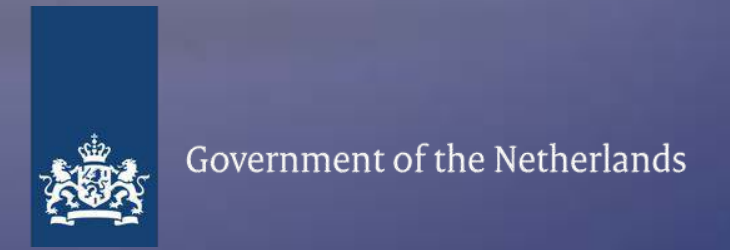




**AFRICA 20
WORKS! 22**
Innovation for Resilient Growth

EXTREME WEATHER EVENTS



MODERATOR



MR. ARNE DOORNEBAL

Community Manager

**The Netherlands-African
Business Council**

PRESENTATION 1



MR. TIM LEIJNSE

Advisor and Researcher

Deltares



**AFRICA 20
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Extreme weather and adaptation measures in Beira

Summary of measures proposed from the coastal protection and drainage master plan studies in Beira

28-June-2022

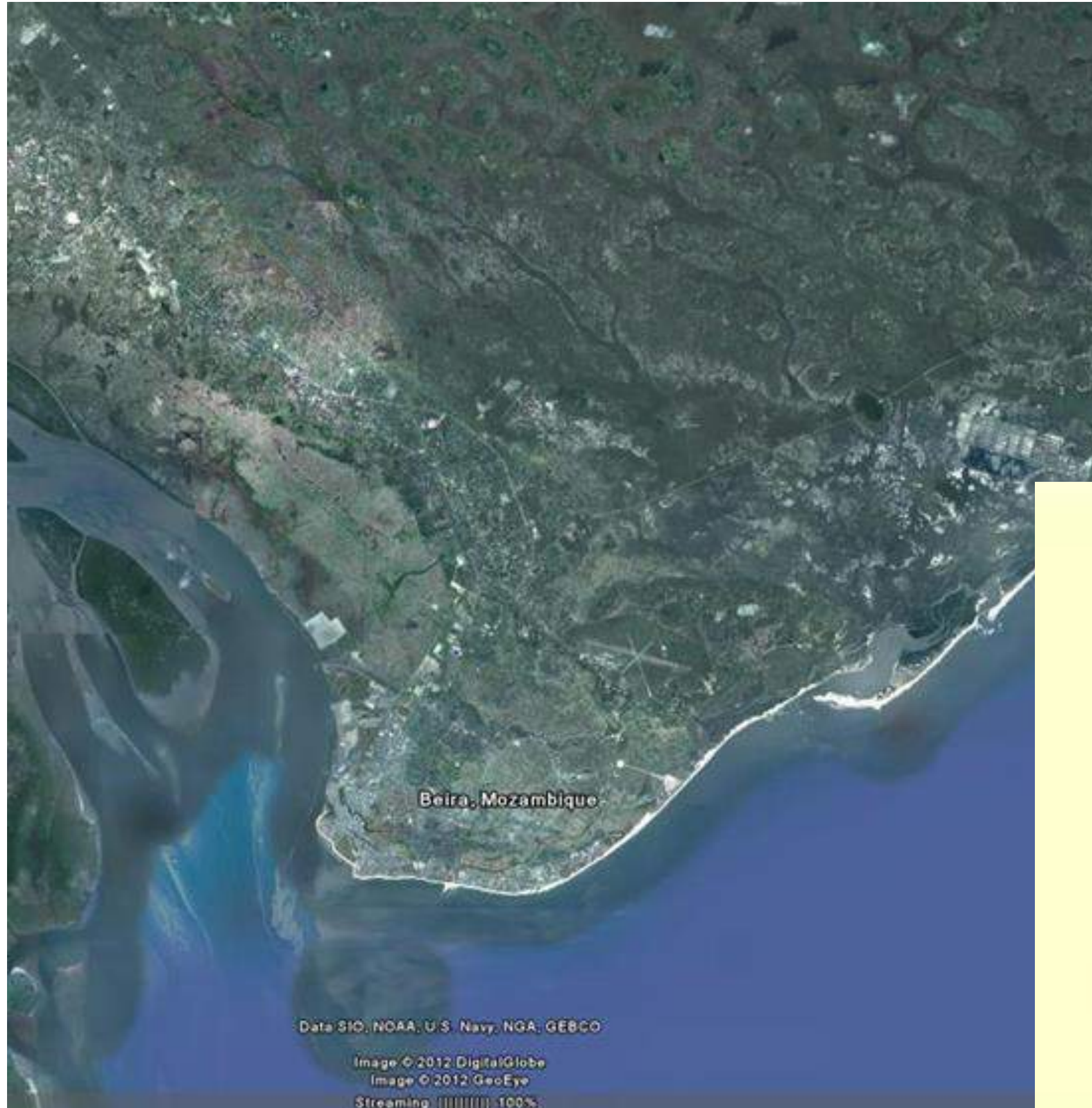
By Peter Letitre and Tim Leijnse

Deltares



View of/from downtown seawall, looking south at Praia Nova

Location of Beira



Beira in 1918



Deltares

Beira in 2018



Deltares



Maximum water depth for return period of 050 years



Why are measures needed?

Deltares



Objectives Beira Master plan 2035



1. Increase the possibilities of economic growth = Opportunities
2. Decrease the threats of climate change = Threats
3. Improve the living conditions = Opportunities

Make a safe, prosperous and more beautiful Beira

Deltares

Beira spatial plan for 2035



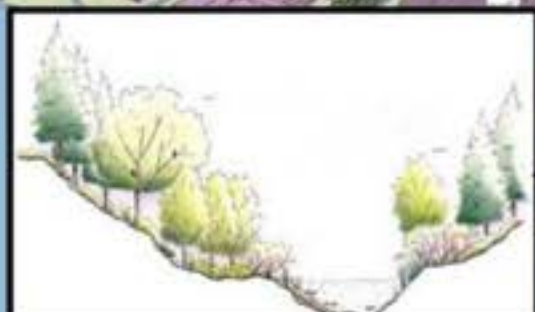
...and the following implementation projects



Improved port access and flow of goods



Expansion of quays and port industrial zone



Restoration of urban ecosystems and flood buffers



Sustaining depth of port access channel



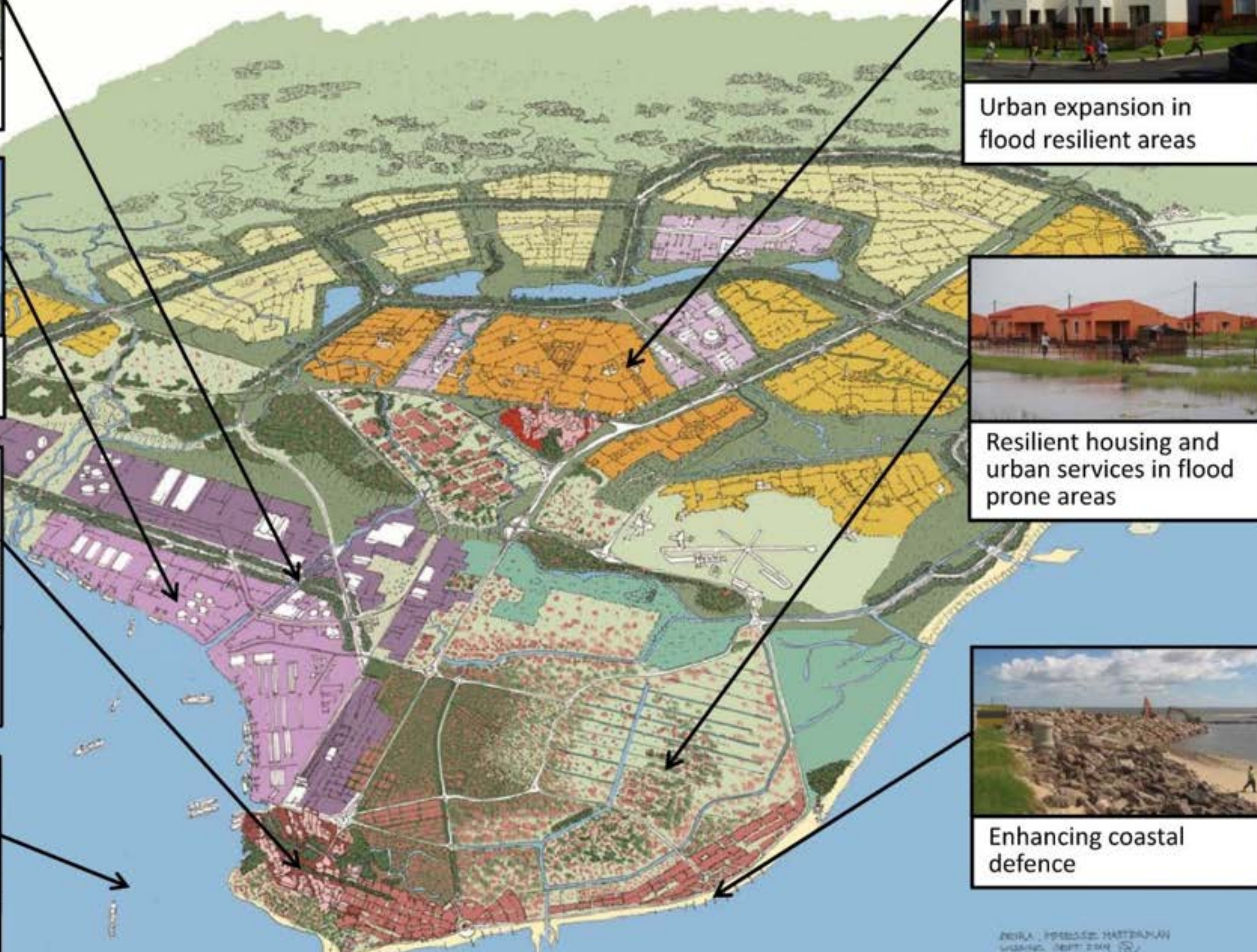
Urban expansion in flood resilient areas



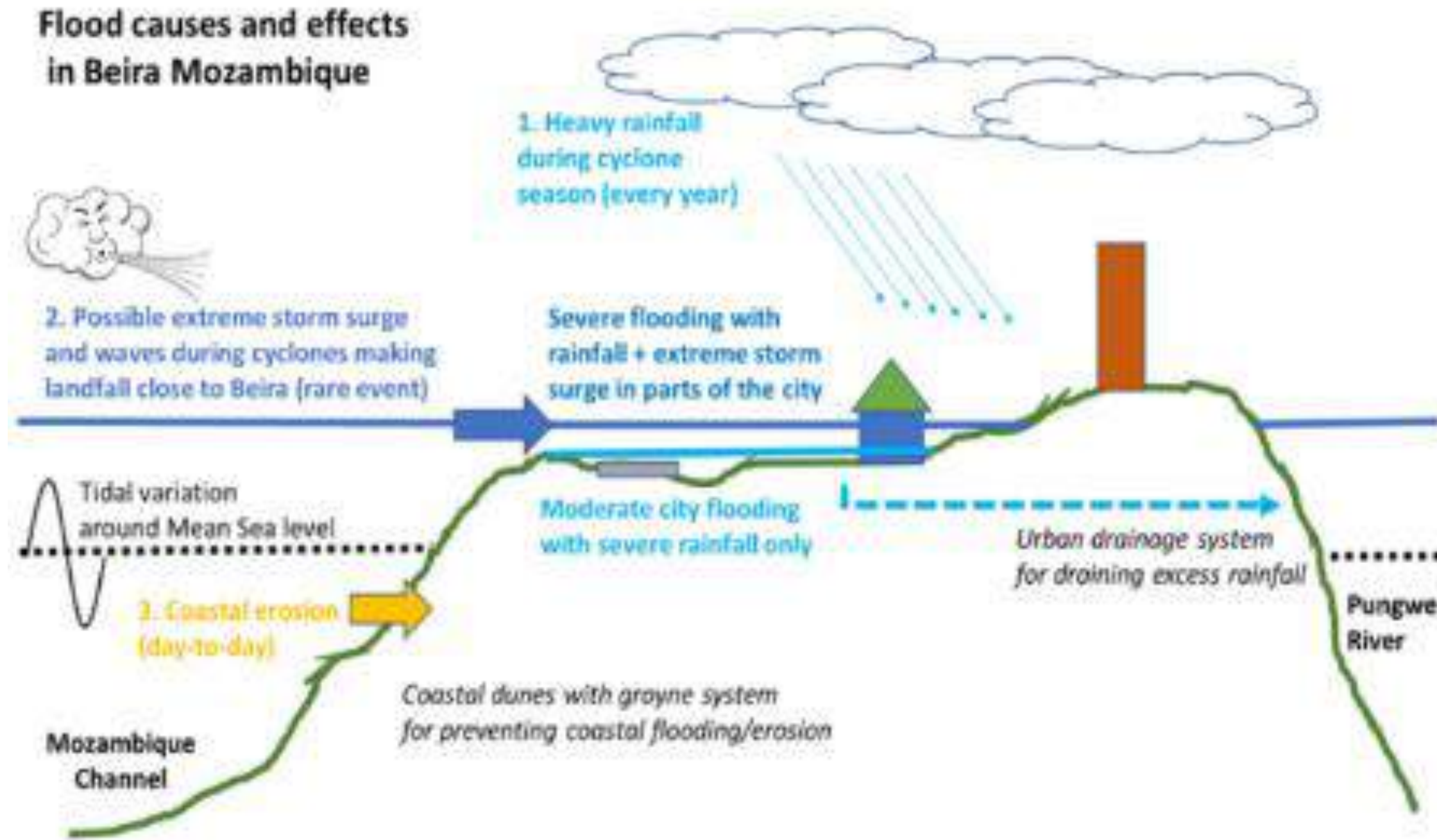
Resilient housing and urban services in flood prone areas



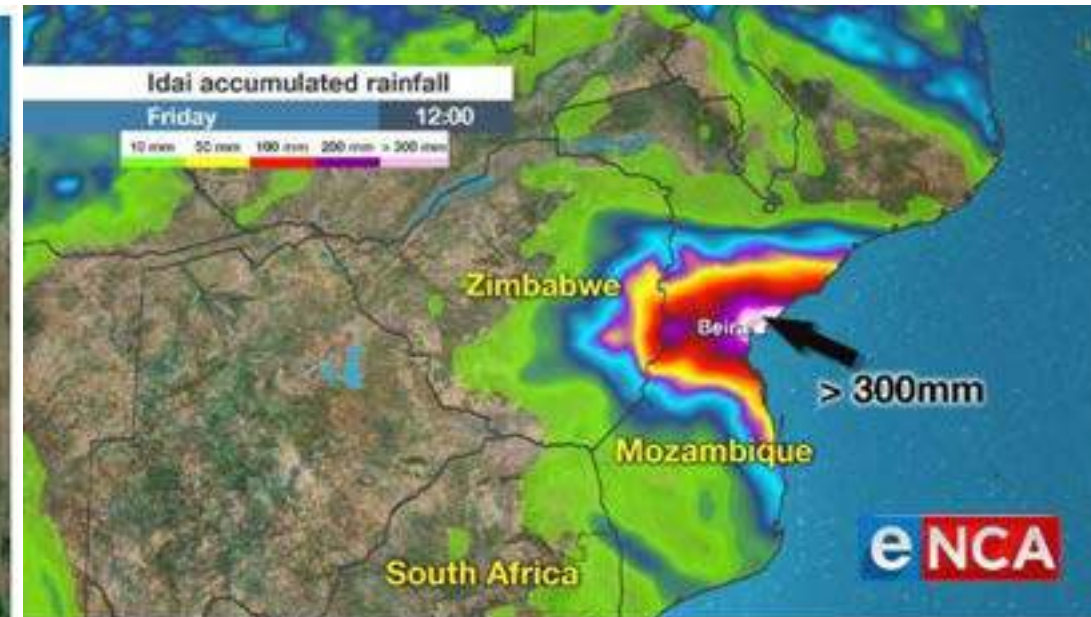
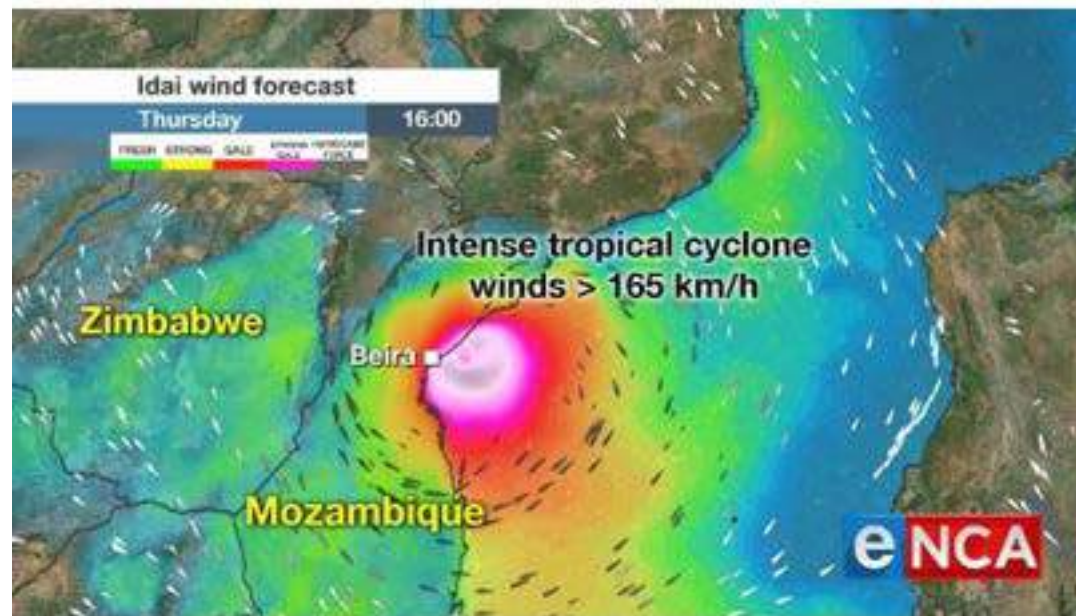
Enhancing coastal defence



Main causes of flooding and effects



Beira corridor of cyclones?



