

# The Mkomazi Estuary

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



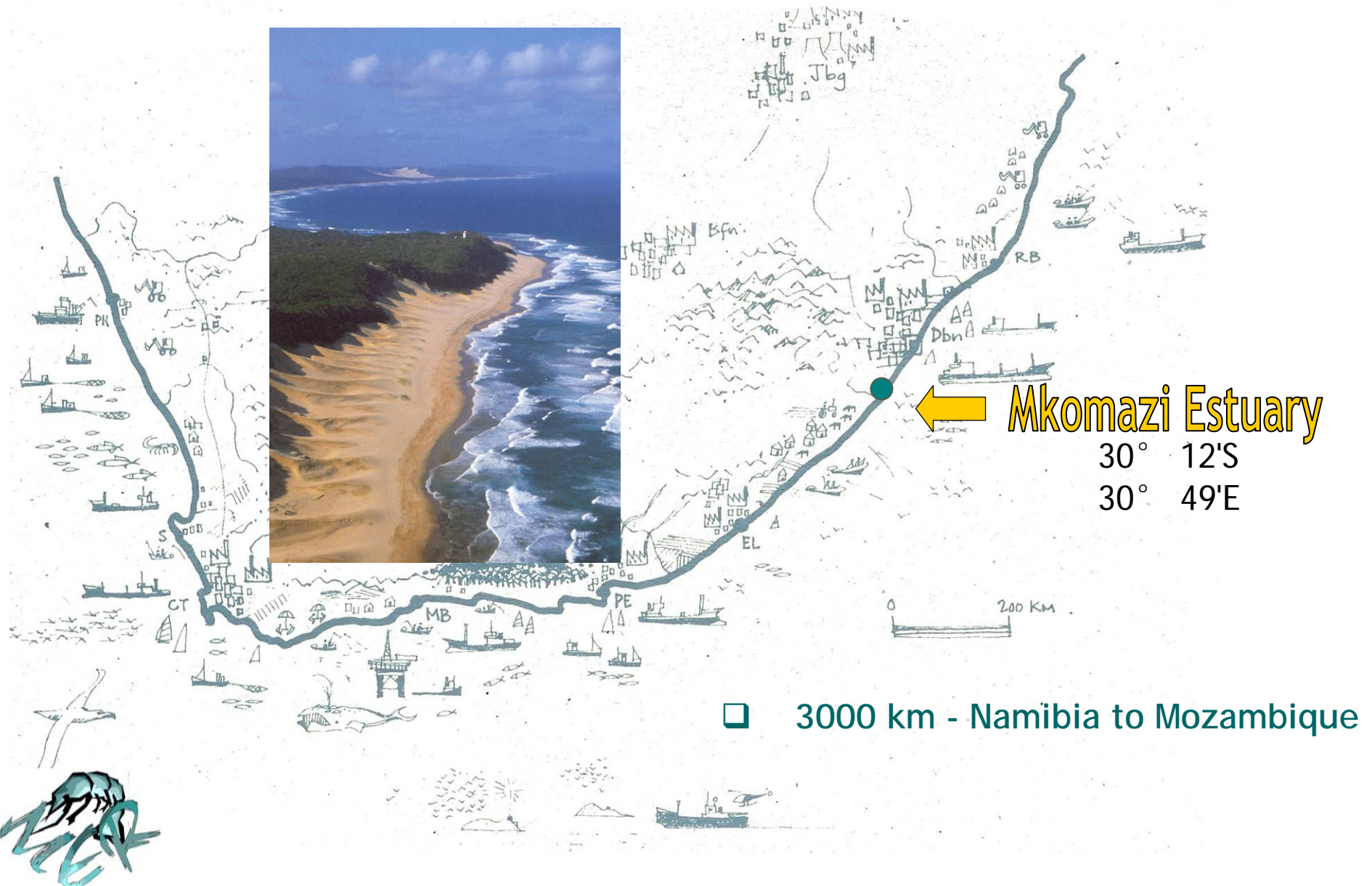
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# The South African Coast





- 🦀 Catchment - 4300 km<sup>2</sup>
- 🦀 River length - 300 km
- 🦀 MAR - 1100 x10<sup>6</sup> m<sup>3</sup>
- 🦀 Axial length of estuary 3 km
- 🦀 Variability in flow
  - 🦀 Average - 10-12 m<sup>3</sup>s<sup>-1</sup>
  - 🦀 Peak flows - 6000-7000 m<sup>3</sup>s<sup>-1</sup>
- 🦀 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

