



Environmental flows

-

does it make sense for Mozambique?

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Overview

1. Environmental flows - legal instruments
2. Incomati: the potential benefits of environmental flows
3. Zambezi: are environmental flows too expensive?
4. Conclusion

Environmental flows - legal instruments

Política de Água (2007)

ÁGUA E O AMBIENTE (Cap. 4):

‘O uso e fornecimento de água para a preservação e manutenção dos ecossistemas deverá ser parte integral da gestão global dos recursos hídricos.

... a gestão dos recursos hídricos inclui a garantia de caudais ecológicos nos rios e estuários onde armazenamentos ou outros factores alterem o regime de escoamento ...’

Environmental flows - legal instruments

The SADC Protocol on Shared Watercourses (2000)

Introduces the concept of “Environmental use” = water for the preservation and maintenance of ecosystems

Protection and preservation of the aquatic environment
(Art. 4, 2d):

‘State Parties shall ... take all measures ... to protect and preserve the aquatic environment, including estuaries, taking into account generally accepted international rules and standards.’

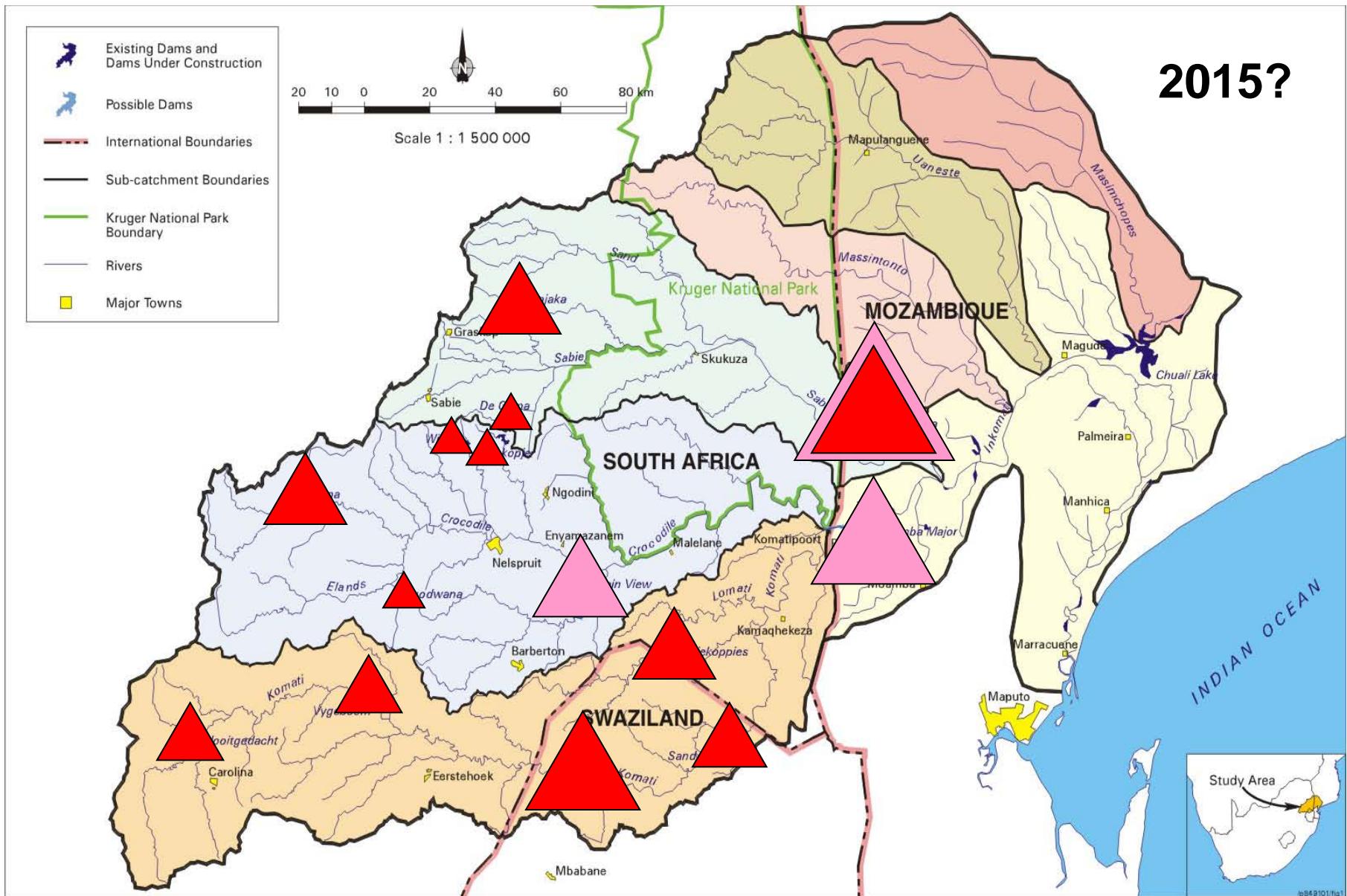
Incomati

Interim Inco-Maputo Agreement (2002)