E. Africa, Recovering From Cyclone Idai, Braces for New Storm



Port of Beira braces for cyclone Eloise

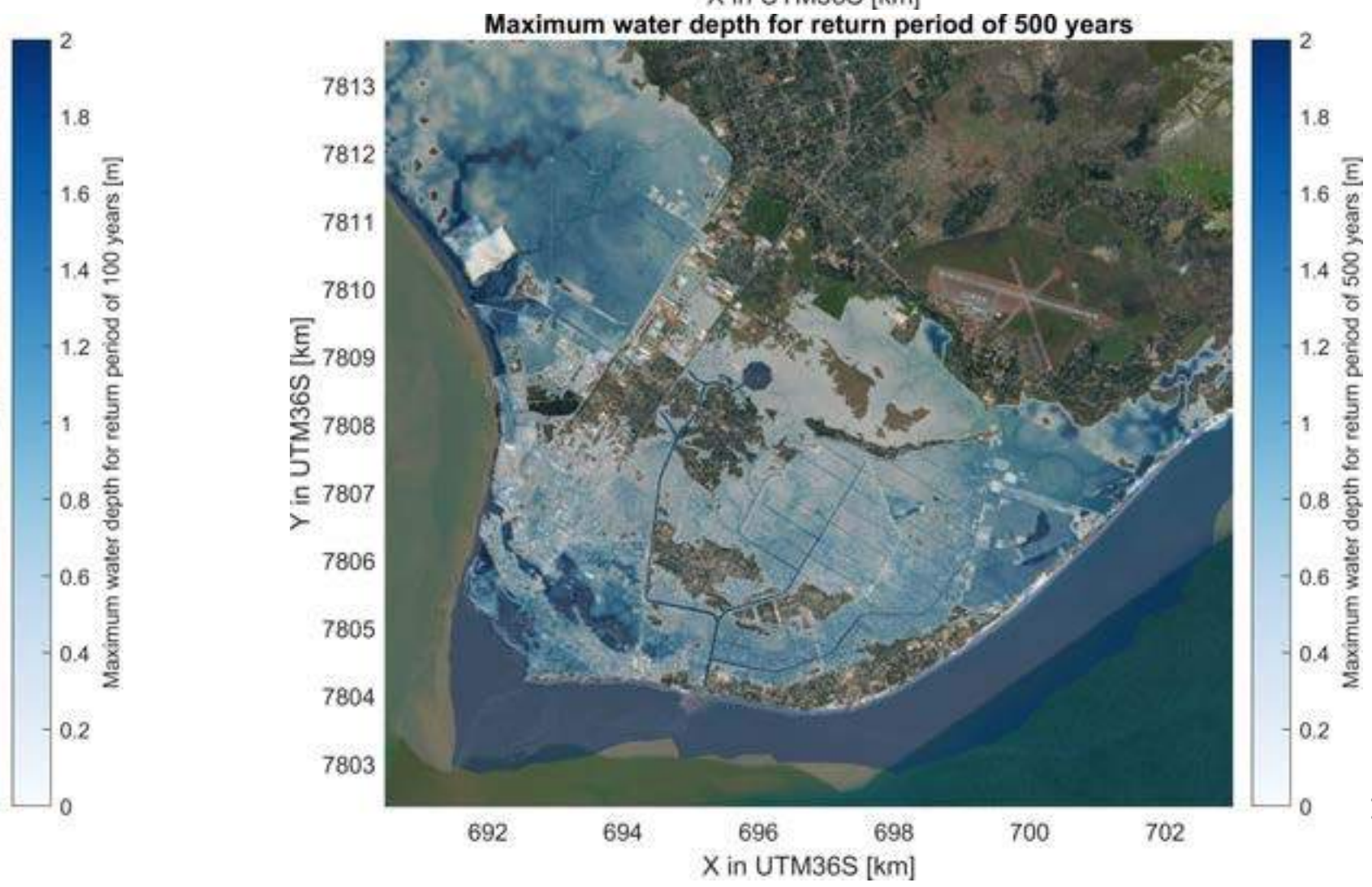
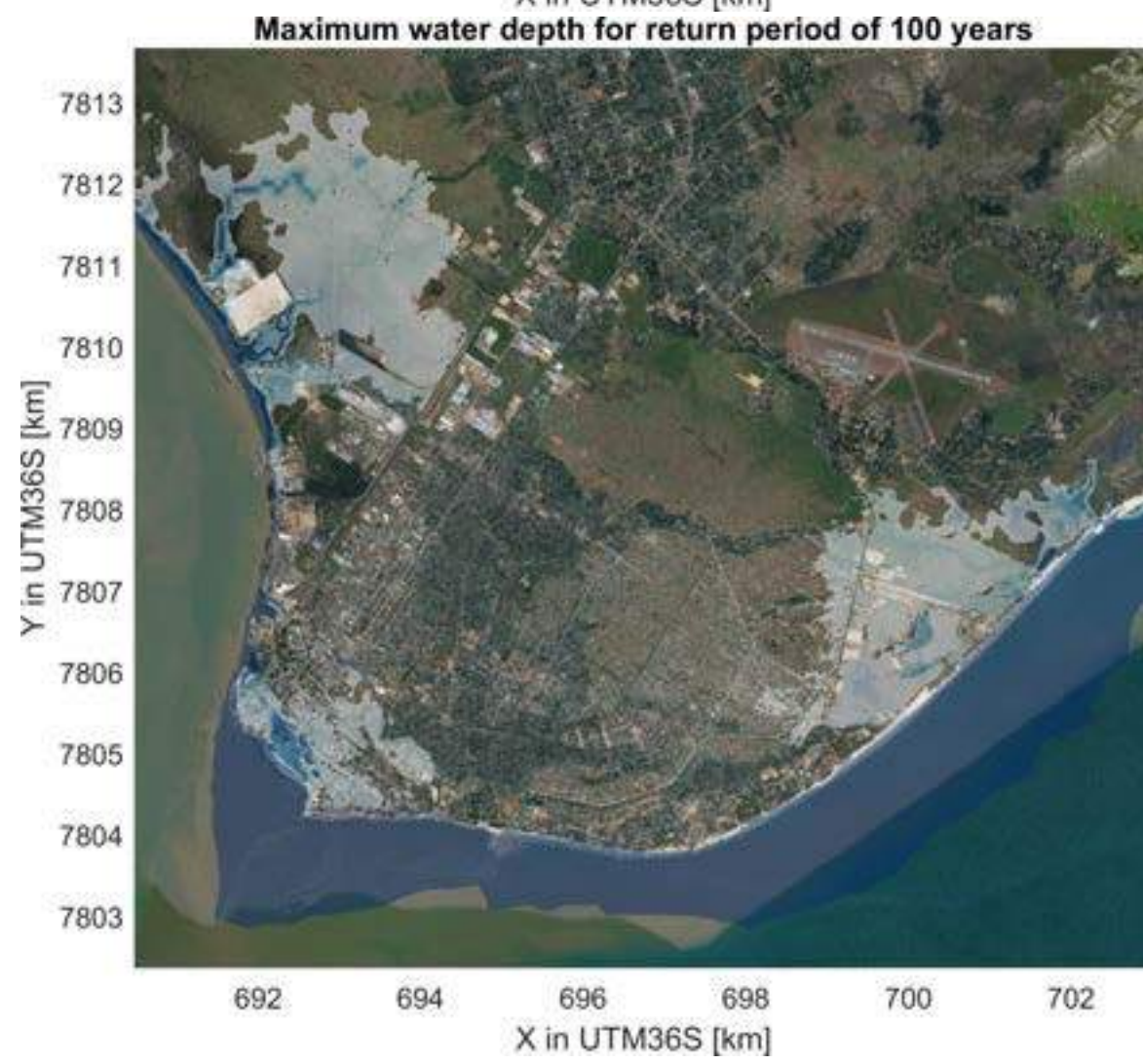
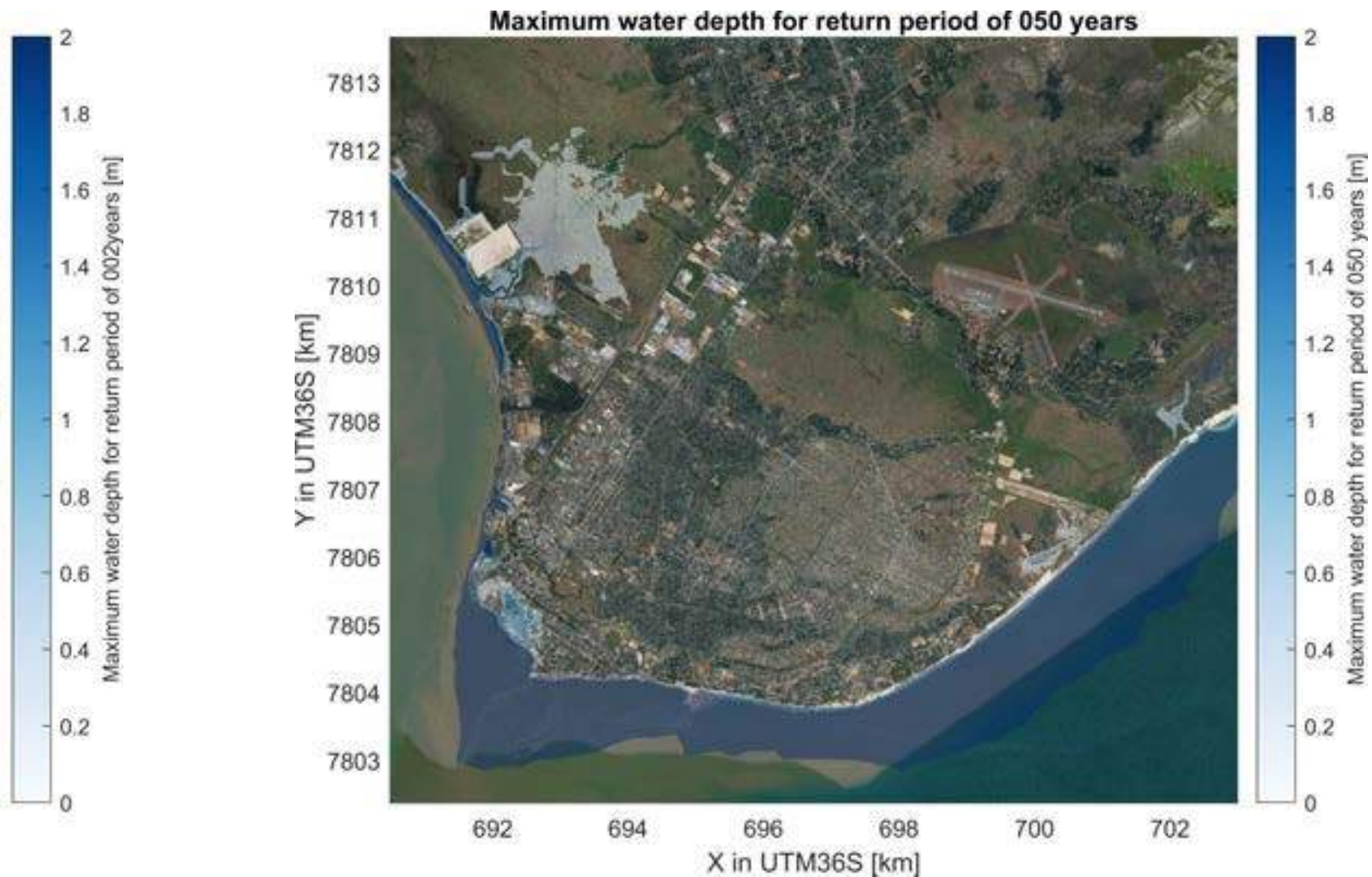
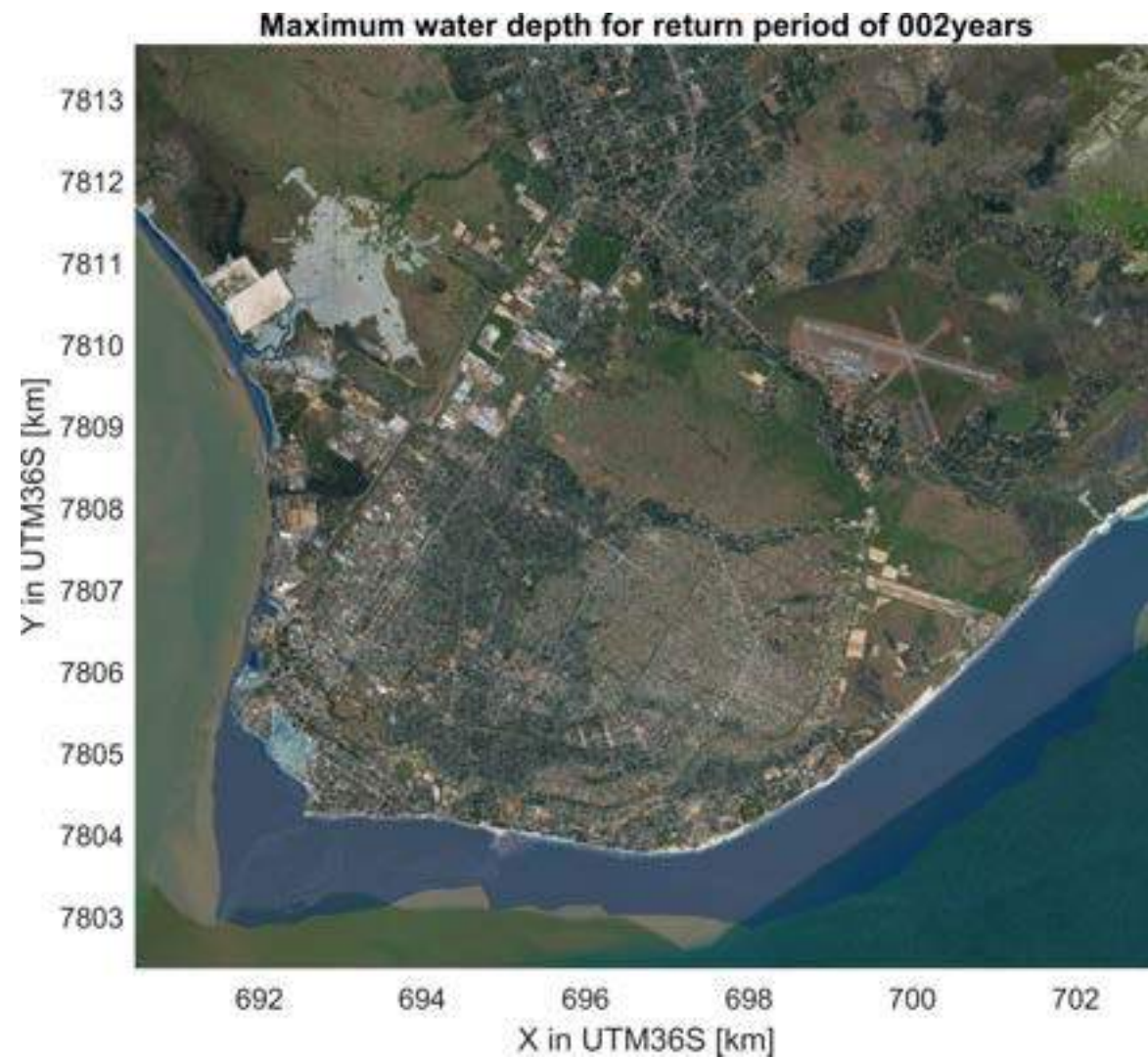
Project map coastal protection project