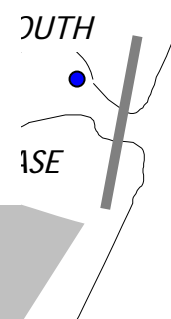
ic invertebrates

associated birds



## 17 year coastal dataset

- Fish egg production
- River flow



INDIAN OCEAN



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

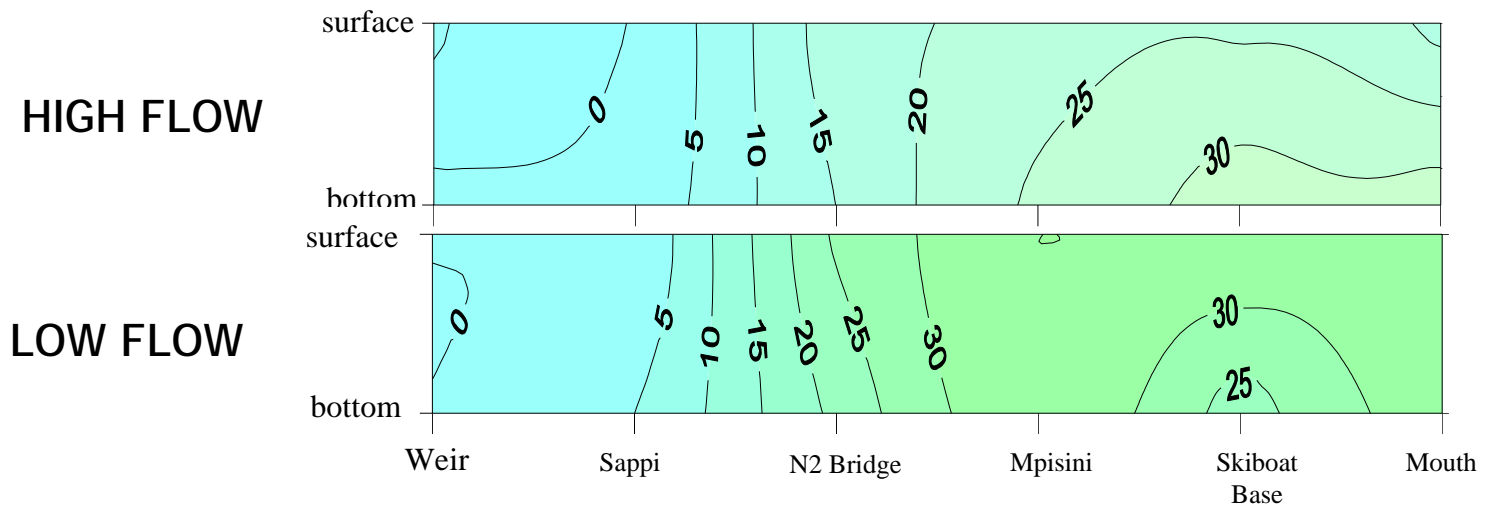
⚡ Freshwater input

➤ *variation*

⚡ Sediment dynamics

➤ *Riverine inputs*

➤ *Marine inputs*















**NOTICE**  
ALL PERSONS USING THE FERRY  
MUST GET THEIR OWN BOAT  
THIS FERRY IS REGULARLY  
BUSINESS WITH OTHER BOATS







# Significance in a coastal context

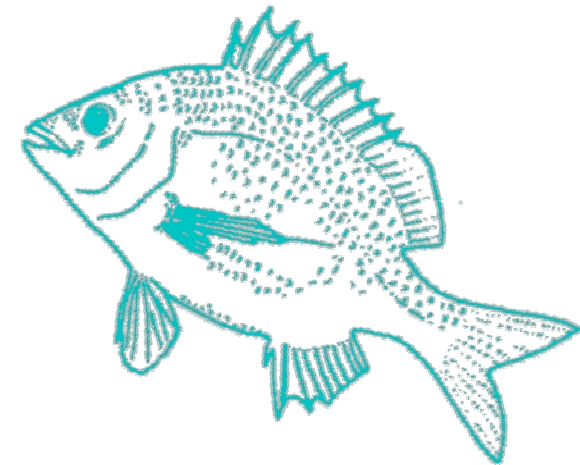
- ≈ UNREGULATED LARGE RIVER
  - ≈ Nutrients - oligotrophic coastal waters
  - ≈ Sediments - supply beaches north of mouth
    - ≈ 600 000 tons / annum





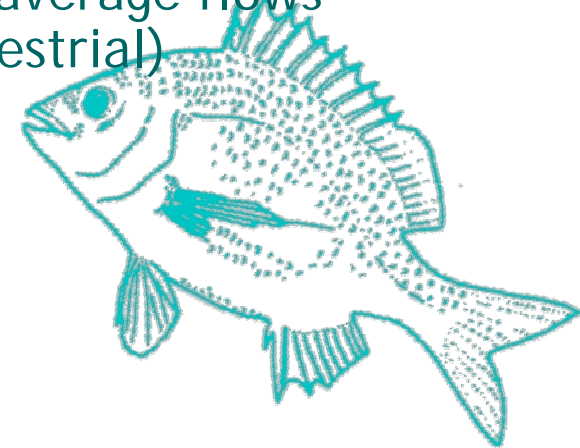
# Coastal monitoring

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



# Coastal monitoring

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

