

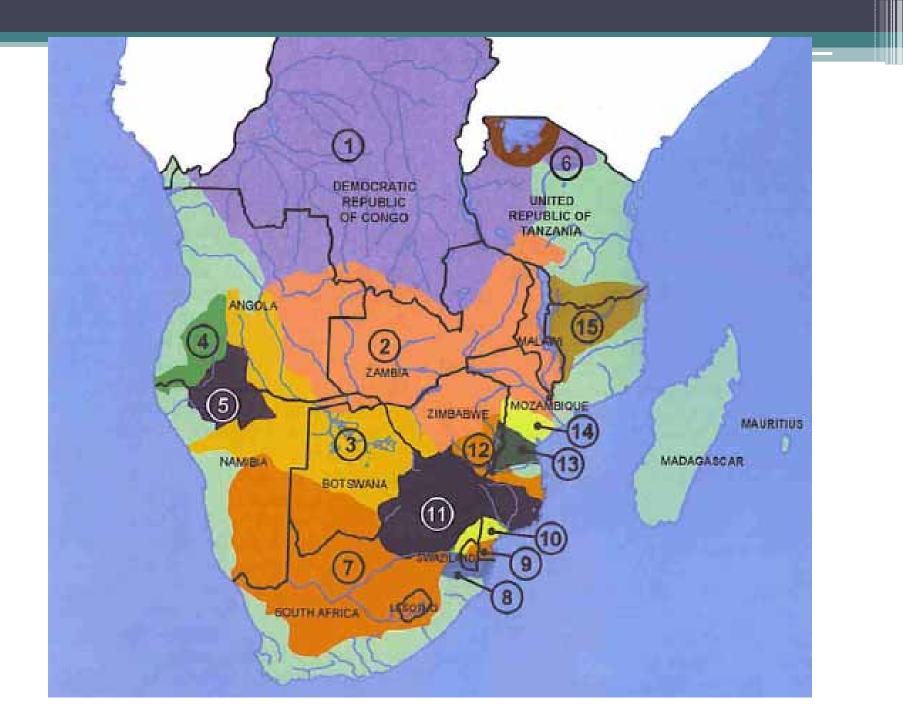


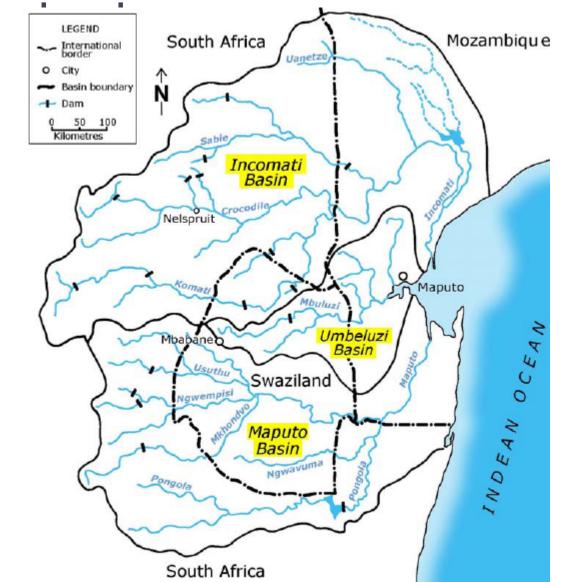


GWSP Workshop: Global Catchment Initiative

The Incomati River Basin

Graham Jewitt, Pieter van der Zaag, Eddie Riddel





- 47 000 Km2IncoMaputo Agreement
 - minimum flow of 109 million m3 per year to Mozambique at Komatipoort (55% from the Komati River and 45% from Crocodile River).