Coastal stretches 1-4



Present
climate (2020)



Coastal protection measures Beira

- Natural dune restoration with vegetation
 - Rock revetment
 - Simple flood wall/ L-wall
 - Repairs and strenghtening old seawall
 - Clay dike connecting to higher grounds
- Important generic measures:**
- *Early Warning System*
 - *Nursery and revegetation plan for coastal belt*
 - *Technisch Assistance/ capacity building O&M*



Ponta Gea Residential Beach

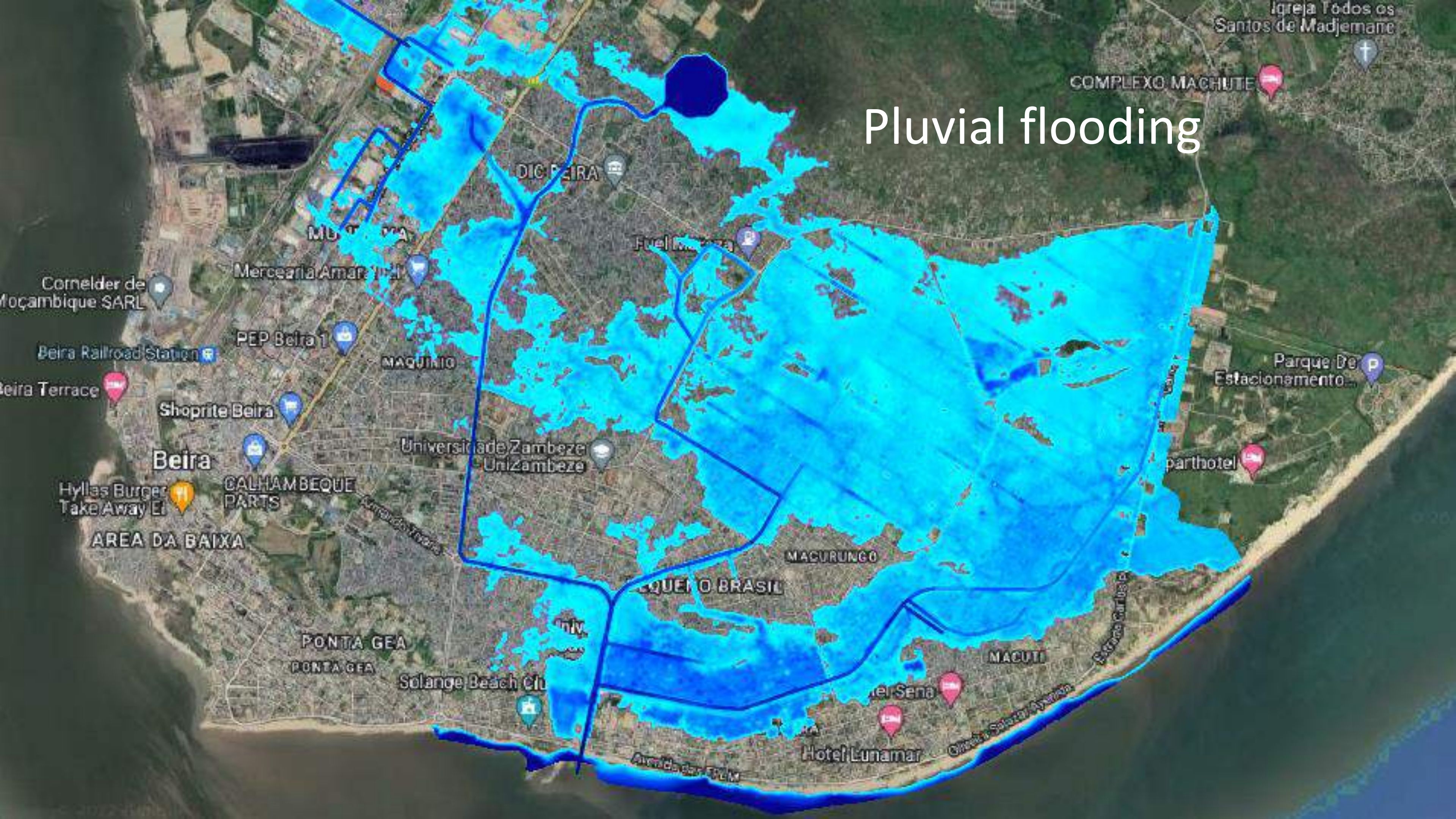


Potential reuse material from navigation channel

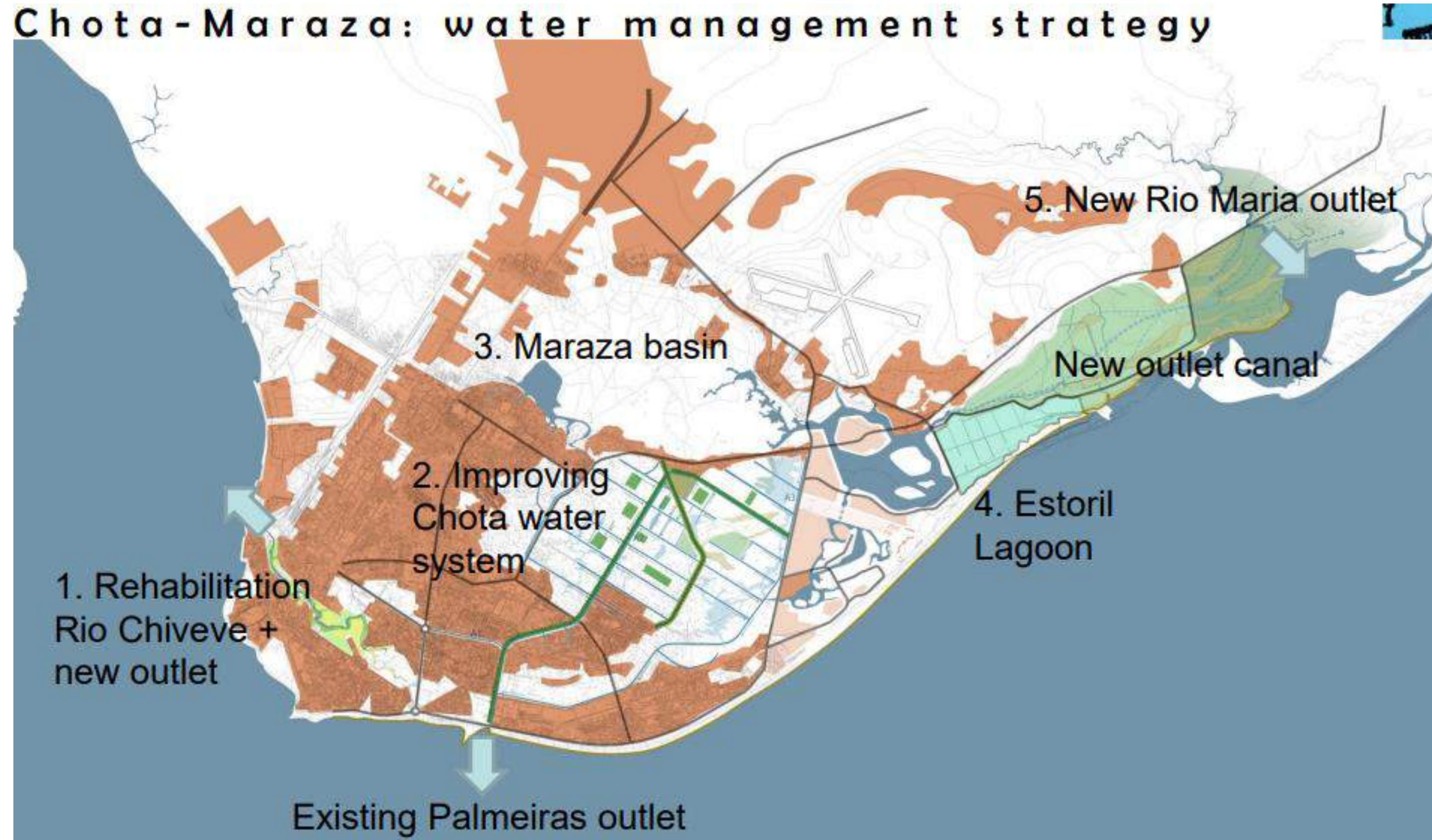
- Potential suggestion to dump sludge from navigation channel in foreshore Praia Nova, if pollution levels allow.
- Depending also on type and amount of sludge retrieved from navigation channel.
- Small embankments required to hold the sludge and allow settlement.
- Potential to make foreshore shallower with sludge material, could be beneficial to flora/ fauna development and /or stimulate mangrove growth. Mangrove growth can enhance robustness coastal protection system and reduce O&M costs.
- Business case needs further study however (how, costs, benefits).
- Situation of 1967 (See map) may be restored.



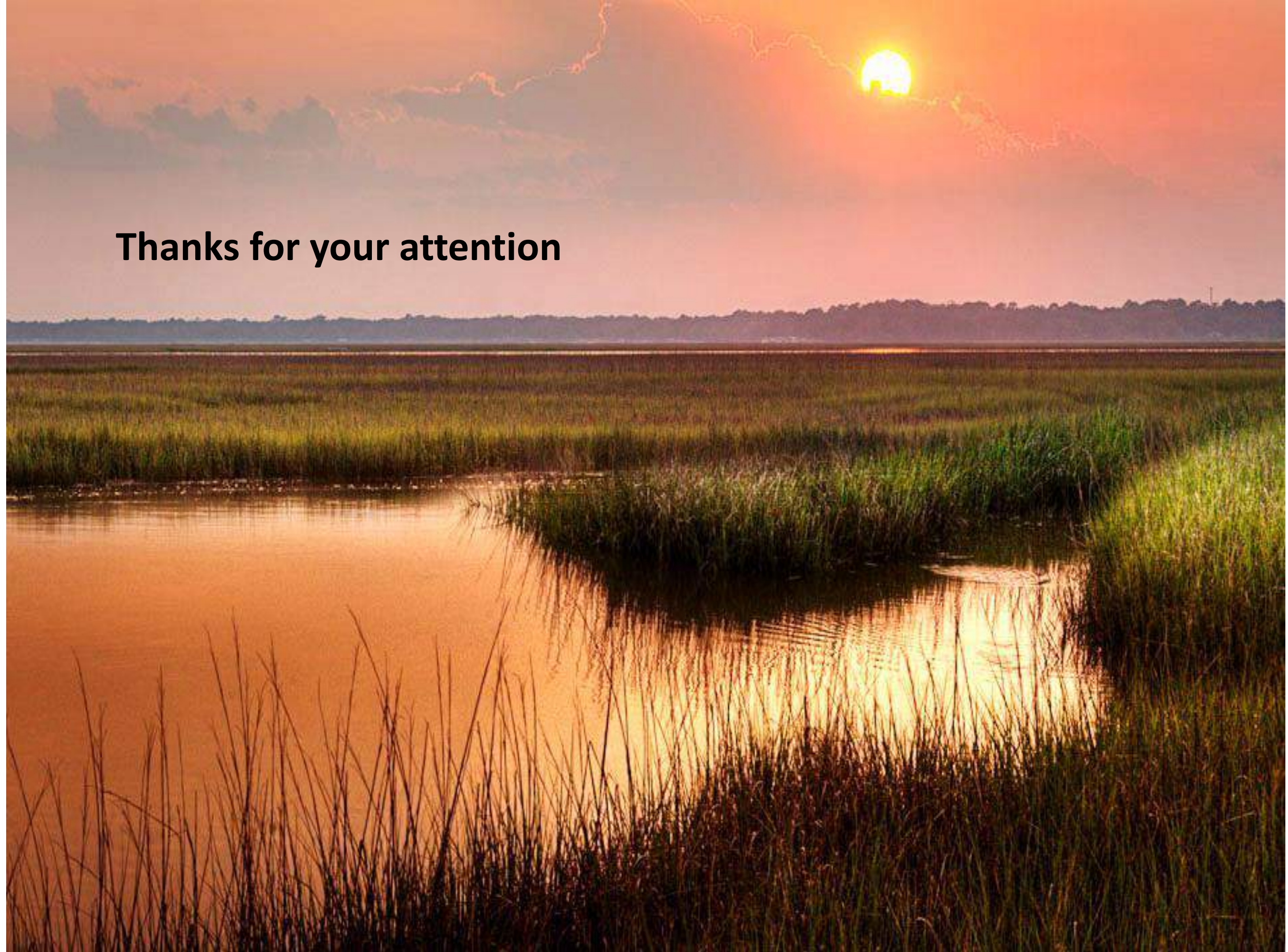
Pluvial flooding



Greeninfra4Beira (conceptual solution)



Thanks for your attention



PRESENTATION 2



MS. ILSE CAMINADA

Climate Adaptation Engineer

Van Oord Dredging and
Marine Contractors



**AFRICA 20
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Innovation for Resilient Growth

Climate Adaptation for Future-proof Coastlines

Ilse Caminada

28 June 2022

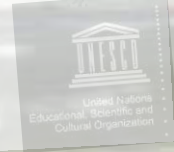
Senegal's old capital on the frontline against rising sea

African countries spending billions to cope with climate crisis

Report says average 4% of GDP will be spent on adapting to climate breakdown, risking deeper poverty

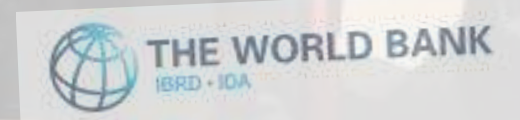
African Heritage Sites threatened by coastal flooding and erosion as sea-level rise accelerates

Ghana's coastline, swallowed by the sea



PUBLICATION | MARCH 14, 2019

West Africa's Coast: Losing Over \$3.8 Billion a Year to Erosion, Flooding and Pollution



Climate Adaptation for Future-proof Coastlines

Coastal Zone Degradation is a large problem

West Africa's coastal areas host about **one third** of the region's **population** and generate **56%** of its **GDP**.

According to a new World Bank study, **environmental degradation** in the coastal areas of Benin, Côte d'Ivoire, Senegal, and Togo **cost \$3.8 billion**, or 5.3% of the four countries' GDP in 2017.

