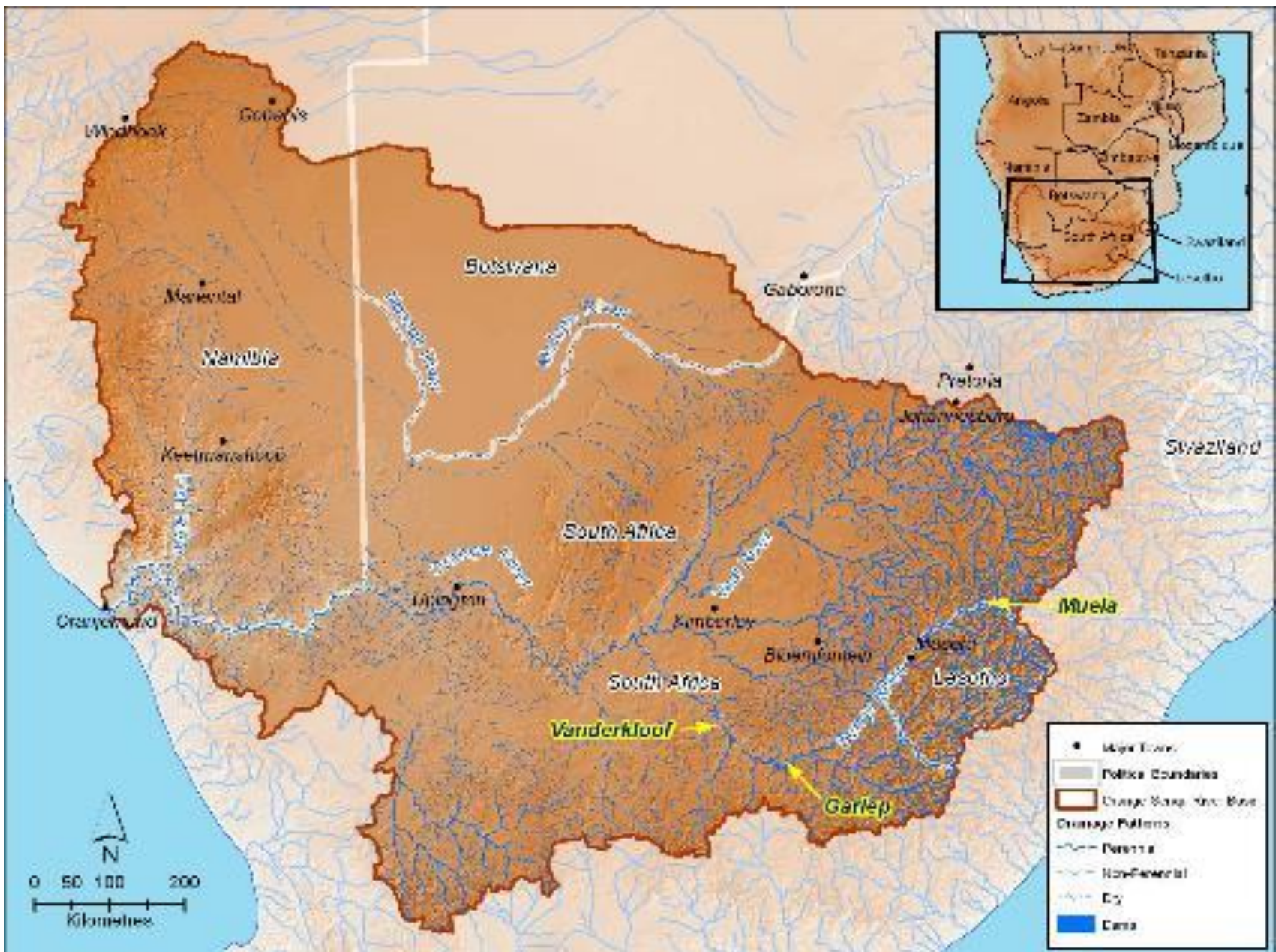


January



# Major Hydropower Installations in the Basin

- Gariep Dam:
  - Full capacity: 360 MW
- Vanderkloof Dam
  - Full capacity: 240 MW
- ‘Muela Hydroelectric Power Facility:
  - Full capacity: 72 MW
- Both Gariep and Vanderkloof supply electricity during peak demand and emergency periods (peaking stations), through the Eskom national grid of South Africa.
- The dams also produce baseload during floods to utilise opportunity of low cost energy production.
- ‘Muela facility supplies electricity to the Lesotho national grid.
- New planned projects which include HEP generation:
  - Lesotho Highlands Water Project Phase II.
  - Lesotho Botswana Water Transfer Project.



Major hydroelectric power generation facilities in the basin



# Lesotho Highlands Water Project Phase I Infrastructure





Gariep Dam, South Africa



Gariep Dam, South Africa

## Issues and Challenges

- Most power generated in the Orange Senqu River basin is utilised by RSA.
- Around 80% of RSA power is generated from coal fired power stations.
- Most of the coal fired power stations utilise water from the Orange Senqu River basin at high assurance of supply.
- On the other hand HEP, although renewable, also faces high competition from other water uses especially during periods of drought.
- Climate variation and change adds more complexity.
- Providing for environmental flows for the river mouth, and downstream livelihoods – are yet more critical water management problems to be adequately addressed.



Sample Coal Fired Power Station in South Africa

# *Export grapes Aussehenkehr Namibia*



The River Mouth along the border between Namibia and South Africa has been declared a Ramsar Site on both sides of the border.



9/5/2017

# **Opportunities and Closing Remarks**

- Cooperation and joint planning at basin level optimises utilisation of water resources, including HEP generation, where feasible, and RBOs provide suitable convening platform.
- Some key ingredients for effective joint basin planning include: establishment of common understanding, building trust and confidence, transparency, and shared long term outlook.
- Agreeing on notification process and its consistent application enables timely delivery of priority projects.
- Nurturing political commitment and acknowledging interdependence of States broadens basket of benefits derived from regional integration and by extension transboundary water cooperation.



- The interconnected regional grid through the SADC Power Pool provides opportunity for power sales which is unlocking HEP potential in our region.
- *At times real cooperation is driven by the spirit of Solidarity.*

**Thank you**

