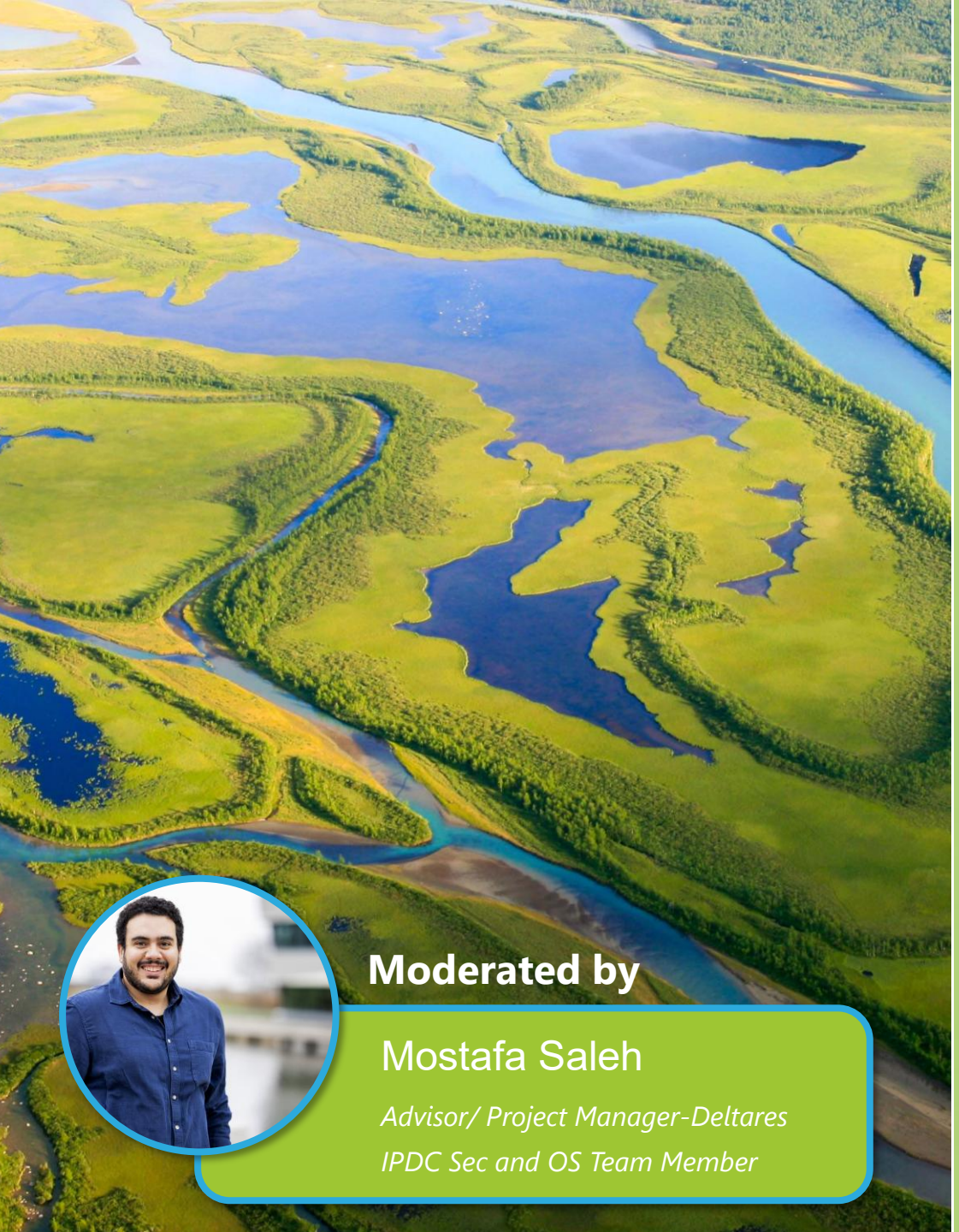


Moderated by

Mostafa Saleh

Advisor/ Project Manager-Deltares

IPDC Sec and OS Team Member

ONLINE SESSION

IPDC DEDICATED ACTIVITIES - SESSION 03: CLIMATE RESILIENCE IN EGYPT AND VIETNAM

The session features presentations on two IPDC projects addressing climate resilience in Egypt and Vietnam, covering flood risk management in arid regions and climate adaptation in the Red River Delta, followed by a panel discussion with experts.

THURSDAY 21 MAY

10:00 - 11:30 CEST (NL TIME)

Practicalities

- Post your questions in the chat.
- Please turn your microphone off during presentations
- *Note: This session will be recorded and uploaded onto the IPDC website. By attending the session, you give your permission for your name to be featured in the recording.*

Today's program

Opening and Introduction	Mostafa Saleh Sonja Pans
Towards Climate-Resilient Flood Risk Management in Egypt	Eng. Mostafa Mashal Mr Amgad Omer
A climate adaptation study in the Red River Delta, Vietnam	Dr. Ngo Thi Thuy Dr. Sepehr Eslami Arab
Interactive discussion	Prof. Hanan Farag Dr Sy Pham Mrs Sonja Pans Mostafa Saleh

