



Bruning lecture – UU – 22/01/2026

# **Not learning from floods in Mozambique (with the Dutch)**

Fredrik Huthoff

# About me

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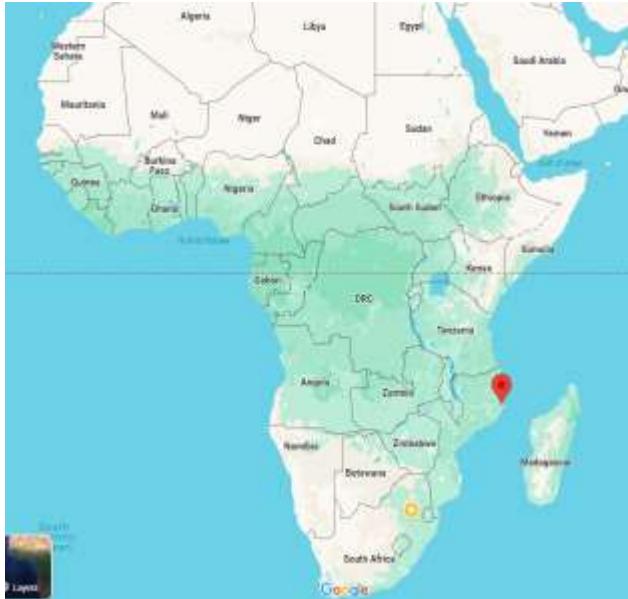


**Dutch Disaster Risk Reduction  
and Surge Support  
(DRRS) Programme:**

Preventing and Reducing the Impact of  
Water and Climate-Related Disasters



# Netherlands and Mozambique



It's 1975. Mozambique has just gained independence. The country faces a collapsed economy and a shortage of skilled professionals. To fill the gap, the government invites foreign experts – known locally as cooperantes – including Dutch engineers specialised in water and irrigation. These Dutch cooperantes help to establish systems that would shape Mozambique's water management for decades.

Over time, this technical assistance evolved into something much greater: a true partnership.

# Netherlands and Mozambique



# FLOODS!

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# Floods in Mozambique – again and again



## Malawi and Mozambique – Dozens Dead After Storm Freddy Triggers Floods and Mudslides

14 MARCH, 2023

At least 99 people have died after Tropical Cyclone Freddy caused floods, mudslides and wind damage in parts of Malawi. Earlier the storm had made a second landfall in Mozambique,...

[Read Full Article](#)



## Mozambique – Thousands Displaced as Cyclone Freddy Brings Flooding Rain

28 FEBRUARY, 2023

At least 7 people have died and thousands have been displaced after Tropical Cyclone Freddy made its way across Mozambique. Prior to reaching Mozambique, the storm caused widespread wind damage...

[Read Full Article](#)



## Mozambique – 6 Dead as Floods Worsen in Maputo Province

13 FEBRUARY, 2023

The flood situation has worsened in the city of Maputo, the capital of Mozambique, and the surrounding province of Maputo, according to an updated report from the National Institute for...

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## Mozambique – Floods Affect Thousands In Maputo Province

10 FEBRUARY, 2023

Storms and heavy rain affected the city of Maputo, the capital of Mozambique, and surrounding areas of Maputo Province on 08 February 2023. Local media reported that heavy rain caused...

[Read Full Article](#)



## Mozambique – Death Toll From Cyclone Gombe Rises to More Than 50

21 MARCH, 2022

Over 50 people have now lost their lives in Mozambique as a result of severe conditions brought by Tropical Cyclone Gombe. Satellite imagery shows over 500 km<sup>2</sup> of land in...

[Read Full Article](#)



## Mozambique – 12 Killed as Cyclone Gombe Brings Strong Winds and Torrential Rain

13 MARCH, 2022

Disaster authorities in Mozambique report that at least 12 people have died after Cyclone Gombe swept across the country bringing winds of 165 km/h and rain of over 200mm in...

[Read Full Article](#)



## Madagascar, Mozambique and Malawi – Tropical Storm Ana Death Toll Climbs

27 JANUARY, 2022

At least 70 people have now died after as a result of floods and severe weather in Madagascar, Mozambique and Malawi over the last few days. Flooding began after heavy...

[Read Full Article](#)



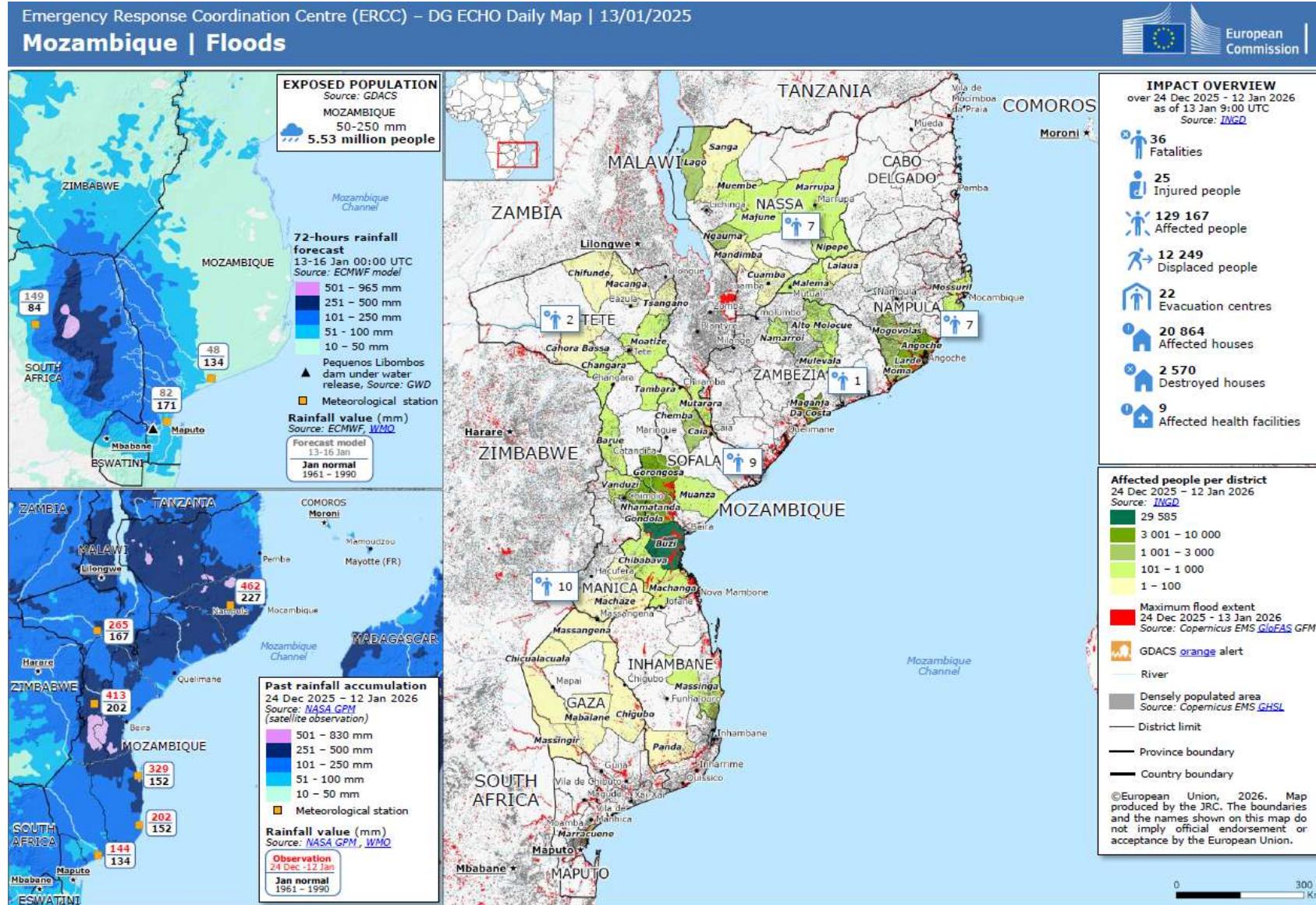
## Madagascar and Mozambique – Fatalities Reported After Tropical Storm Ana Triggers Floods

25 JANUARY, 2022

More severe flooding has struck in Madagascar after Tropical Storm Ana passed over the country from 22 to 23 January 2022. Two people died in floods in Mozambique after heavy...

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# Floods in Mozambique – January 2026



# Happening still!

16 January 2026

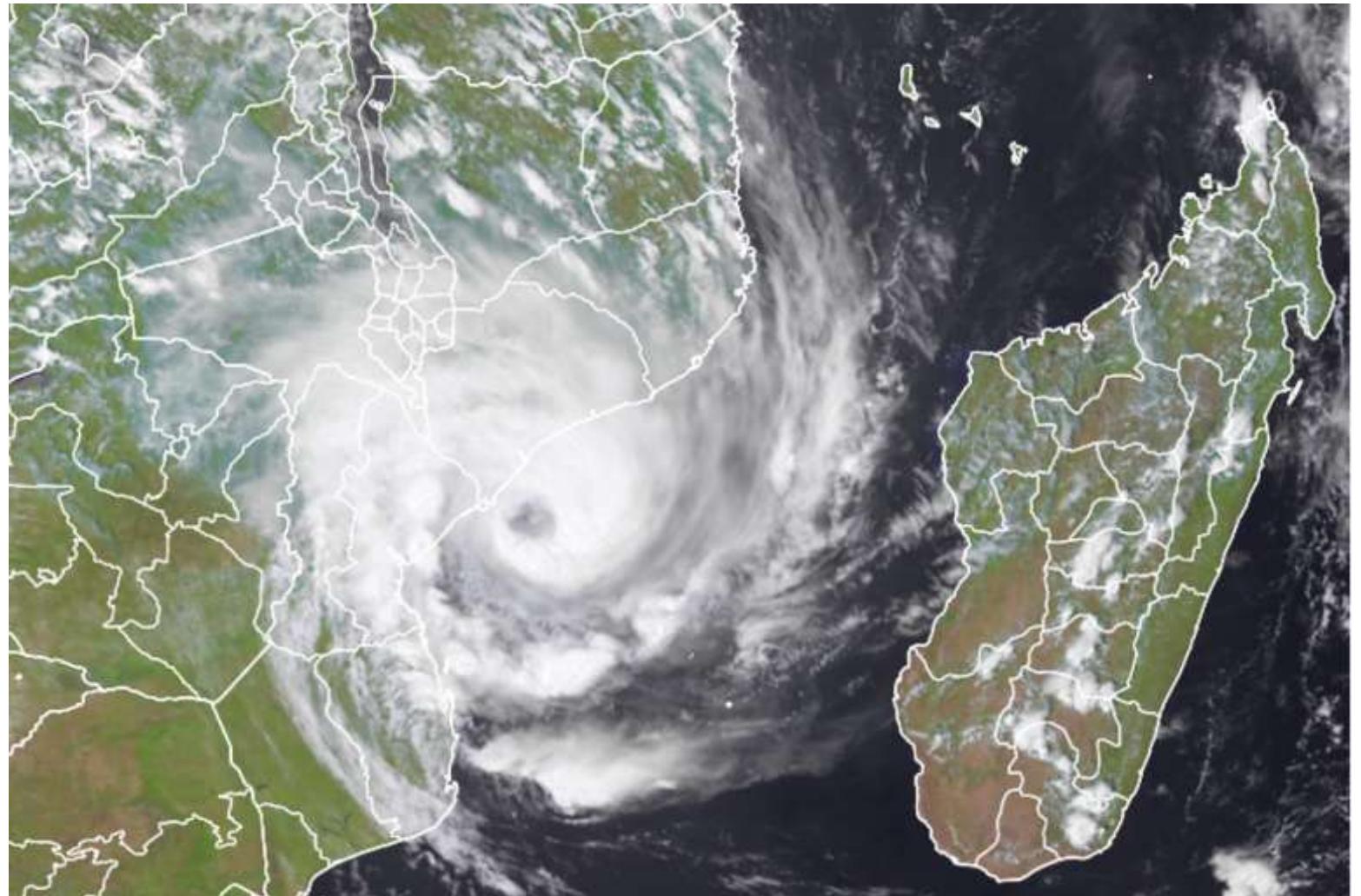
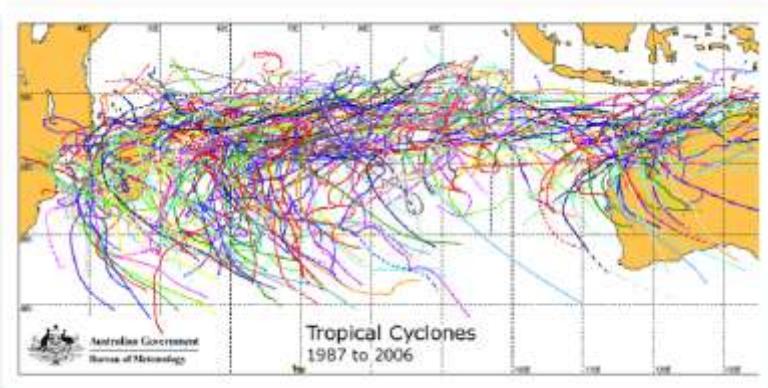