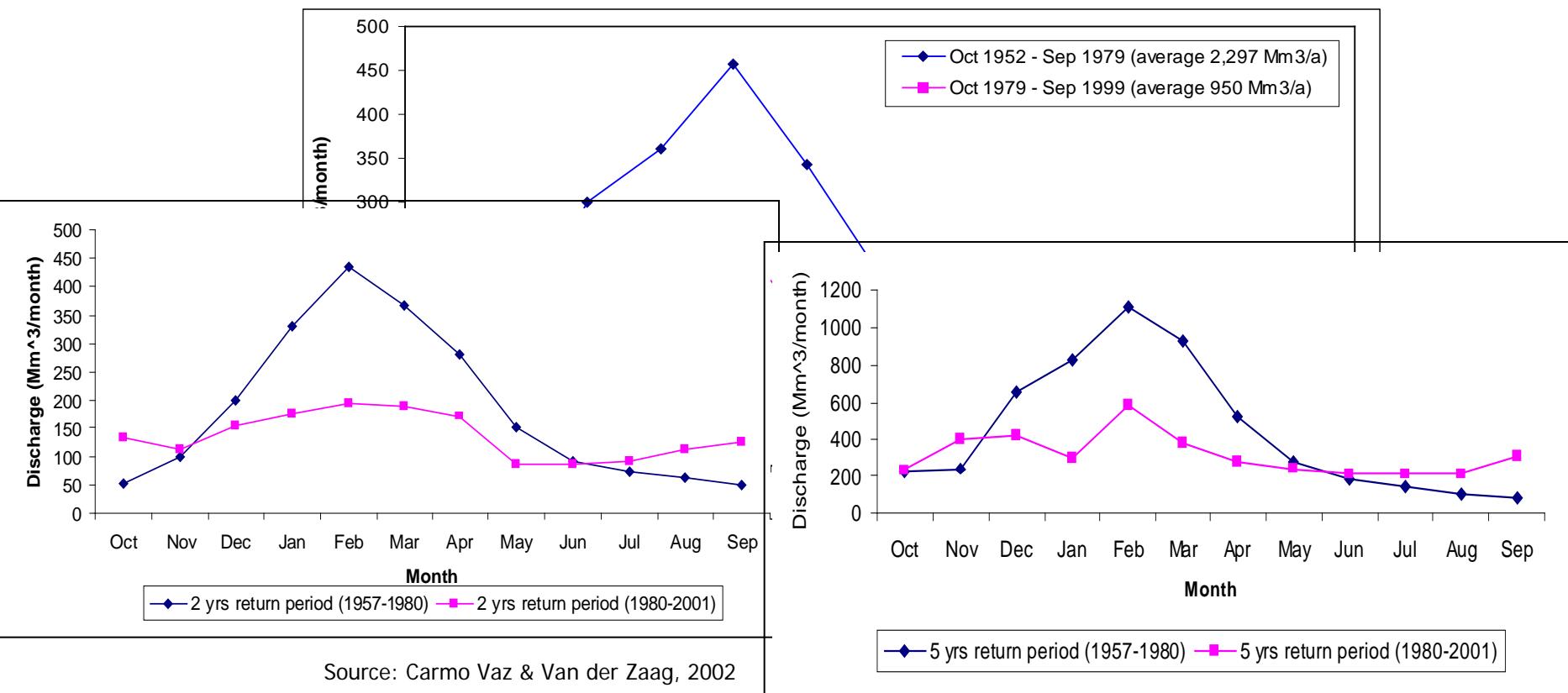
Article 6 **Protection of the Environment**

- (1) The Parties shall, individually and, where appropriate, jointly, protect and preserve the aquatic environment of the Incomati and Maputo watercourses, taking into account generally accepted international rules and standards.

- (2) The Parties shall, individually and, where appropriate, jointly, take all measures to protect and preserve the ecosystems of the Incomati and Maputo watercourses.



