Climate Change Risk Assessment

Floods and Coastal Erosion Sector

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The Floods and Coastal Erosion Sector

Floods :

1% of population 5% risk in 1 year

5% of population 0.2% risk in 1 year

Urbanisation, vulnerable goods, institutional framework, more intense rain events:

More Flood Damages

Coastal Erosion:

Protected Developed Coastlines

PRESENTATION OVERVIEW

Introduction: Floods & Coastal Erosion

Policy Context

Metrics

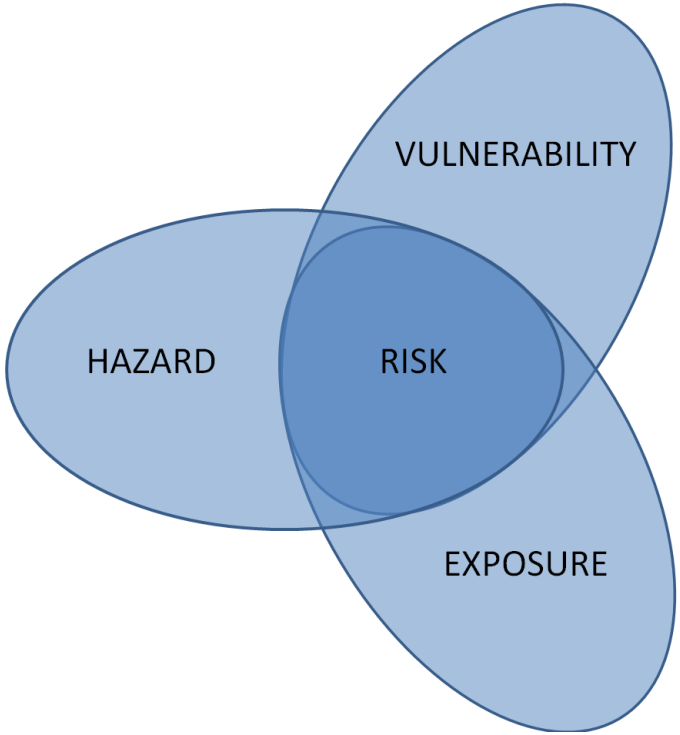
Consequences

Economic Impact

Conclusions

What is Flooding

Flooding is the covering by water of land not normally covered by water.



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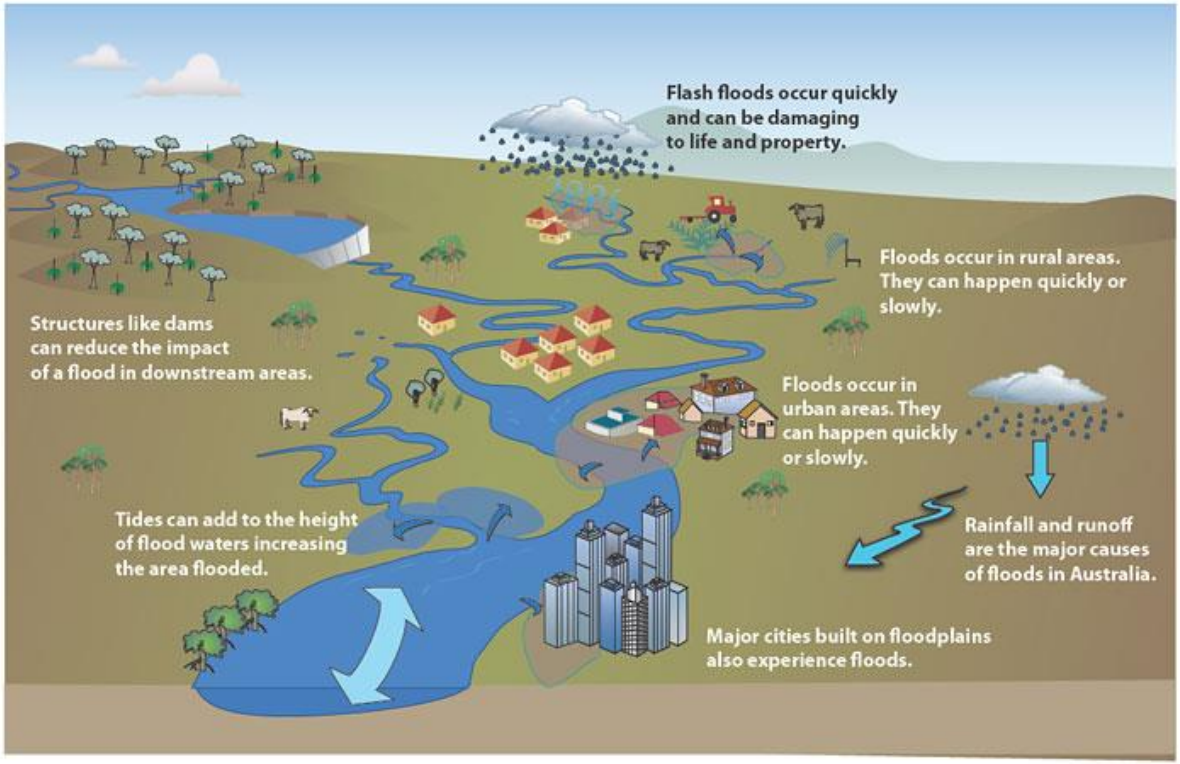
Main types of flood hazards

- Fluvial or River floods
- Pluvial or Flash floods
- Groundwater floods
- Reservoir floods
- Coastal floods
  - Due to storm waves
  - Due to Tsunamis waves