	Catchment	Catchment area		Virgin discha	urge	
		Mm^2	Mm	³ /a	Mm/a	
	Komati	11,209	1,42	20	127	
	Crocodile	10,468	1,22	26	117	
Existing Dan Dams Under	Sabie	7,048	75	50	106	
Man and a second second second	Massintonto	3,429	2	22	б	18
Possible Dar	Uanetze	3,932	1	l4	4	6
Internationa	Mazimechopes	3,970	2	21	5	15 5
Sub-catchm	Incomati	6,692	13	34	20	1317
Kruger Natic	Total	46,748	3,58	37	77	36~
Rivers Major Towns	And the second	- from	5		γ	Chuail (Dik
n.	Country	Catchment a	irea	Virgin di	ischarge	12
1-1		Mm^2	%	Mm³/a	%	1
he -	South Africa	28,556	61	2,937	82	0
2 m	Swaziland	2,545	5	479	13	AN
1 m	Mozambique	15,647	33	171	5	000
A. A	Total	46,748	100	3,587	100	al Ath
	Ferstation	SWAZILAND Manager Sama Minduary	- Ar	A	Martin Contraction	INDIAN OCEAN

Global Change - Questions 1 - 4

- Land Use Change
- Climate Change
- Associated Impacts

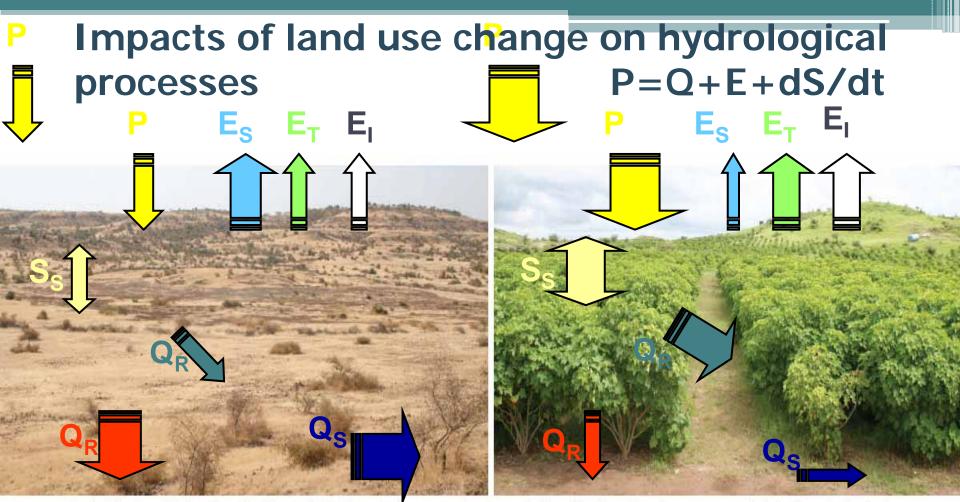
The context

 A massive land-grabbing scramble in Africa as foreign companies some with foreign aid money support - rapidly establish enormous monoculture fields in tropical countries.
Prof Seif Madoffe, SUA



'climate colonialism'

Sugar Cane – Kilombera Basin, Tanzania



Oasis in the desert: Jatropha cultivation can halt soil erosion, increase water storage in the soil and transform barren expanses into lush, productive land.

Short-term dynamics (e.g. interception, flood generation) *vs.* long-term dynamics (e.g. groundwater recharge, base flow)

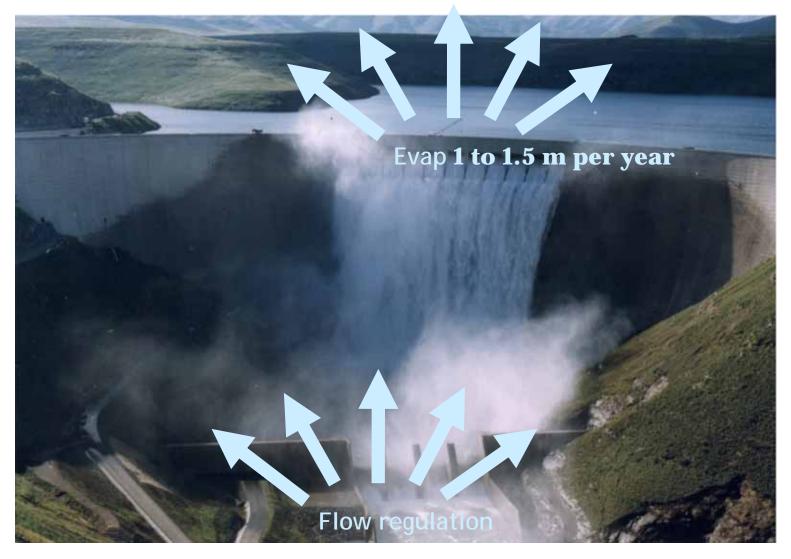
Picture from Fairless, 2007, Nature with annotation by Stefan Uhlenbrook