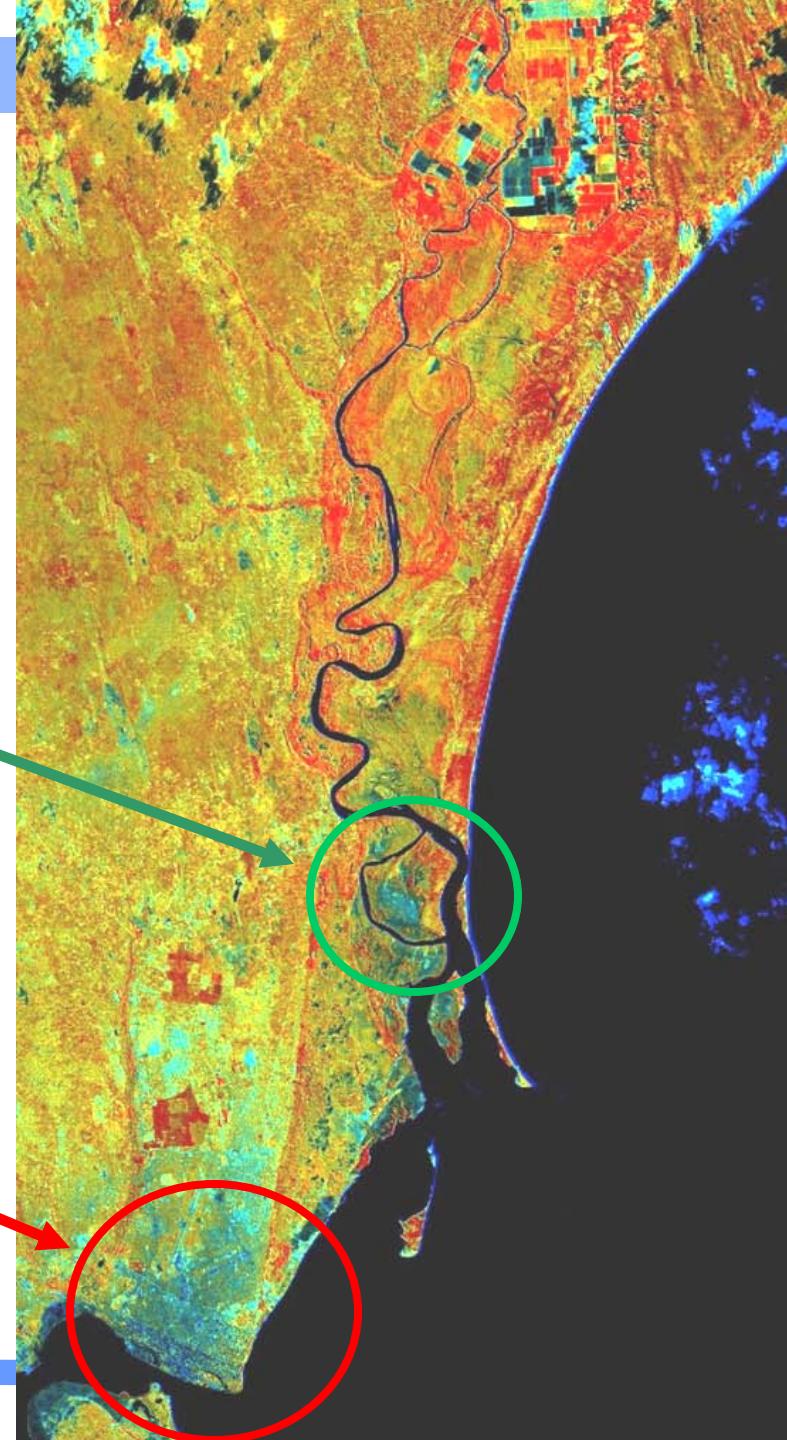
Incomati

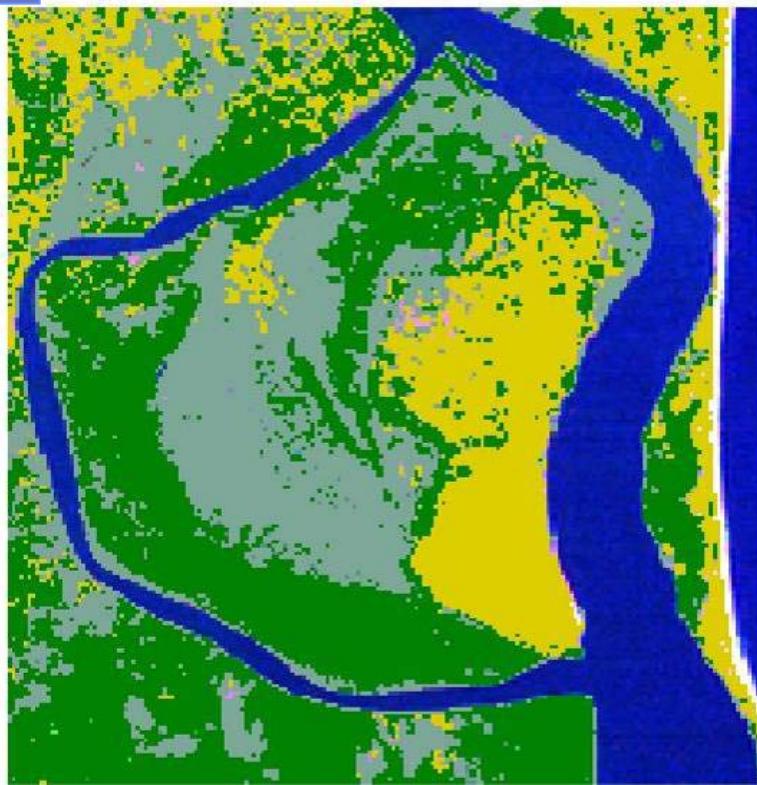


The flow regime has been fundamentally changed

Benguela
island

Maputo
city



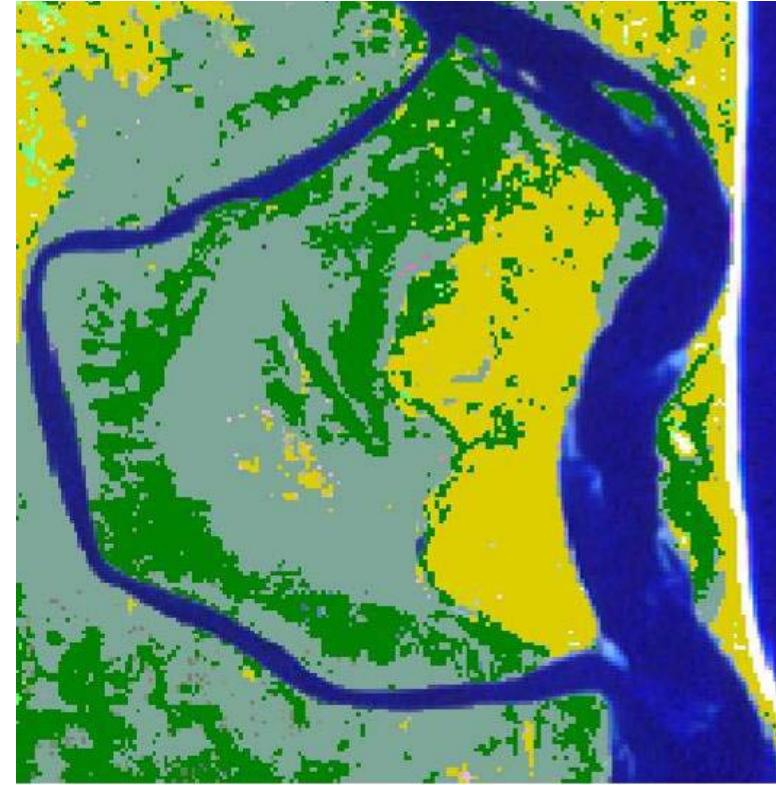