21 January 2026



# Floods in Mozambique

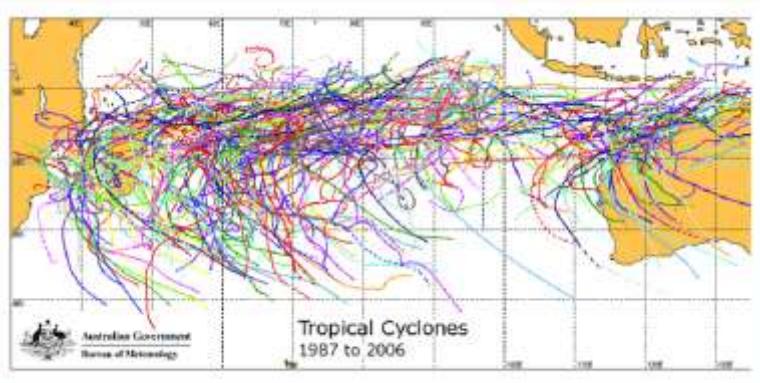
- Extreme weather



Cyclone Eloise (January 2021)

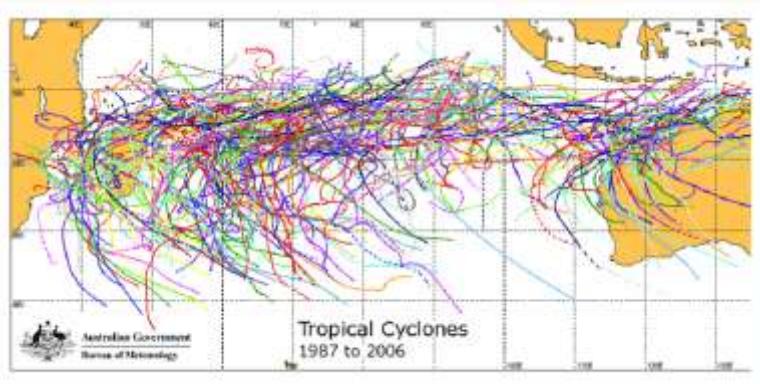
# Floods in Mozambique

- Extreme weather
- Topography



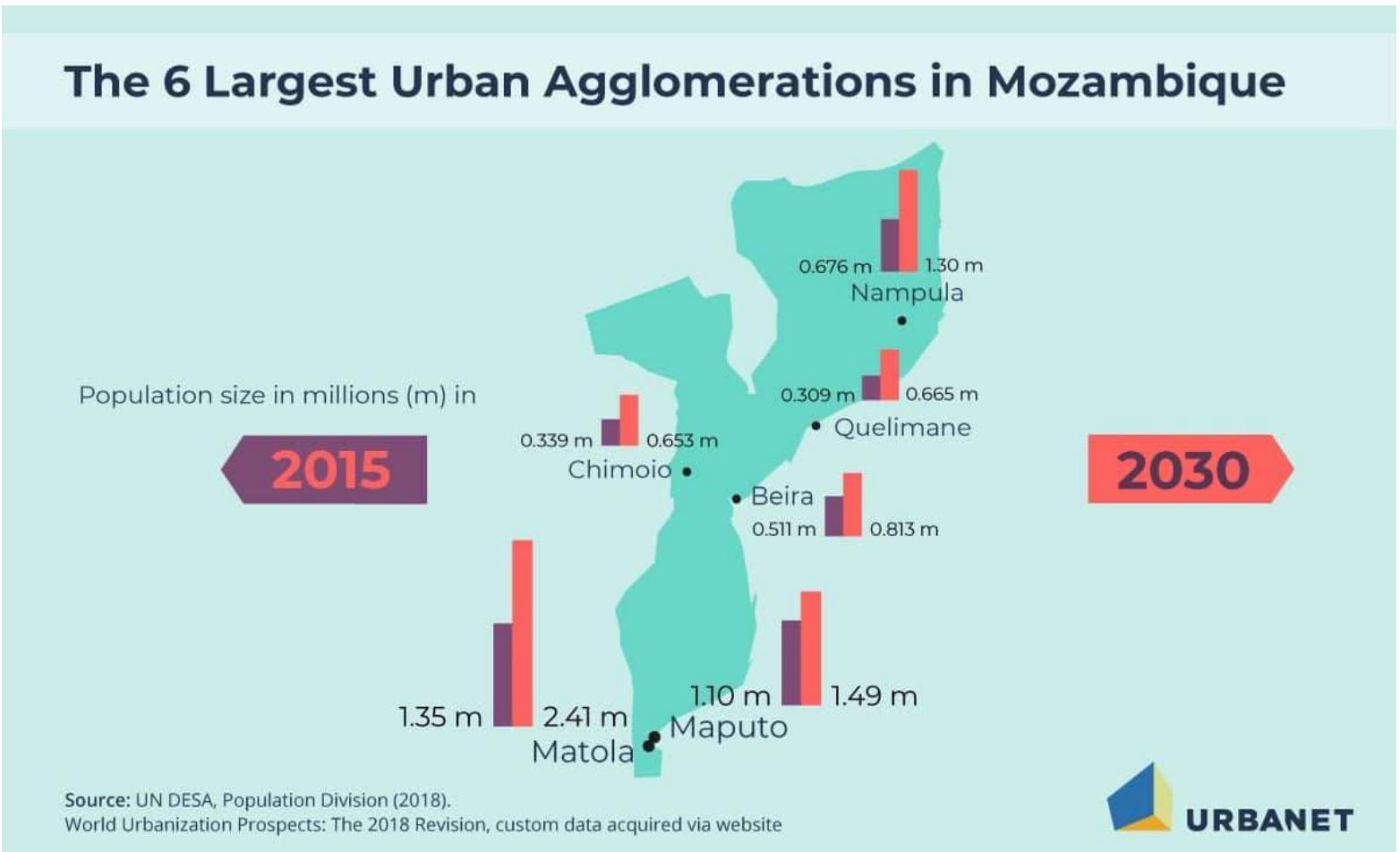
# Floods in Mozambique

- Extreme weather
- Topography



# Floods in Mozambique

- Extreme weather
- Topography
- Urban expansion



# Floods in Mozambique

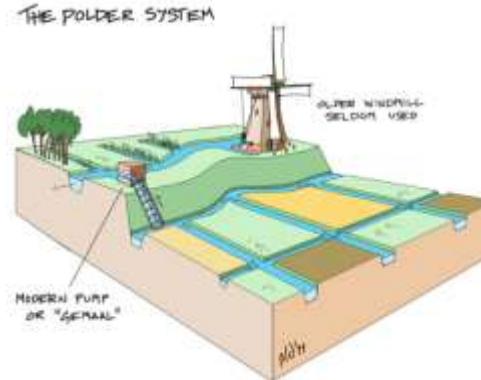
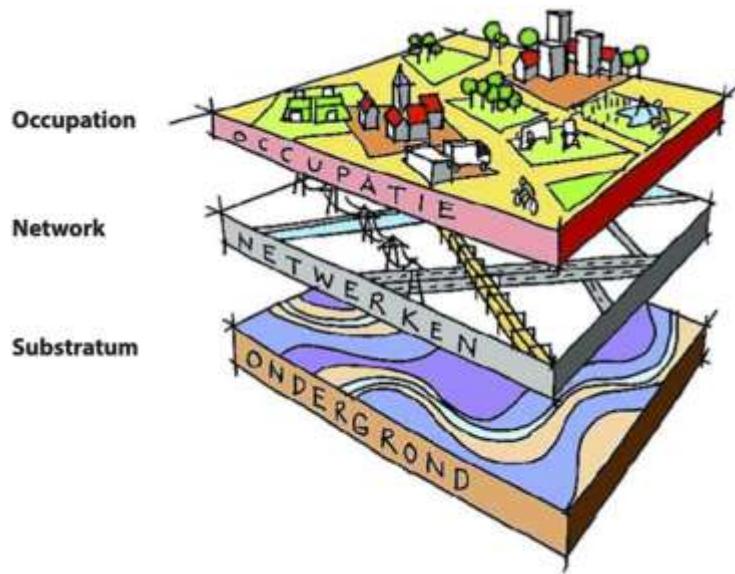
- Extreme weather
- Topography
- Urban expansion
- Vulnerable infrastructures



# Some “Dutch approach” maybe?

Key principles:

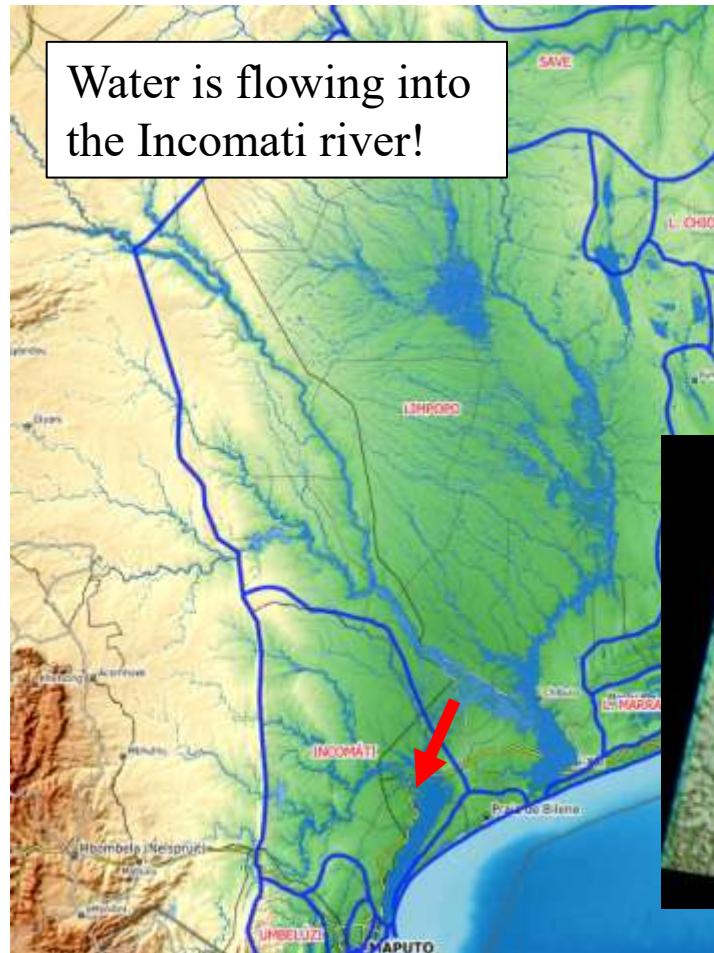
1. System/basin approach
2. Advanced technologies
3. Integral planning



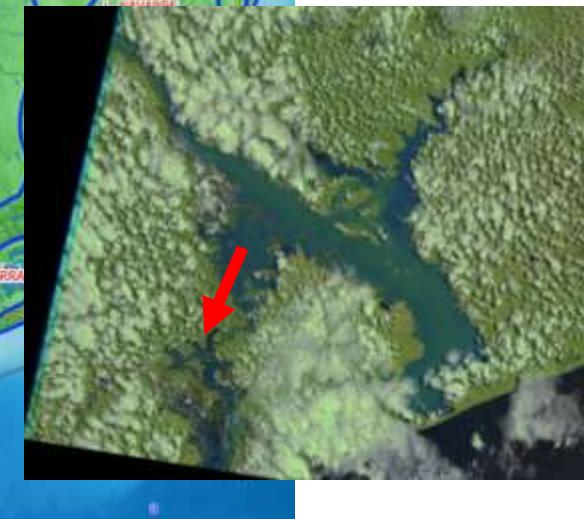
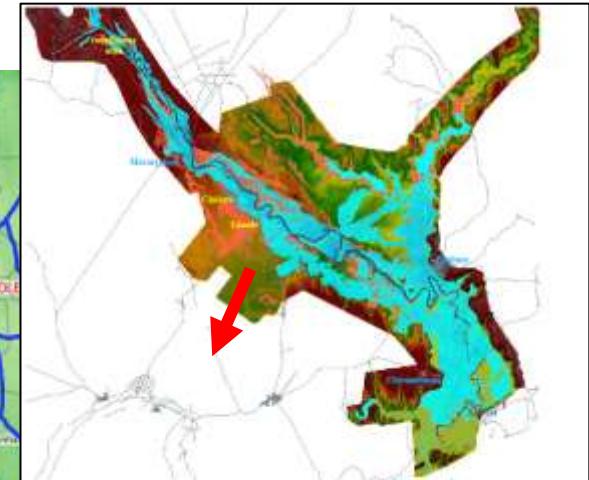
# 1. Basin approach?



Limpopo river



2D Hydraulic model



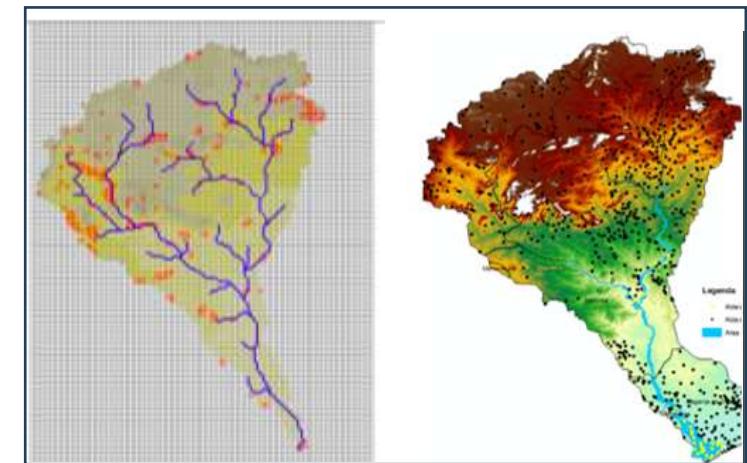
# 1. Basin approach?



Licungo river



Model



## 1. Basin approach?



## Licungo river

All these basins are interconnected during floods!

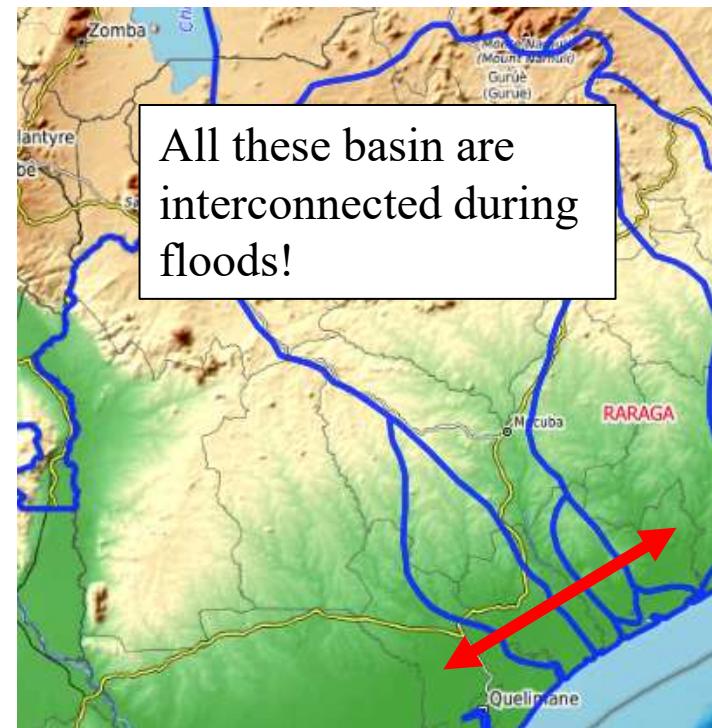
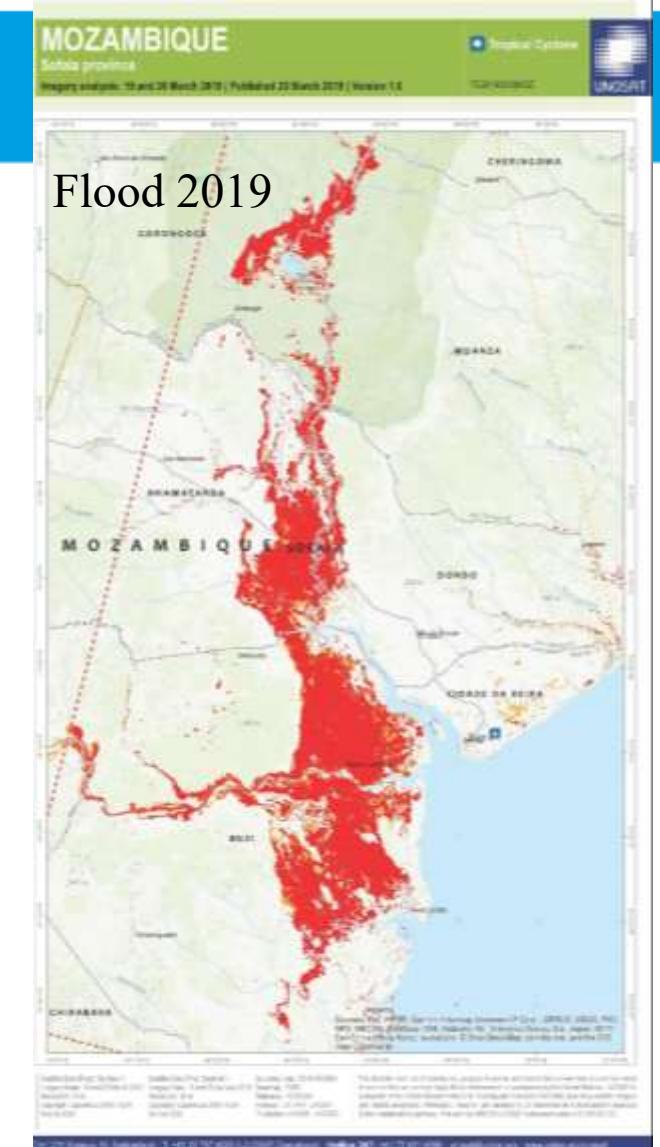
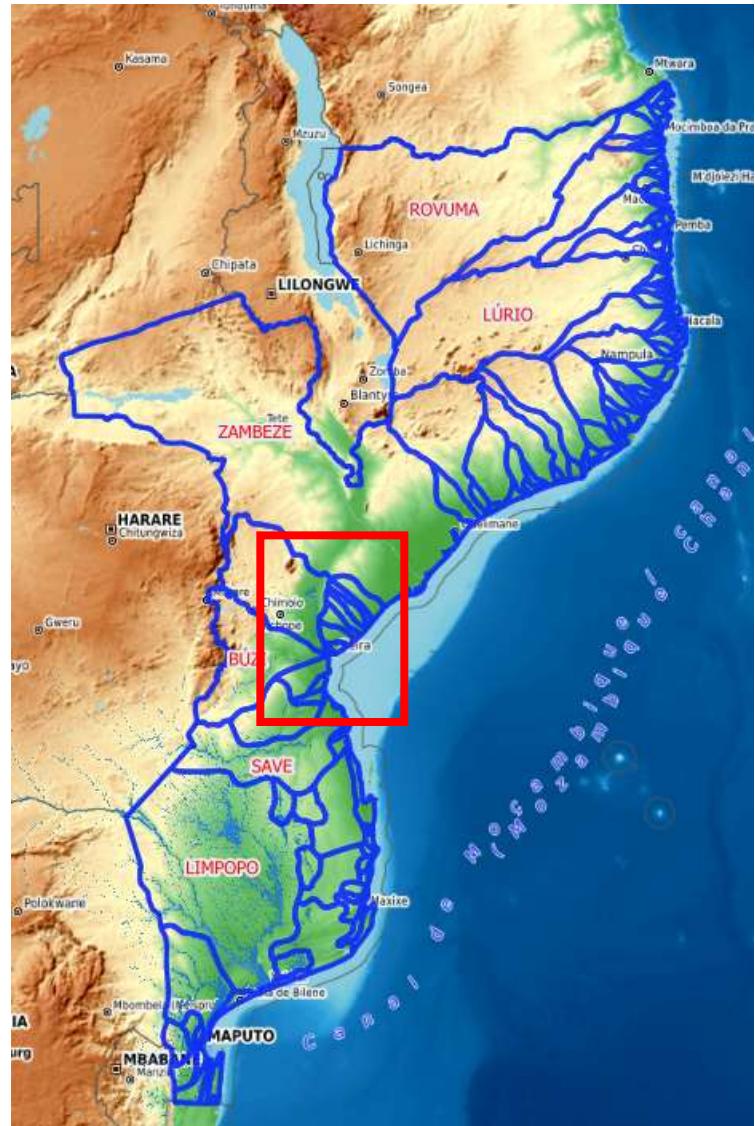