Opening words by the IPDC

Sonja Pans

IPDC Secretariat
Senior advisor, Deltares

Towards Climate-Resilient Flood Risk Management in Egypt

Eng. Mostafa Mashal

Hydrologist

MWRI – NWRC - Water Resources Research Institute

Egypt

Amgad Omer

Senior advisor

Deltares, the Netherlands

PM – Extreme Events Project

Egypt extreme events

Towards Climate-Resilient Flood Risk Management in Egypt

Online session

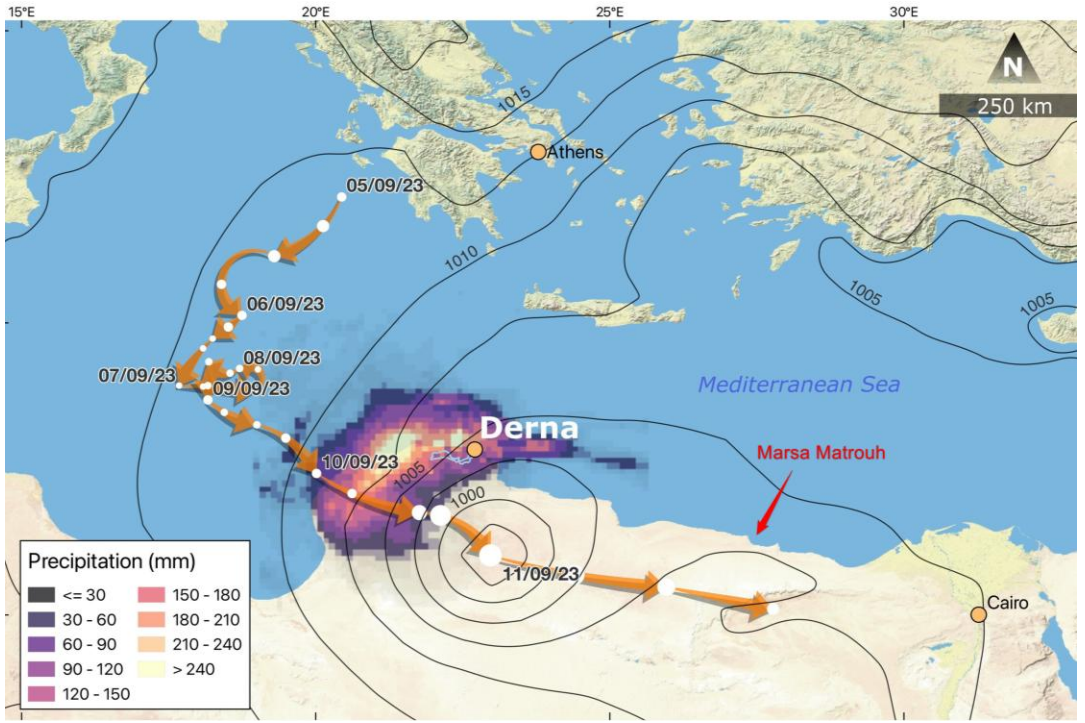
Eng. Mostafa Mashal

Amgad Omer

21 May 2026

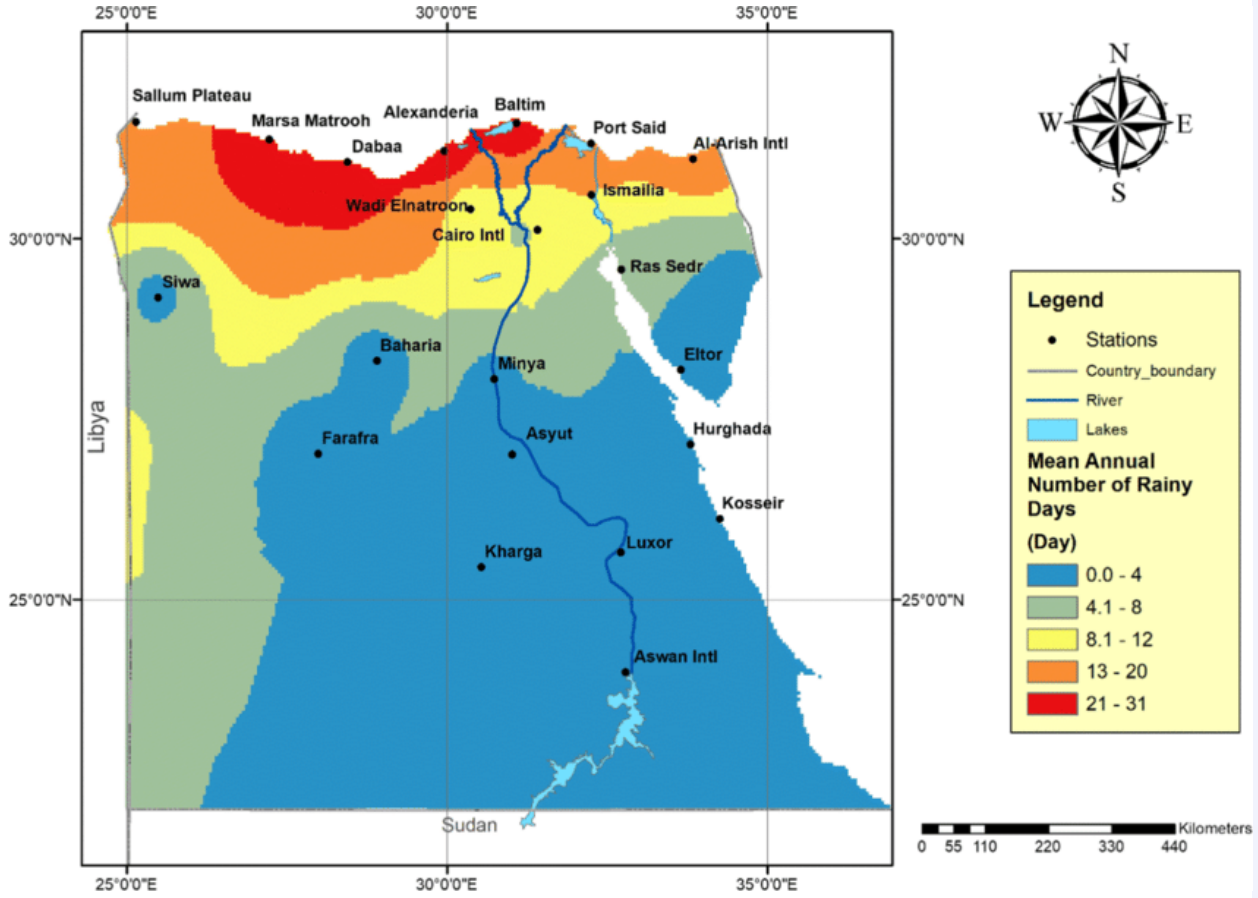
Why we do that?

- Long-standing focus on water allocation and drought management in Egypt
- Critical gap in flood risk management planning and experience
- Rising flood risks due to climate change and increasing extreme events
- Derna 2023 disaster significantly raised regional awareness of flood vulnerability
  - Storm Daniel (150-240 mm in 24 hr)
  - Dam failures → devastating wadi flash flood
  - 4000+ deaths
  - 40,000+ displaced
- Clear need for a climate-resilient national flood risk management strategy



Egypt in the same climate zone

- Torrential rains flood Marsa Matrouh, inundate roads, cause chaos, Tursday 5 Oct 2023



The project objective ➔ Develop practical guidelines for flood risk management (FRM) focused on pluvial floods (heavy rainfall) in Egypt.

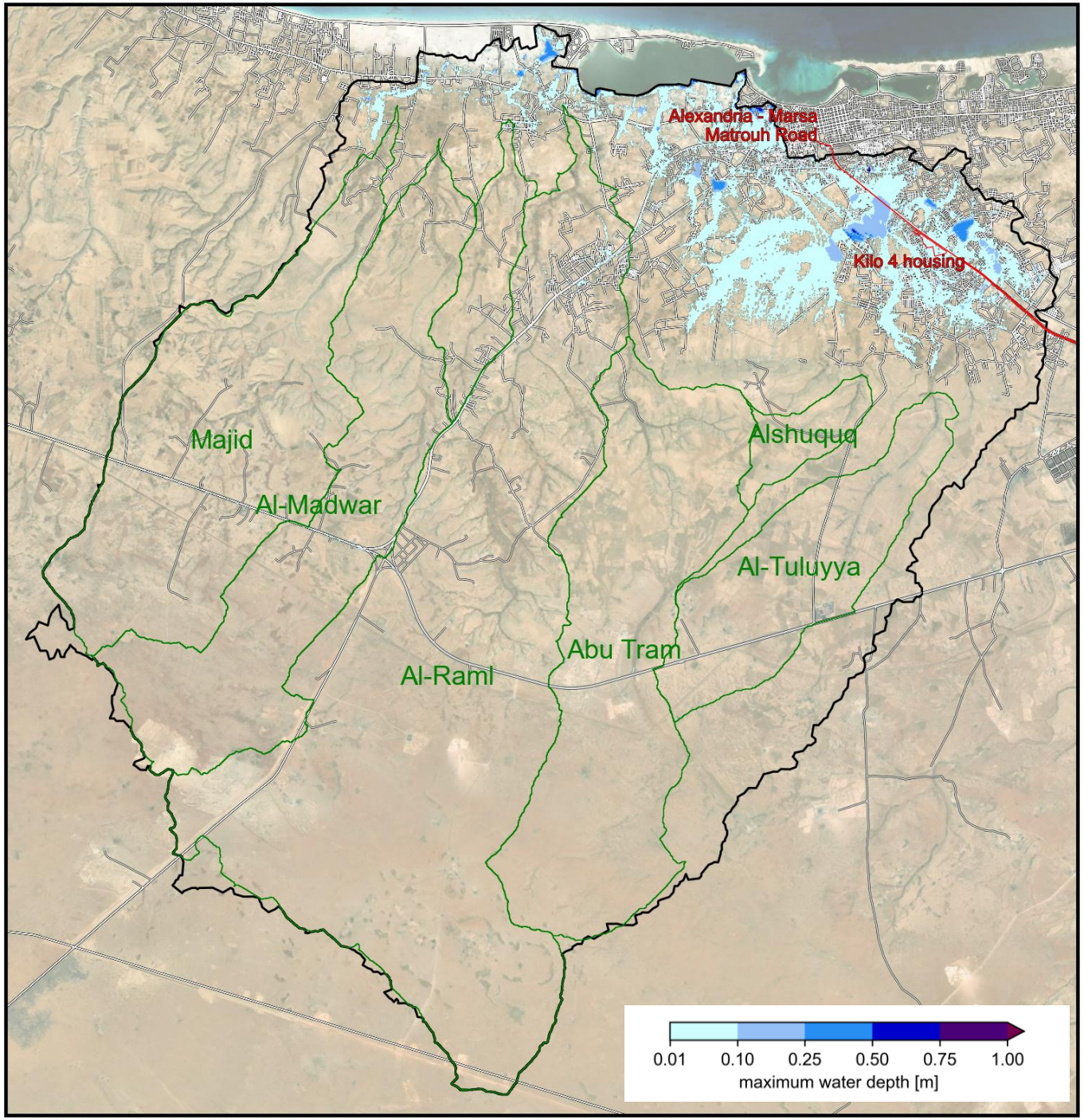
Project partners ➔ Deltares, WRRI, HKV and Ministry of water resources and Irrigation (Egypt)

Study area: Marsa Marouh

The model shows mostly pluvial flooding in the depression area

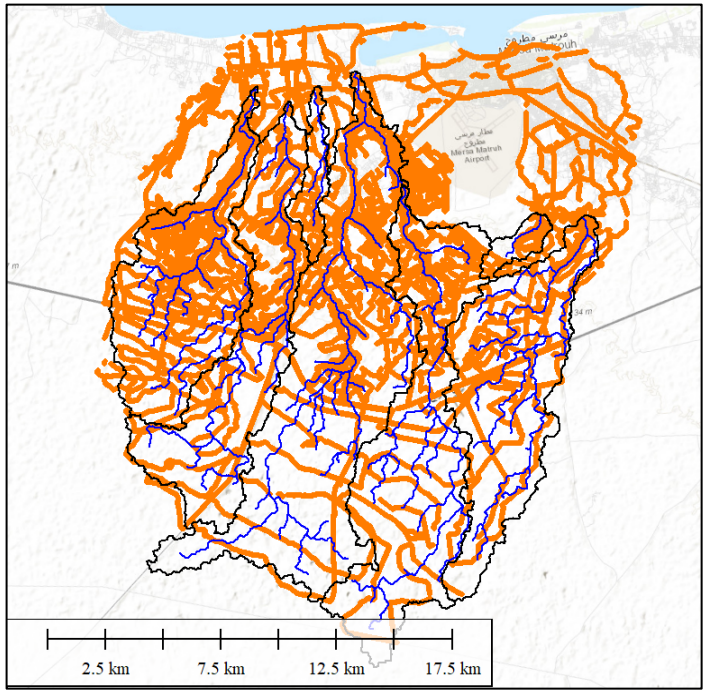
“The most affected areas in the governorate were Wadi Al-Raml, Al-Kharouba, and Kilo 4 areas”