1984

 Mangroves non degraded

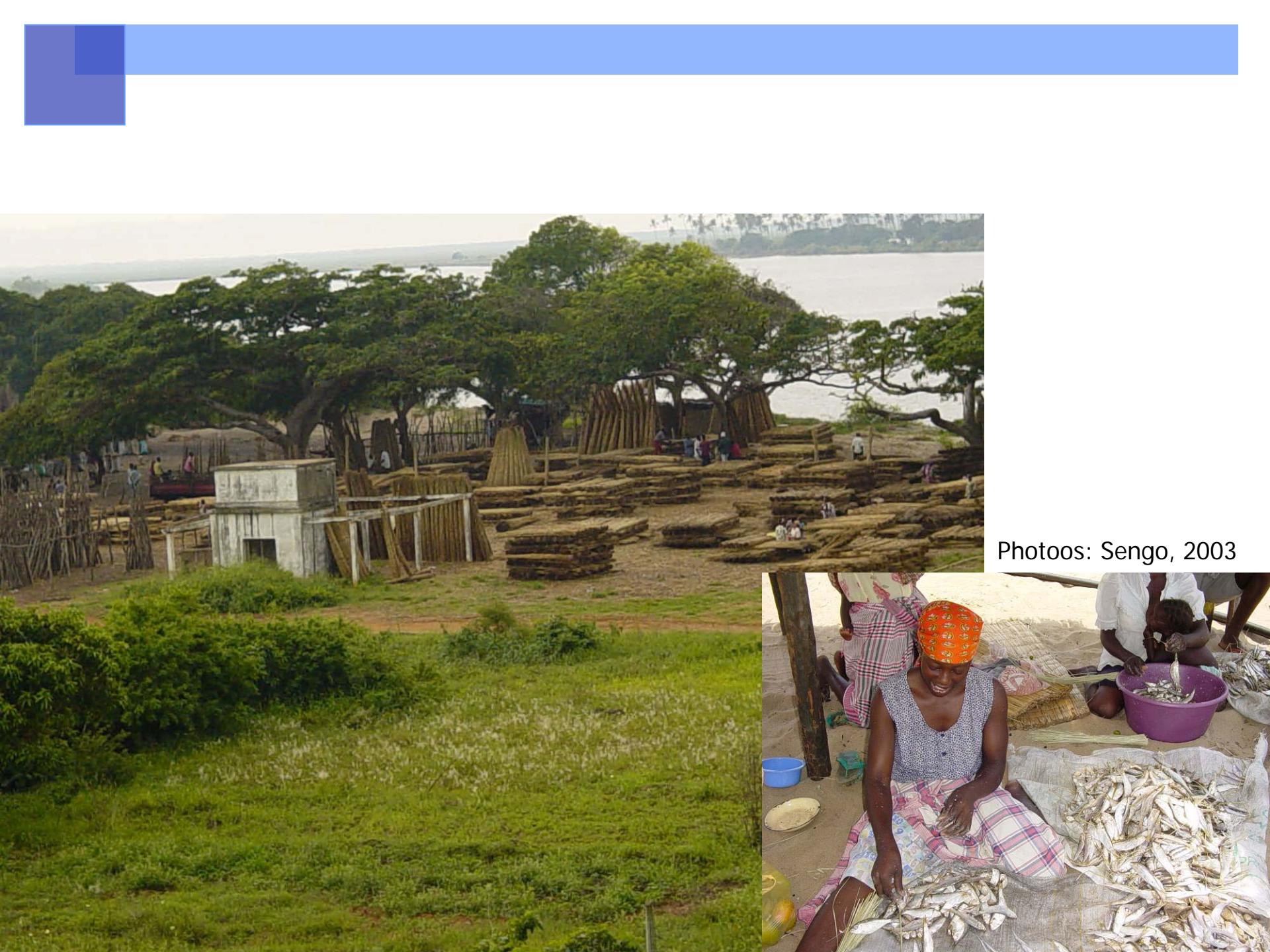
 Mangroves degraded

 Dune vegetation



2003

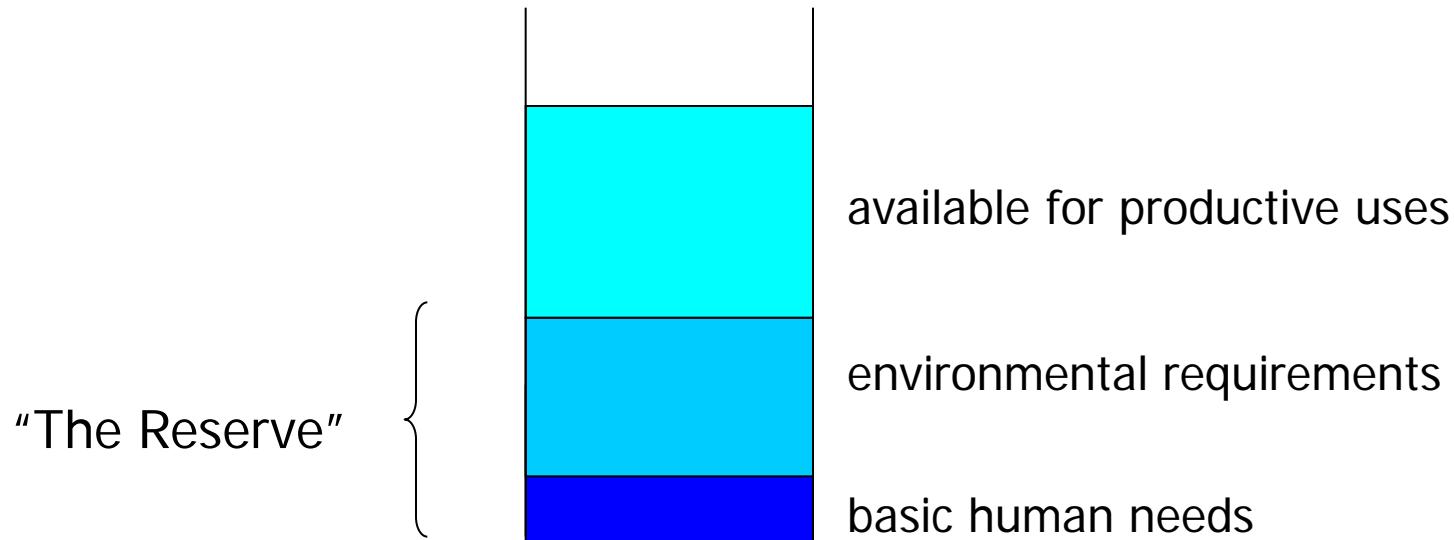
Source: LeMarie et al., 2006