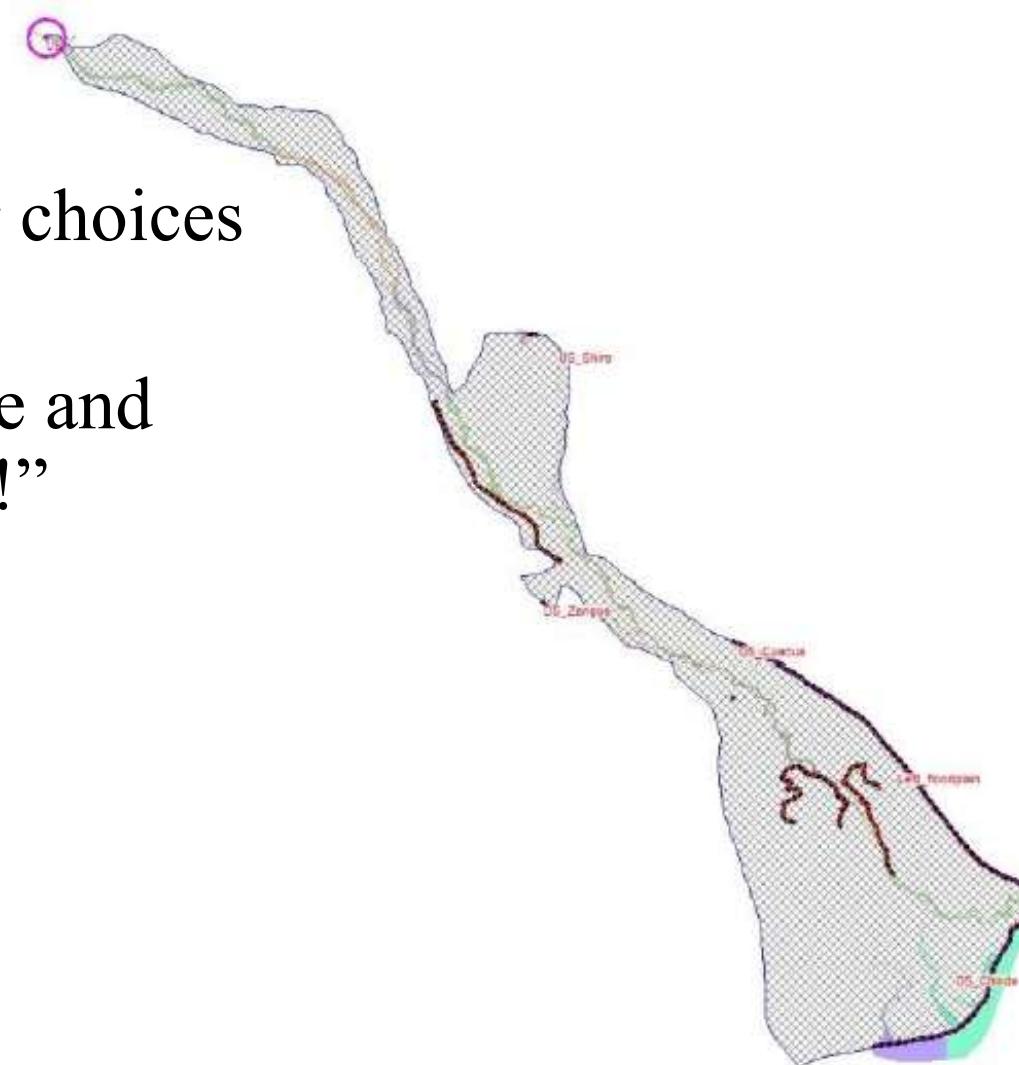
Figure 1 Map of Licungo Basin. Red shading indicates the extent of the January 2015 flood along the Shire (Nichalo, Nsanje), the Zambezi (Tambala, Marromeu) and the Licungo Rivers (Gurue, Mocuba, Nante).

# 1. Basin approach?



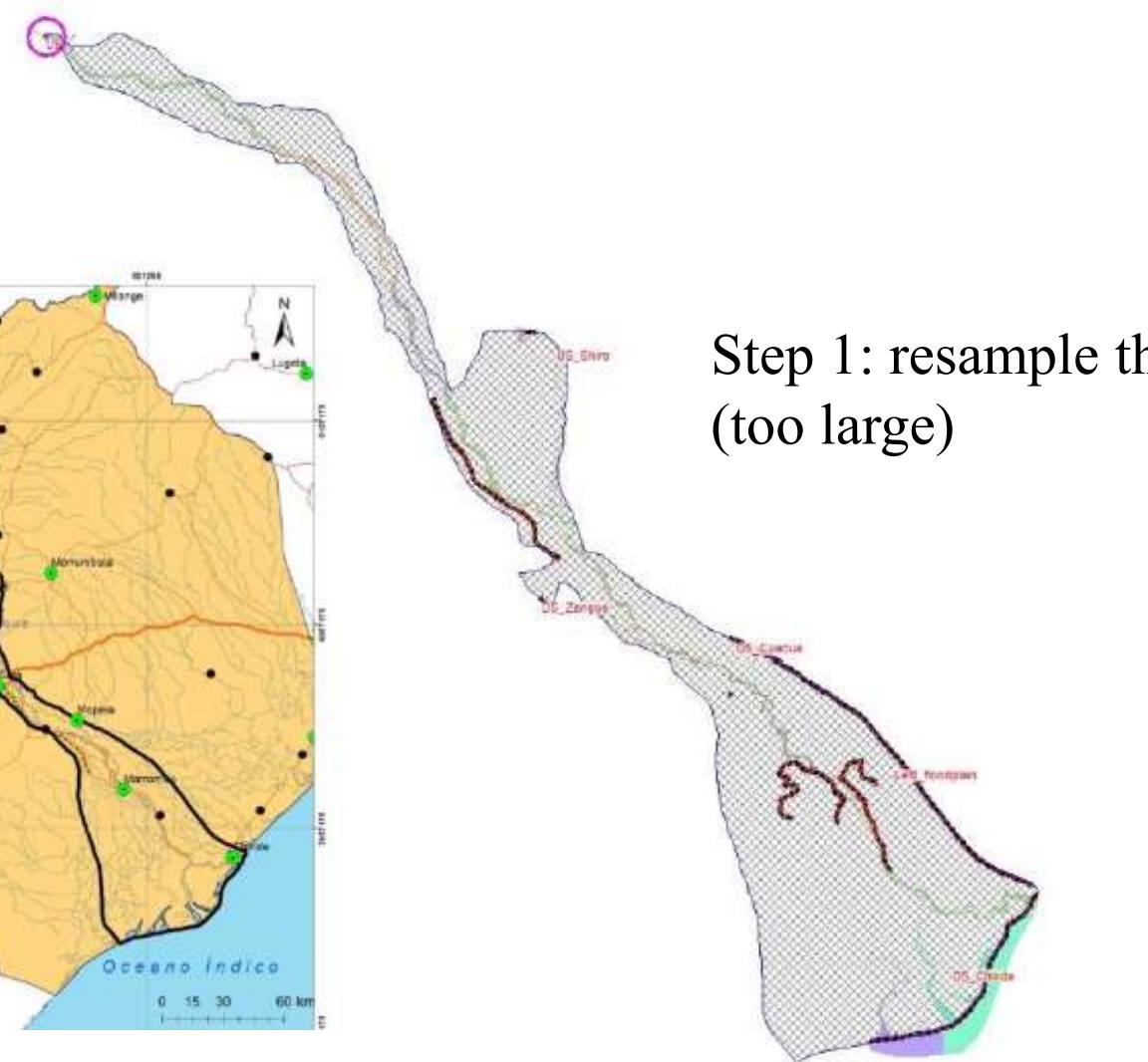
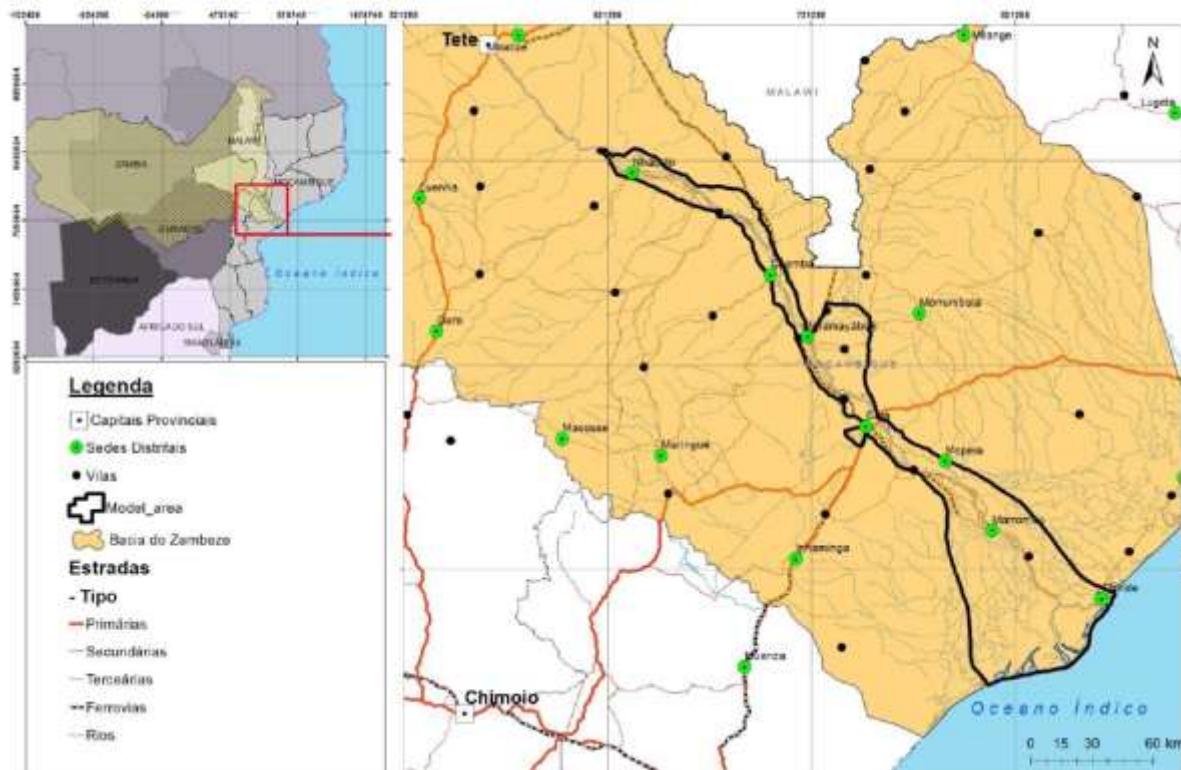
## 2. Advanced (proven) technology?