Beyond the economic cost, **coastal degradation takes lives and destroys livelihood**

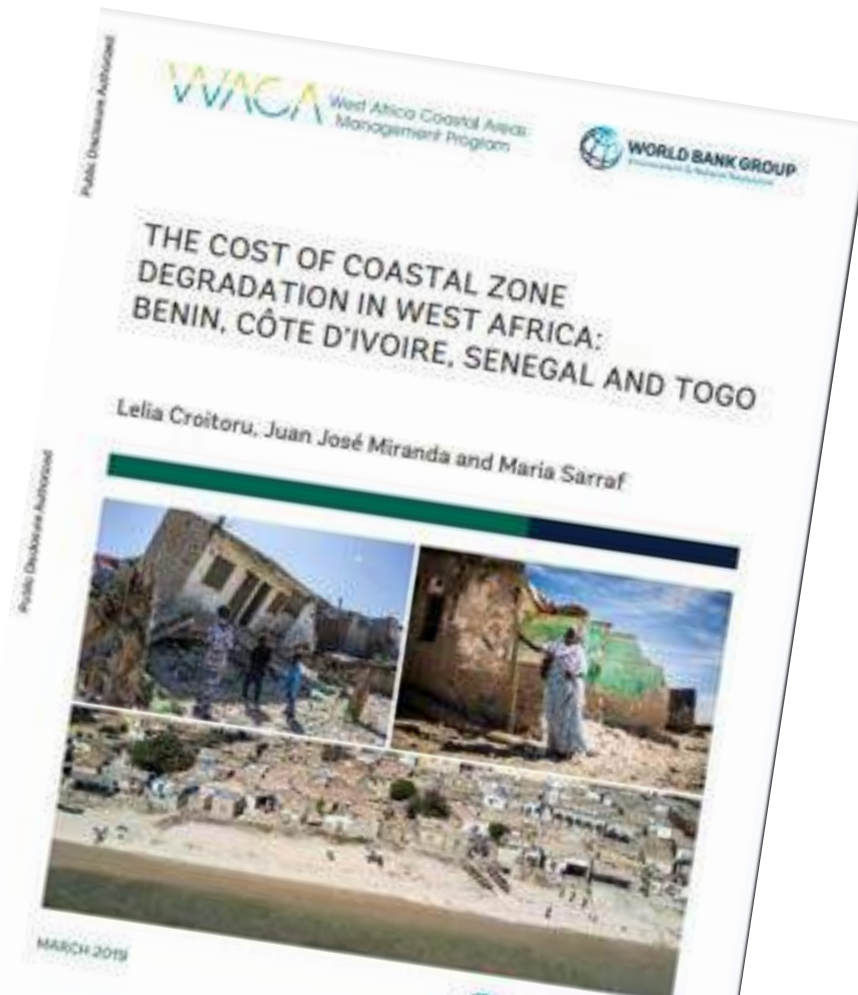
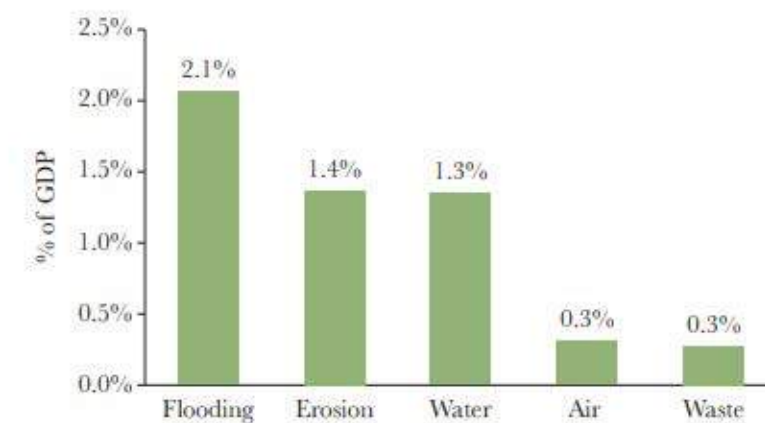


FIGURE 1: ESTIMATED COED BY CATEGORY, 2017



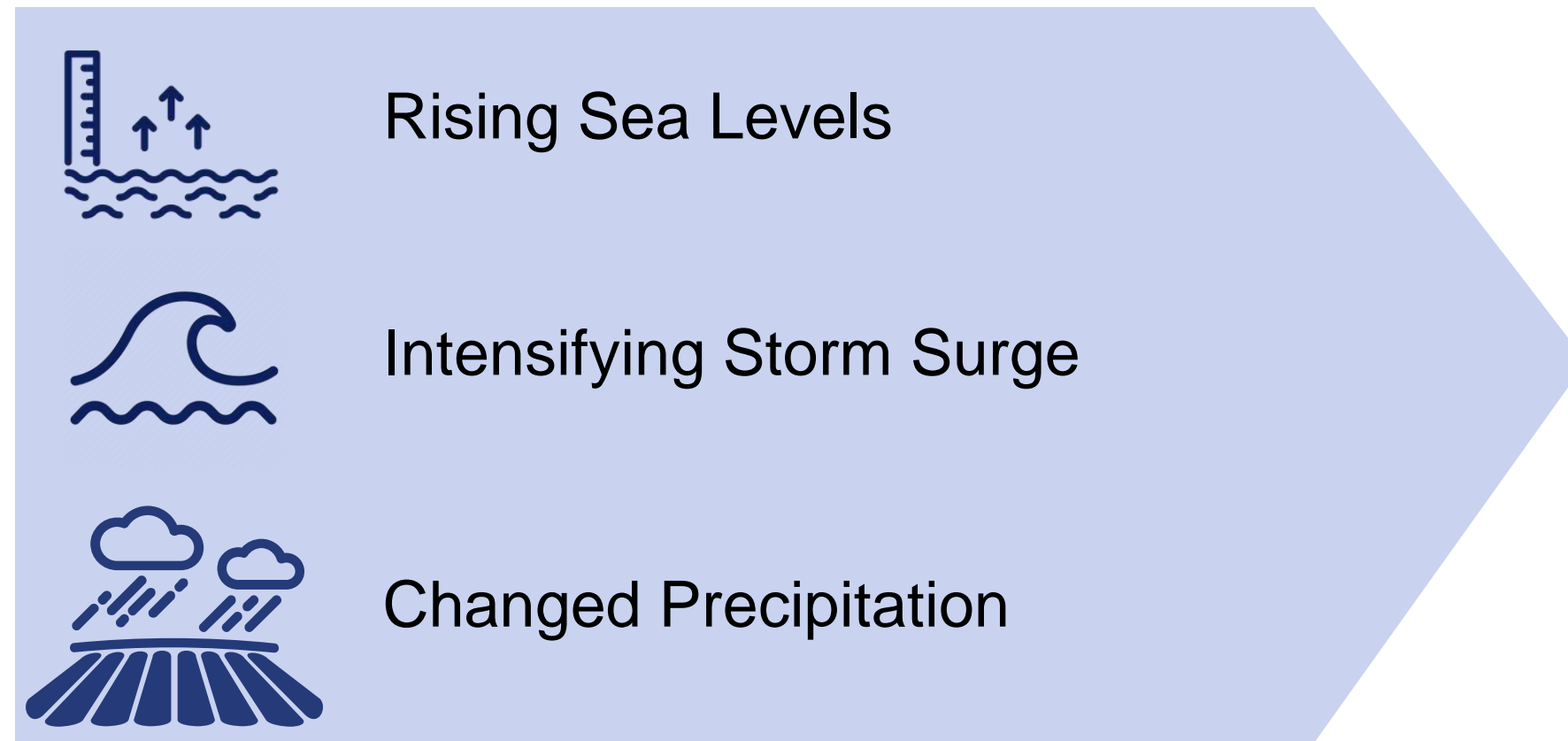
Source: World Bank estimates

Photo Credit: World Bank/Vincent Tremblay



Climate Adaptation for Future-proof Coastlines

Climate Change causes problems in coastal areas



- Erosion
- Flooding
- Loss of natural ecosystems
- Loss of resources

*The socioeconomic impacts are massive, because coastal areas are **home to millions** of people and **billions of dollars of infrastructure**.*

(WACA, World Bank Group)

Climate Adaptation Action Plan

1



**Climate
Risk Overview**

2



**Climate
Adaptation Solutions**

3



**Climate Adaptation
Action Coalitions**

Climate Adaptation for Future-proof Coastlines

Climate Adaptation Solutions – T-shape groynes and offshore breakwaters



Climate Adaptation for Future-proof Coastlines
Climate Adaptation Solutions – **Integrated nature in coastal defence**



Climate Adaptation for Future-proof Coastlines
Climate Adaptation Solutions – **Mangrove restoration**

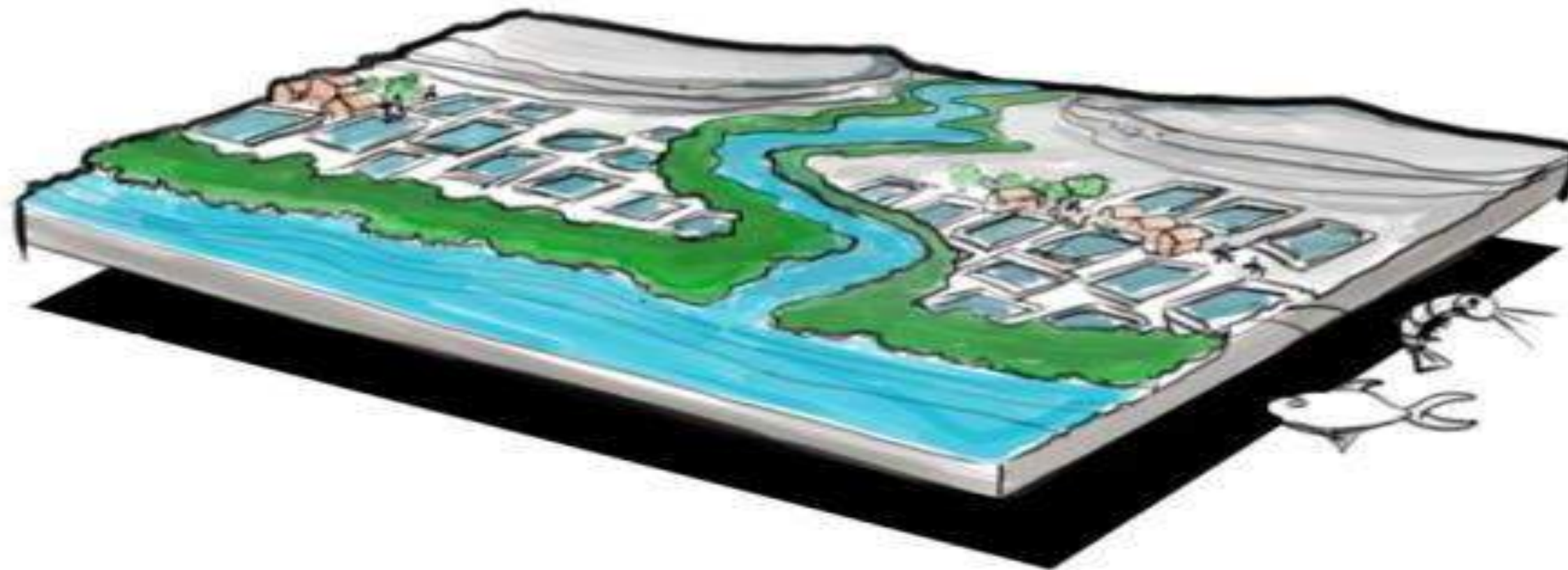


Climate Adaptation for Future-proof Coastlines
Sustainable way to design and execute coastal protection projects

Start from the system....

.....analyse.....

.....and then think of opportunities.