Photoos: Sengo, 2003

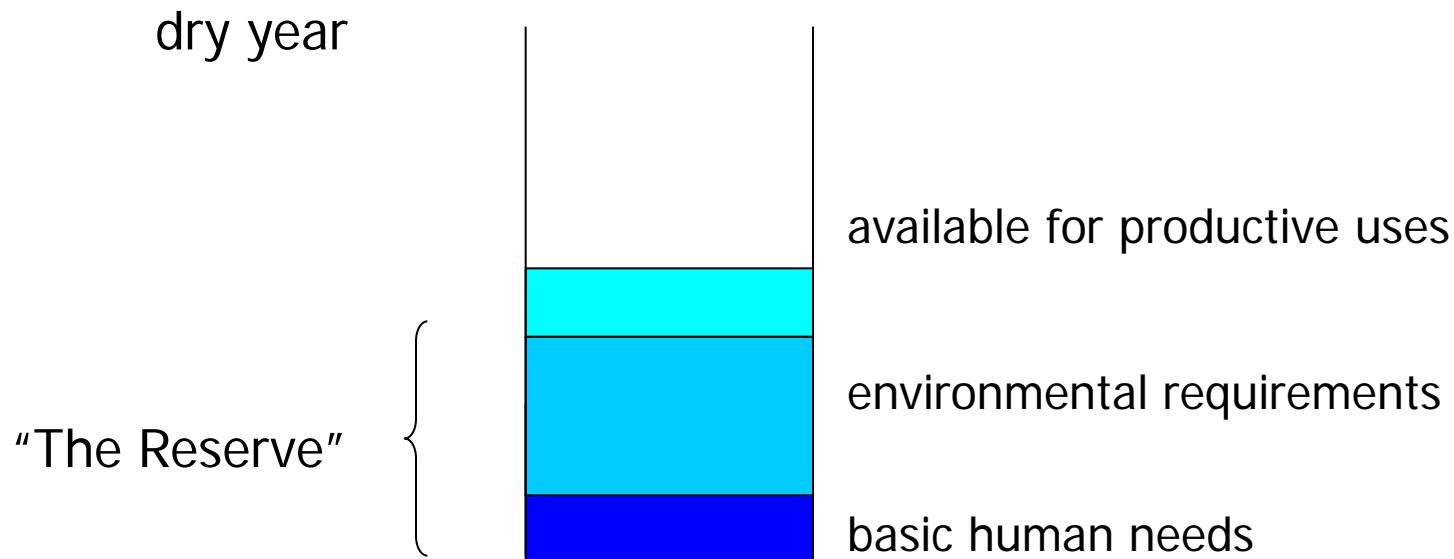
Incomati

South Africa



Incomati

South Africa



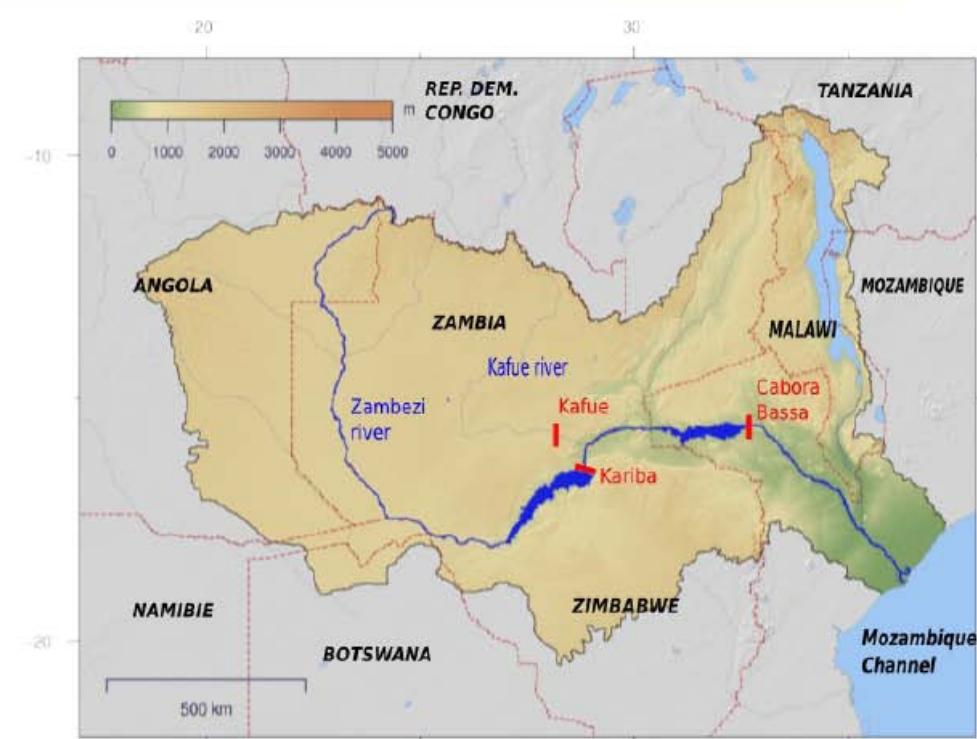
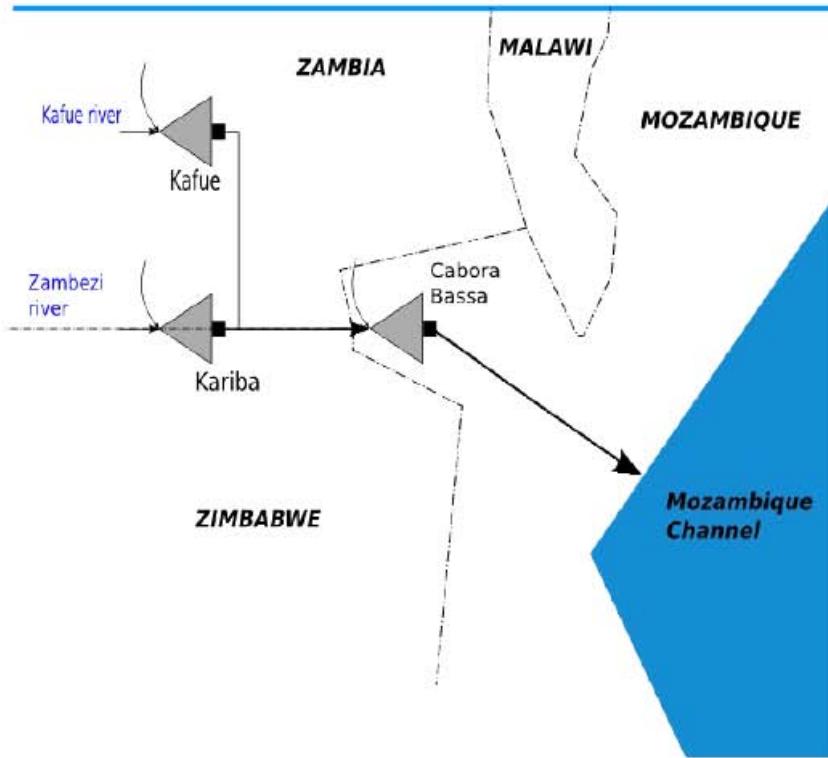
Incomati