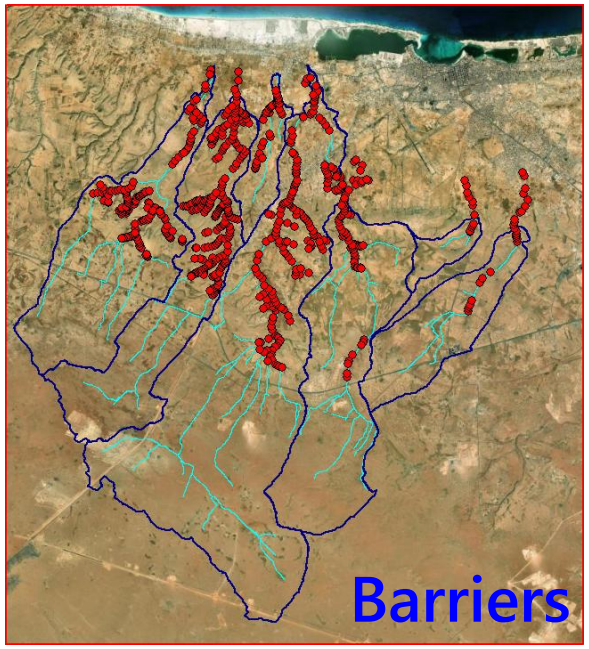
Source: https://english.ahram.org.eg/News/509647.aspx

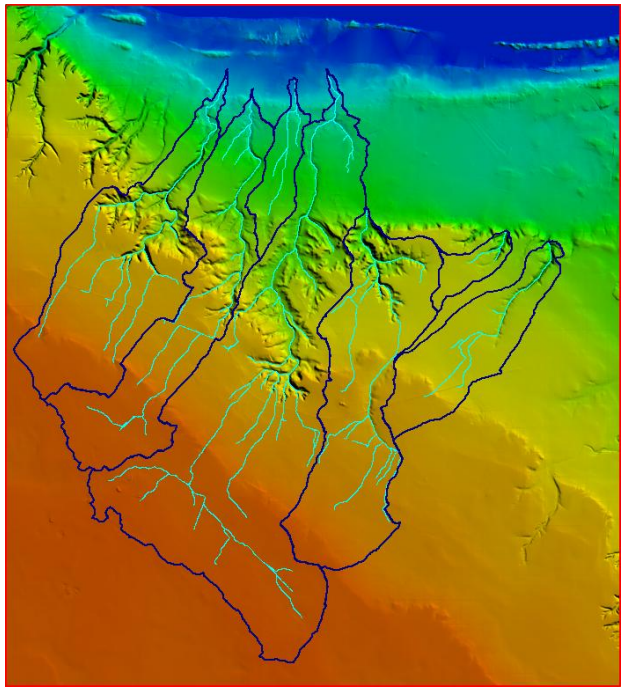


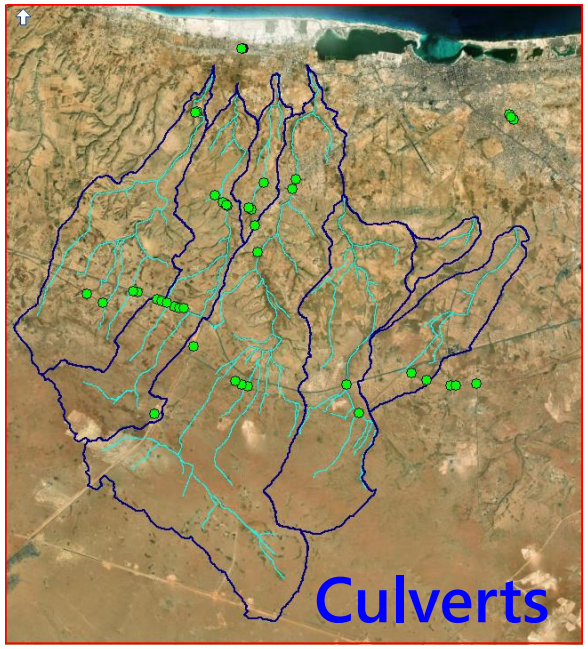
Project Tasks

- **Surveys & Data collection**
- Assess flood hazards (probability, depth, extent, velocity)
- Assess flood risks (impact on people and assets)
- Analyze current and future scenarios (climate and socio-economic changes)
- Identify and evaluate structural and non-structural risk reduction measures
- Develop flood risk management plans for next 5-20 years









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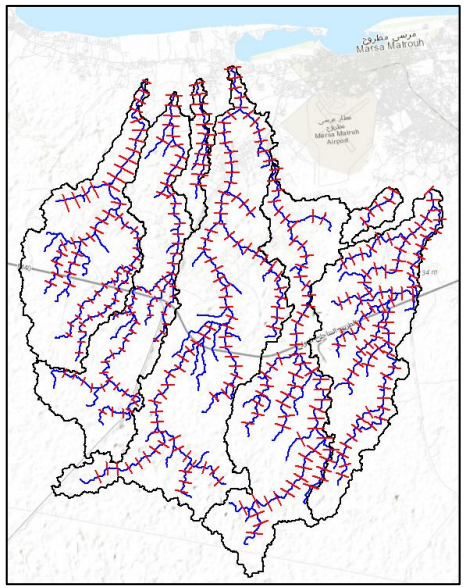
Wadi Barriers

Local Communities



400 Cross Section Generated

Road Culverts

Project Tasks

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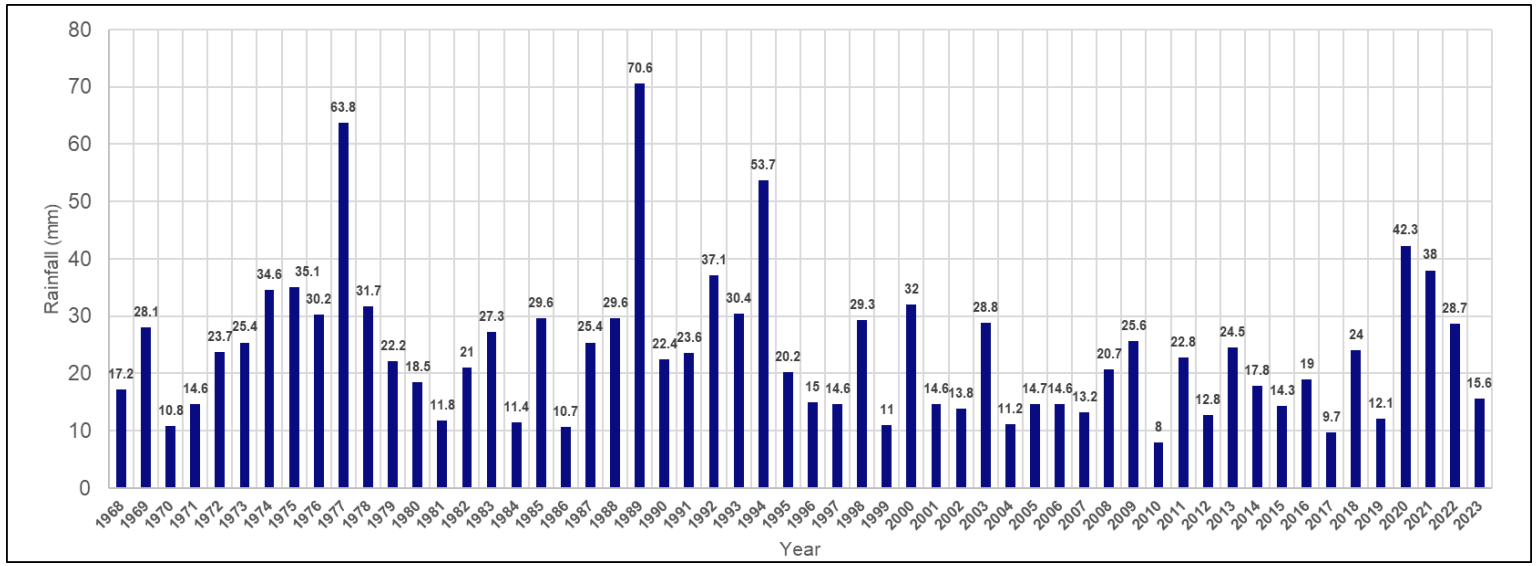

the **Marsa Matruh station**, covering the **maximum daily rainfall per month from 1968 to 2023** .