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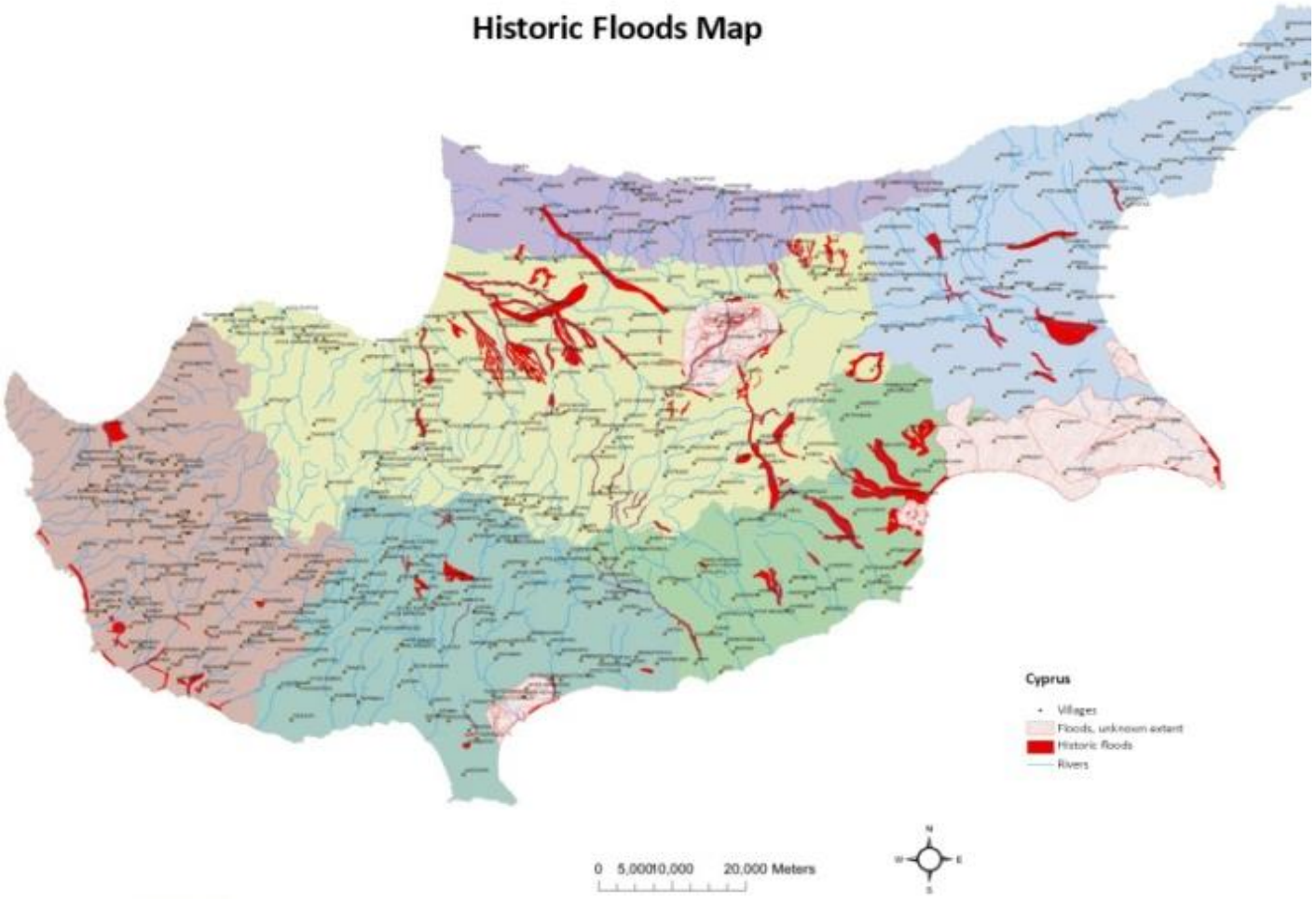

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Areas of Potentially Significant Flood Risk – (APSFRs)

Area Code		River name	Area Name
Description	Map		
CY-APSFR01	CY-APSFR01	Pedieos	From Politiko to Nicosia
CY-APSFR02	CY-APSFR02	Klimos	Egkomi, Ag. Dometios
CY-APSFR03	CY-APSFR03	Merika river branch	Kokkinotrimithia
CY-APSFR04	CY-APSFR04	Kalogeros	Strovolos and Latsia Industrial area
CY-APSFR05	CY-APSFR05	Merikasand branches Koutis and Katouris	Paliometoho and Ag.Trimithias
CY-APSFR06	CY-APSFR06	Almiros-Alikos	Dali Industrial Area
CY-APSFR07	CY-APSFR07	River entry and Paralimni Lake	Paralimni
CY-APSFR08	CY-APSFR08	Yialias	Nisou, PeraChorio, Dali
CY-APSFR09	CY-APSFR09	Ormidia River	Ormidia
CY-APSFR10	CY-APSFR10	Archaggelos- Kamitsis	Aradippou - Livadia
CY-APSFR11	CY-APSFR11	Kamares River	Kamares Larnaca
CY-APSFR12	CY-APSFR12	Koshinas	Mesogi, Paphos, Chlorakas
CY-APSFR13	CY-APSFR13	Limnarka	Paphos city
CY-APSFR14	CY-APSFR14	Germasogeia River	Germasogeia
CY-APSFR15	CY-APSFR15	Vathias River and Vathias branch	Mesa Gitonia, Ag. Athanasios, Limassol East area
CY-APSFR16	CY-APSFR16	New and old Garyllis river	Poleimidia, Ag. Antonios
CY-APSFR17	CY-APSFR17	Marketos stream - Ypsonas	Ypsonas
CY-APSFR18	CY-APSFR18	Komitis	Astromeritis
CY-APSFR19	CY-APSFR19	Vasilikos stream, Paphos	Paphos city

