

The Mkomazi Estuary

Human effects, freshwater and an oligotrophic coast in south-east Africa



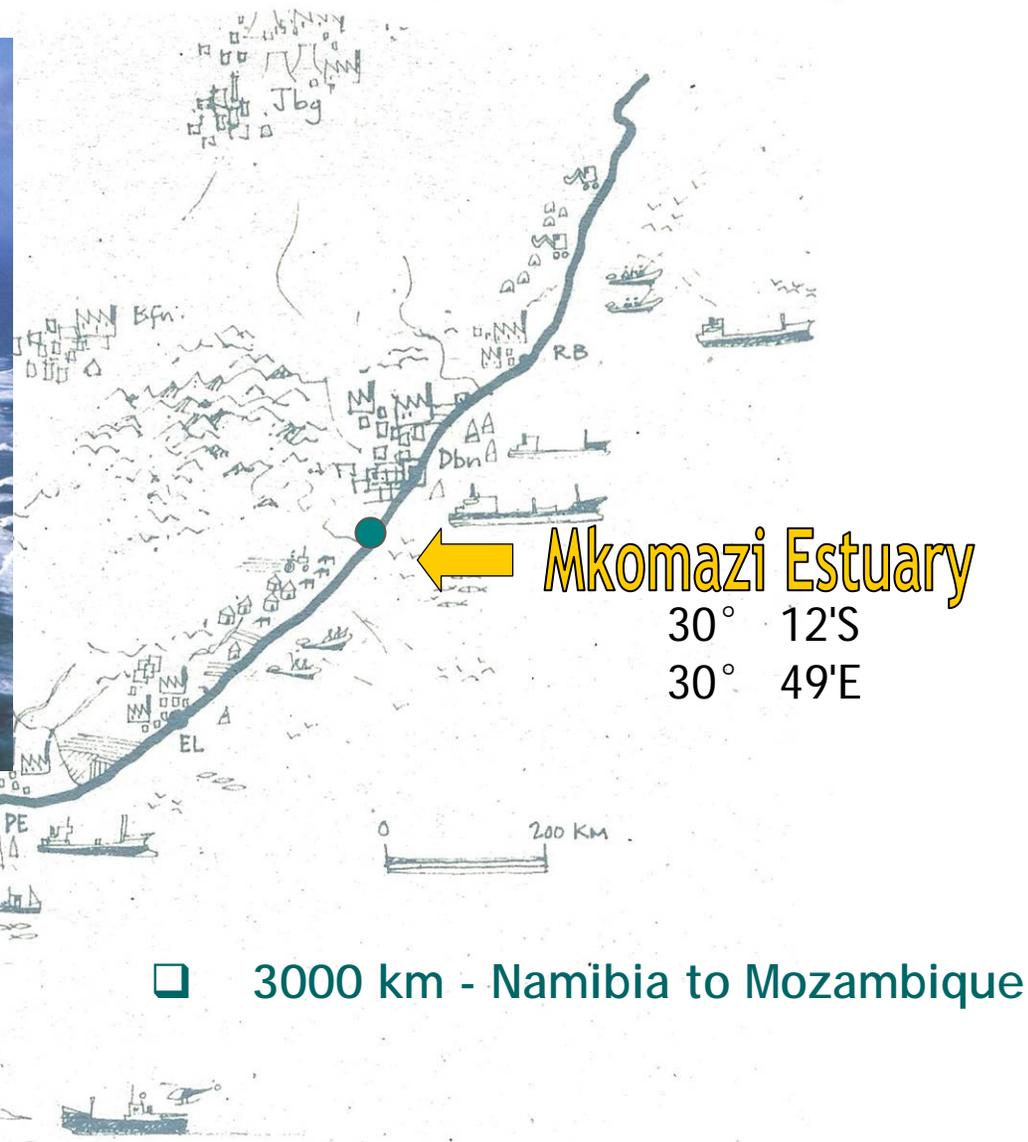
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The South African Coast