Shifting Agriculture

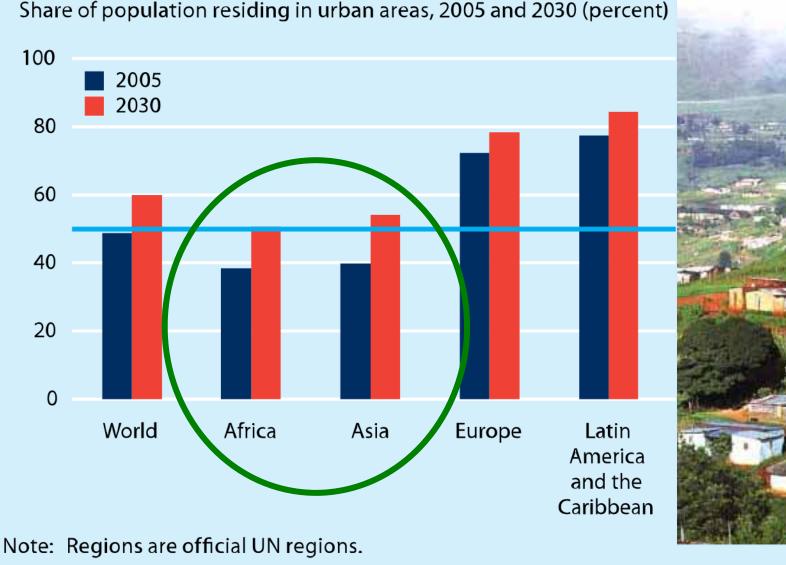


Most international schemes must have a local opportunities

Reservoirs



By 2030 about 60% of the world's population is expected to live in urban areas



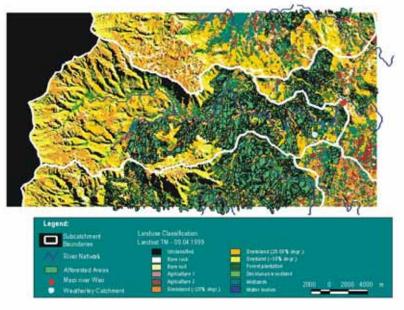
Source: United Nations 2006b.