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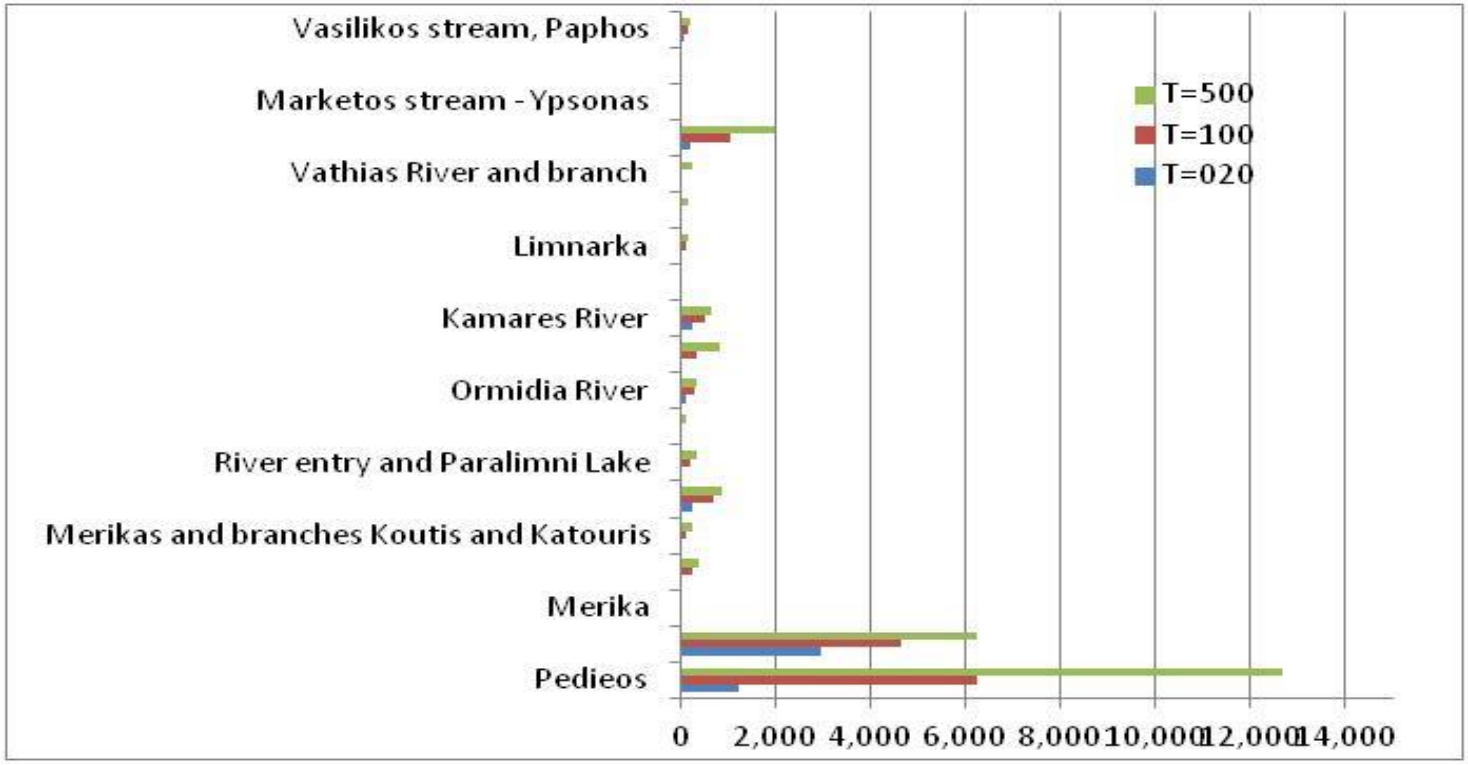

Estimated number of people affected by flooding at present building density (T= return period)

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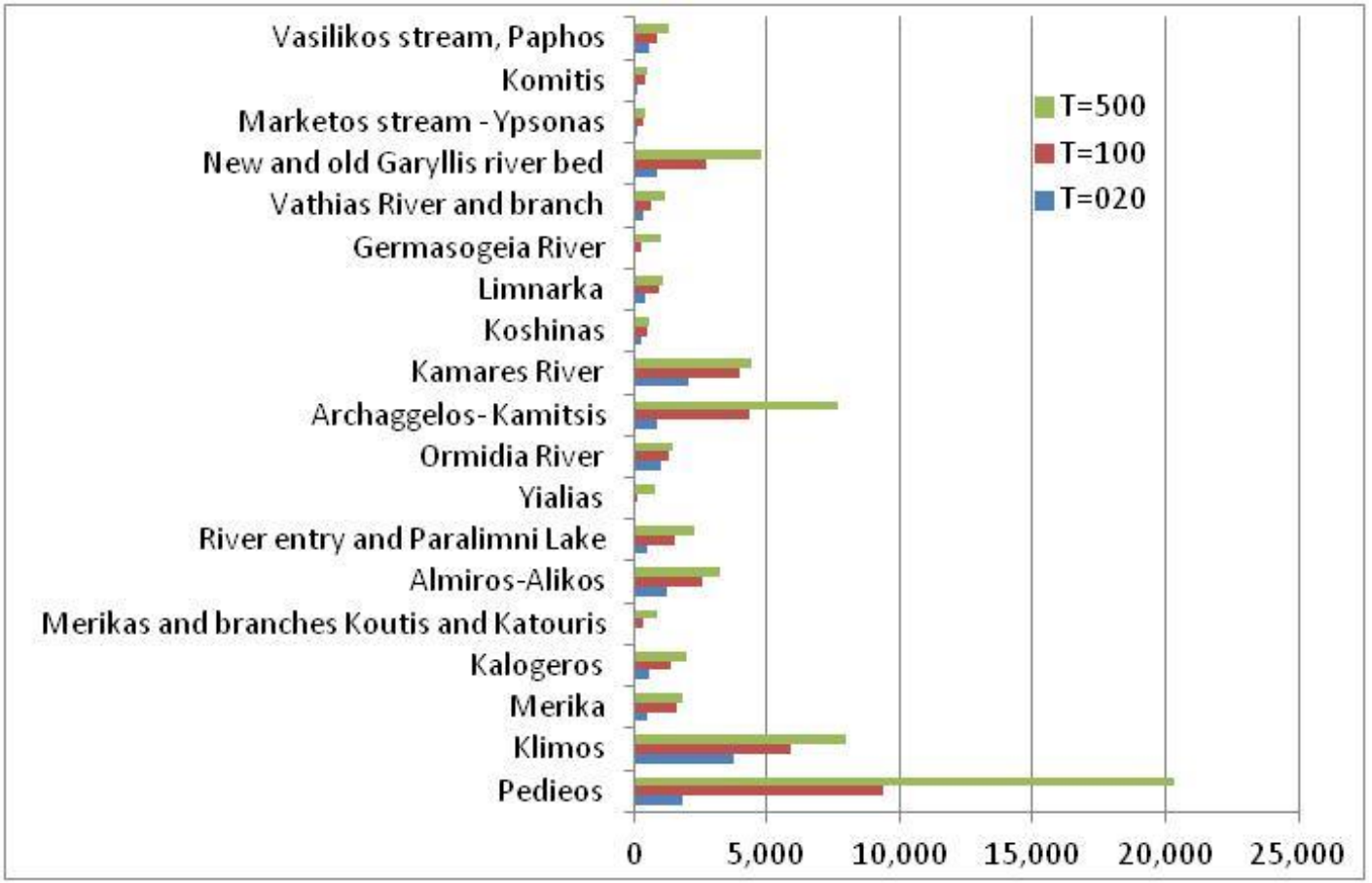