Return period (years)	Duration					
	1hr	2hr	3hr	6hr	12hr	24hr
2	6.4	10.2	12.9	17.7	21.7	23.3
5	9.6	15.4	19.5	26.6	32.6	35.1
10	11.9	19.1	24.1	33.0	40.4	43.5
25	15.0	24.1	30.4	41.6	51.0	54.8
50	17.4	28.0	35.4	48.4	59.4	63.8
100	20.0	32.1	40.6	55.5	68.1	73.2
200	22.7	36.4	46.0	62.9	77.2	82.9
250	23.6	37.9	47.8	65.5	80.2	86.2
500	26.4	42.5	53.7	73.5	90.1	96.8

Project Tasks

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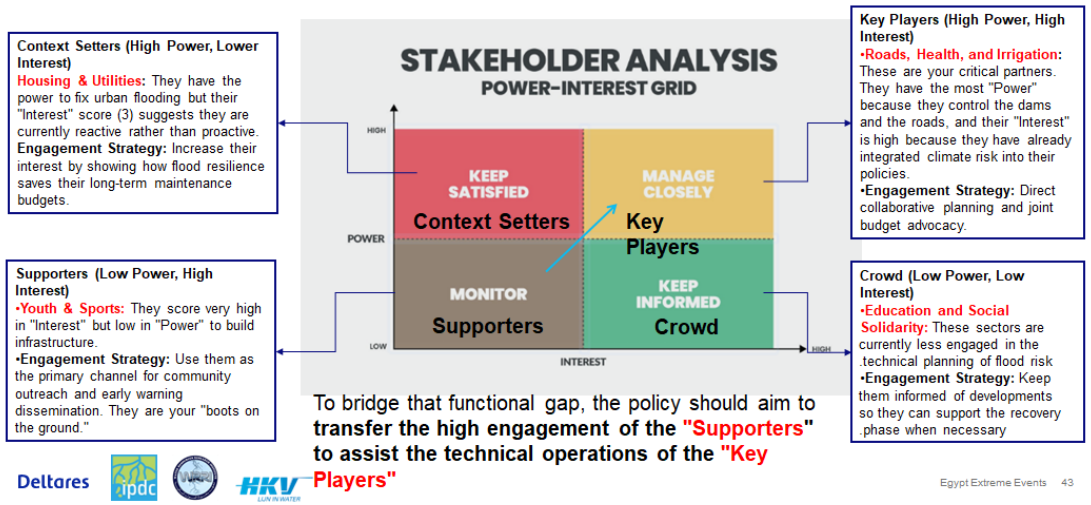
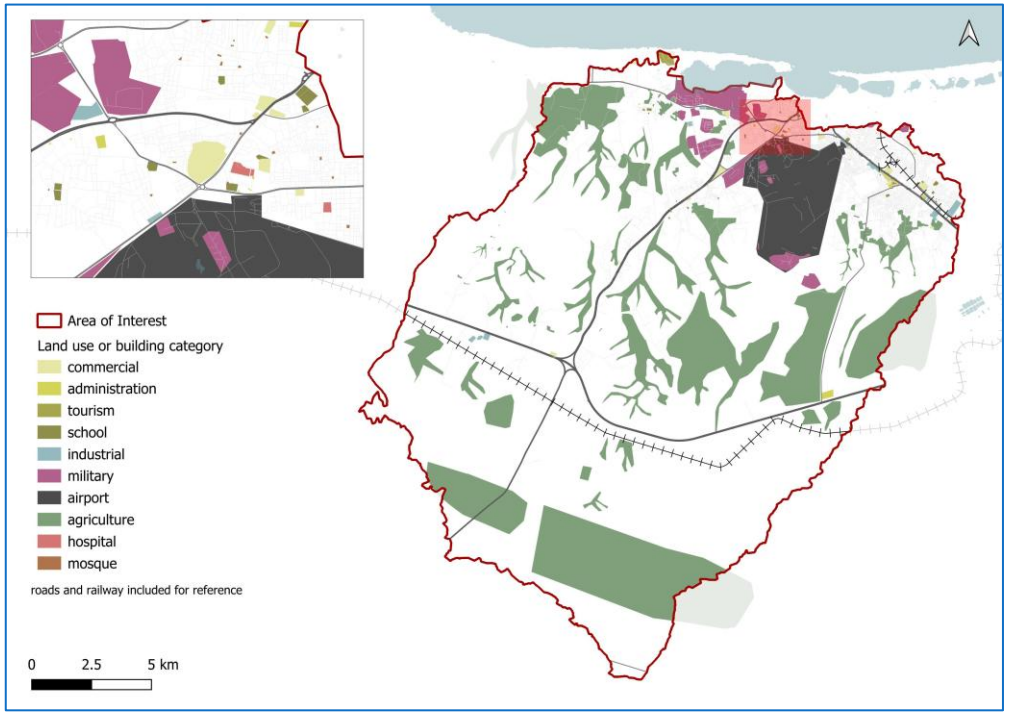
Power-Interest Matrix Graph





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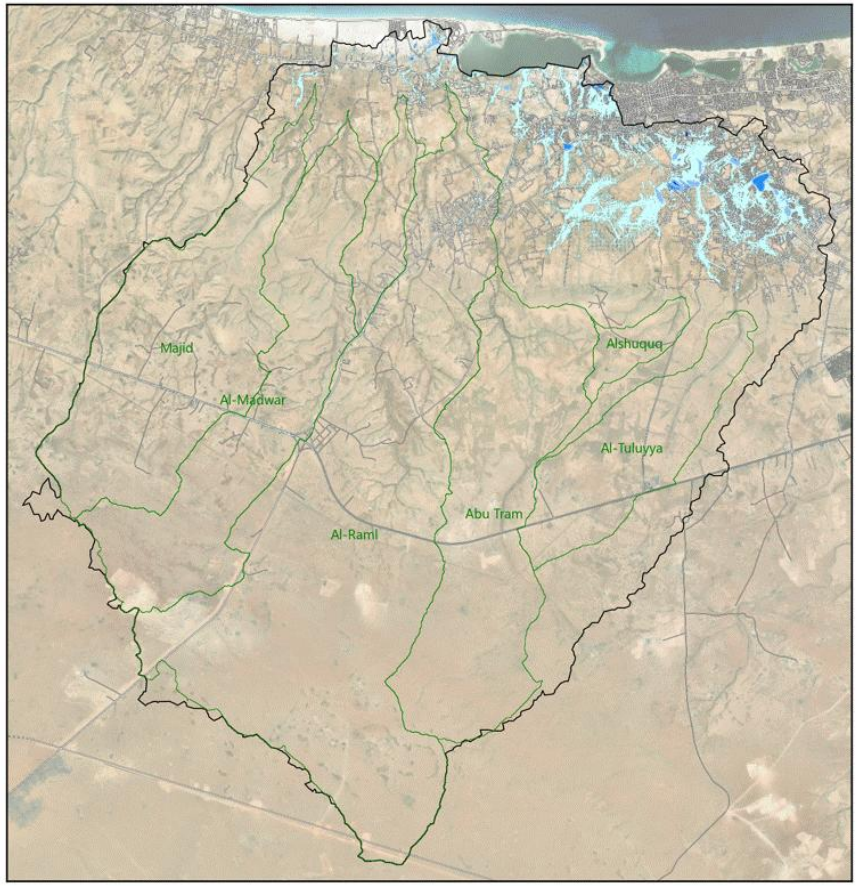
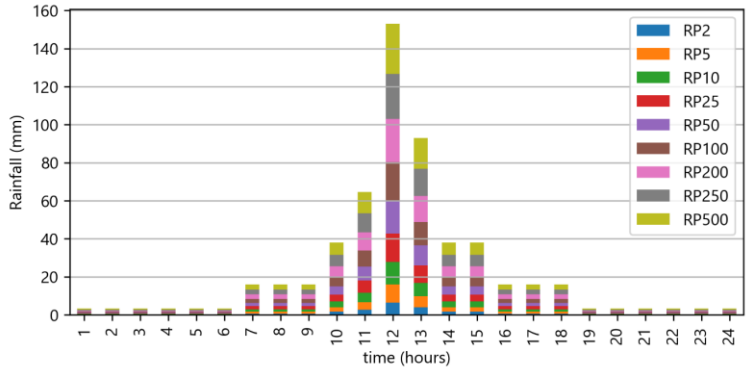


RP2



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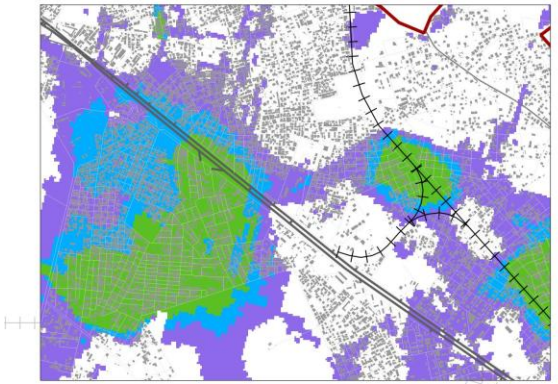