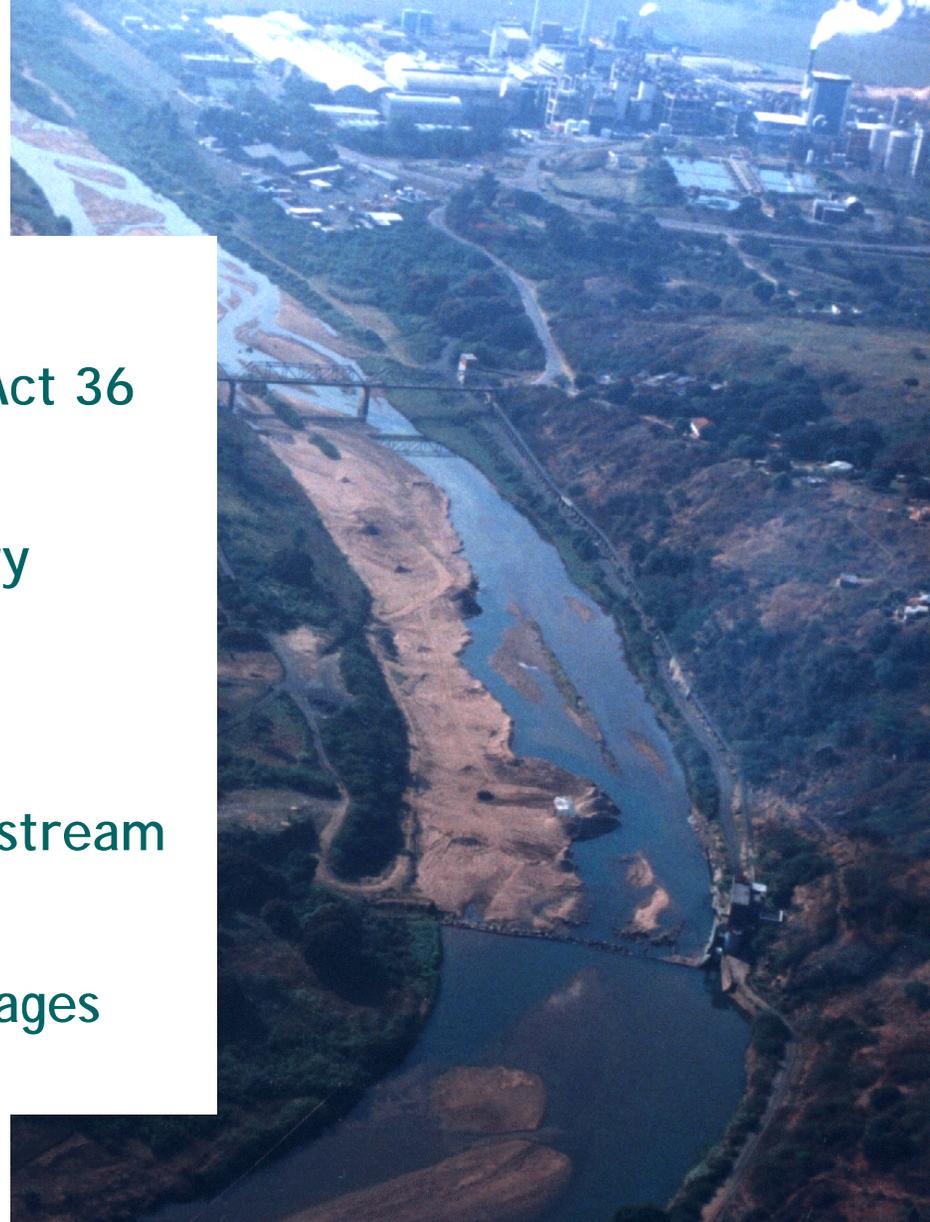


- 🦀 Catchment - 4300 km²
- 🦀 River length - 300 km
- 🦀 MAR - 1100 x10⁶ m³
- 🦀 Axial length of estuary 3 km
- 🦀 Variability in flow
 - 🦀 Average - 10-12 m³s⁻¹
 - 🦀 Peak flows - 6000-7000 m³s⁻¹
- 🦀 Mouth closure



Why monitoring was initiated

- 🦀 SAPPI SAICCOR
- 🦀 Water permit - National Water Act 36 of 1998
- 🦀 Annual monitoring of the estuary during low flows
- 🦀 Abstraction of $1.4 \text{ m}^3 \text{ s}^{-1}$
- 🦀 Discharge back to estuary downstream of plant
- 🦀 Temporary construction of barrages during some years