Sedimentation

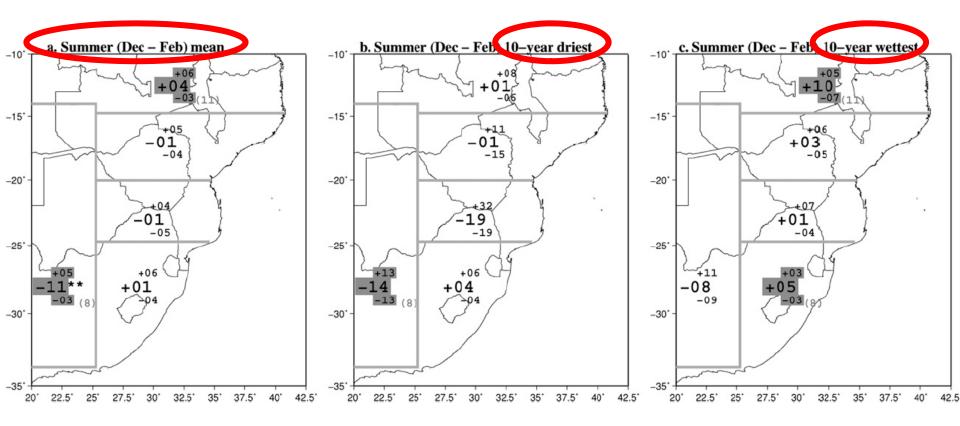
Dry Deposition



Commercial Forestry

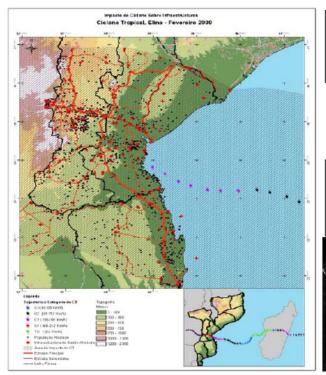
Mining

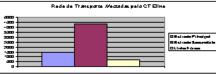
Change in Precipitation in Southern Africa

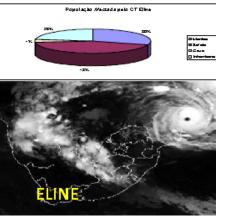


(Shongwe et al. 2009, *J. of Climate*)

Climate Change - Tropical Cyclones

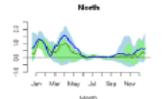






 Indian Ocean models suggest decreasing frequency of tropical cyclones but increasing cyclone intensity (Emanual 2008)

Climate Change - PPT and Temp



Central

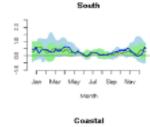
Jan Mar May Jul Sep Nov

LAAMEN

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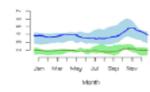
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Jan Mar May Jul Sep Nov

Marith



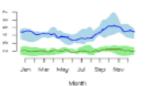
North

Central

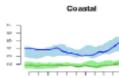
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Month

Jan Mar May Jul Sep Nov



South



Jan Mar May Jul Sep Nov Month

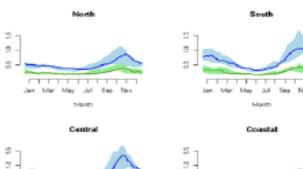
PET

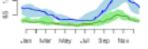
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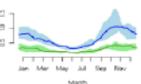
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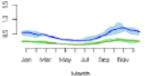
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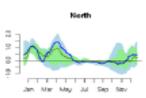




Manth







Month

Central

Jan Mar May Jul Sep Nov

Month

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PMI

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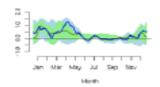
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South _____ Jan Mar May Jul Sep Nov

Month

Coastal



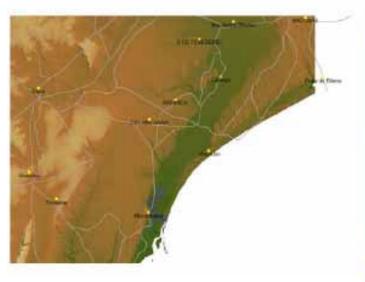
Climate Change

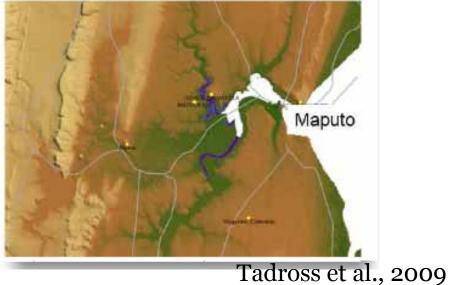


Southern Region Rivers: Salt Water Intrusion

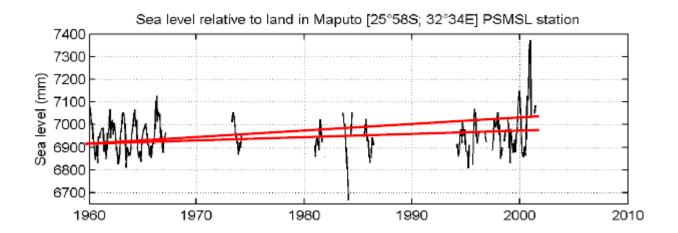
Deep penetration in Limpopo and Incomati basins