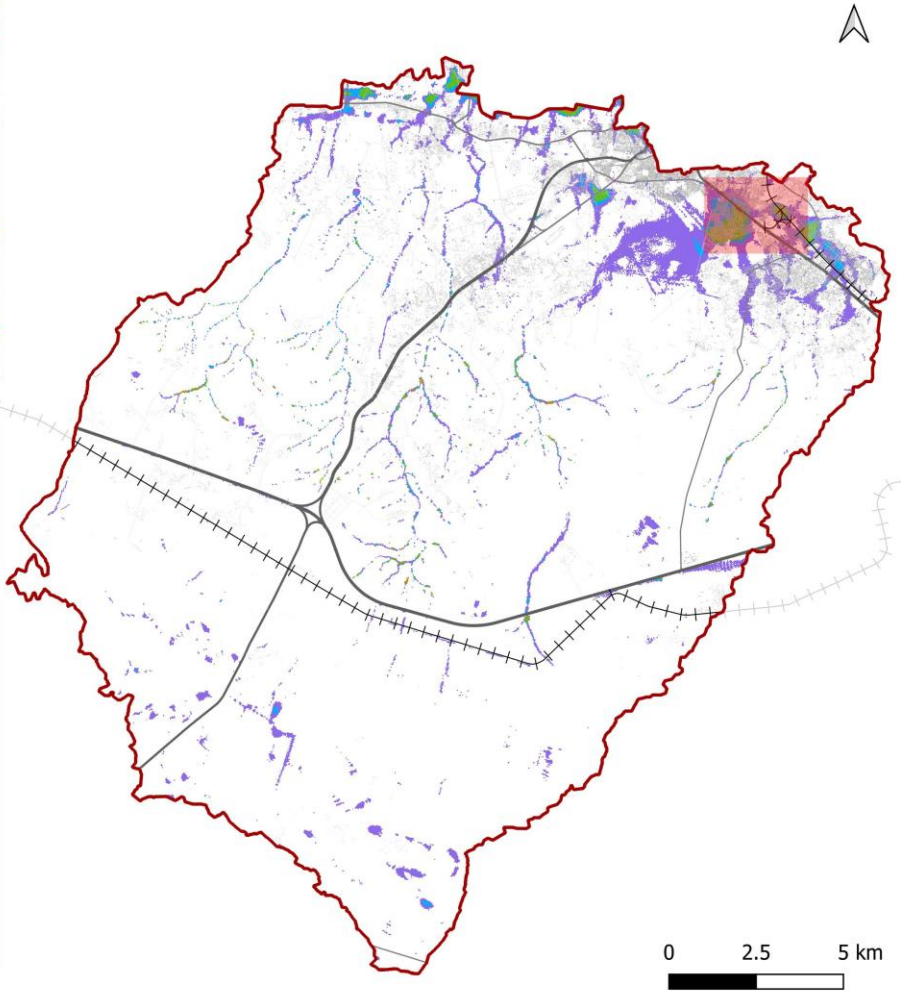

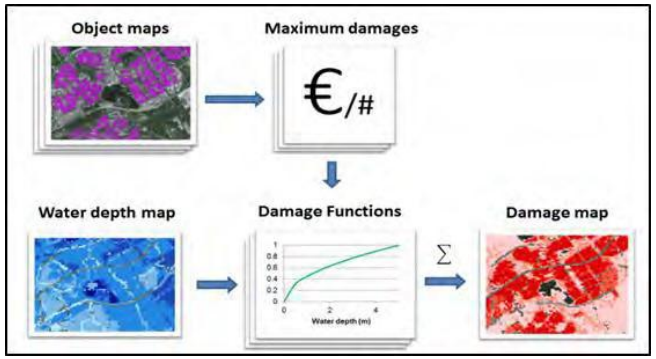

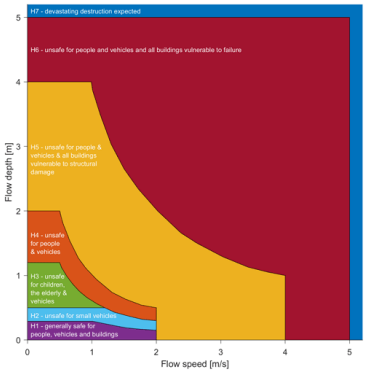

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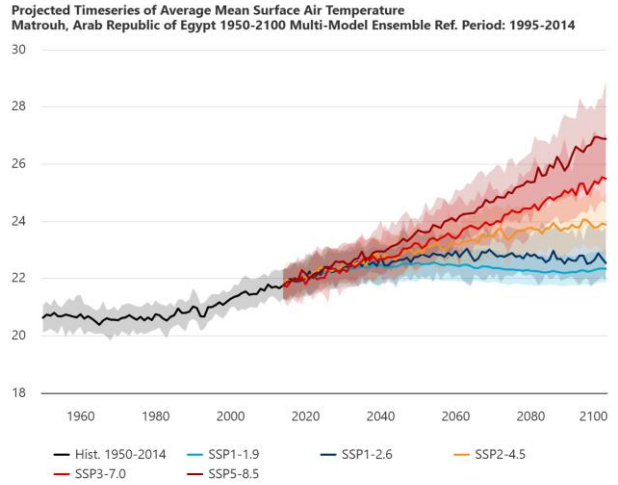
- The normal Clausius-Clapeyron relation assumes about 7% more extreme rainfall per 1°C rise.
- A "super CC relation" with about 14% more extreme rainfall per 1°C rise when plenty of water is available, for example over oceans.



#	Scenario group	Scenario ID	Description	Return periods (years)	Data basis / notes
1	Baseline (current)	B1	Current conditions, full-frequency analysis	2, 5, 10, 25, 50, 100, 200, 250, 500	Current hydro-climate and land use
2	~~Climatic zones~~	~~C1~~	~~stations 4 (of 5)~~	~~2, 5, 10, 25, 50, 100, 200, 250, 500~~	~~RP analysis per climatic zone/station~~
3	~~Climatic zones~~	~~C2~~	~~Alexandria (Ras El Teen?)~~	~~2, 5, 10, 25, 50, 100, 200, 250, 500~~	
8	Future: CC	F1	Low CC, current land use	**5, 25, 50, 100?**	Rain 14%
9	Future: CC	F2	High CC, current land use	5, 25, 50, 100?	Rain 28%
10	~~Future: CC-Land use~~	~~F3~~	~~Low CC, BAU~~	~~5, 25, 50, 100?~~	~~Rain 14% ,, BAU???~~
11	~~Future: CC-Land use~~	~~F4~~	~~High CC, BAU~~	~~5, 25, 50, 100?~~	~~Rain 28%, BAU???~~
12	~~Future: land use~~	~~F5~~	~~BAU, current climate~~	~~5, 25, 50, 100?~~	~~BAU??~~
13	Future: land use	F6	ID, current climate	5, 25, 50, 100?	ID????
14	Future: CC-Land use	F7	Low CC, ID	5, 25, 50, 100?	Rain 14% ,, **ID**??
15	Future: CC-Land use	F8	High CC, ID	5, 25, 50, 100?	Rain 28% ,, ID??
16	The mitigation measures	F9	B1? + Dams	5, 25, 50, 100?	**Future protection or our suggestions**? What is the target?
17	The mitigation measures	F10	B1?+dams+ dikes, diversion, better drainage system	5, 25, 50, 100?	Future protection or our suggestions? **B1 ,ID or BAU?**
18	Event-based (stress test)	E1	Derna event (historical reconstruction)	N/A (event hyetograph)	
19	Sea Rise (stress test)	E2	B1, Sea level rise 20 cm	50	
20	Sea Rise (stress test)	E3	B1, Sea level rise 40 cm	50	