- We saw that modelling choices can be risky
- But still “we need more and better data and models!”



## 2. Advanced (proven) technology?

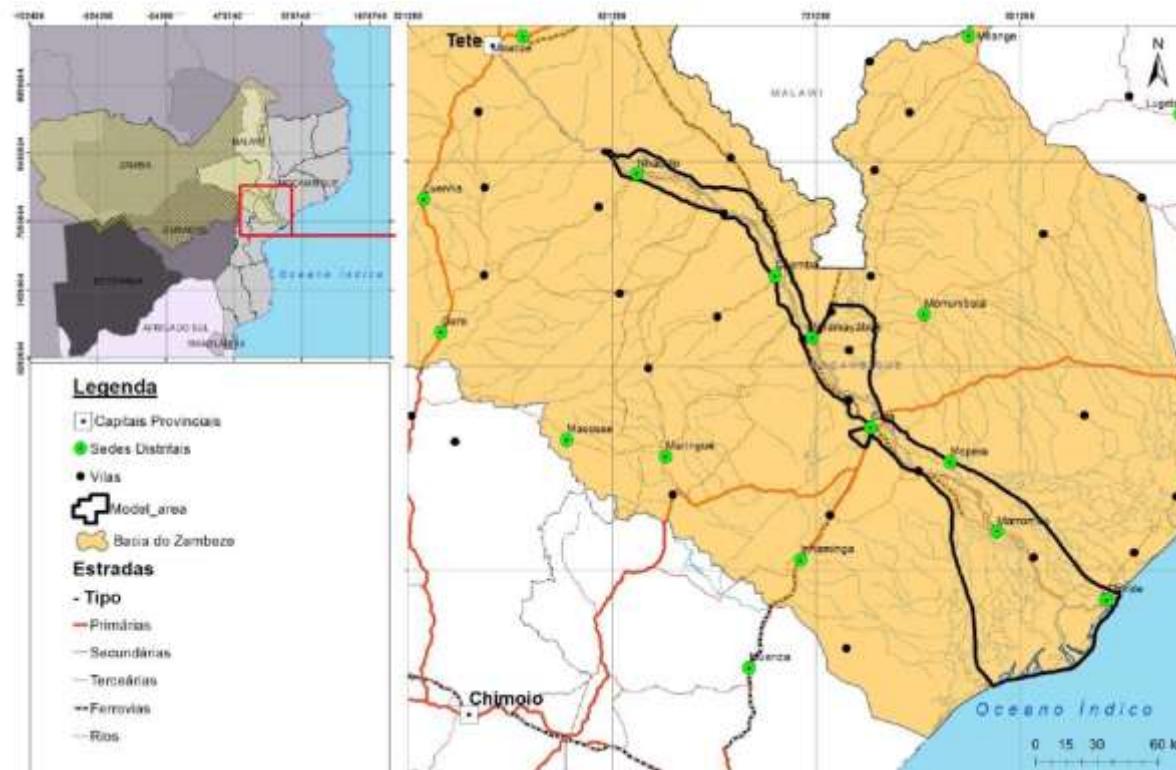
# LiDAR data for the Zambeze river 1x1m elevation model



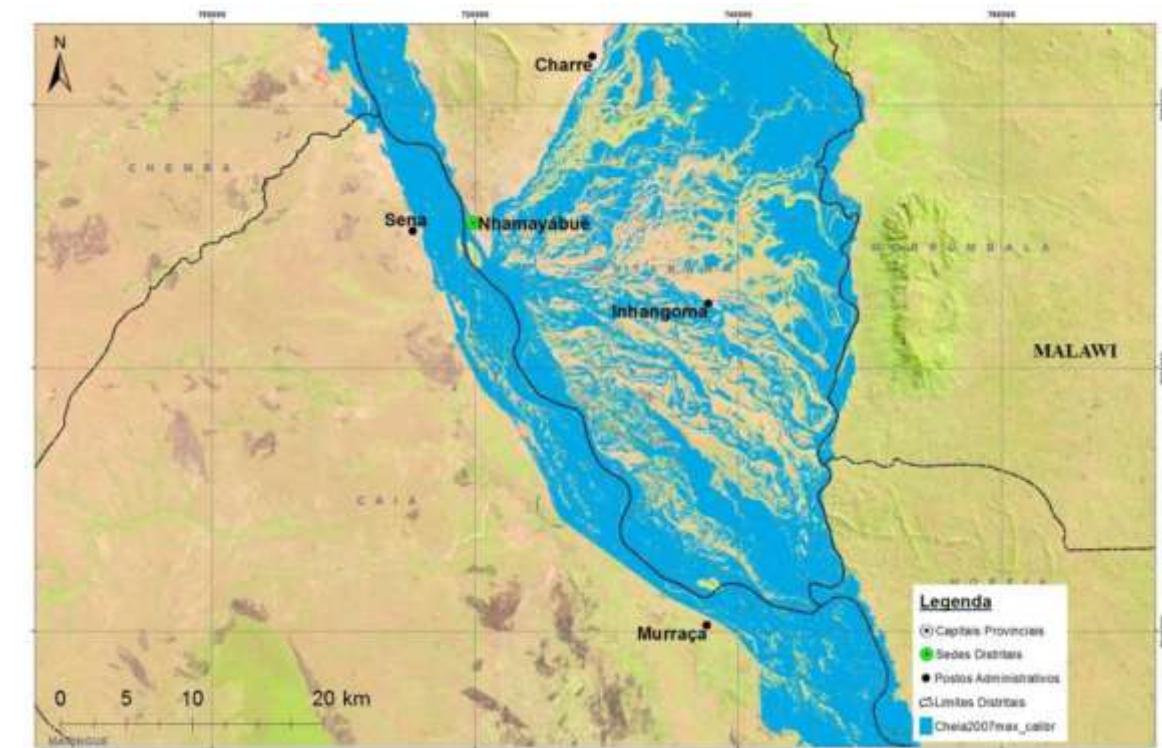
Step 1: resample the data  
(too large)

## 2. Advanced (proven) technology?

**LiDAR data for the Zambeze river  
1x1m elevation model**



**Flood waters reach  
the model boundaries!**



# Cyclone Freddy (2023)



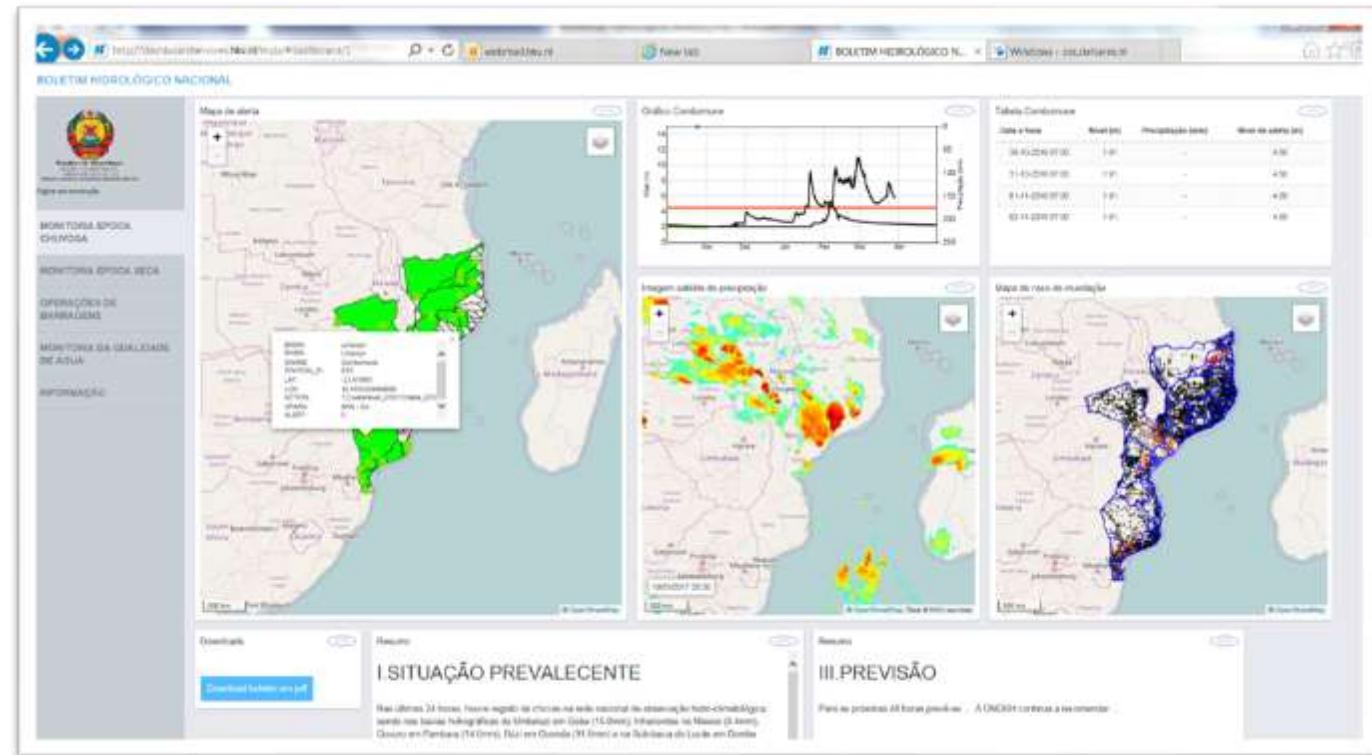
March 21, 2023



## 2. Advanced (proven) technology?

### Unit for Flood and Drought Control (est. 2017)

Water information dashboard



Dashboard discontinued in 2019:

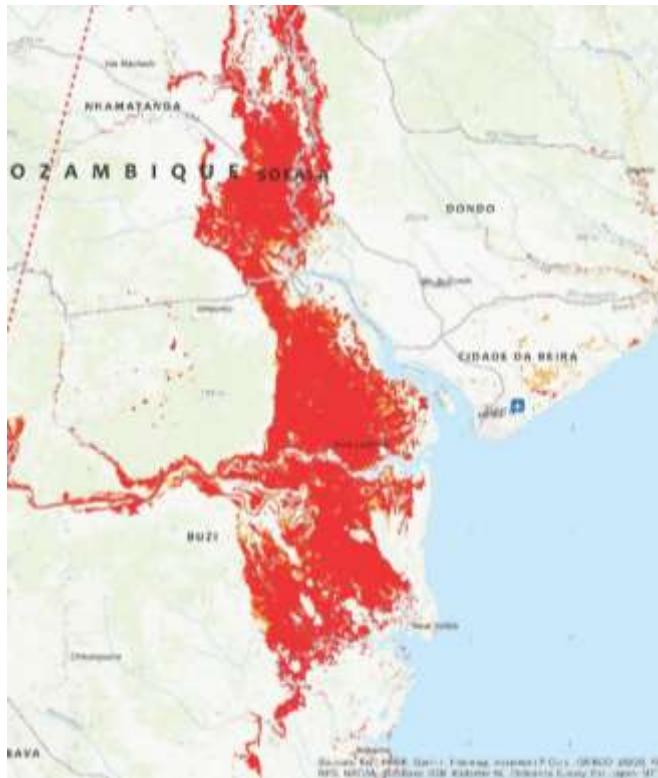
- difficulties in maintenance and keeping up with IT technologies