Thus:

Environmental flows are good for the Incomati in
Mozambique

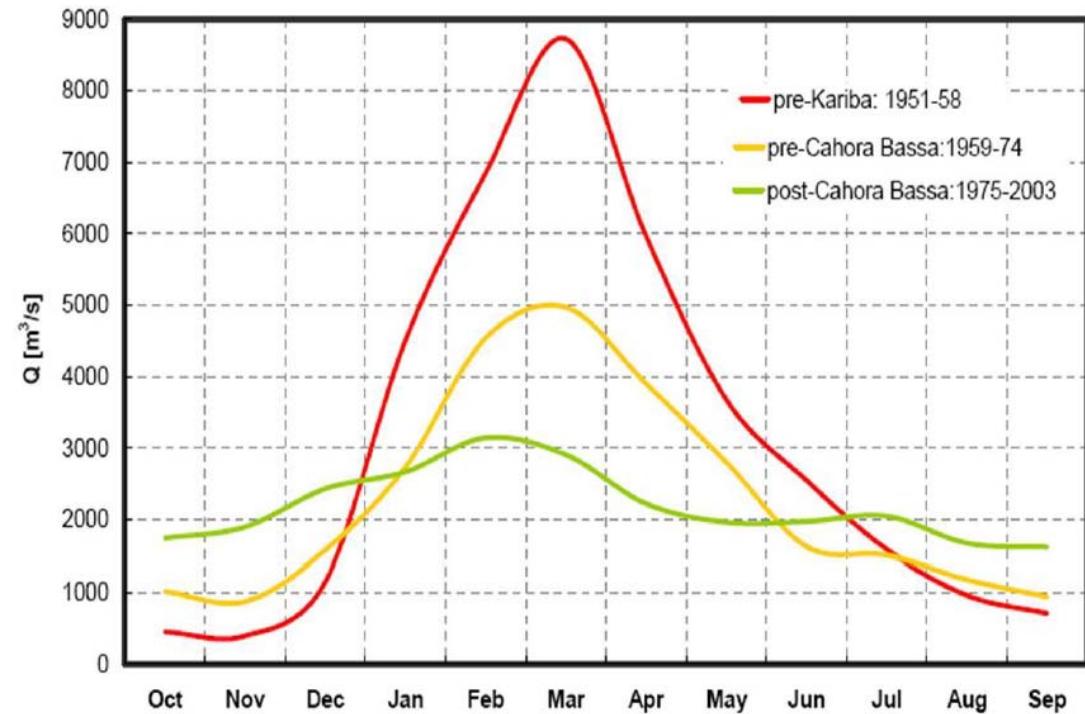
Zambezi

Zambezi Basin



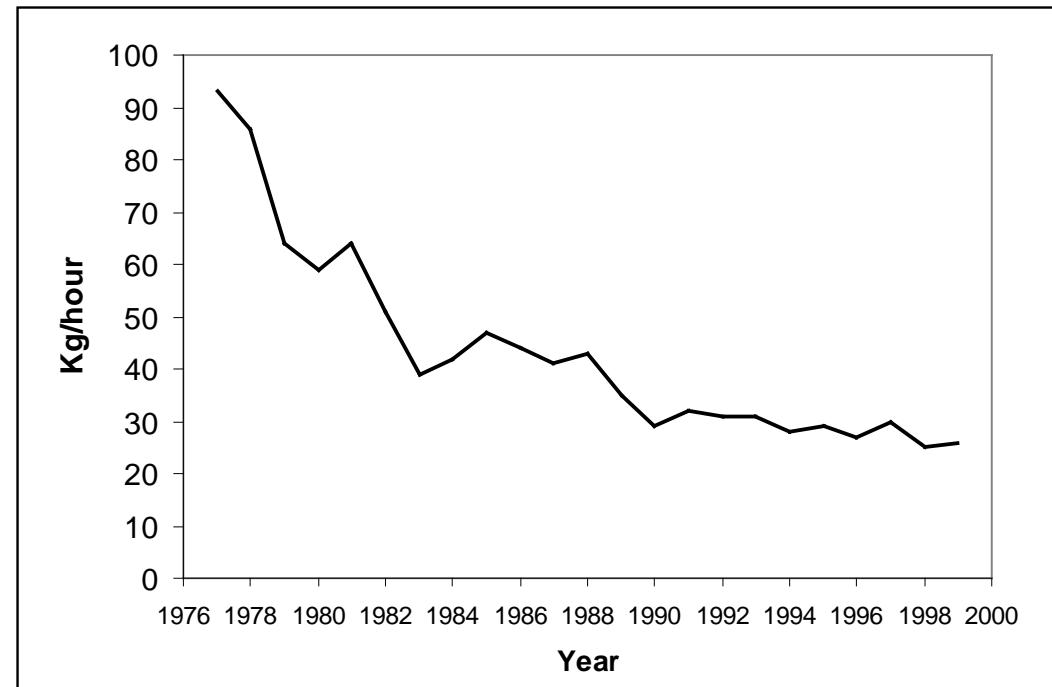
Zambezi

A significantly modified flow regime



Source: Riversdale, 2011

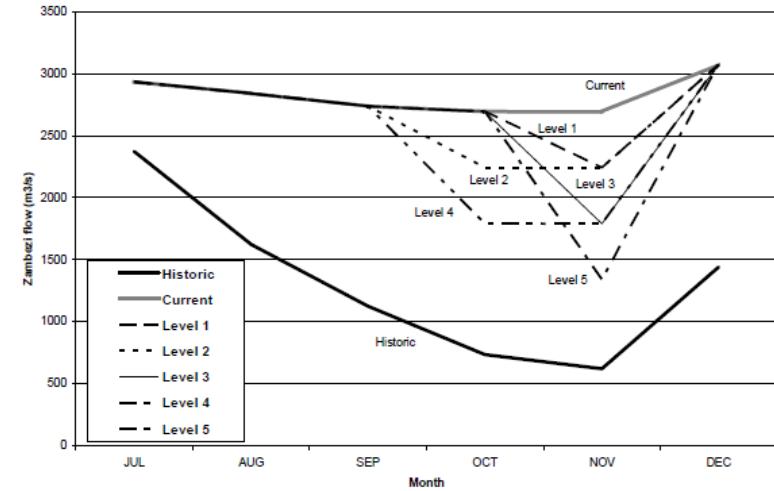