Estimated number of people affected by flooding for <u>fully developed</u> areas (T= return period)

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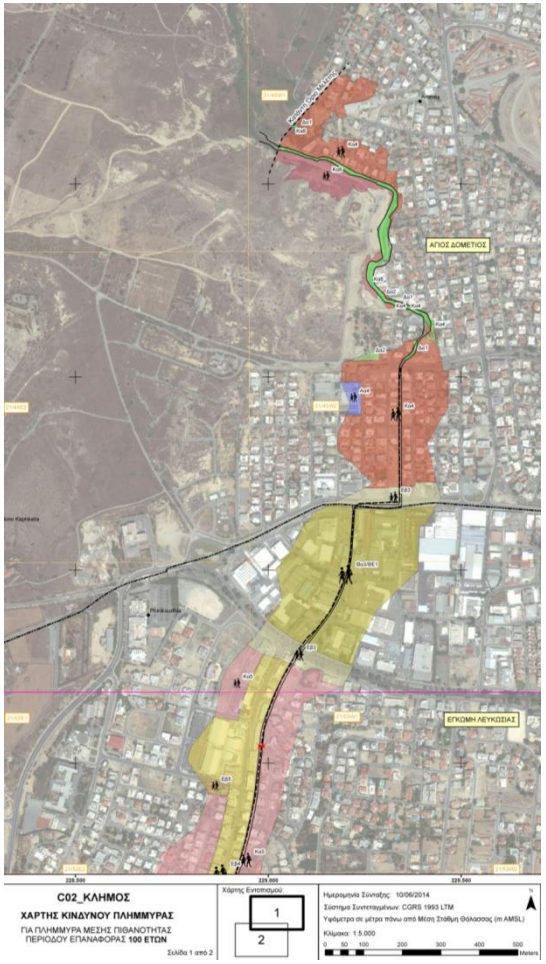

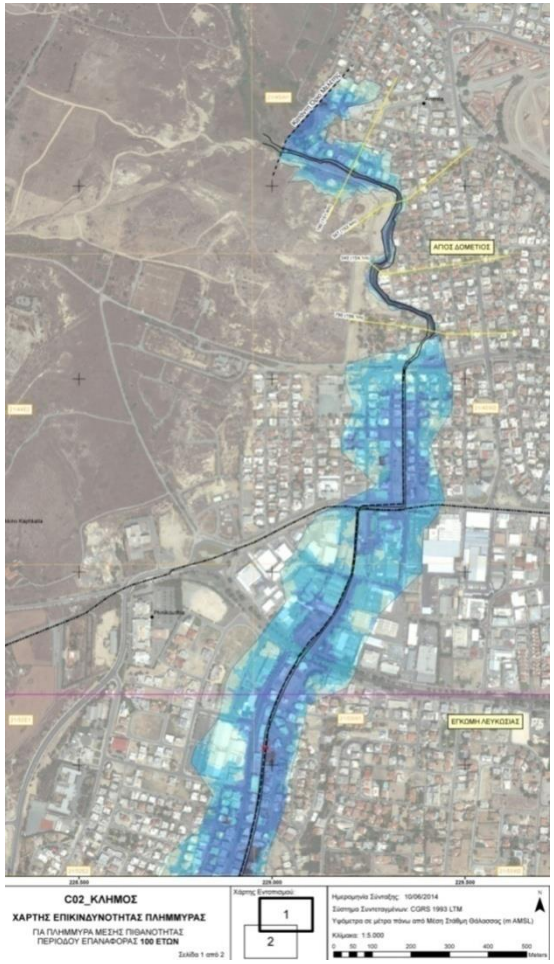

Flood hazard and flood risk maps (100 year event, Klimos)

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WDD is implementing various measures for reducing flood damage and flood risk. Such measures include:

1. Building new flood protection dams
2. Establishing and protecting the route of surface water flow (rivers, streams)
3. Providing adequate space along river flow
4. Providing adequate apertures at river crossings (bridges, culverts etc.)
5. Encouraging Sustainable Urban Drainage Systems (SUDS)
6. Minimising the flood damage by installing flood prevention technologies

Water Drainage Boards, like the Sewerage Board of Limassol-Amathus (ΣΑΛΑ),are already applying SUDS in new developments.

Pluvial (Flash) Floods

Storm water drainage surcharge: common cause of damage in urban areas.

Design of Drainage networks: Surcharge probability = 20% in any one year (1 in 5, T=5 years)

Probability of surcharge in 20 years is almost 99% (for ideal scenario – clean!!)