New multi-million National Information System implemented in 2019-2021

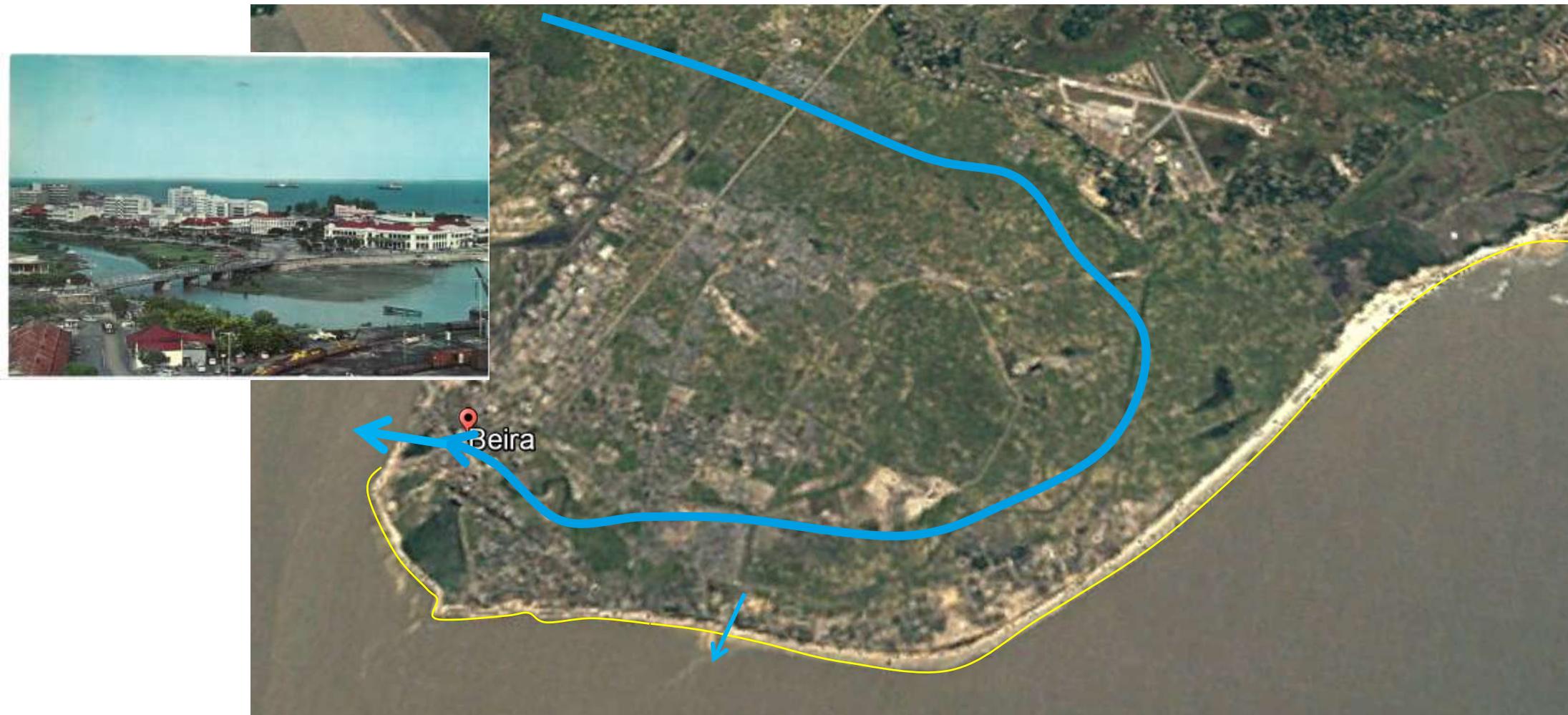
- Not operating anymore

### 3. Water governance and integral planning?

- Complex planning and complex solutions
- Beira master plan developed in 2012-13, looking towards 2035



# Beira in 1984



1984

River Chiveve natural drainage, large areas available for retention

# Beira in 2017



2017

- Urban expansion, river Chiveve and retention areas disappeared
- Drainage outlet pushes longshore sand transport further out

# So... challenges remain for integral implementation



2017

- Urban expansion, river Chiveve and retention areas disappeared
- Drainage outlet pushes longshore sand transport further out

- **Basin approach**

- Basin understanding is not our strongest point...
- Basin boundaries are lines on a map, but don't hold back water!
- Be careful with drawing system boundaries upfront!

- **Advanced technologies**

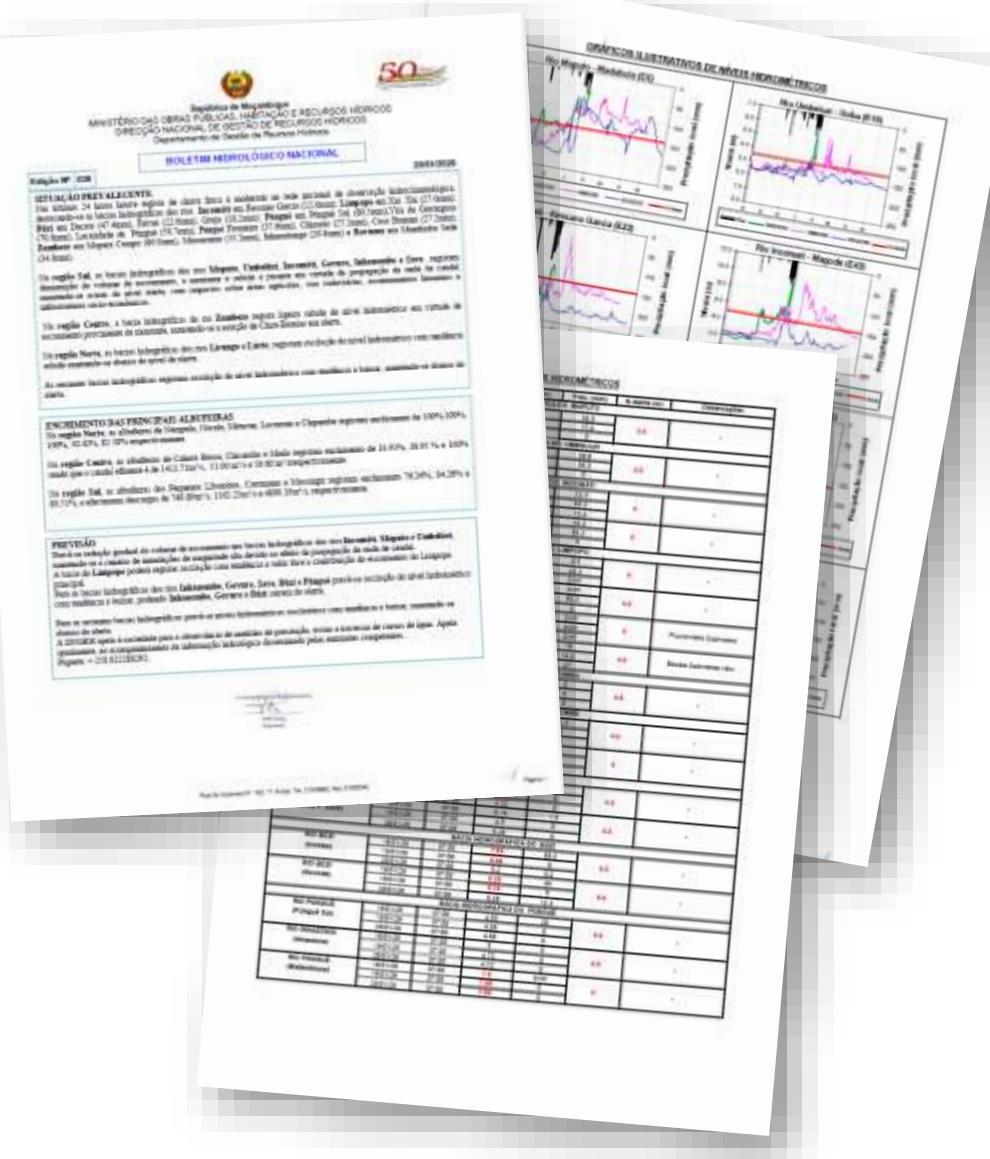
- More and more accurate data also require more advanced (and careful) processing
- Which additional data do we really need?
- Are conditions fit for new technology? Can the jump be made?

- **Integral planning**

- How about integral implementation?

But are there also successes?