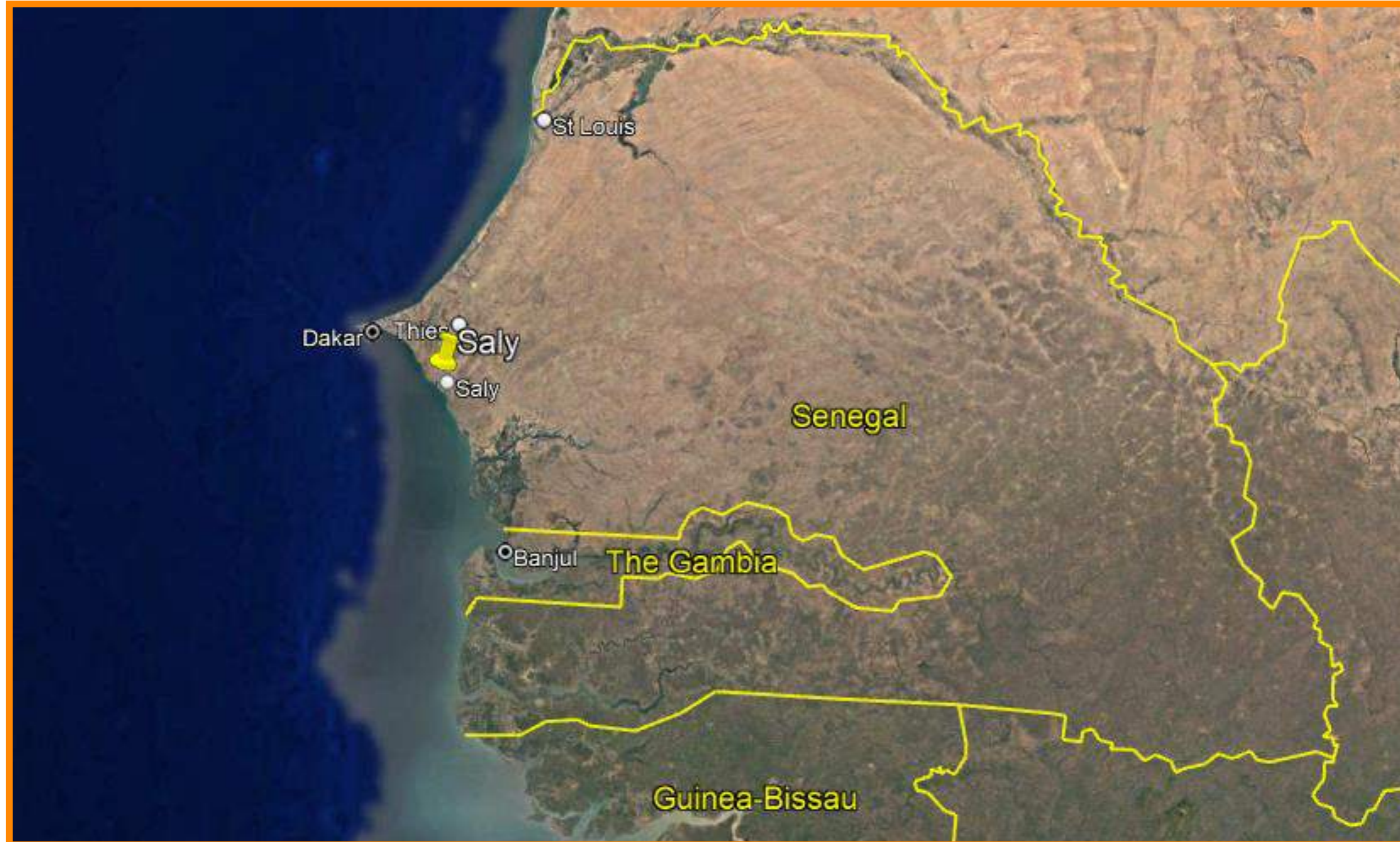
Understand the system

Local materials

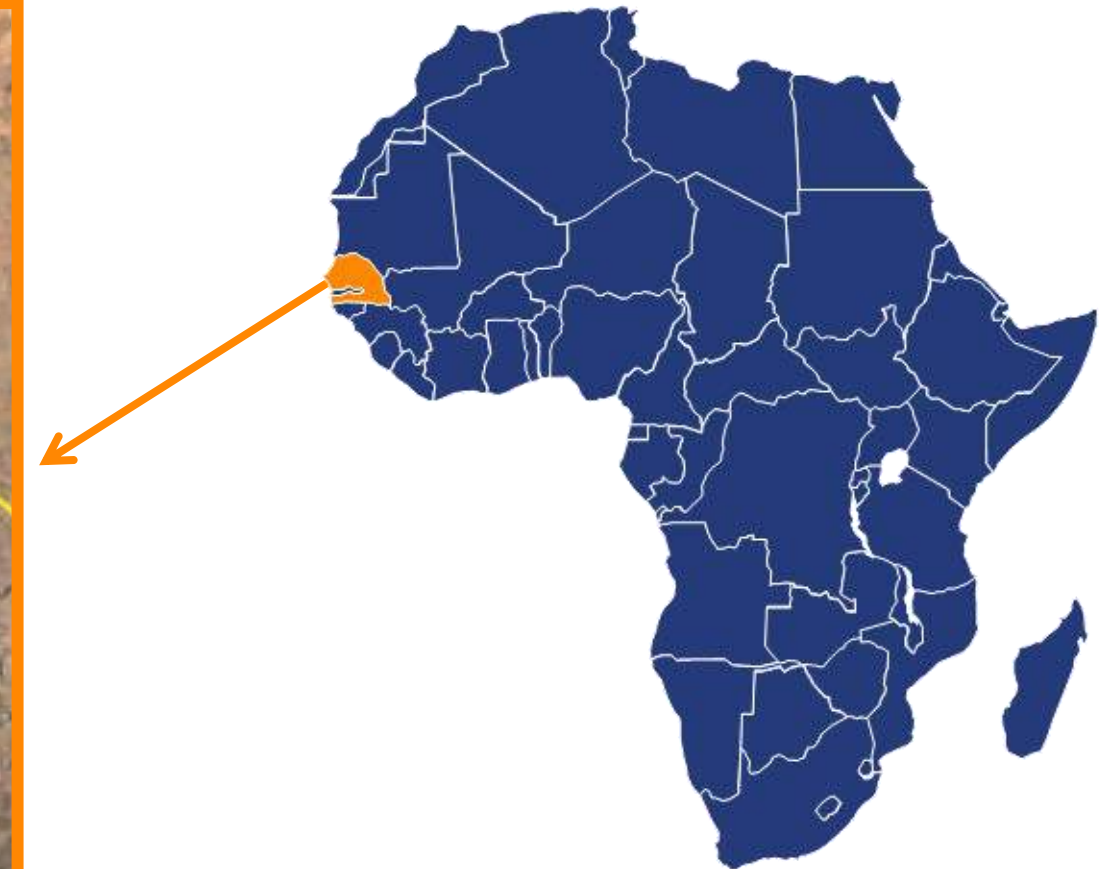
Provide value for the area

Climate Adaptation for Future-proof Coastlines

Example project – Saly, Senegal



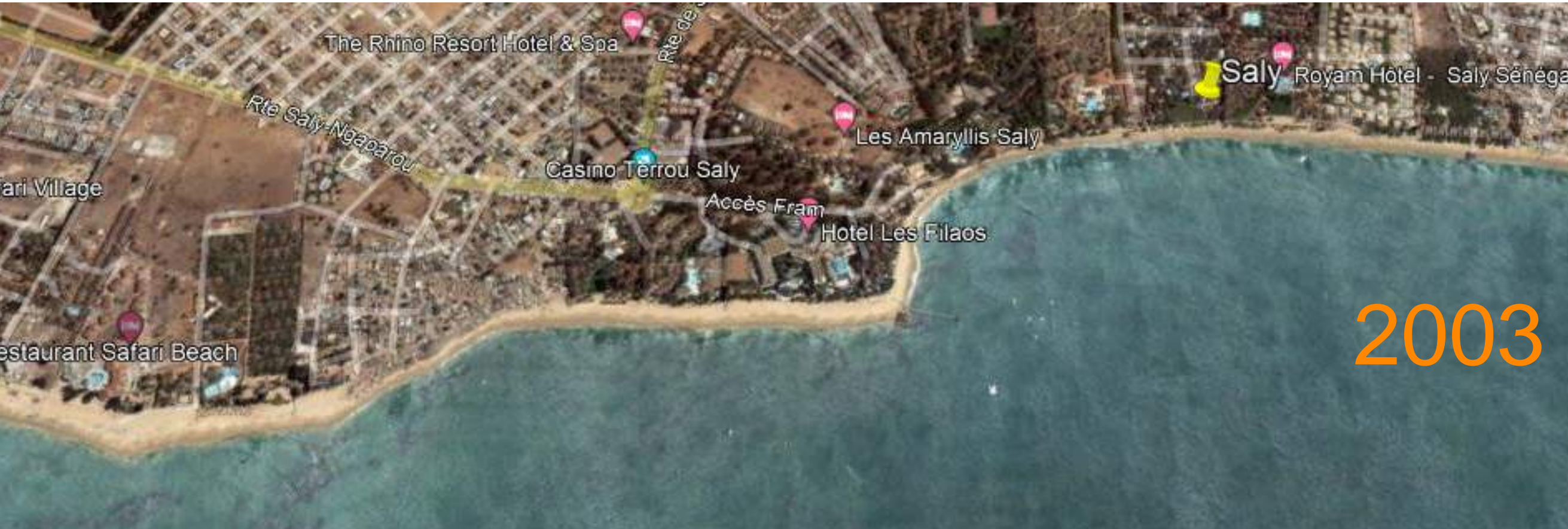
Senegal - Africa



- Coastal town south of Dakar
- 20,000 inhabitants
- Fishermen
- Local economy driven by tourism

Climate Adaptation for Future-proof Coastlines

Example project – Saly, Senegal



Climate Adaptation for Future-proof Coastlines

Example project – Saly, Senegal



Climate Adaptation for Future-proof Coastlines

Example project – Saly, Senegal

- Recovery of beach **tourism**
- **Safe harbour** for fishermen
- Safeguard homes and livelihoods

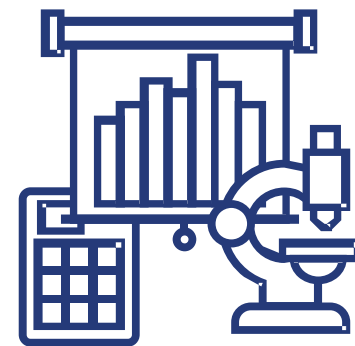
- Value creation by protecting the coast from erosion



Climate Adaptation for Future-proof Coastlines
Collaboration is key to successful Climate Adaptation projects



Climate
Adaptation
Action Alliance



Knowledge
Development



Local
Authorities and
Communities



Collaboration on all levels from financing to project implementation



www.vanoord.com/en/sustainability



CRO: climaterisk.data.vanoord.com



www.linkedin.com/in/ilsecaminada



Climate Adaptation: vimeo.com/629939426
Saly Coastal Protection: vimeo.com/378555155
Saly True Value: vimeo.com/524257688

Stay in touch with Van Oord

Climate Adaptation Africa



Ilse Caminada

Engineer – Climate Adaptation



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Schaardijk 211, 3063 NH Rotterdam
The Netherlands*



Ilse.Caminada@vanoord.com



Mobile: +31 6 21902469



www.vanoord.com

Van Oord



Marine ingenuity

PRESENTATION 3



MR. FRANK ANNOR

CEO

**Trans-African Hydro-
Meteorological Observatory
(TAHMO)**



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Climate Resilient Development: The TAHMO Perspective



Enhancing Sustainable Climate Services with Cost-Effective Technological Innovations

**Frank Annor, Prof. Nick van de Giesen,
Prof. John Selker & Dr. Hessel Winsemius**
annorfrank@tahmo.org



METER

TAHMO Core Team & Goals

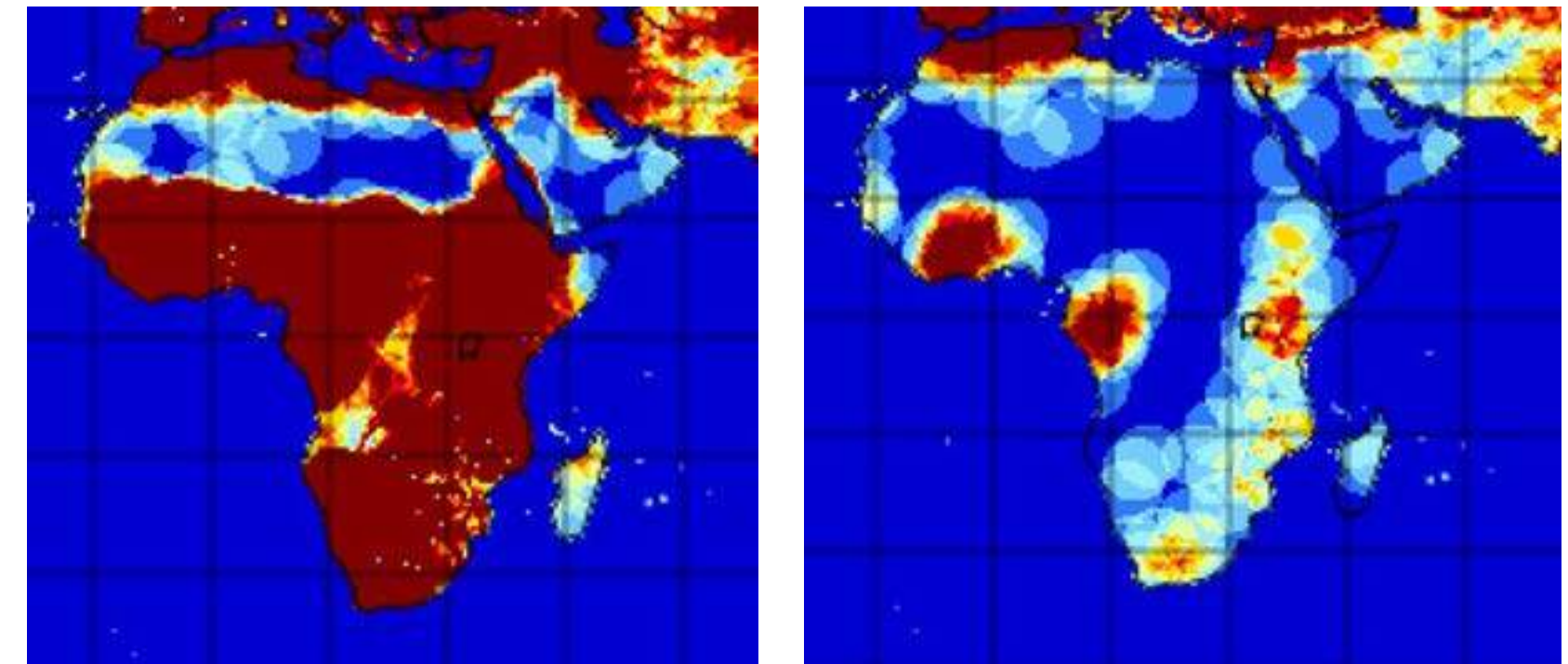
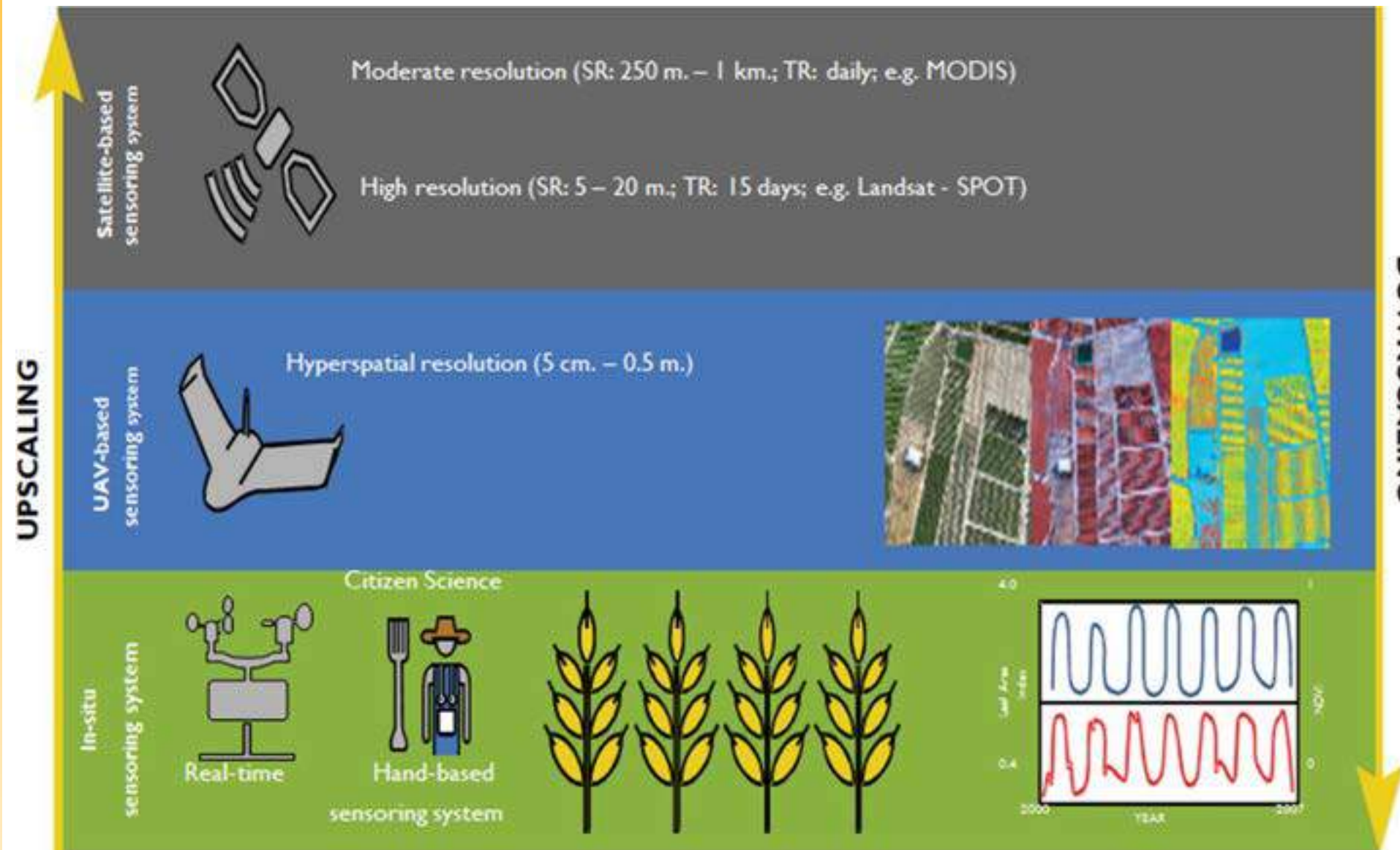


- 1 weather station every 30km!
- Provide educational material (School2School)
- Hydro-Climatic data for Governments and Academia