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Design based on rainfall statistics of the past !!!

Assessment: Surcharge more frequent than 20% in any one year

Floods due to drainage pipe surcharge do not fall under the jurisdiction of the WDD.

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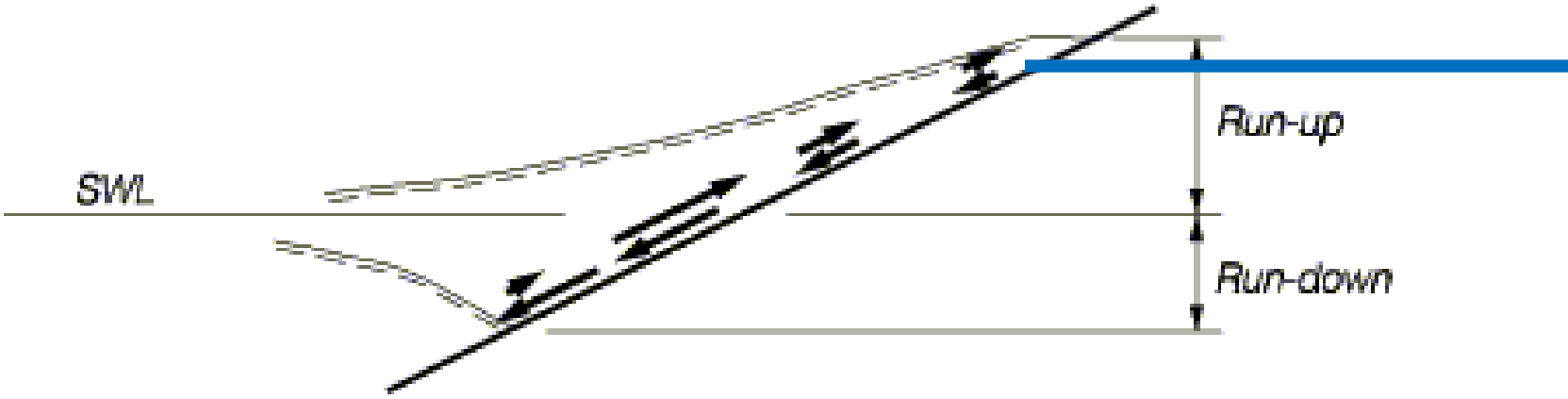
Groundwater Floods

Reservoir Floods

Coastal Floods

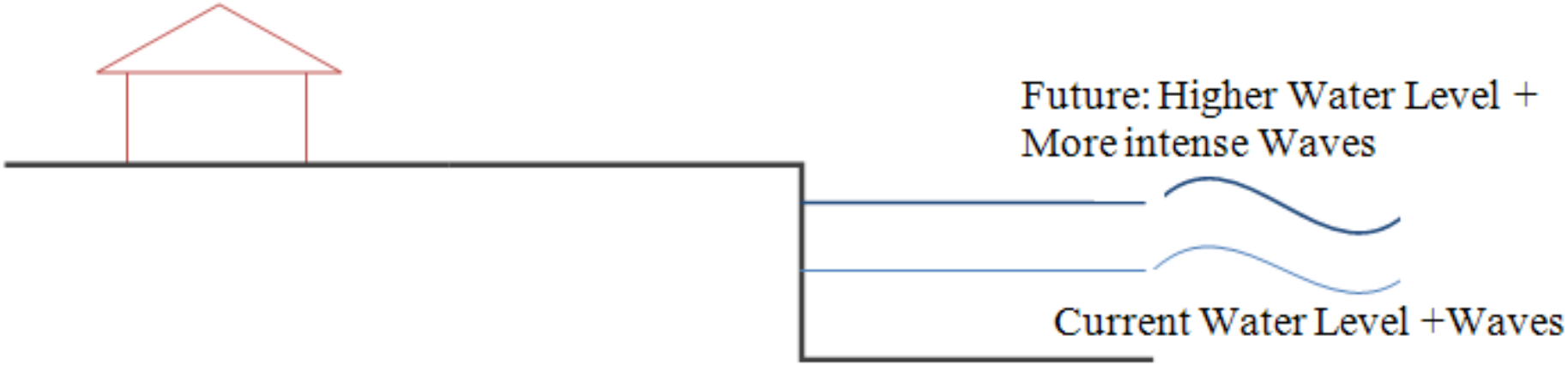
COASTAL FLOODS

Wave Run-up exceeds Crest Level



Wave Overtopping Factors

- Sea Level
- Extreme Wave Conditions
- Coastal Topography



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Policy context – Competent Authorities - Floods

- Ministry of Agriculture, Rural Development and Environment –WDD Floods Directive (rivers only)
  No jurisdiction in urban drainage or in natural streams which are not recorded on the maps.

- Ministry of Interior – Sewerage Boards of Cities

- Ministry of Transport, Communications and Works – PWD

- Local Authorities

What is Coastal Erosion

Relocation of sediments

- volume of sediments decreases: erosion
- Volume of sediments increases: accretion.