Rivers	Distance Inland	Area Impacted	
Limpopo	29 km	83 km ²	
Incomati	28 km	9 km ²	
Maputo	11 km	5 km ²	



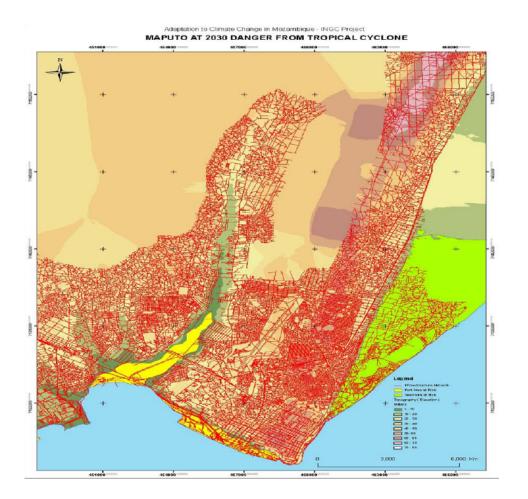


Global Change - Sea Level Rise



Tadross et al., 2009

Impact on Society

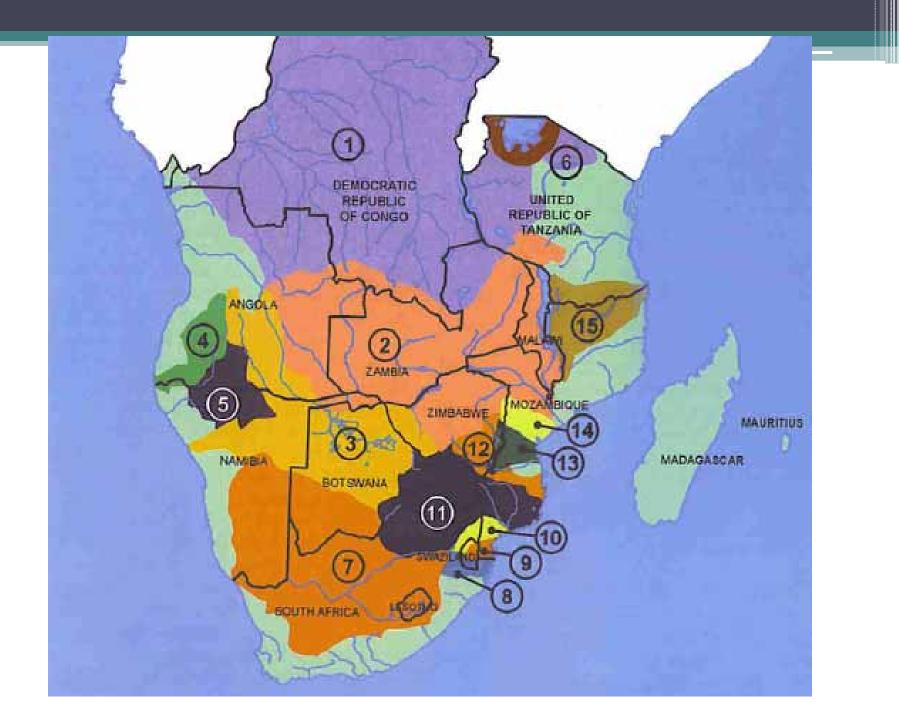


Maputo – Flood Risk 2030

Tadross et al., 2009

Virtual Water Trade

• Sugar Cane as a case study



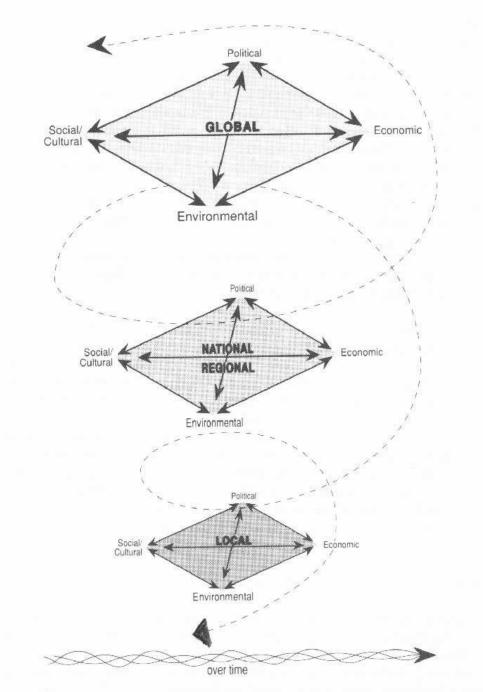
Conventions, agreements, power relations and governance (Os 6-9)