Next steps

- Surveys & Data collection
- Assess flood hazards (probability, depth, extent, velocity)
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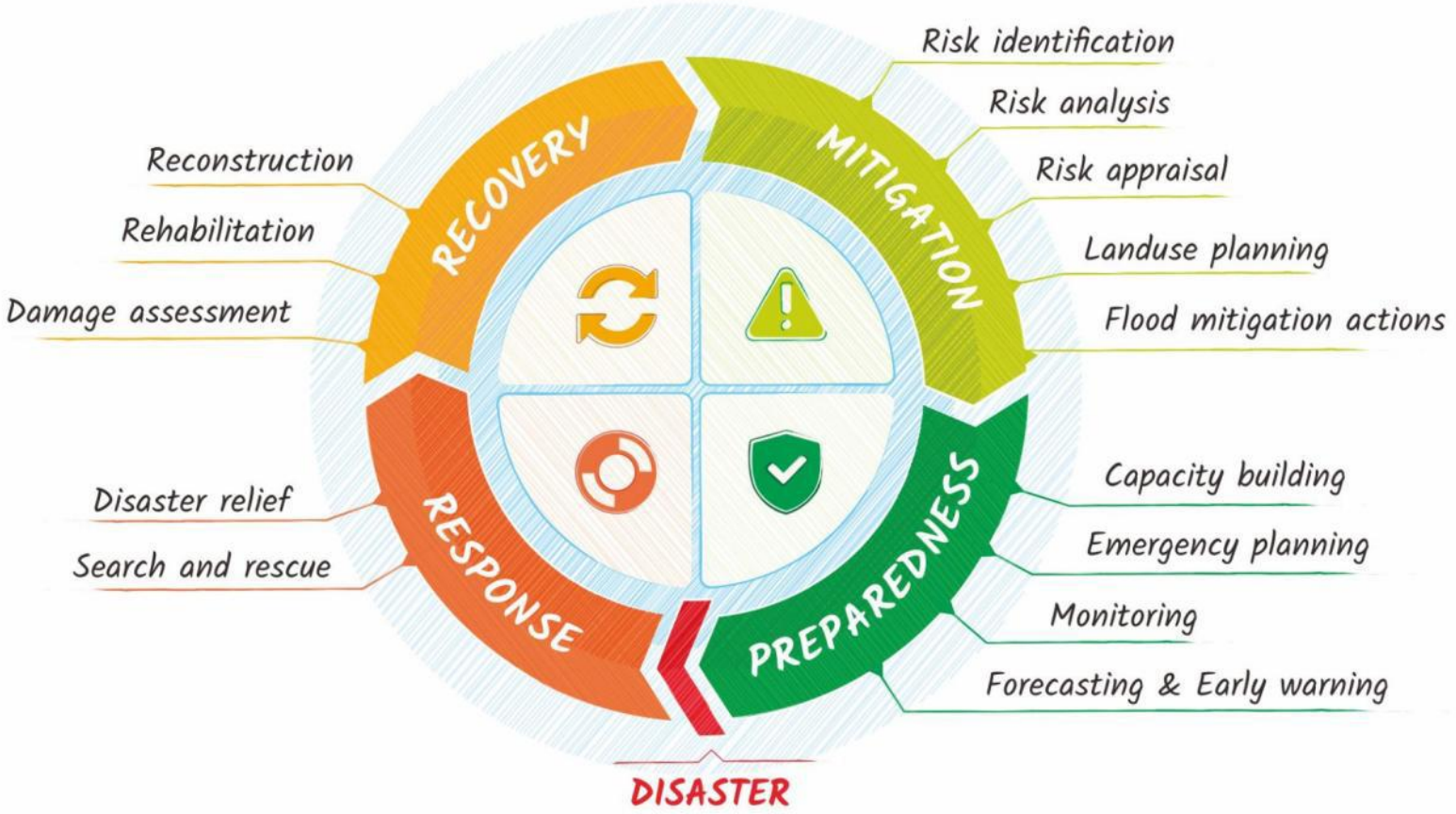


Phases and steps in disaster management (picture from ADB: A practical guide to integrated flood risk management 52014-001-tacr-en.pdf)

Questions?

- What are the lessons learnt? -
- Vulnerability and exposure data

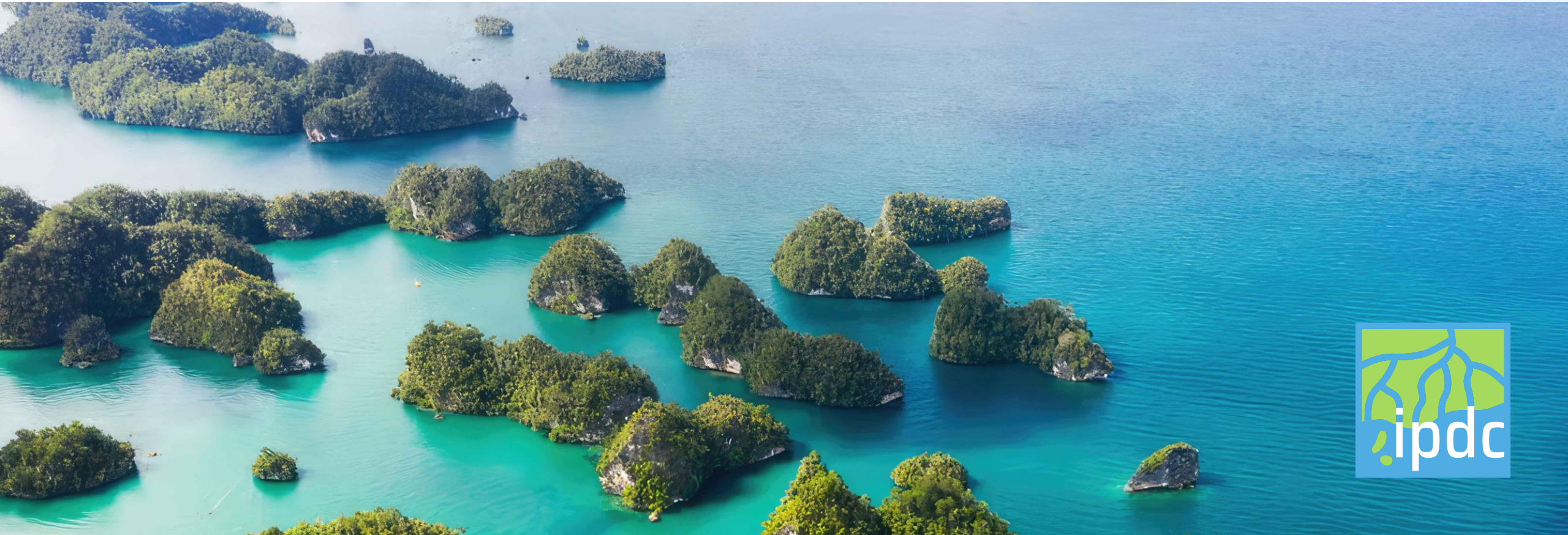
Contact

IPDC
Boussinesqweg 1
2629 HV, Delft

deltasandcoasts.net

ipdc@deltares.nl

MADS: https://www.minambiente.gov.co/



A climate adaptation study in the Red River Delta, Vietnam

Dr. Ngo Thi Thuy

Senior Researcher and Deputy Director
Center for Hydrology Research in Institute of Meteorology Hydrology, Environment and Marine Sciences

Vietnam

Dr. Sepehr Eslami Arab

Sr. Advisor/Researcher

Deltares, the Netherlands

A climate adaptation study in the Red River Delta, Vietnam

IPDC-Vietnam, Activity #2

Ngo Thi Thuy, Sepehr Eslami, Sem Roozendaal

21-05-2026

Content

- A brief introduction to the project
- List of activities
- Early assessment of the state of the Red River Delta
- Climate adaptation efforts in the Ninh Binh Province