Mkomazi estuary

9 year estuarine dataset

- Water quality - selected parameters (dissolved oxygen, salinity, nutrient status); bacteriological)
- Sediments
- Phytoplankton
- Zooplankton

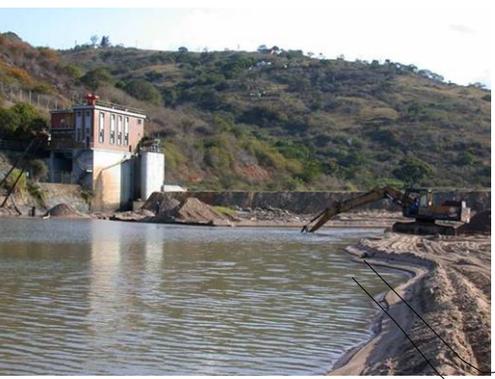
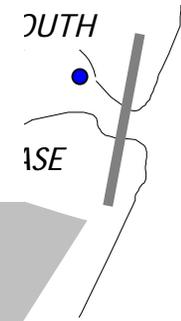
ic invertebrates

associated birds

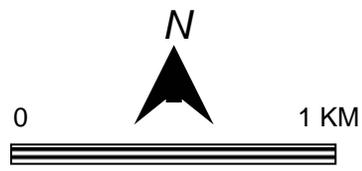
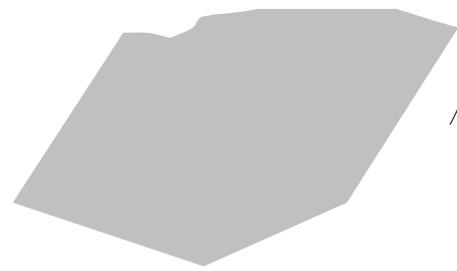


17 year coastal dataset

- Fish egg production
- River flow



WEI



Status of the estuary

Water quality

- Fair water quality
- Slightly elevated nutrients
- Point source sewage contamination from Mpisini stream

Sediments

- Coarse, mobile limited mud patches

Biota

- Plankton freshwater dominated
- Poorly developed benthic invertebrate community
- Fish community dominated by mugilid species - high proportion of estuarine dependent species