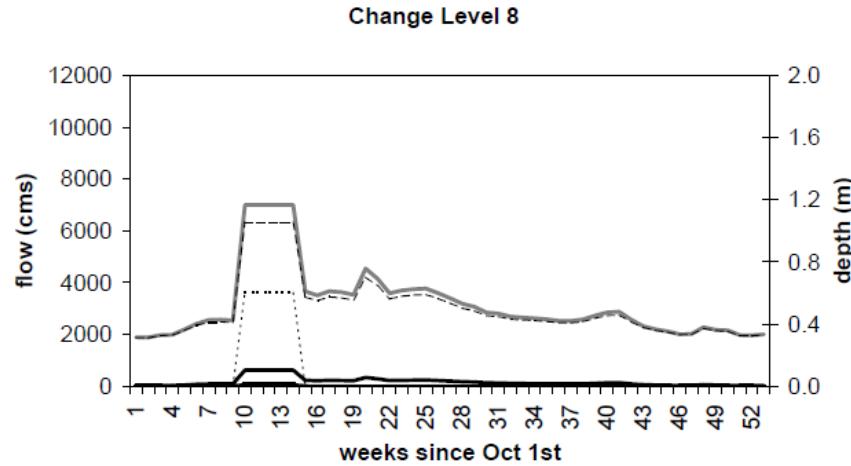
Zambezi



Evolution of the catch rates of the shrimp in Sofala Bank

Source: Hogue, n.d.

Zambezi



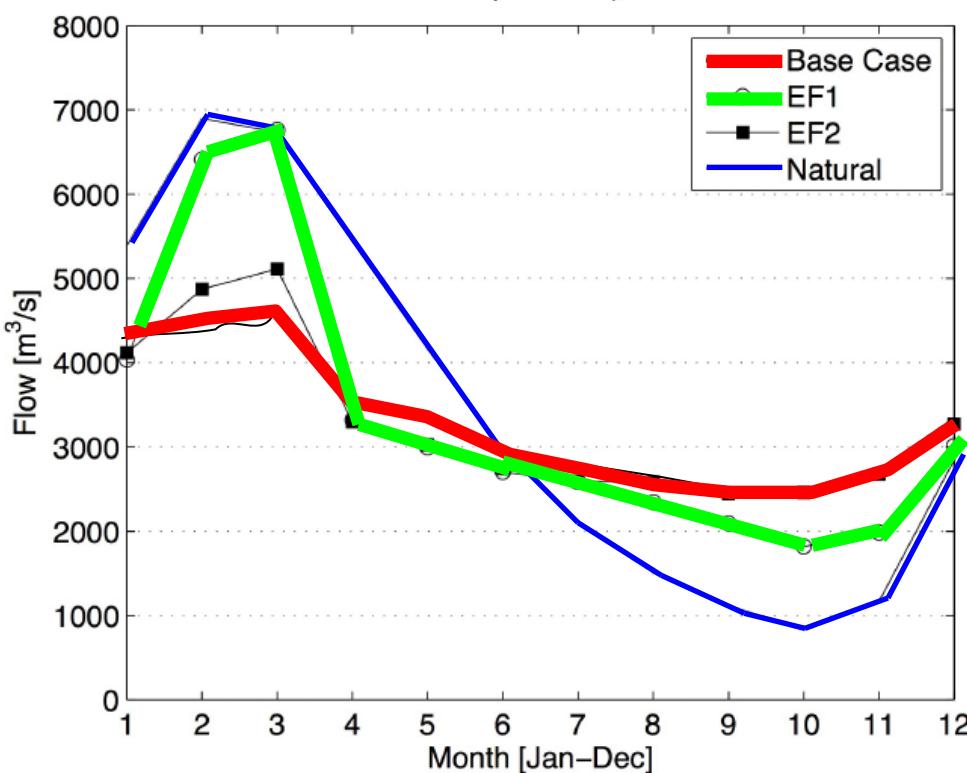
Re-establishing partly the flow regime

Source: Beifuss and Brown, 2006

- legally mandatory?
- possible?
- benefits?
- costs?