Operations in 23 Countries - 650+ stations

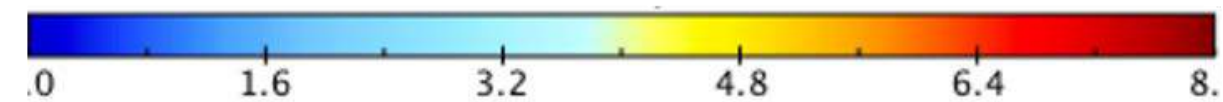


Climate Services - Our Motivation



1955

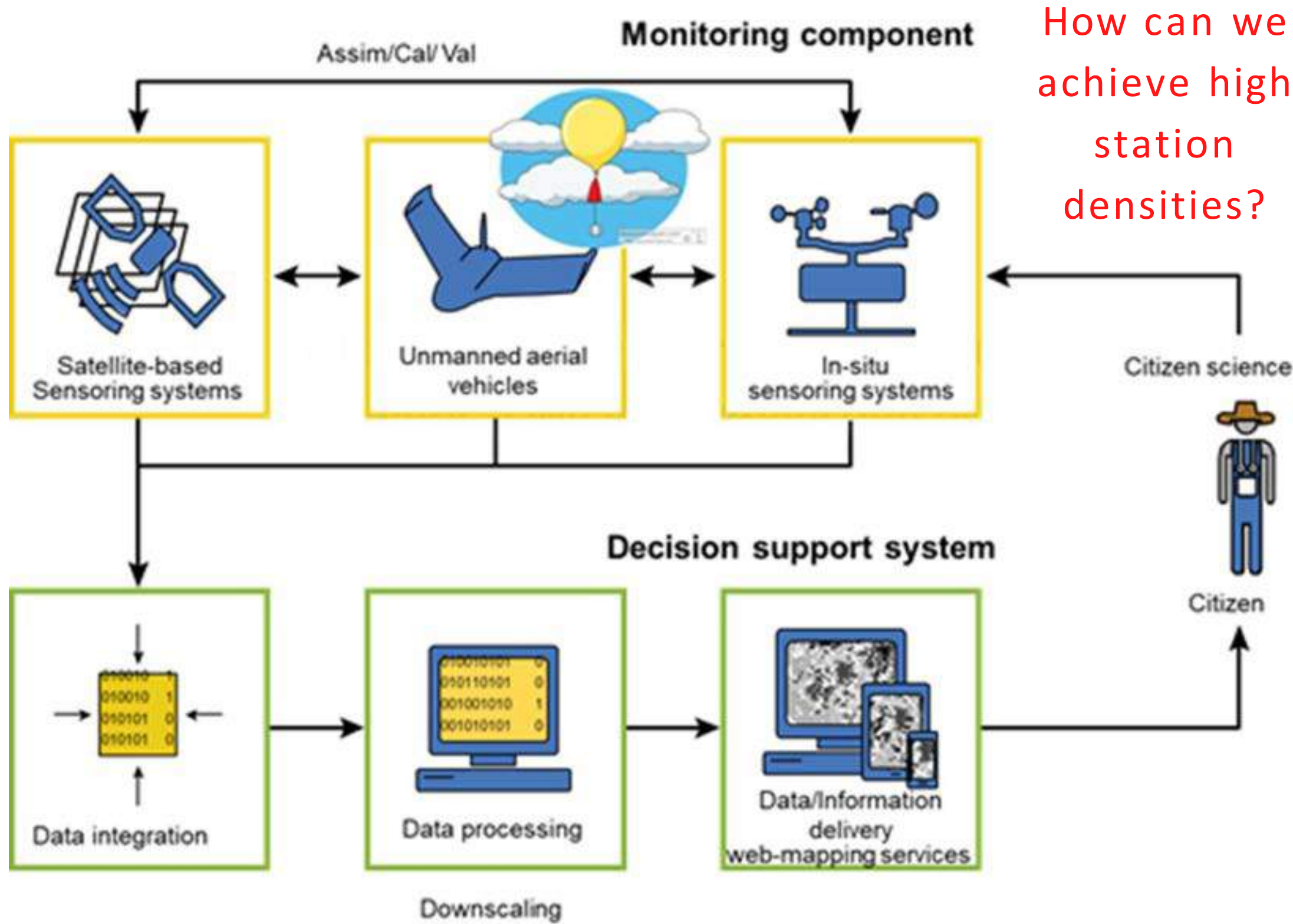
2015



Stations reporting per 1,000,000 km²

Univ. East Anglia

Climate Services - Data Integration



How can we achieve high station densities?



Four elements of Effective Early Warning Systems*



*Adapted from UN International Strategy for Disaster Reduction

Sensors - Data Integration ...1



IJINUS Sensor



TAHMO ATMOS41 AWS



RQ30 Radar Sensor



CR310 Data Logger



Foscam IP Camera



© Hikvision

Sensors - Data Integration ...1

Home / News / Earth / Technology
 TECHNOLOGY NEWS 15 December 2015

Sensors to give early storm warnings to people near deadly lake

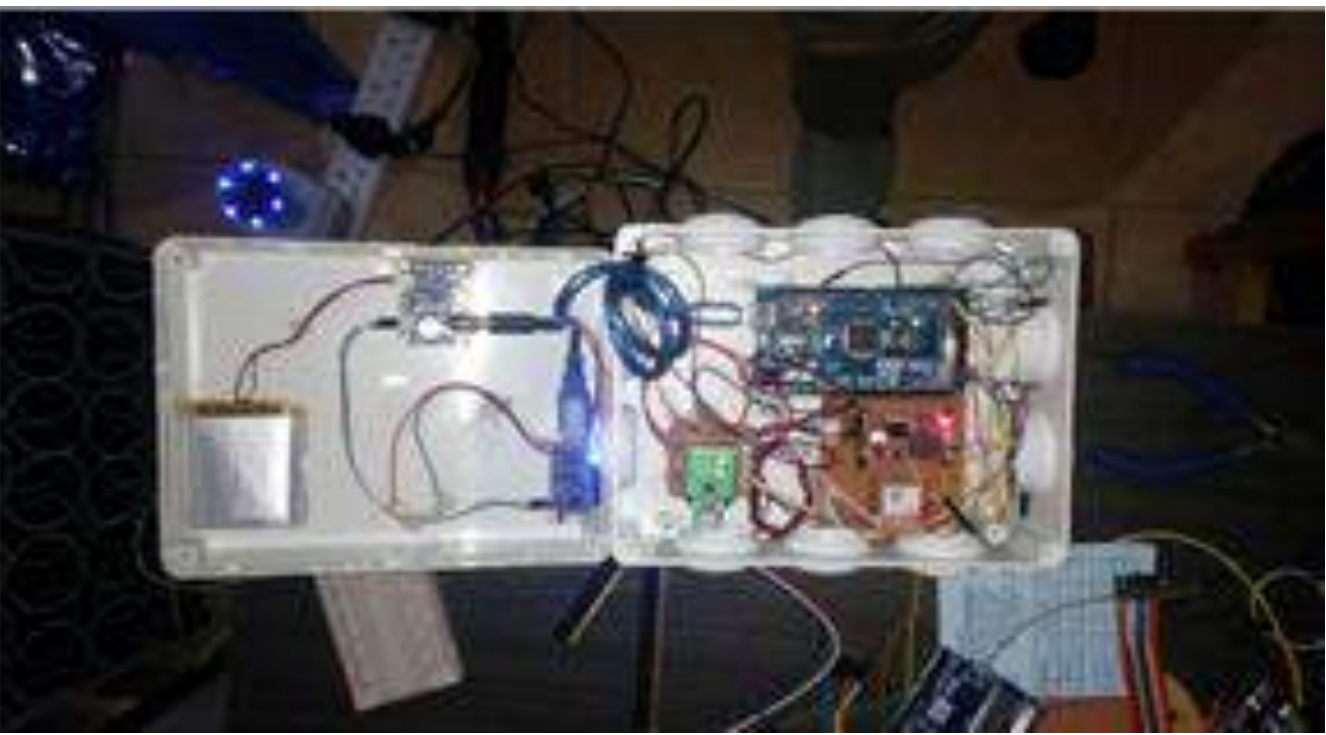
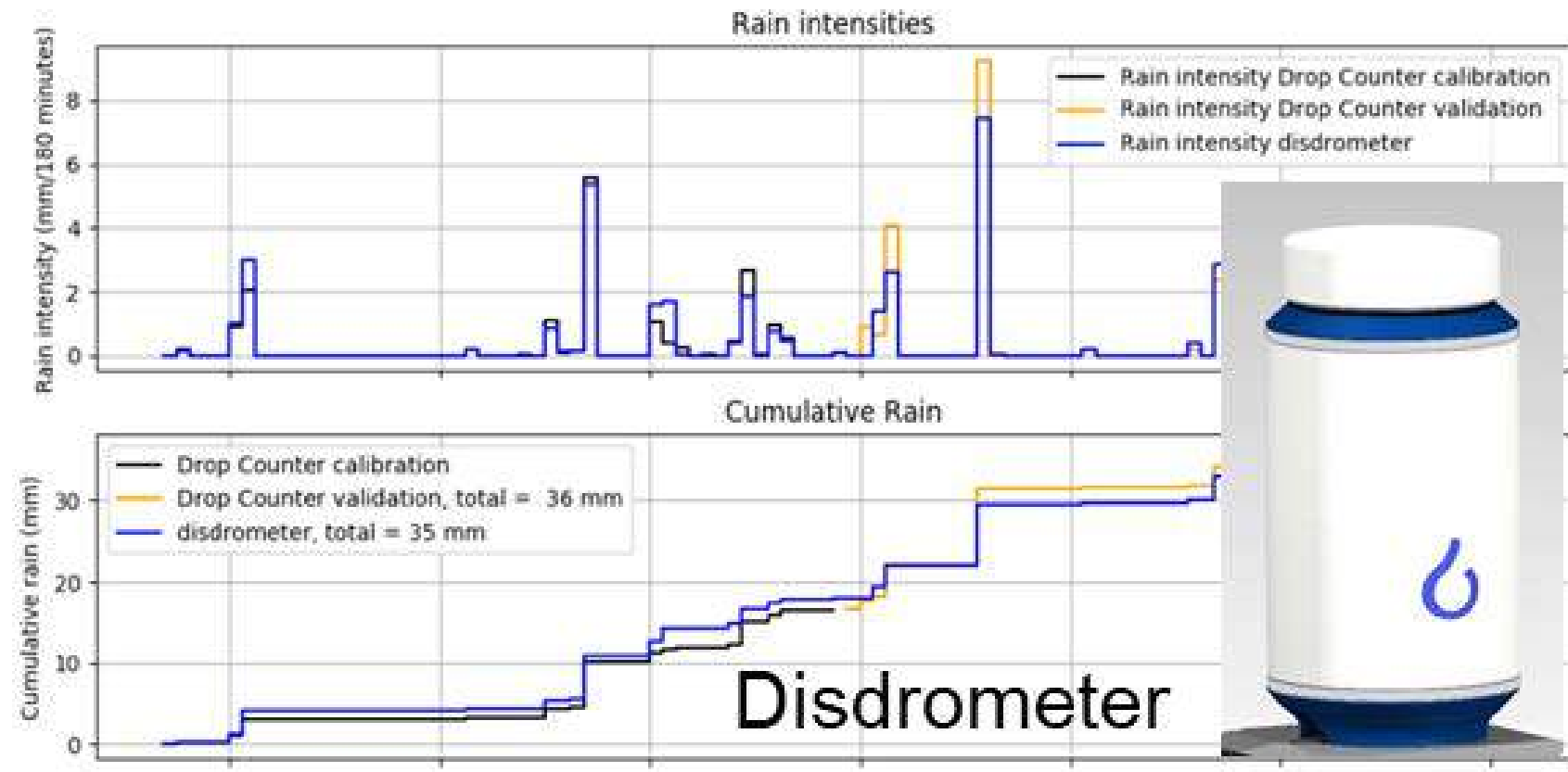
An automated SMS network could help save lives on Lake Victoria - where 4000 people drown every year amid near-constant storms



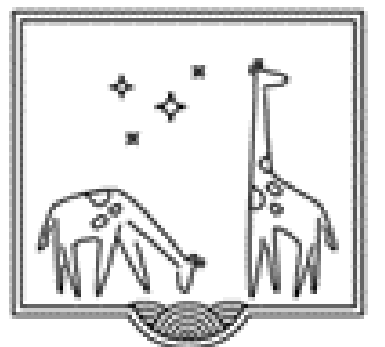
By Hal Hodson
 OVER Lake Victoria, one of the largest bodies of fresh water on the planet, the weather can be treacherous. More than 4000 people drown in this east African lake every year as storms overwhelm their boats.
 "There are 285 days of lightning a year in [the nearby Ugandan city of] Kampala - just one day without lightning every week," says Frank Annor, field director of the Trans-

Advertisement

SPECIAL REPORT
EPISTEMOLOGY
 The science of knowledge itself
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AS3935 - Lightning



TWIGA



Sensors - Data Integration ...111



GNSS Rover



Dumpy Level



River Surveyor M9 ADCP



Some Challenges in instrumentation in Africa



Installations



RQ 30 Radar



Ijinus Sensor



Installation /Configuration Challenges



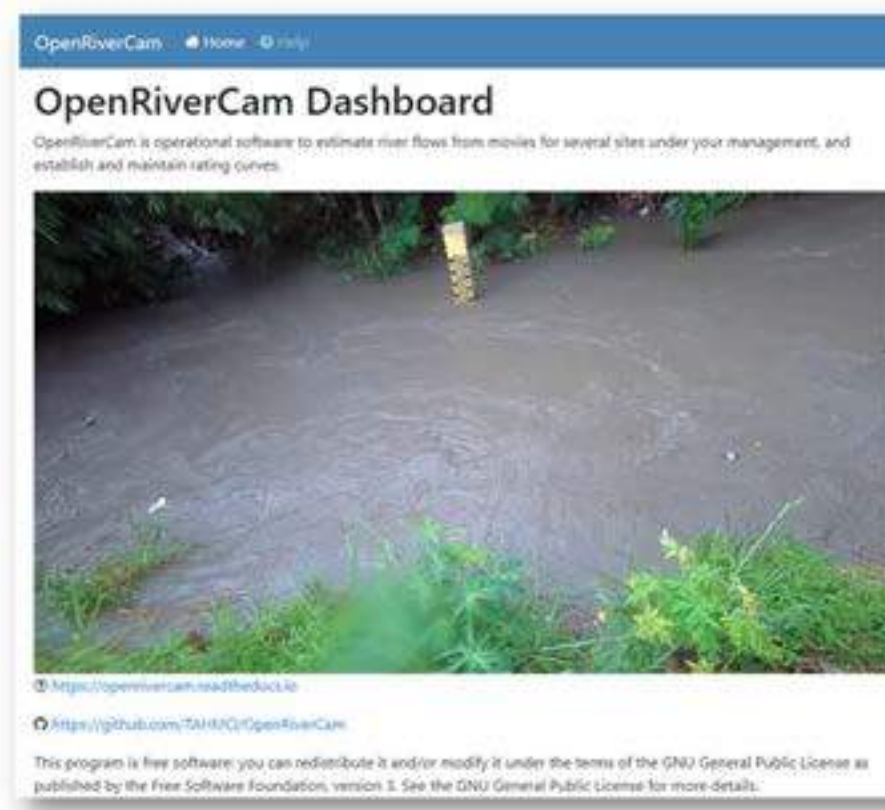
Installation Challenges



Staff Development & Training - e.g. from Tanzania



- Van Dorn Water Sampler
- GNSS Rover
- ADCP & Bathymetry
- TAHMO Stations
- Sediment Sampling Protocol
- OpenRiverCam