- Helsinki Rules of 1966
- UN Convention on the Law of the Non-Navigational Uses of International Watercourses
- (1997)
- SADC Protocol on Shared Watercourse Systems (in force since 1998)
- Revised as the SADC Protocol on Shared Watercourses in 2000
- World Bank
 - technical support to MZ 1989
 - declaration of "no objection" from Mozambique (Maguga).

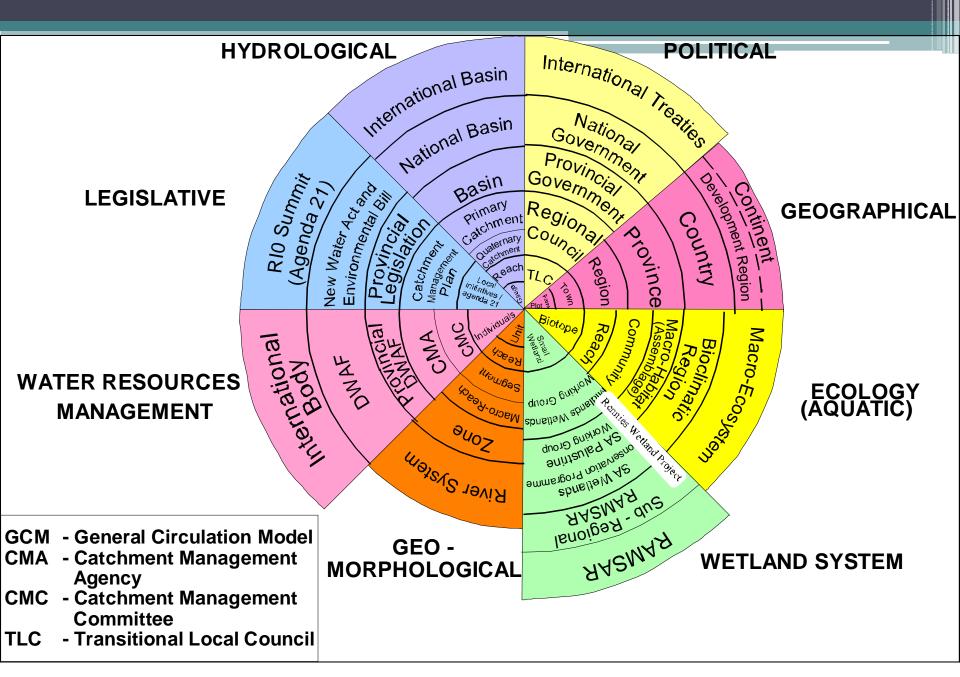
Key Messages

- Upstream-Downstream power relations
- Despite political tensions, ongoing dialogue on water issues (longest gap 10 years)
- "Water drives peoples and countries towards cooperation is supported by the developments in the Incomati basin"

• (Carmo Vas and VD Zaag, 2002)



Campbell et al., 1995



Jewitt, 1998

Conclusions

- Incomati subject to global drivers
 - Biophysical
 - Socio-Politico-economic
- Sustainable Water Management?
 - Consideration in the context of development
- Strong institutional and legislative framework at all levels of water resources management particularly on Transboundary Rivers is vital as it:
 - Promotes political and economic cooperation between riparian states,
 - Promote transparency and create trust, and peace between riparian states and their users,
 - Improve strategies for managing extreme events (droughts/floods, alien invasive plants, pollution),
 - Improves possibilities of attracting funding for water projects
 - Promote capacity building and skills transfer.

(Enoch Dlamini 2005)