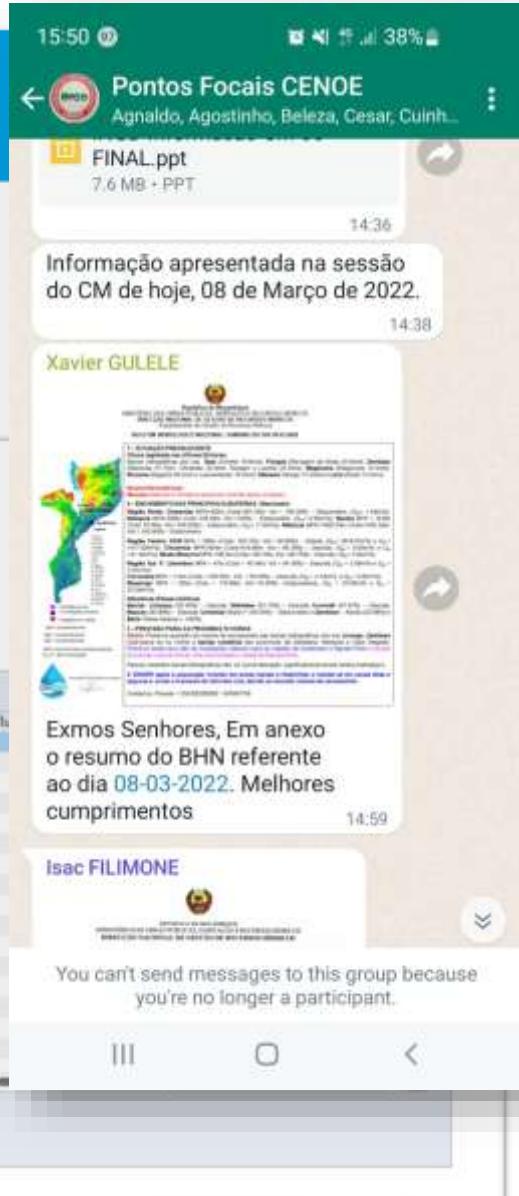
# Unit for Flood and Drought Control



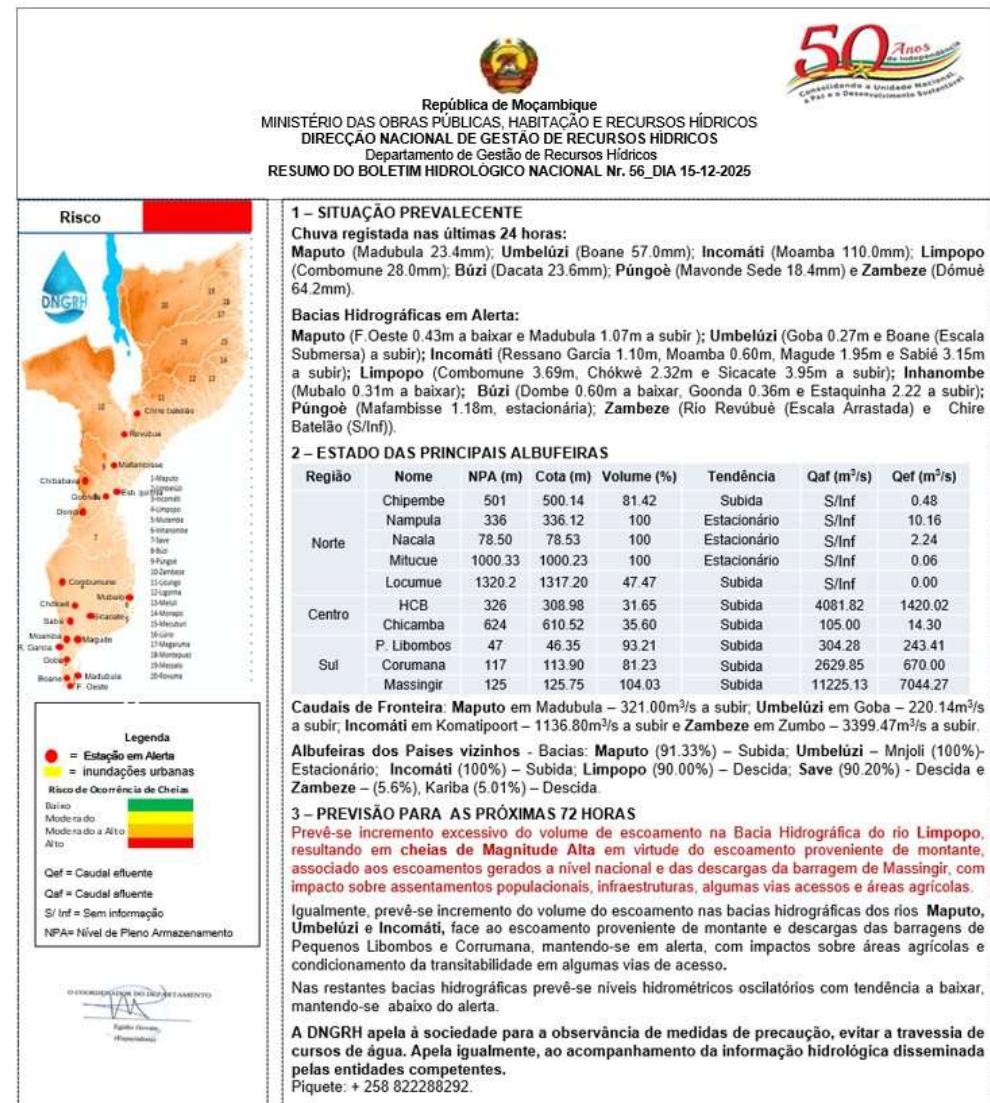
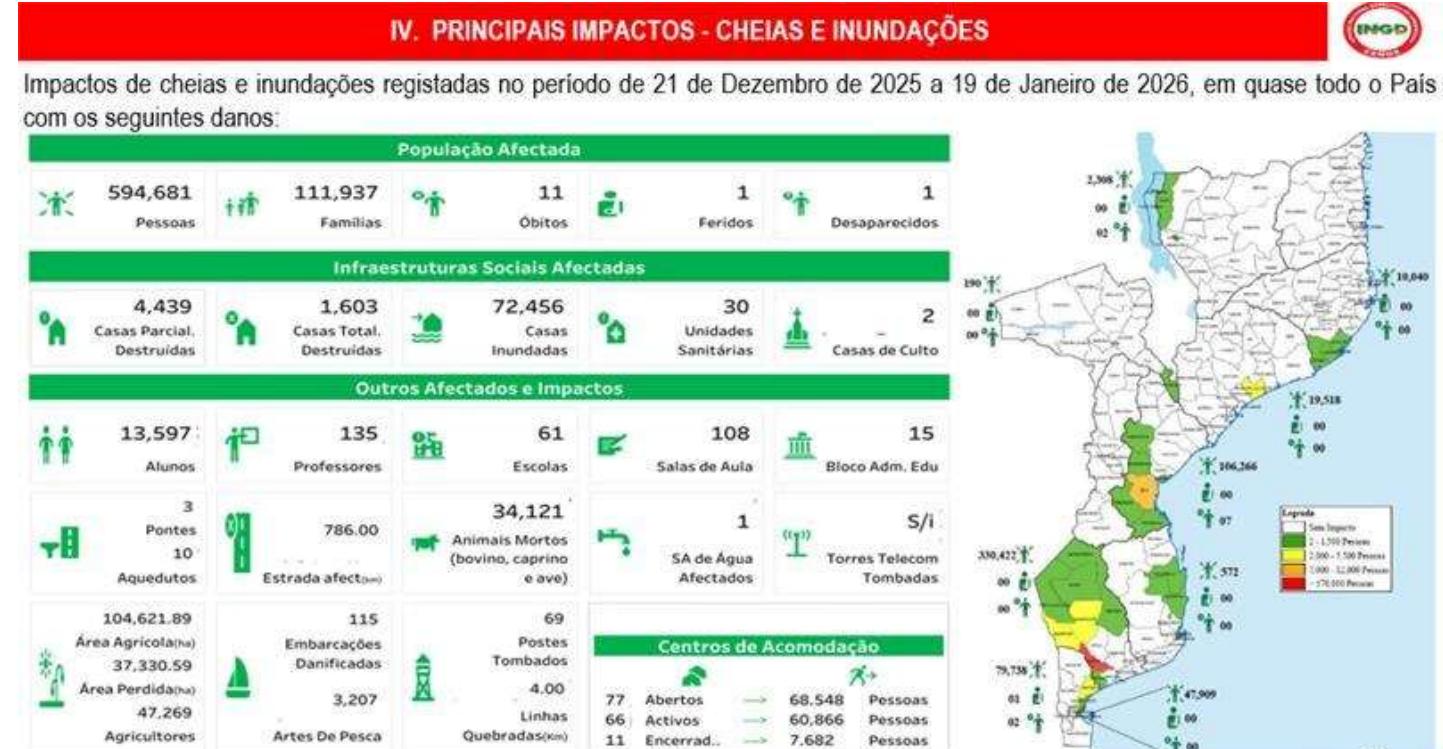
## Automated Hydrological Bulletin Daily publication since 2016



- Dissemination via WhatsApp and email
- “Early warning” based on measurements and experience