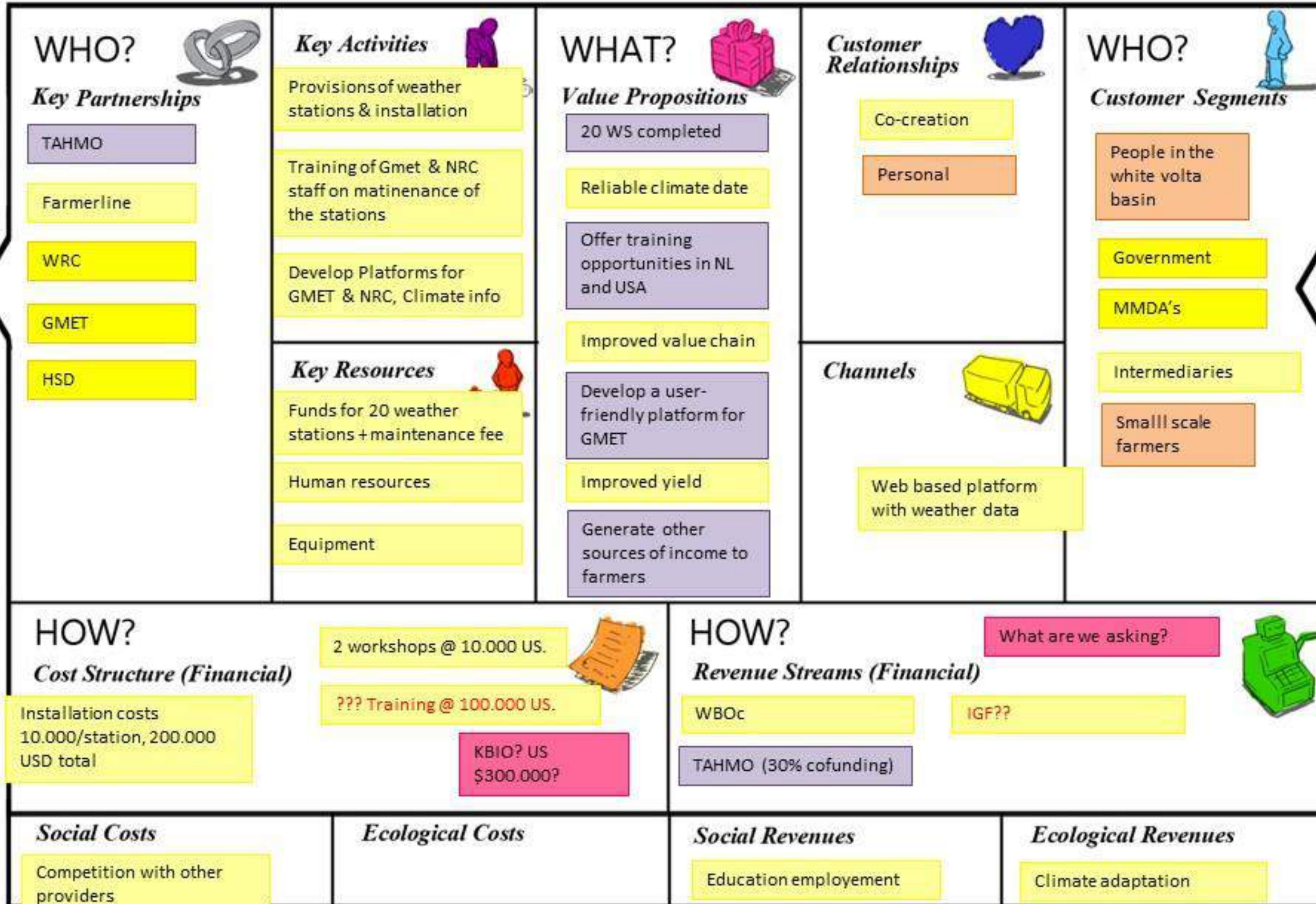
TAHMO - GMET



<https://portal.tahmo.org/login>



https://tahmo.org/docs/TAHMO_API_documentation_latest.pdf

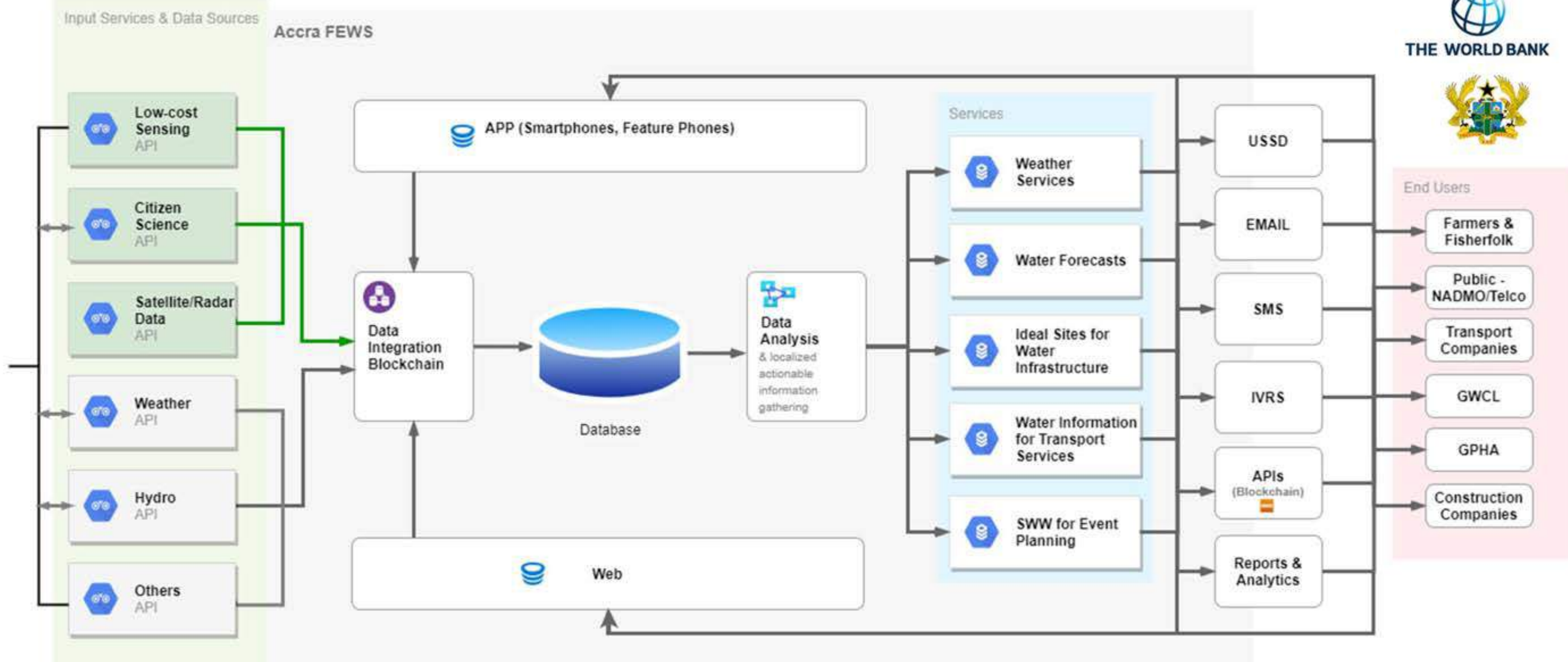


Connecting to Services

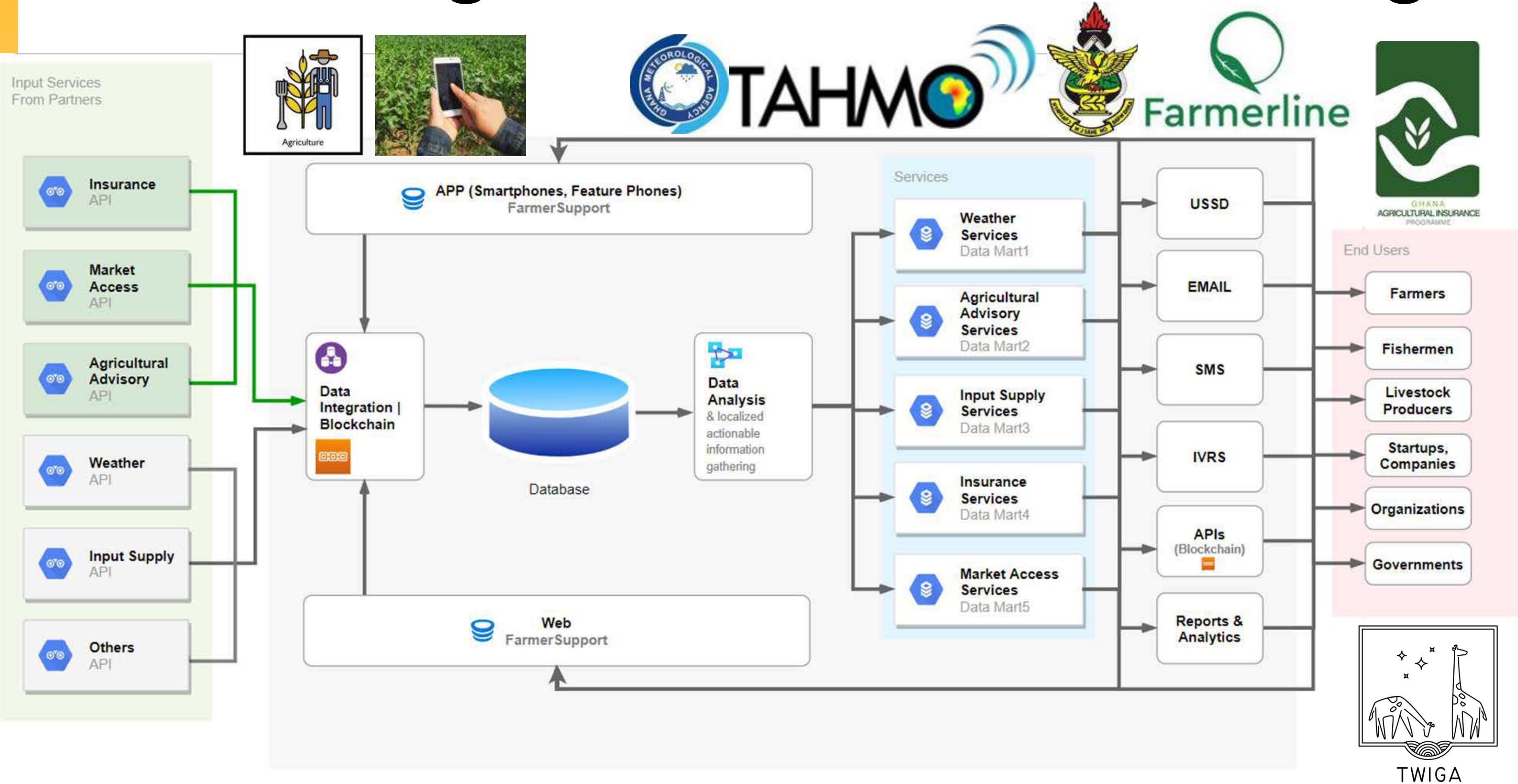


Architecture: Accra FEWS - customized and operational water information dashboards for GAR

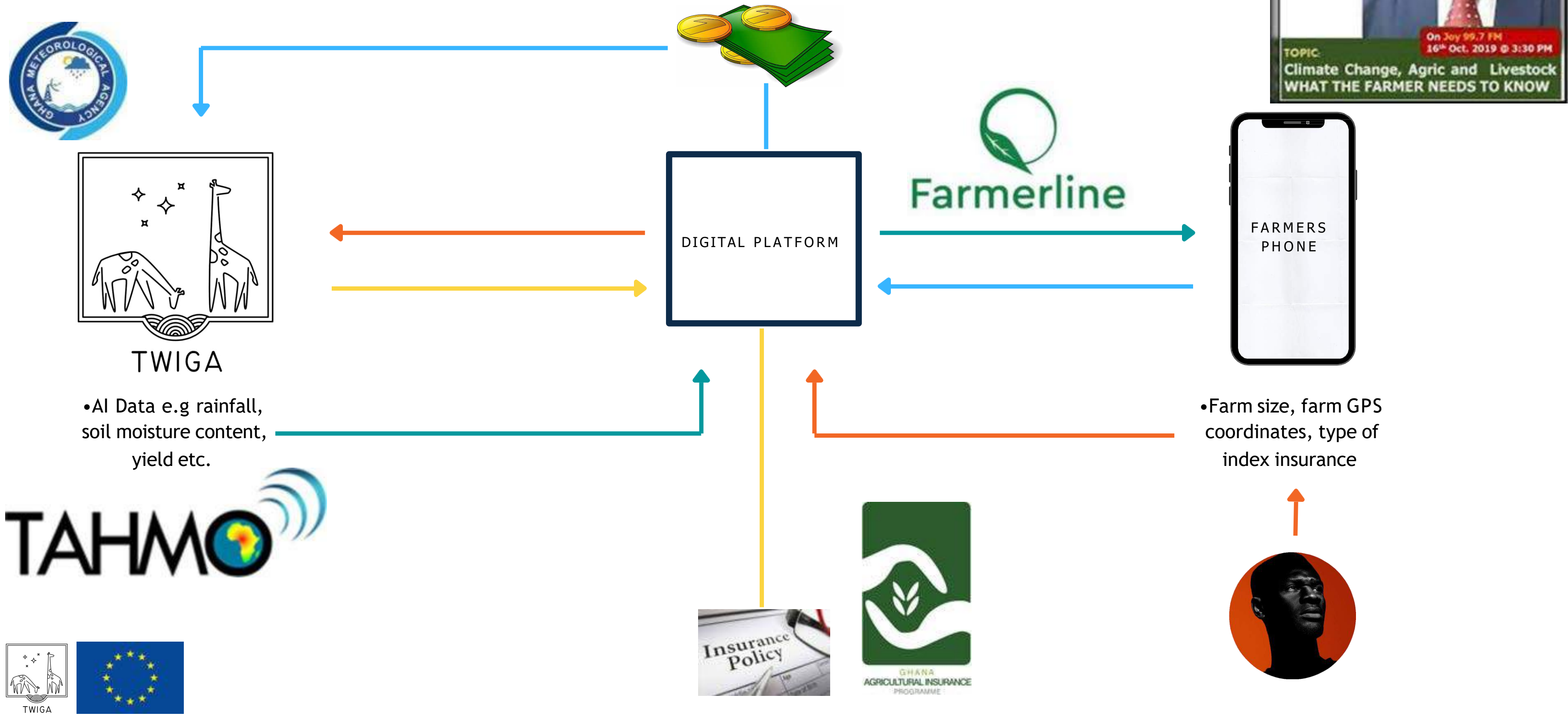
Continuous calibration and validation of model output