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Conditions for Erosion

- There are sediments which may be transported
- There is a driver that can initiate and transport sediments

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Main Causes of Human associated erosion

- Sediment mining from the coastal zone
- Obstruction in the movement of sediments along the coastline
- Obstruction in the supply of sediments

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Policy context – Competent Authorities – Coastal Erosion

- Ministry of Transport, Communications and Works, Public Works Department (PWD) – Coastal Section
- District Officer – Cyprus Ports Authority (Piers Law)
- Ministry of Interior, Lands and Surveys Department (sea level)

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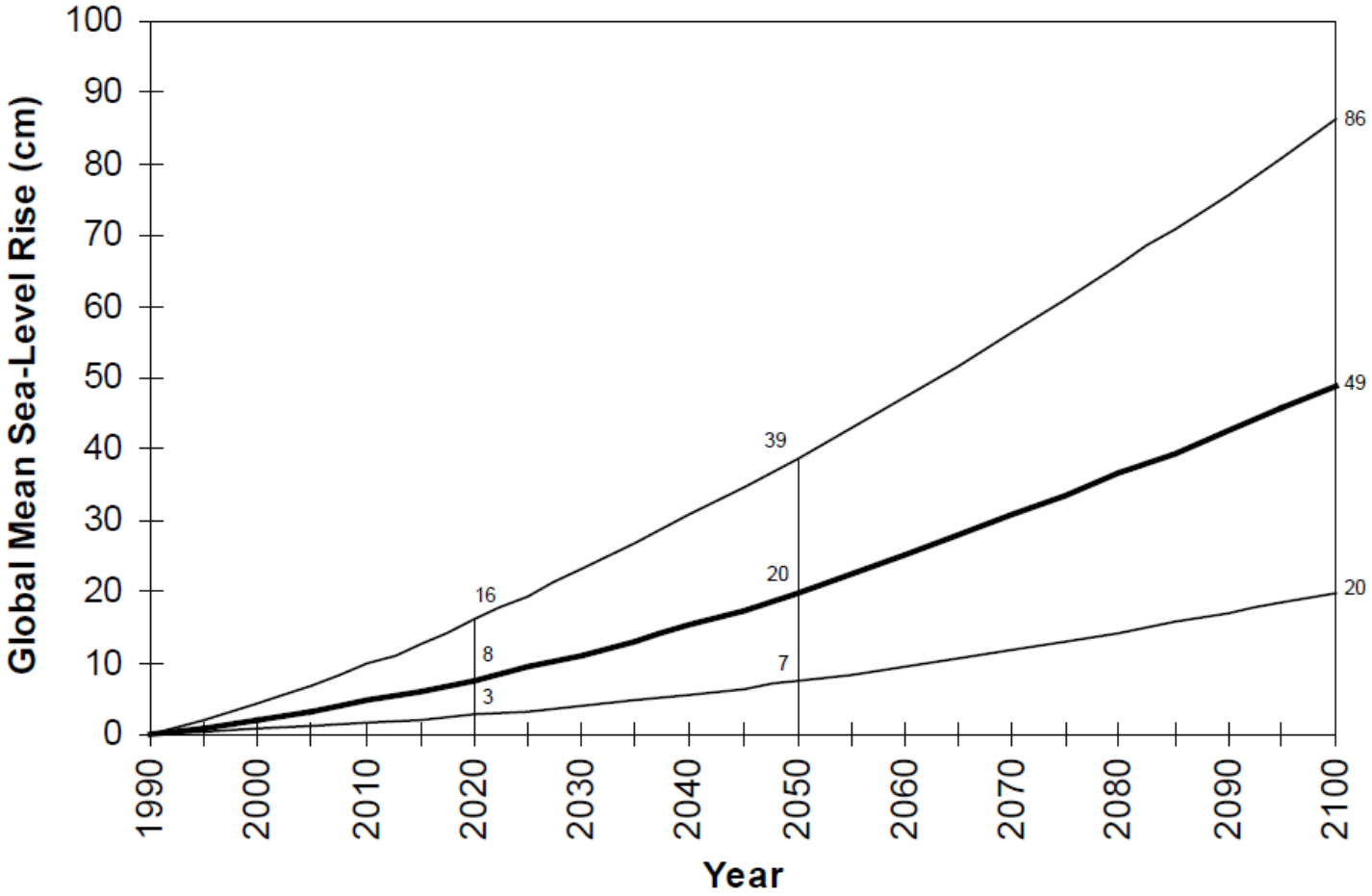

Projected Global sea-level rise for the period 1990-2100

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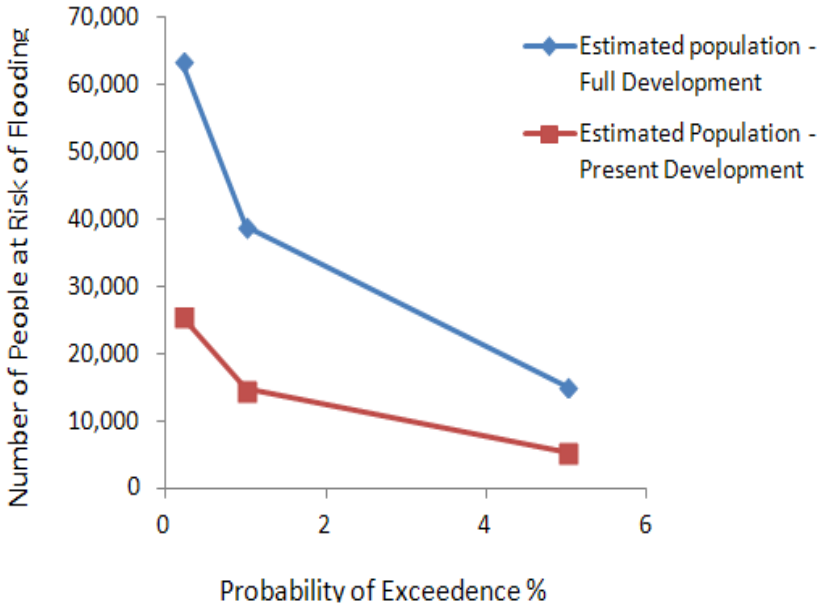
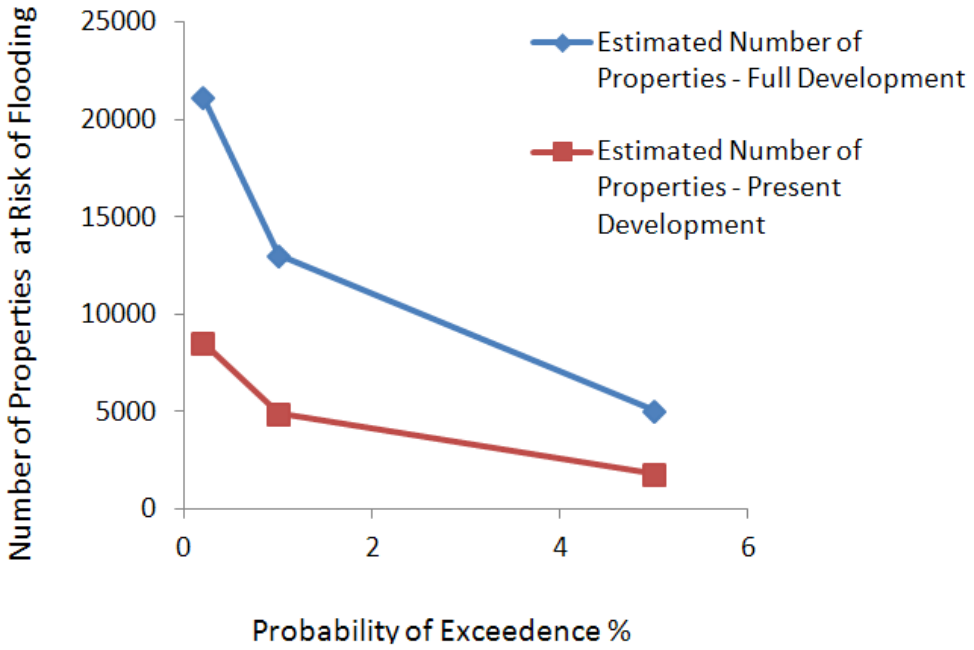
FL1 Number of people exposed to significant likelihood of flooding