Estuarine Function

⚡ Largely defined by physical processes

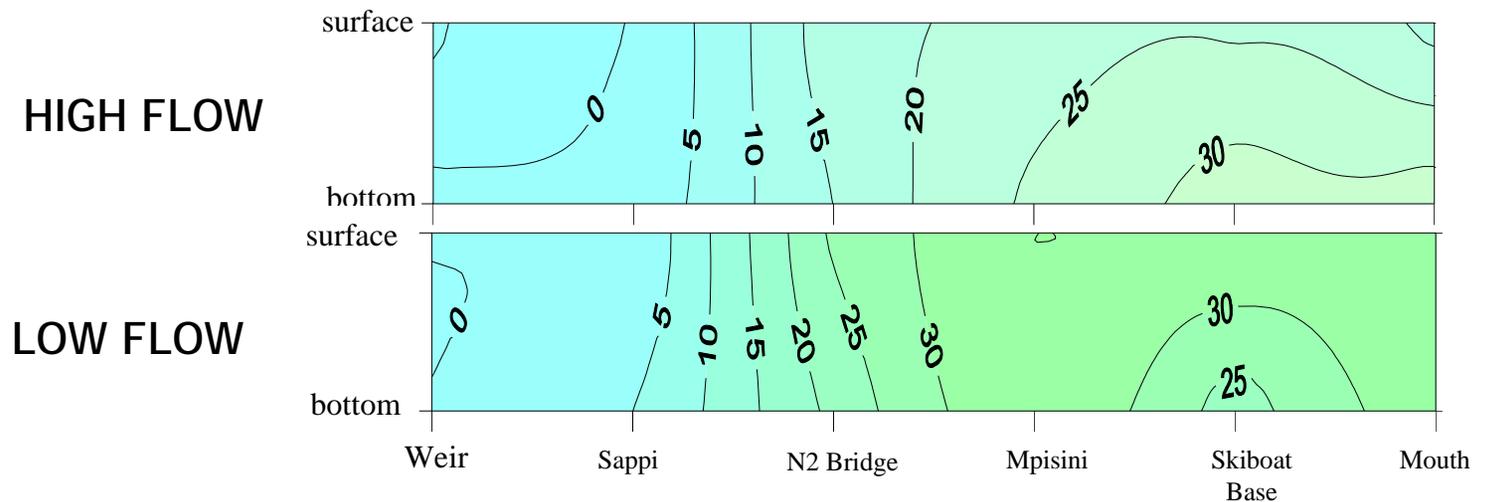
⚡ Freshwater input

➤ *variation*

⚡ Sediment dynamics

➤ *Riverine inputs*

➤ *Marine inputs*









NOTICE
ALL PERSONS USING THE FERRY
TO GO BY THEIR OWN BOAT
THIS FERRY IS REGULARLY
EQUIPPED WITH RUBBER MATS





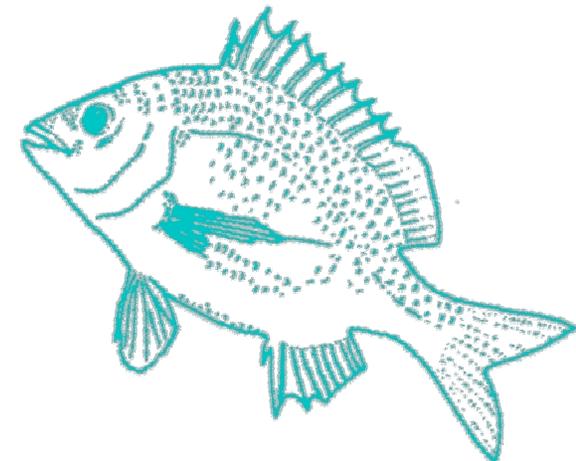
Significance in a coastal context

- ⚡ UNREGULATED LARGE RIVER
 - ⚡ Nutrients - oligotrophic coastal waters
 - ⚡ Sediments - supply beaches north of mouth
 - ⚡ 600 000 tons / annum



Coastal monitoring

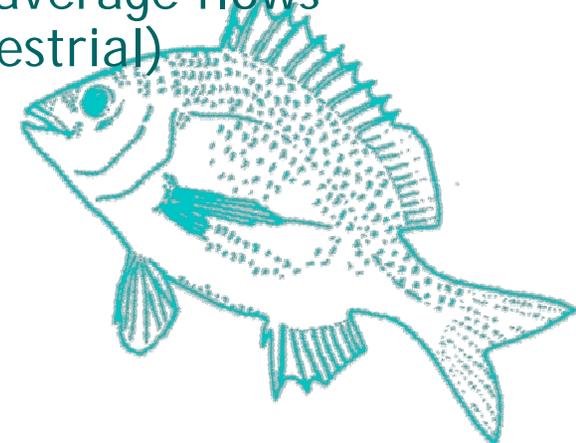
- ❑ 17 years of coastal fish egg production
- ❑ Strong correlations with Mkomazi river flow
- ❑ Particularly obvious after flood events - 1987
 - 250 eggs/sample - 1500/sample
- ❑ Linked to blooms of calanoid copepods in winter *Calanus agulhensis*
- ❑ *Target food of three major spawners*
 - Sardine *Sardinops sagax*
 - Redeye *Eutrememus teres*
 - Mackerel *Scomber japonicus*
- ❑ large variations



Coastal monitoring

- ❑ Verification of preliminary results by light isotope analysis during a low flow year (also low spawning)
 - Copepods collected in estuary and offshore
 - Offshore eggs
 - Gonad tissue of three major spawners

- ❑ Waiting for exceptional rainfall and above average flows to compare ratios (oceanic vs riverine/terrestrial)



Threats and Pressures

- ❑ water abstraction - proposal for off channel dam
- ❑ poor catchment management
- ❑ floodplain development
- ❑ urban encroachment
- ❑ Sewage contamination
- ❑ Sandwinning in the upper reaches of the estuary