Connecting to Services - Bundling



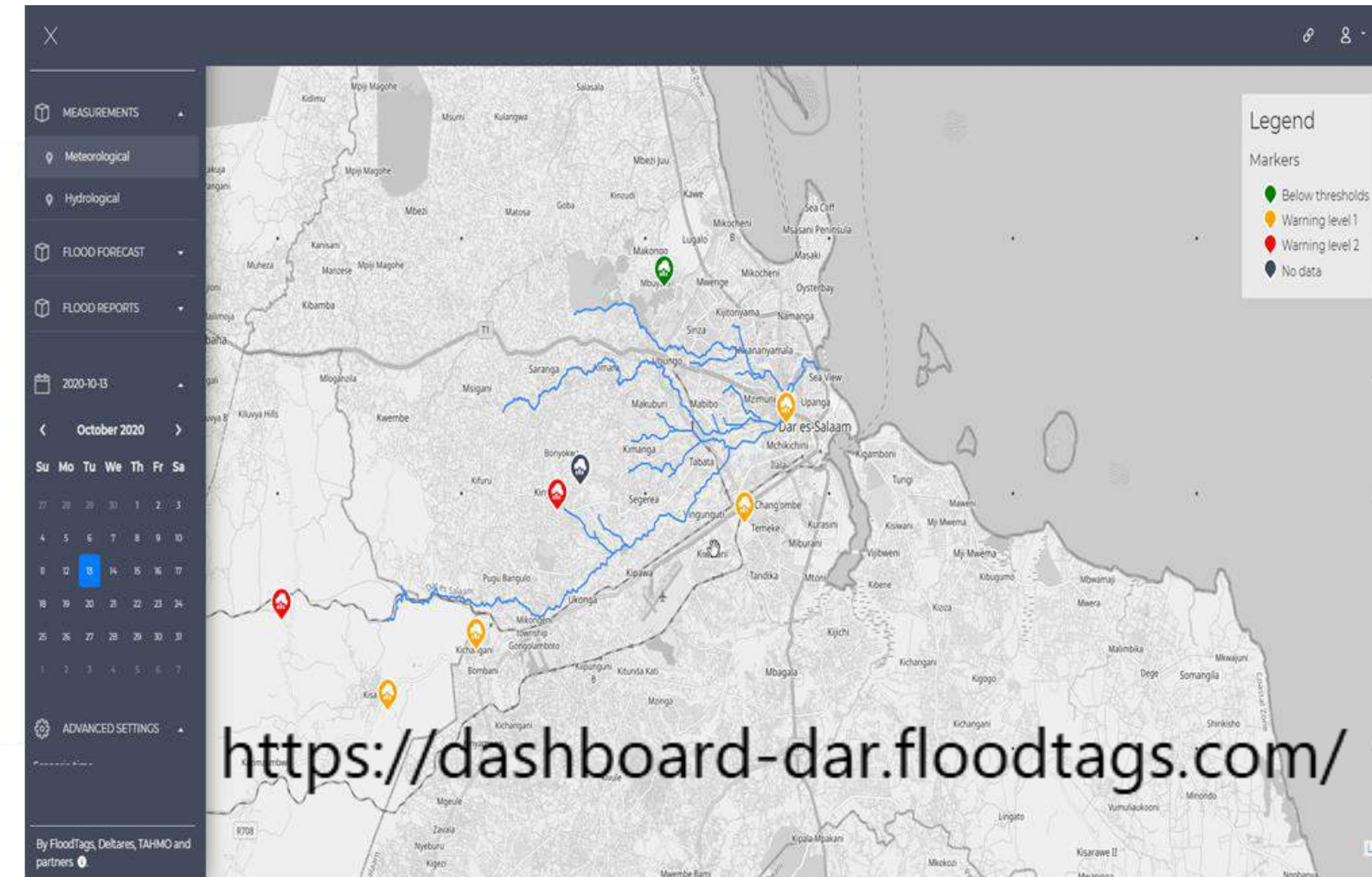
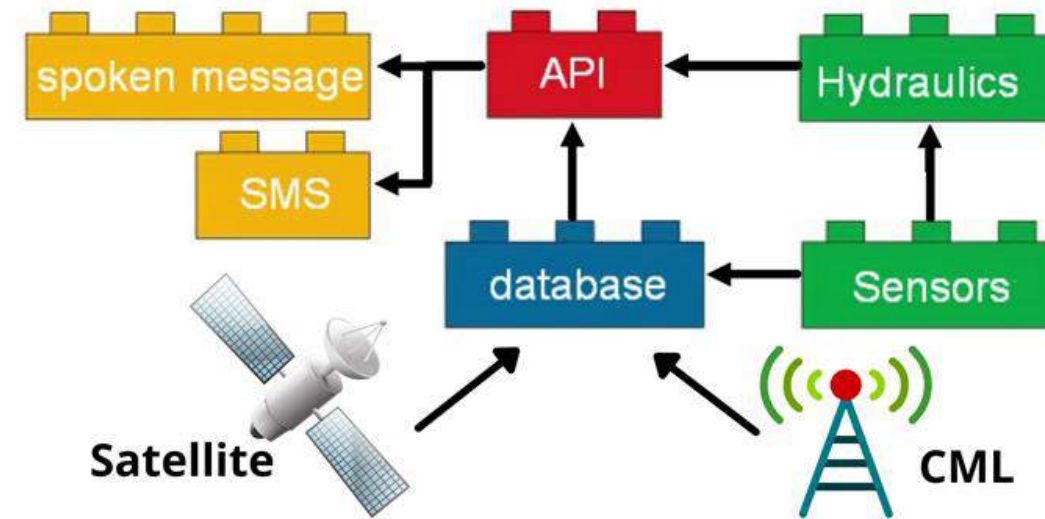
Digital Platform for Insurance



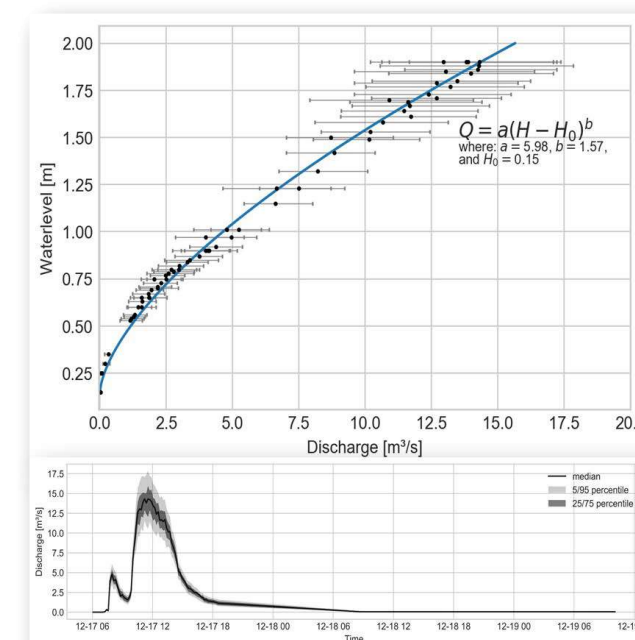
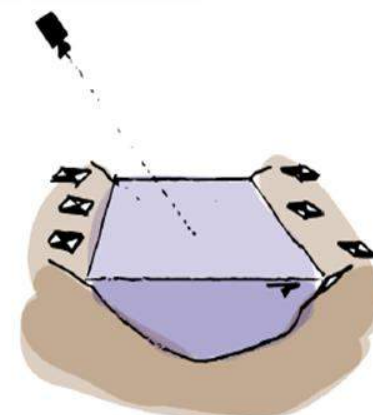
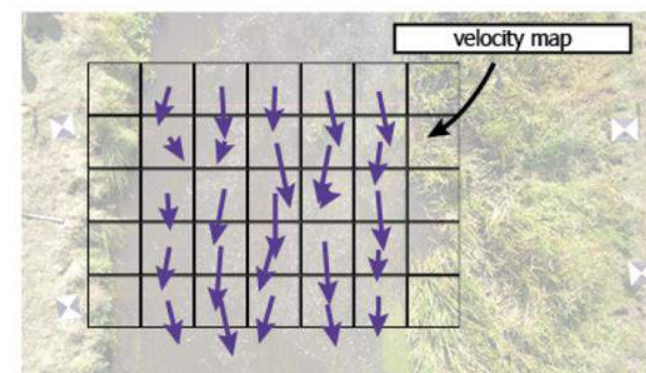
Flood Early Warning Systems

Working with local people,
local Knowledge
& local devices

TAHMO Solution: Lego-ization of FEWS elements



<http://openrivercam.readthedocs.io>

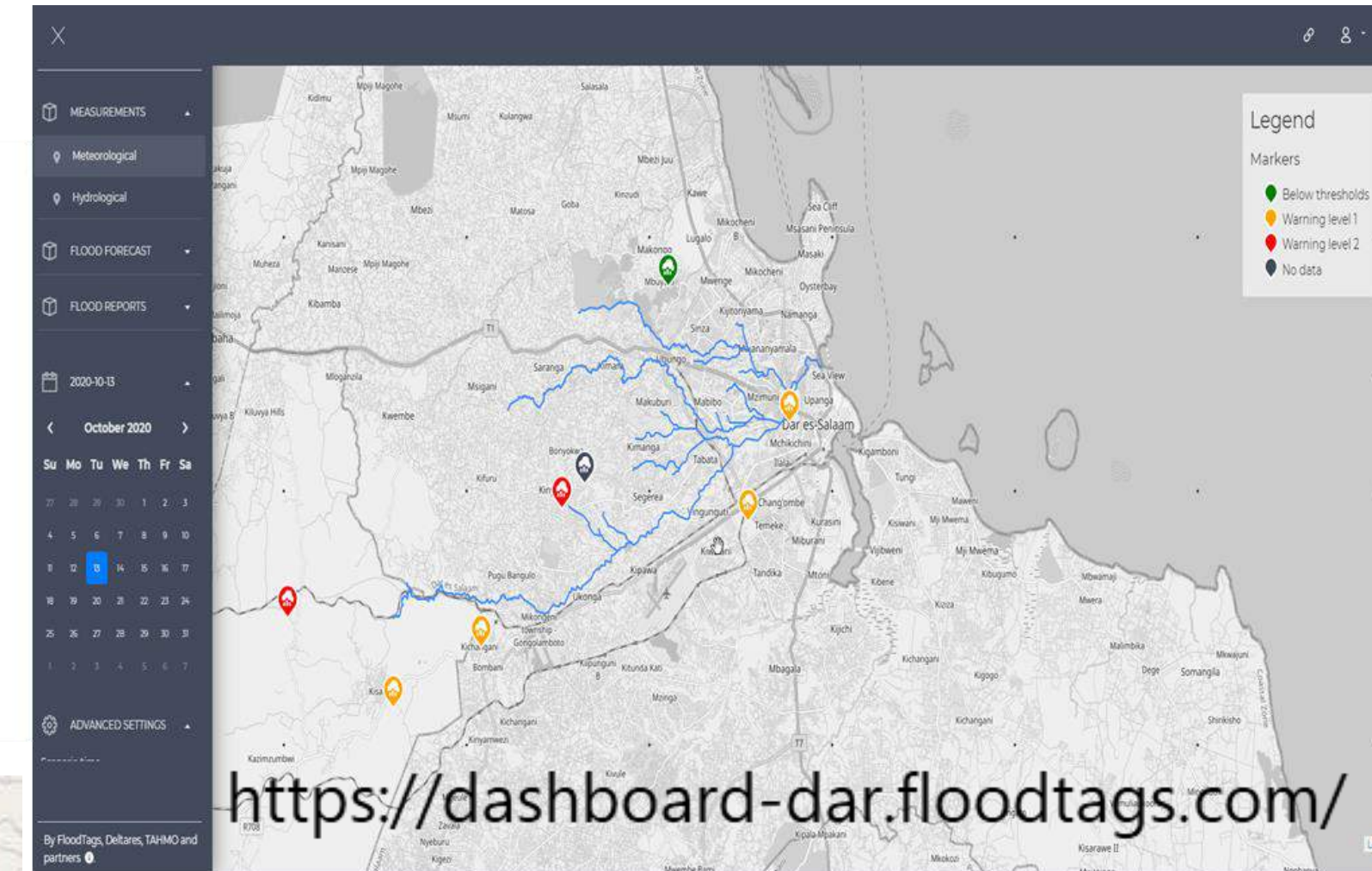
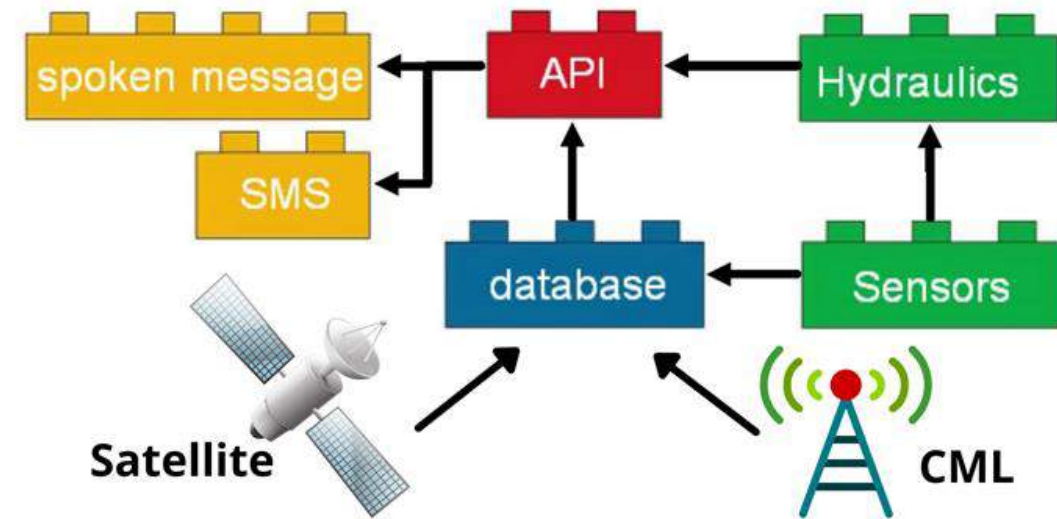




Conclusion

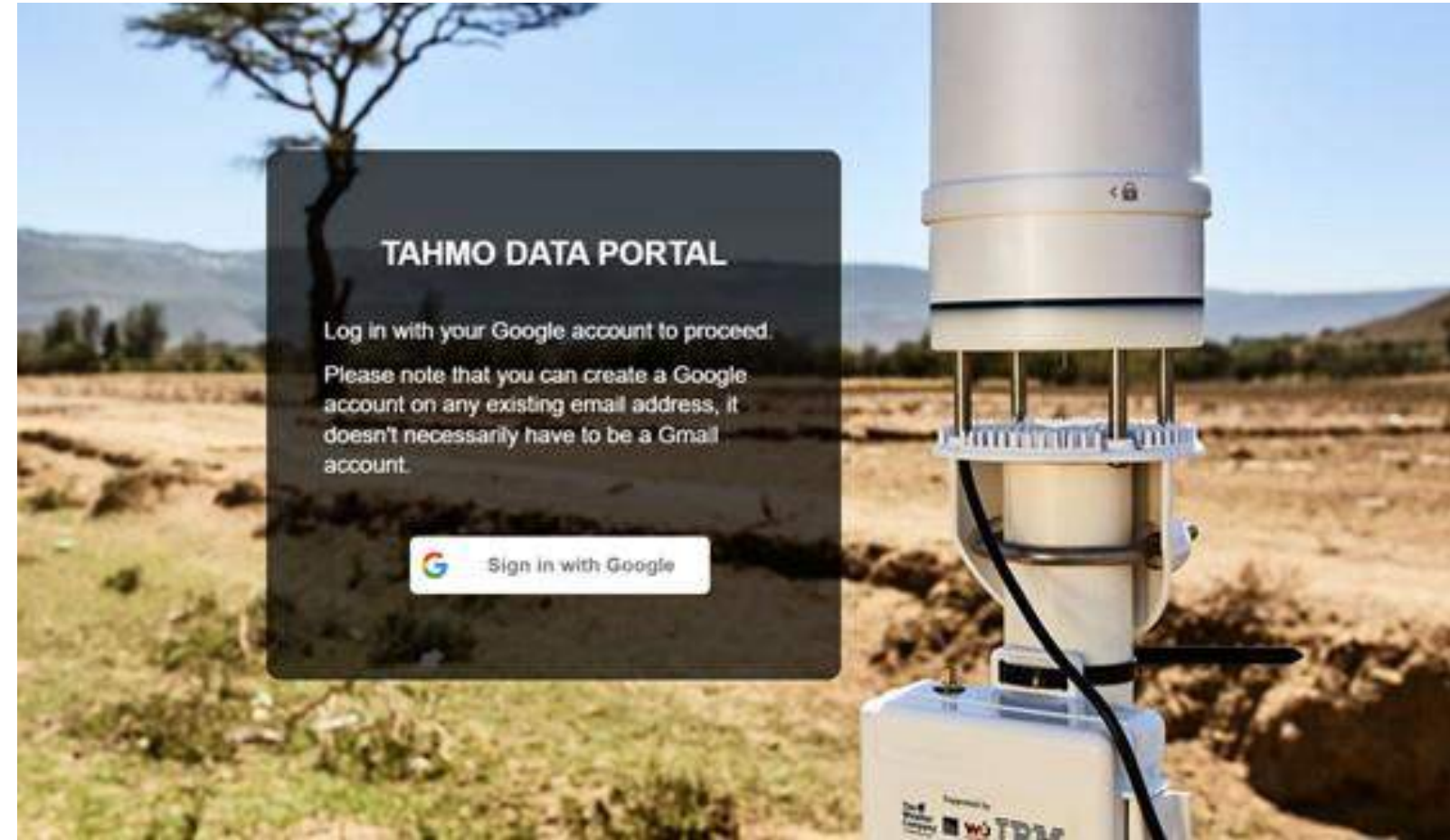


TAHMO Solution: Lego-ization of FEWS elements



Cost efficient solution for high density climate services from which NHMS profit from extra data and local relevance

*Thank
You*



Email: annorfrank@tahmo.org

Websites: <https://tahmo.org/>

<https://twiga-h2020.eu>

@TAHMO_World





**THANK YOU FOR
YOUR ATTENTION**

**DO YOU HAVE ANY
QUESTIONS?**

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Pr. Beatrixlaan 582, 2595 BM, The Hague, Netherlands