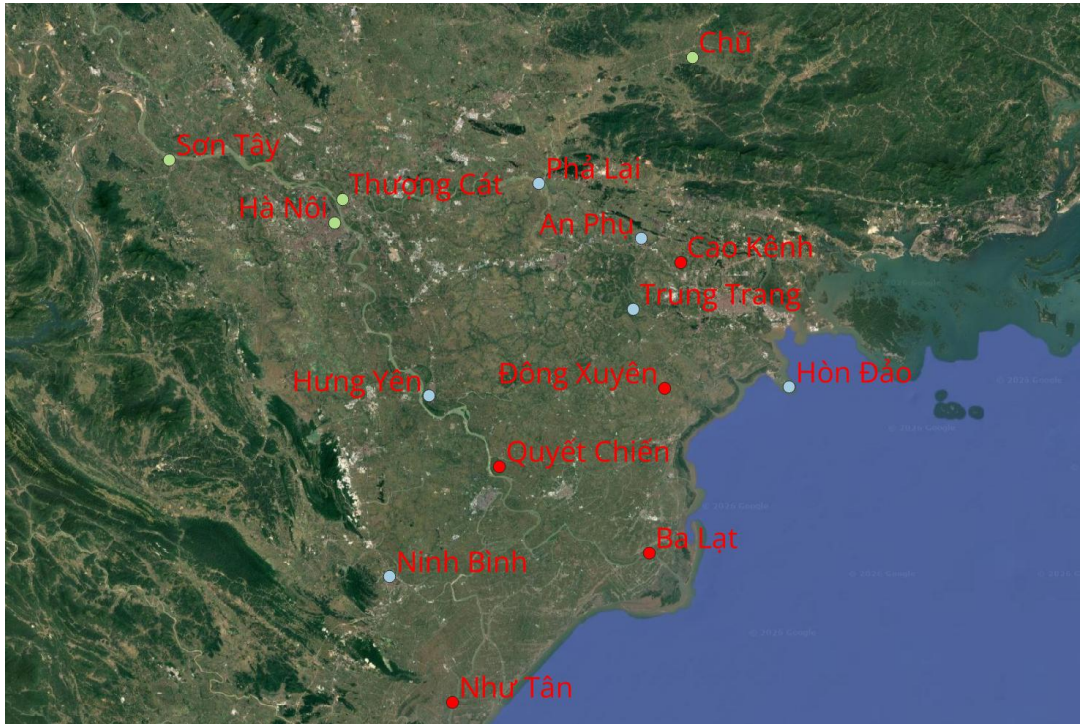
Source: NASA, Mission: STS046

Project activities

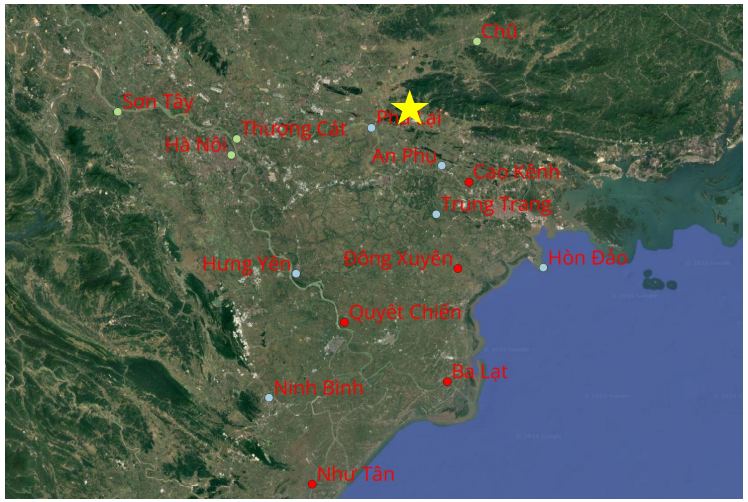
- To delvelop an early understanding of the deltaic system
- A trend analysis of the hydrodynamic trends
- Using AI for a system understanding
- Assessing flood and salinity hazard assessment
- Risk assessment in the Ninh Binh Province
- Adaptation Roadmap for the Ninh Binh Province
- Developing a visual database for risk maps, trends and projections

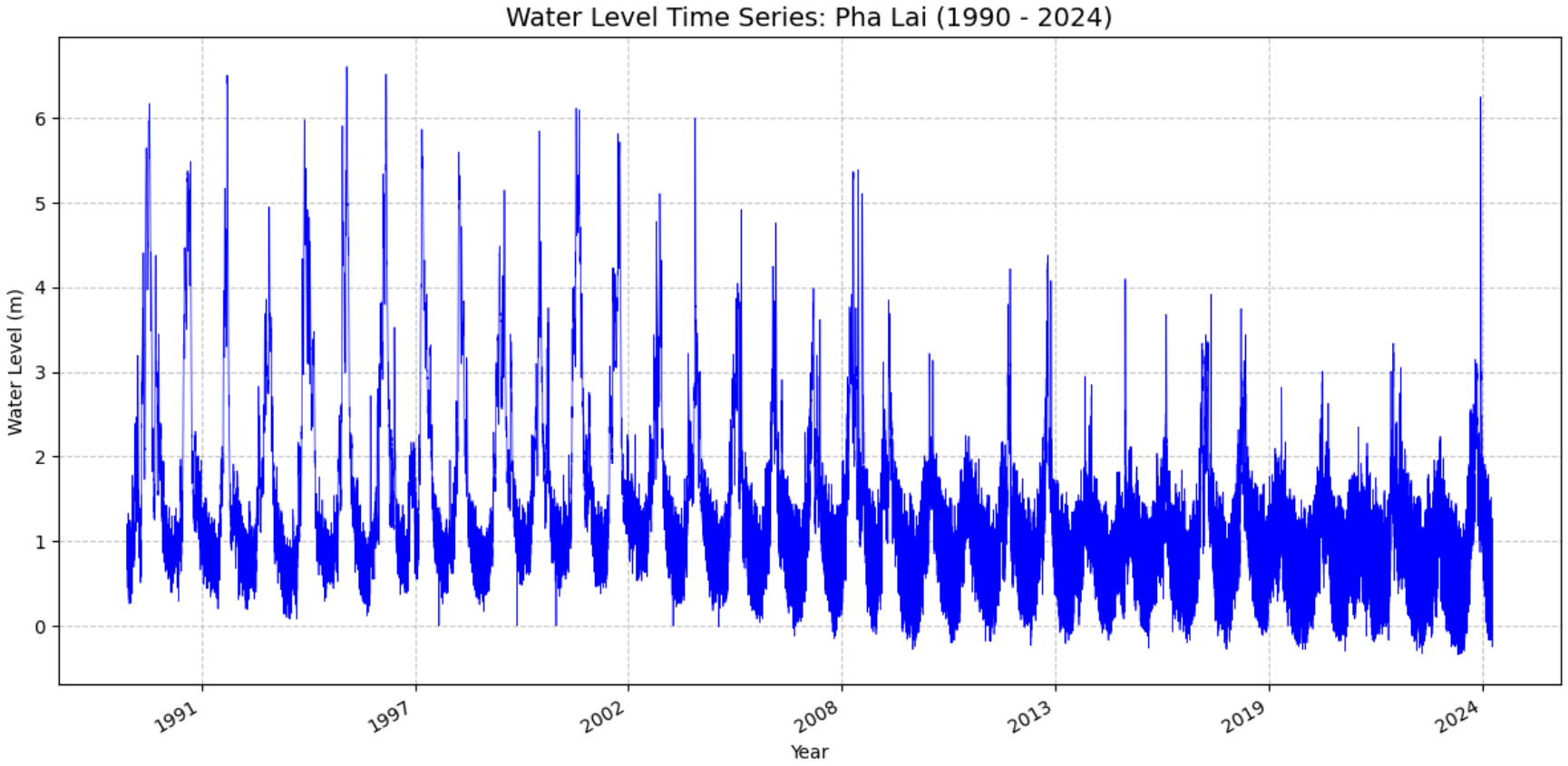
A historical trend analysis

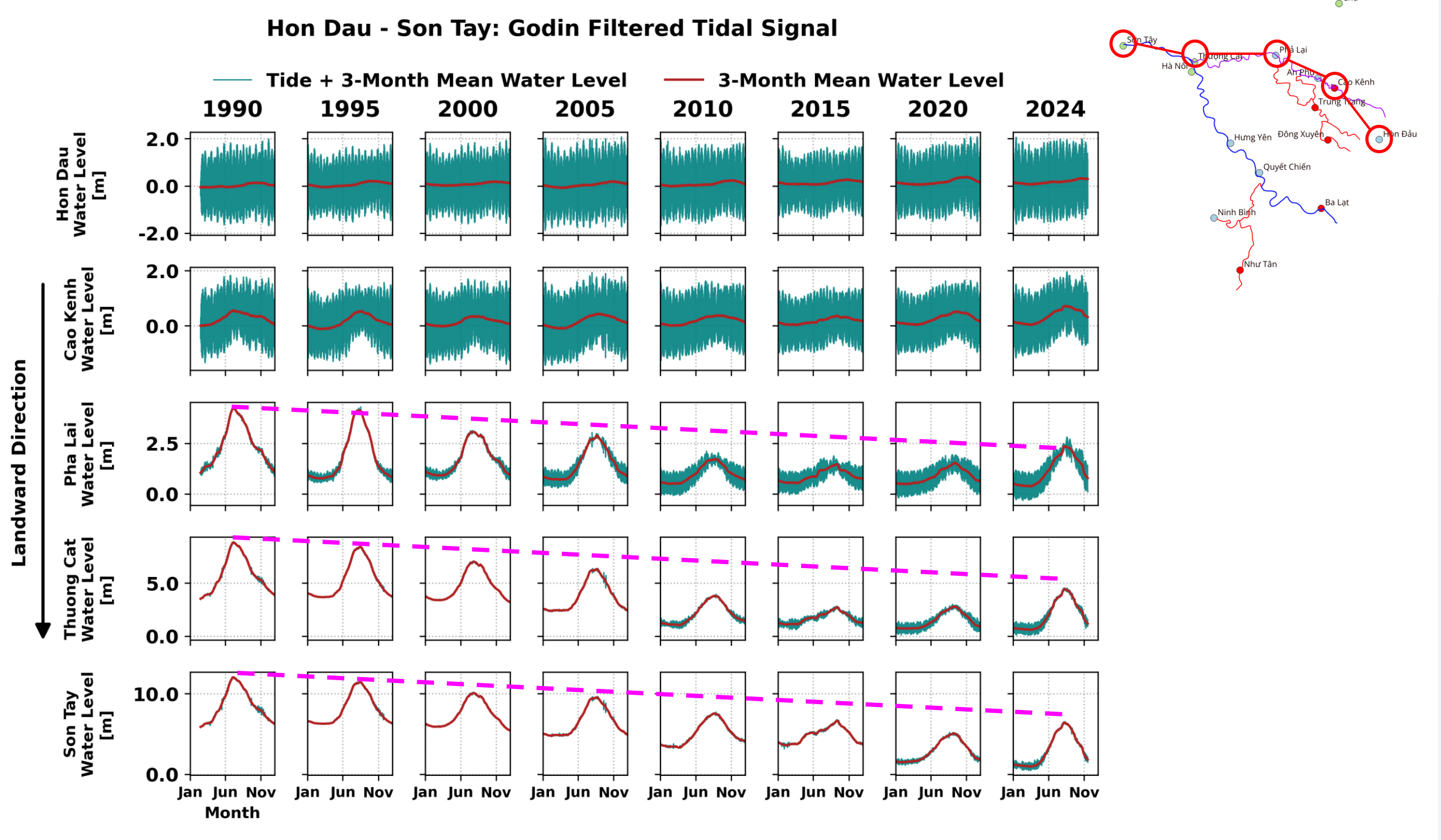
- Analysing ~30 years of hydrodynamic (water level, discharge, salinity) data.
- Establishing patterns for salinity and flood
- Discerning systemic changes in the delta