Number of people presently at a significant risk of flooding (5% in any one year) **5 370**

Number due to urbanisation **15 170**



FL 2 Number of properties at significant likelihood of flooding



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FL3 Flooding of transport infrastructure, critical utilities and archaeological sites

FL4 Insurance premiums for flood risk

FL5 Land affected by coastal erosion and wave overtopping

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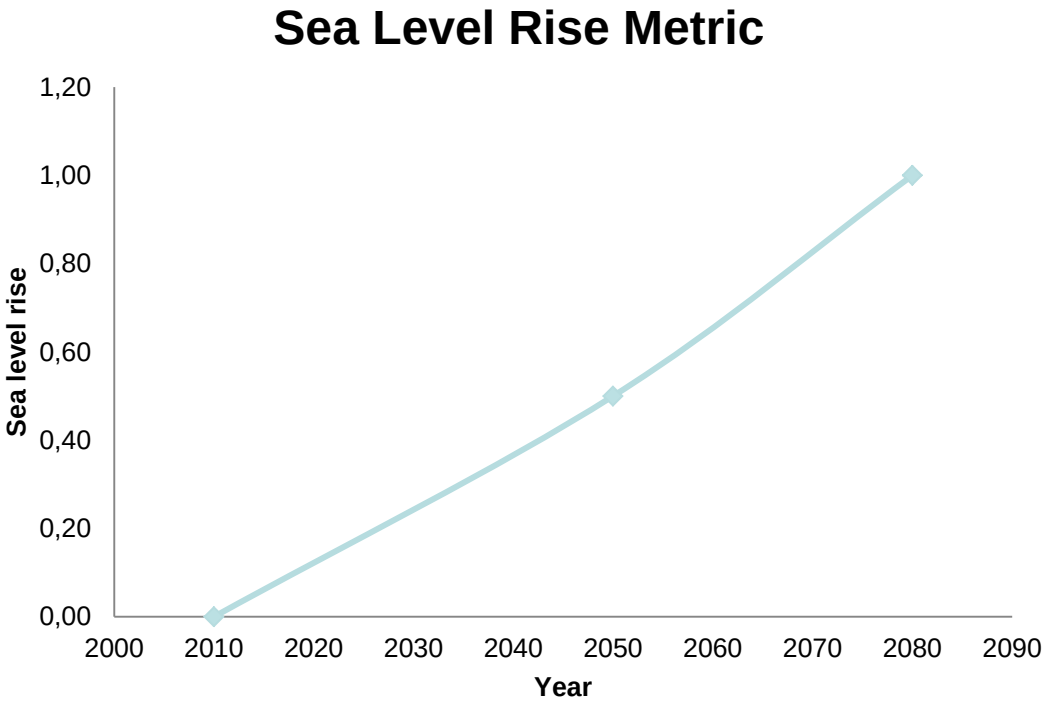