# Floods in Mozambique – 16 January 2026

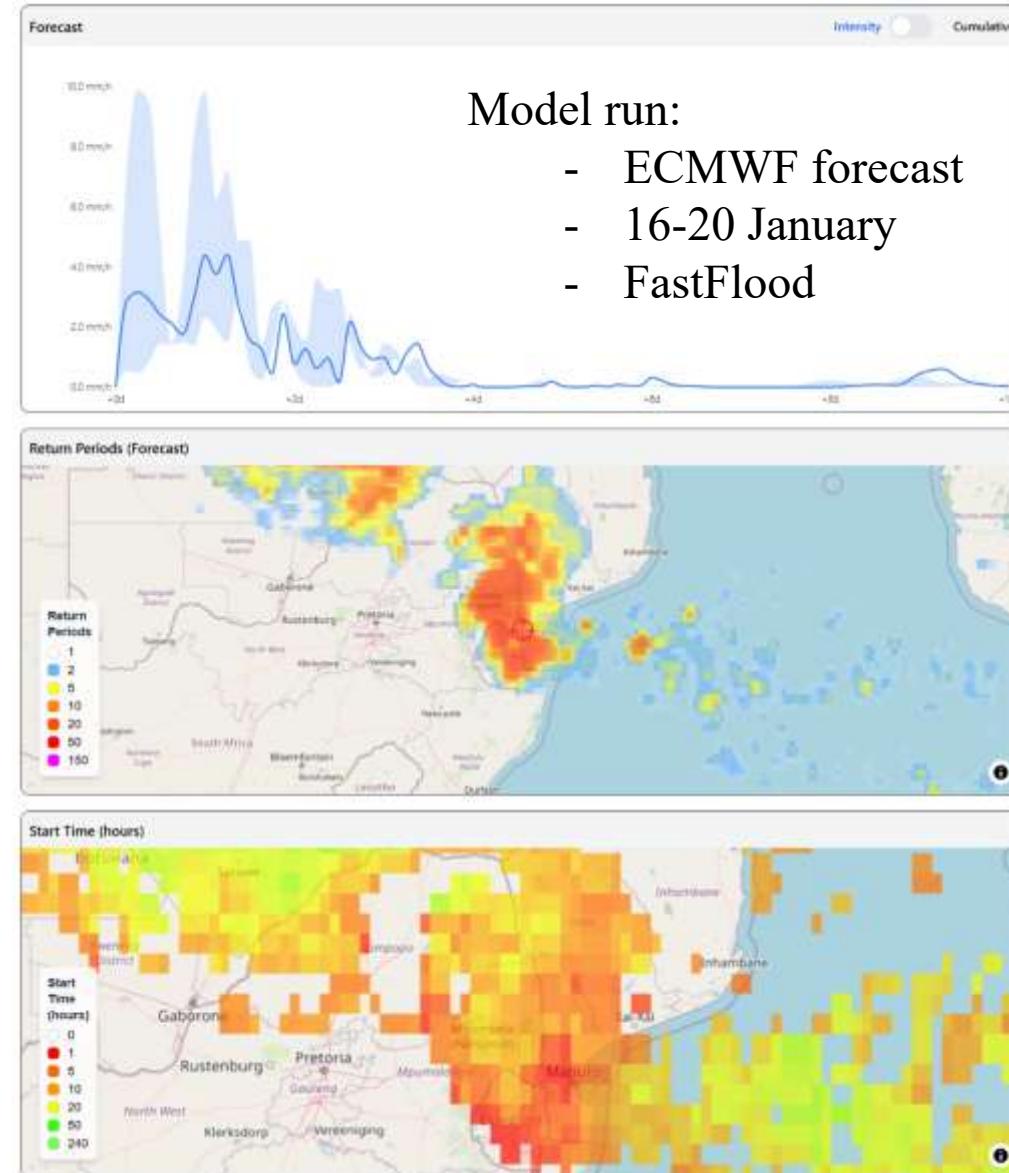


## &lt;divFloods in Mozambique – 16 January 2026



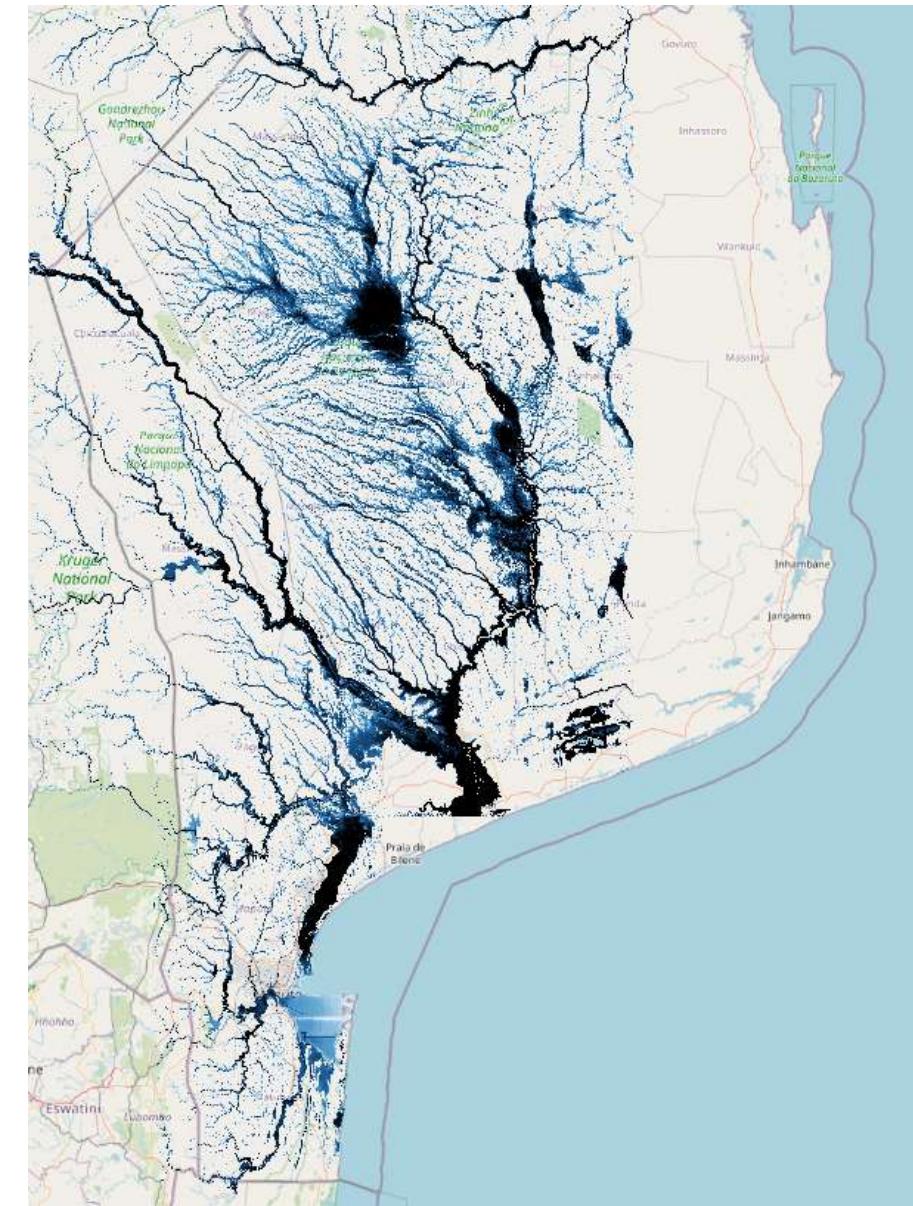
### Dutch Disaster Risk Reduction and Surge Support (DRRS) Programme:

## Preventing and Reducing the Impact of Water and Climate-Related Disasters



## Model run

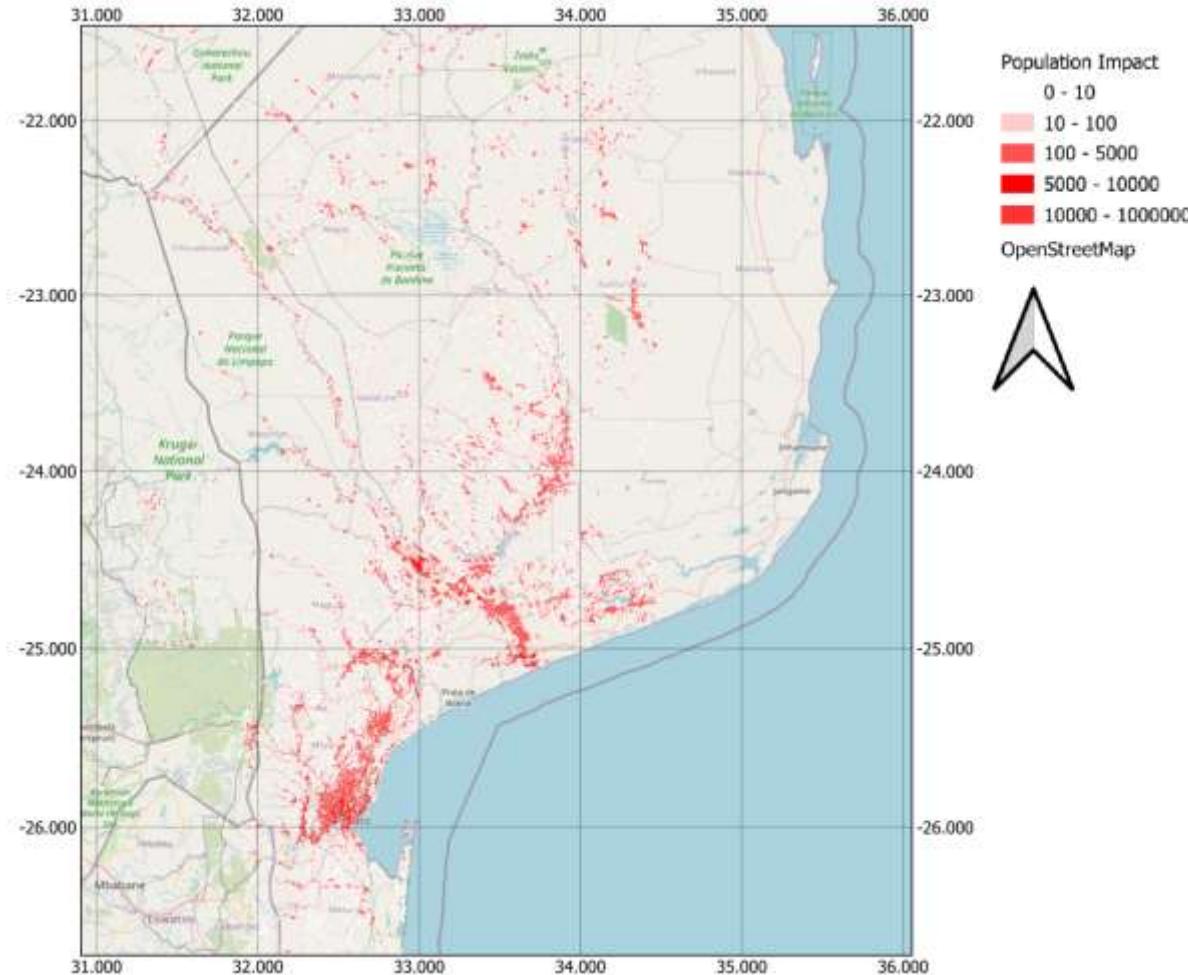
- ECMWF forecast
- 16-20 January
- FastFlood



# Floods in Mozambique – 16 January 2026

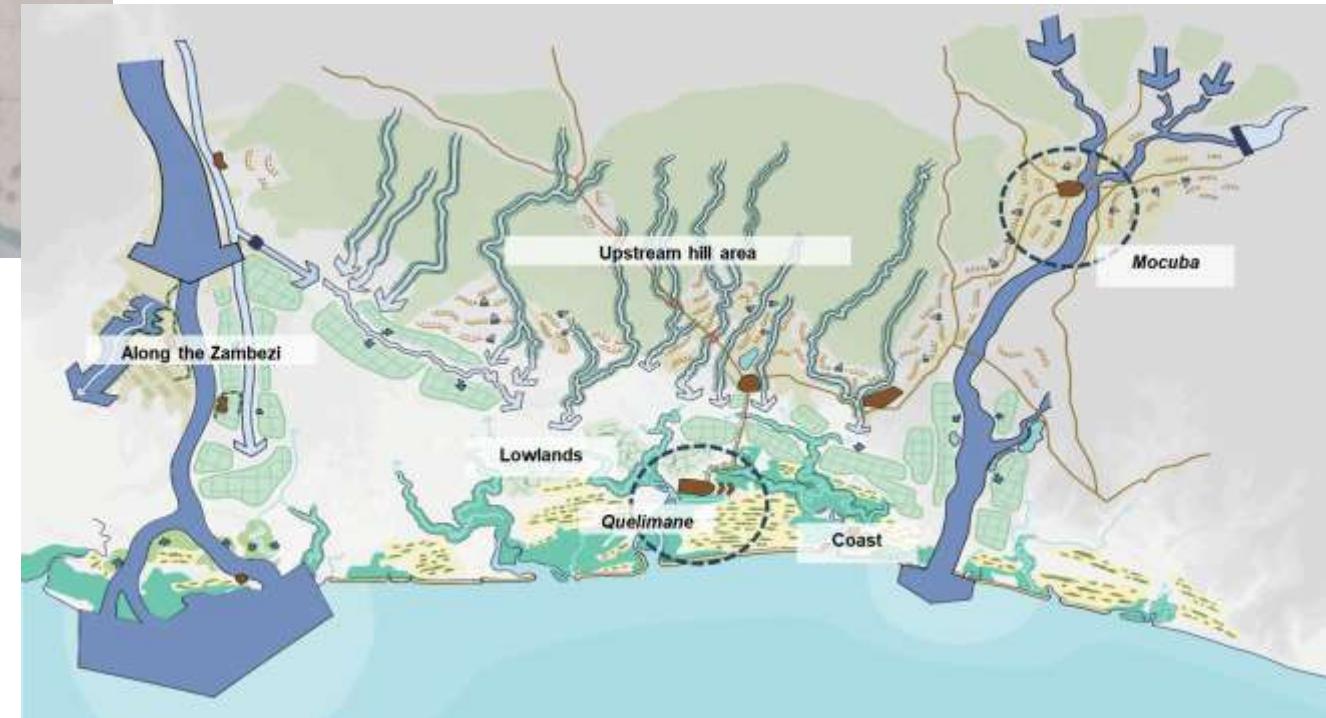


Dutch Disaster Risk Reduction  
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(DRRS) Programme:  
Preventing and Reducing the Impact of  
Water and Climate-Related Disasters



**“Affected population is in the range 400k-650k, of which 110k-230k severe”**

# Multi-basin approach



# Smarter, robuster infrastructure



- Join forces to improve system understanding
  - Combine local experience with understanding of physical processes
  - Be critical on both.
- Don't only look for “gaps” or opportunities for “solutions”, but look for existing successes.
  - Build (together) step-by-step upon what works
  - It is tempting to jump to available (technological) solutions, but do they fit?

“I think we started from the idea that we knew how everything should be done, because our water infrastructure is so well organised in the Netherlands,” reflects Maarten Gischler, Delta Coordinator at the Ministry of Foreign Affairs and long-time advisor to the Dutch water programme in Mozambique. “Over time, we learned to really start listening to what is happening locally, to enable local leadership, and to focus on long-term processes rather than quick results.”

# Thanks! Obrigado!