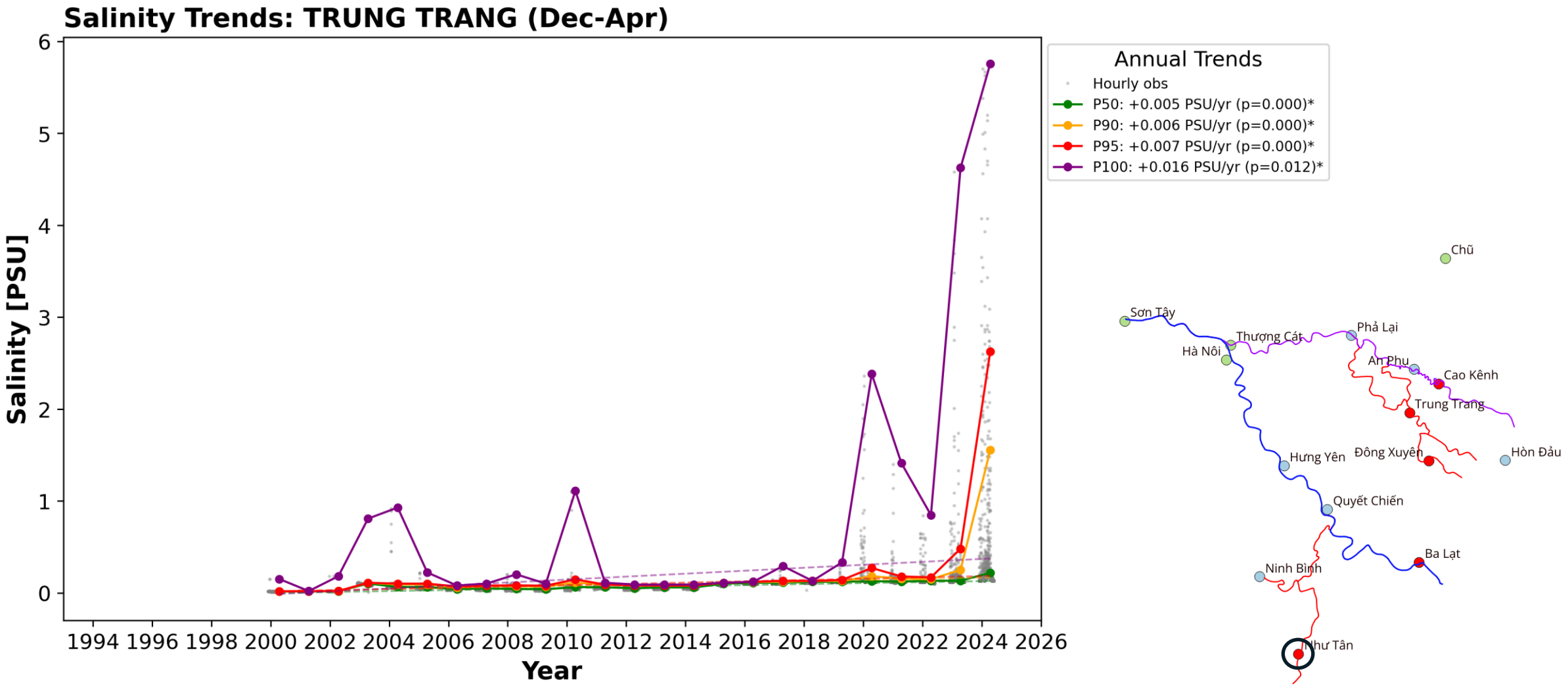
Water level changes






Hon Dau - Son Tay: Godin Filtered Tidal Signal
Tide + 3-Month Mean Water Level
3-Month Mean Water Level
1990
1995
2000
2005
2010
2015
2020
2024
Hon Dau Water Level [m]
Cao Kenh Water Level [m]
Pha Lai Water Level [m]
Thuong Cat Water Level [m]
Son Tay Water Level [m]
Landward Direction
Jan Jun Nov
Month
Sơn Tây
Hà Nội
Thượng Cát
Phả Lại
Cao Kênh
Trung Trang
Hòn Dấu
Hưng Yên
Đông Xuyên
Quyết Chiến
Ba Lạt
Ninh Bình
Như Tân

Salinity trends



Main takeaways

- The Red River Delta has gone through fundamental changes over the past two decades.
  - Deeper estuarine channels
  - Significantly longer tidal propagation (tides now propagate all the way to Son Tay (~200 km upstream)
  - Increasing salinity trends, especially extremes
  - Hydrological regime shifts (delay in the onset of the flood pulse)
  - Clear signs of land subsidence

Questions?

Contact details IPDC

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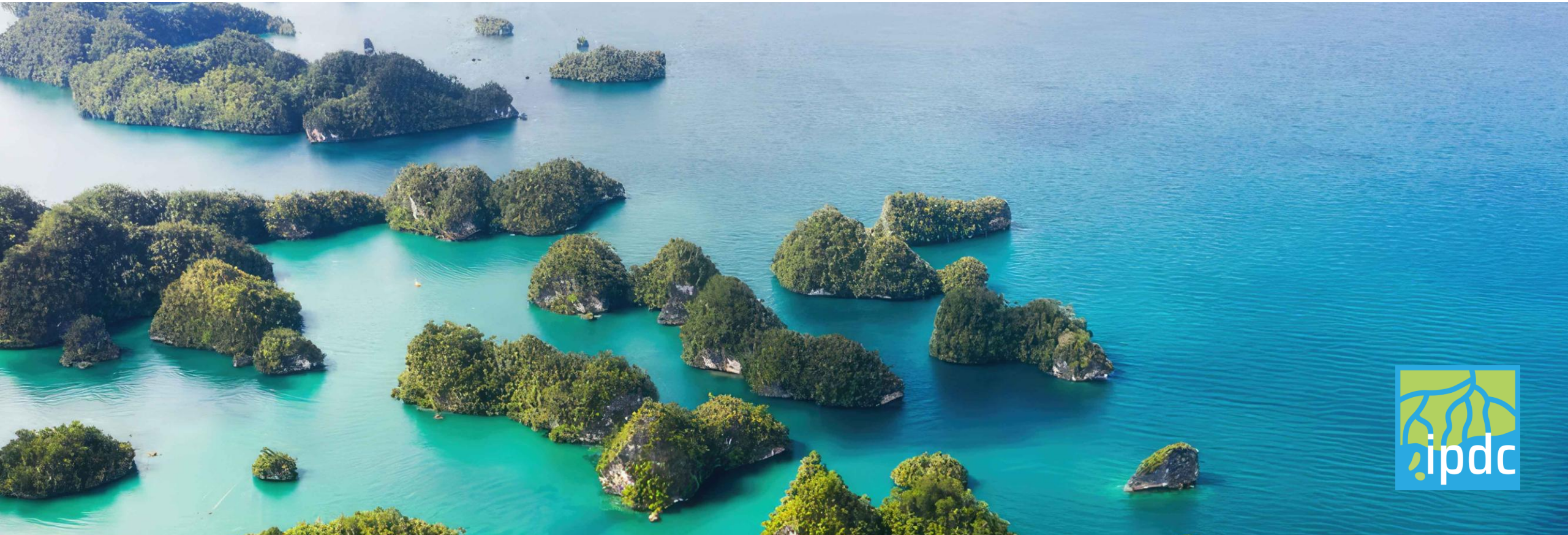
ipdc-climate-action.org

ipdc@deltares.nl



Panel Members

Prof. Hanan Farag

Deputy Director, Water Resources Reseaerch Institute,

NWRC, Egypt

Dr Pham Van Sy

Miistry Officer – Ocean Modelling & Climate Change Researcher

Department of Climate Change, Vietnam

Sonja Pans

IPDC Secretariat
Senior advisor, Deltares

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