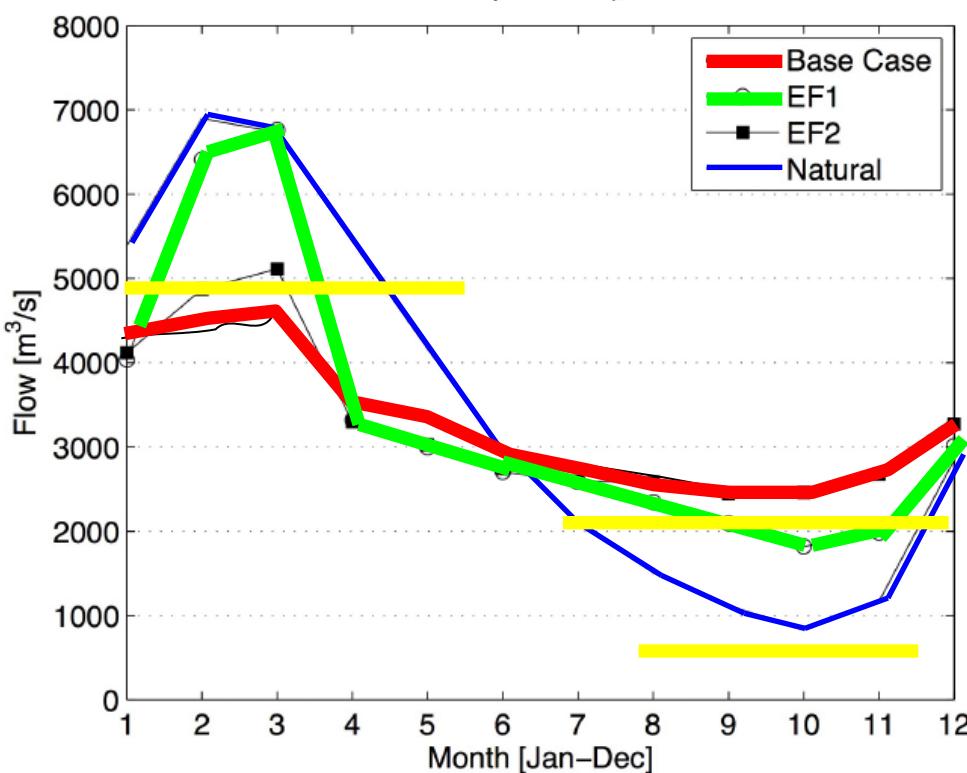
Zambezi

Zambezi Basin



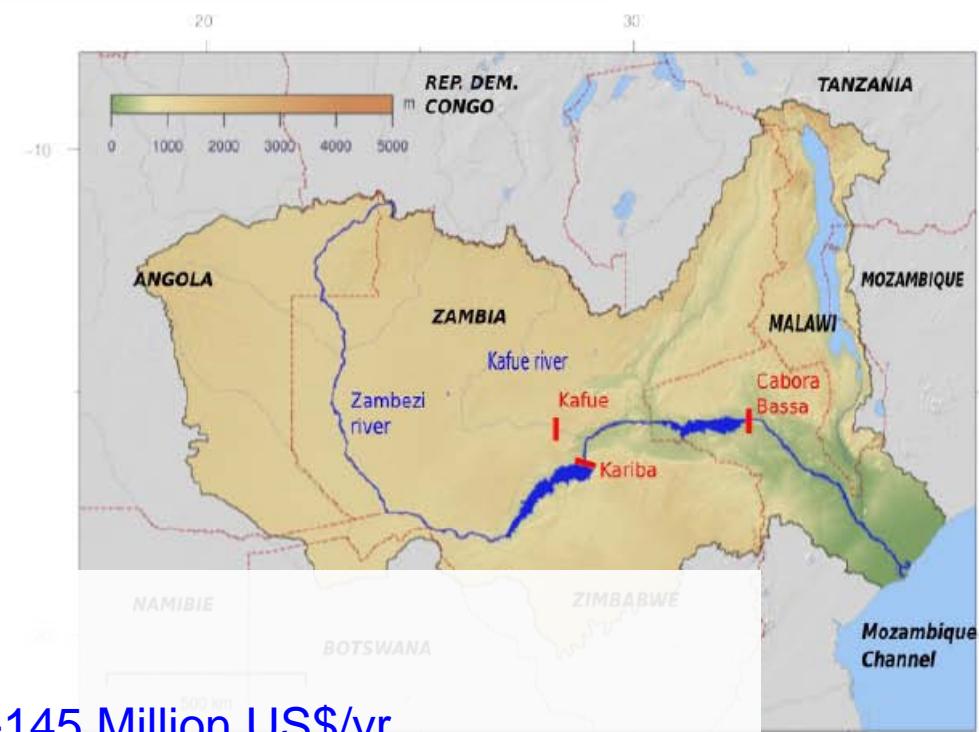
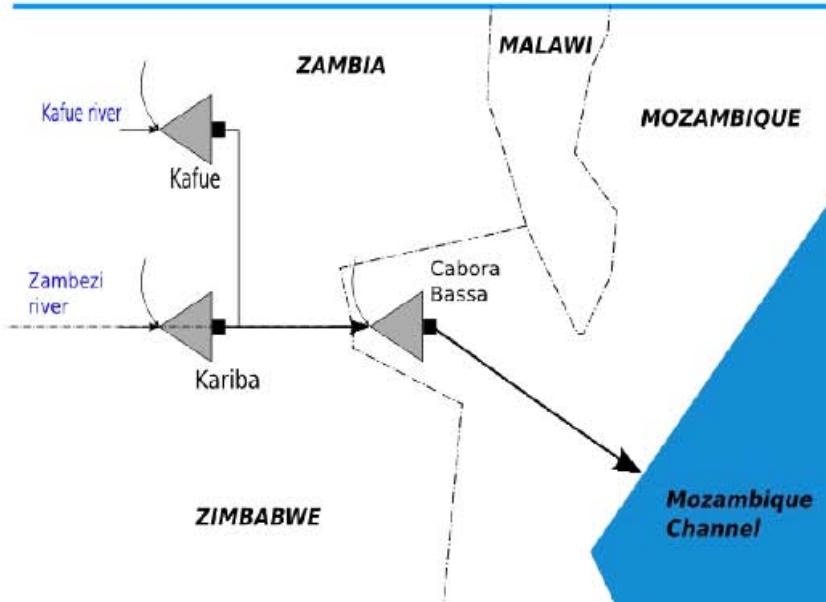
Zambezi

Zambezi Basin



Zambezi

Zambezi Basin



Electricity produced:

Full development: 30.8 TWh/yr

EF1 scenario: -1.8 TWh/yr \approx -145 Million US\$/yr

EF2 scenario: -0.4 TWh/yr \approx -32 Million US\$/yr

Source: Tilmant et al., 2010

Zambezi

Environmental flows

- ZamCom does not yet prescribe EFR
- technically possible
- will benefit fisheries, and environment
- economic benefits not known
(+20% fish production? Hogue, unpub.)
- transboundary synchronisation of the operation of Kariba and HCB will bring additional benefits
- costs: reduced electricity production
- costs: may impair navigation, especially during the (short) low flow season

Conclusion

1. Environmental flows are good for Mozambique in the Incomati
2. Environmental flows are good for fisheries and the environment in the Zambezi
3. Environmental flows reduce electricity production and may impair navigation during one month per year in the Zambezi
4. Environmental flows in the Zambezi requires changing the operating rules of HCB
5. Who will decide?



photo: Chris Key, 10 February 2009

Thank you!

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