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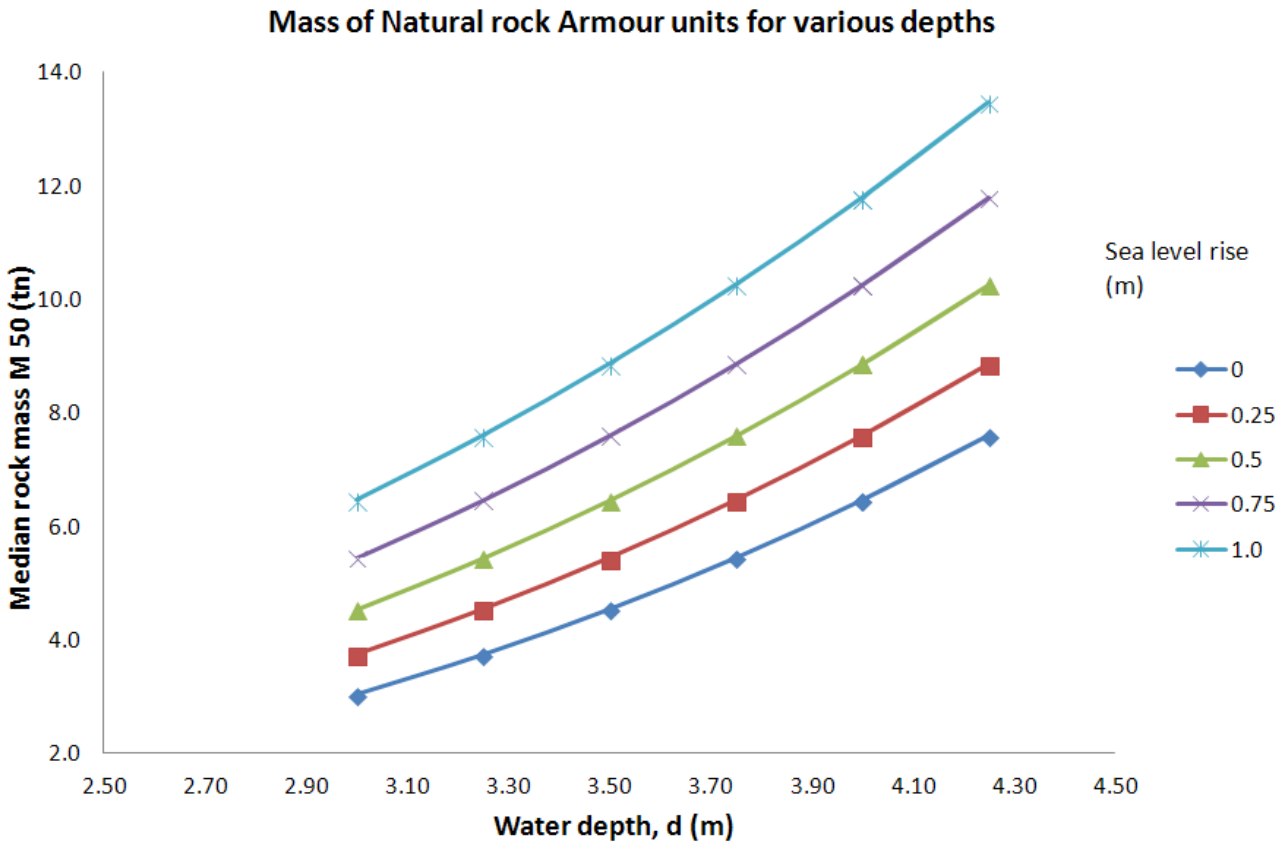

Metric for natural rocks to remain stable during wave attack for various water depths (depth limited wave conditions)

FL1 Number of people exposed to significant likelihood of flooding

Metric Code	Metric Name	Confidence	2050s		2080s	
			L RCP4.5	U RCP8.5	L RCP4.5	U RCP8.5
			Risk/opportunity			
FL1	Number of people exposed to significant likelihood of flooding	M	2	2	2	2

FL 2 Number of properties at significant likelihood of flooding

Metric Code	Metric Name	Confidence	2050s		2080s	
			L RCP4.5	U RCP8.5	L RCP4.5	U RCP8.5
			Risk/opportunity			
FL2	Number of properties at significant likelihood of flooding	M	2	2	2	2

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FL3 Flooding of transport infrastructure, critical utilities and archaelogical sites

Metric Code	Metric Name	Confidence	2050s		2080s	
			L RCP4.5	U RCP8.5	L RCP4.5	U RCP8.5
			Risk/opportunity			
FL3	Flooding of transport infrastructure, critical utilities and archaelogical sites	L	1	1	1	1

FL4 Insurance premiums for flood risk

Metric Code	Metric Name	Confidence	2050s		2080s	
			L RCP4.5	U RCP8.5	L RCP4.5	U RCP8.5
			Risk/opportunity			
FL4	Insurance Premiums for Flood Risk	M	1	1	1	1

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FL5 Land affected by coastal erosion and wave overtopping

Metric Code	Metric Name	Confidence	2050s		2080s	
			L RCP4.5	U RCP8.5	L RCP4.5	U RCP8.5
			Risk/opportunity			
FL5	Land affected by coastal erosion and wave overtopping	L	1	2	1	2

FL1 Number of people exposed to significant likelihood of flooding

Risk Metric	2050	2080	Estimation Method	Confidence	Notes
FL1 People exposed to flooding					
L, RCP4.5	-H	-H	WDD (APSFR)+ Informed judgement	H	Number of people >15.000 in all scenarios
U, RCP8.5	-H	-H			

FL 2 Number of properties at significant likelihood of flooding

Risk Metric	2050	2080	Estimation Method	Confidence	Notes
FL2 Properties exposed to flooding					
L, RCP4.5	-H	-H	WDD (APSFR)+ Informed judgement	H	Loss > €1m/ year
U, RCP8.5	-H	-H			

FL3 Flooding of transport infrastructure, critical utilities and archaelogical sites

Risk Metric	2050	2080	Estimation Method	Confidence	Notes
FL3 Flooding of transport, utilities, archaeological sites					
L, RCP4.5	-L	-L	Informed judgement	L	Measures are being taken by competent organisations
U, RCP8.5	-L	-L			

FL4 Insurance premiums for flood risk

Risk Metric	2050	2080	Estimation Method	Confidence	Notes
FL4 Insurance Premiums					
L, RCP4.5	-H	-H	Informed judgement	M	Large losses/ premiums irrespective of climate change scenario
U, RCP8.5	-H	-H			

FL5 Land affected by coastal erosion and wave overtopping

Risk Metric	2050	2080	Estimation Method	Confidence	Notes
FL5 Land affected by coastal erosion and wave overtopping					
L, RCP4.5	-L	-L	Informed judgement	L	Low confidence in continuation of pro-active measures
U, RCP8.5	-L	-L			

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CONCLUSIONS

1. 1% of population at risk of flooding with probability 5% in any one year and 5% of population at risk of flooding with probability 0.2% in any one year.
2. Monetary damage due to flooding >€1M/year expected to increase
3. WDD efforts commendable
4. Coastal erosion addressed by PWD
5. Sea level rise: (Limited data)
6. Climate change: opportunity for institutional changes

Thank you for your attention