



# TRA 2024 | Transport Research Arena



18/04/2024

Session: Resilient Infrastructure

## Stakeholders' Insights for Development of a Decision Support System (DSS) to foster resiliency of Greek Ports against climate change.

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## Background

# Why is resilience important for Maritime Ports?

- Ports are vital gateways for international trade.
- Located along coastlines, maritime ports are also highly susceptible to a range of climate hazards (hurricanes, coastal floods, and beach erosions).
- Ports are experiencing more frequent occurrences of heatwaves, hurricanes, wildfires, and coastal floods.
- Unmitigated climate hazards can disrupt port operations, leading to delays, damage to infrastructure, and increased costs for businesses.
- Investing in port resilience enhances long-term economic stability.

## Extreme Weather Events & Impact on Greek Ports (1/2)

- On 5-6/9/2023 the cyclone “Daniel” struck the region of Thessaly.
- According to the World Meteorological Organization (WMO), Mount Pelion received 700mm of rain during 24h, the equivalent of 18 months of average rainfall, resulting to severe floods in the city of Volos.
- The port of Volos had to cease all operations for several days.
- To mitigate the impact, all passenger ferry routes to Sporades were redirected to the port of Agios Konstantinos which is in a distance of 160 km from Volos.



## Extreme Weather Events & Impact on Greek Ports (2/2)

- On 9/9/2023 severe winds (force >8bf) in the port of Rafina resulted in the entanglement of the anchors of three ferries, leading to a collision incident.
- This event necessitated the closure of the port for 5 days.



Collision at the Port of Rafina due to Extreme Winds, Sep. 2023.

## Living Labs as a Supportive Tool

ResPorts project establishes 3 Living Labs in ports of different size and magnitude.

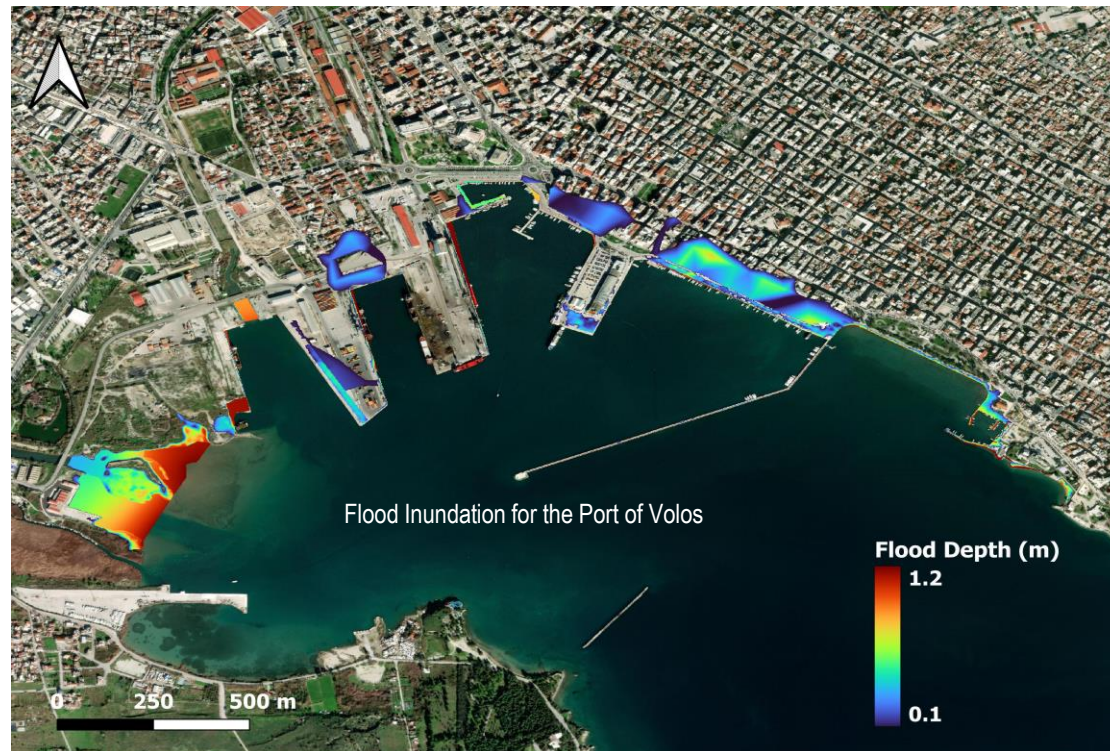
Feature	Heraklion Port	Volos Port	Chios Port
<b>Port Authority Ownership</b>	Private	Private	Municipal
<b>Passenger</b>	✓	✓	✓
<b>Freight</b>	✓	✓	✓
<b>Cruise</b>	✓	✓	✓
<b>Usable Area</b>	87.660m <sup>2</sup> [46]	n/a	n/a
<b>Water Max Depth</b>	9.00m-14.20m	9.4-10.0 [48]	8.20m [47]
<b>Available Transportation Modes To/ From the Port</b>	Road, Sea	Road, Sea, Rail*	Road, Sea
<b>Total Pier Length</b>	3,000m	4,700m	300m~400m
<b>Population of neighbouring urban area</b>	179,302	85,803	50,361





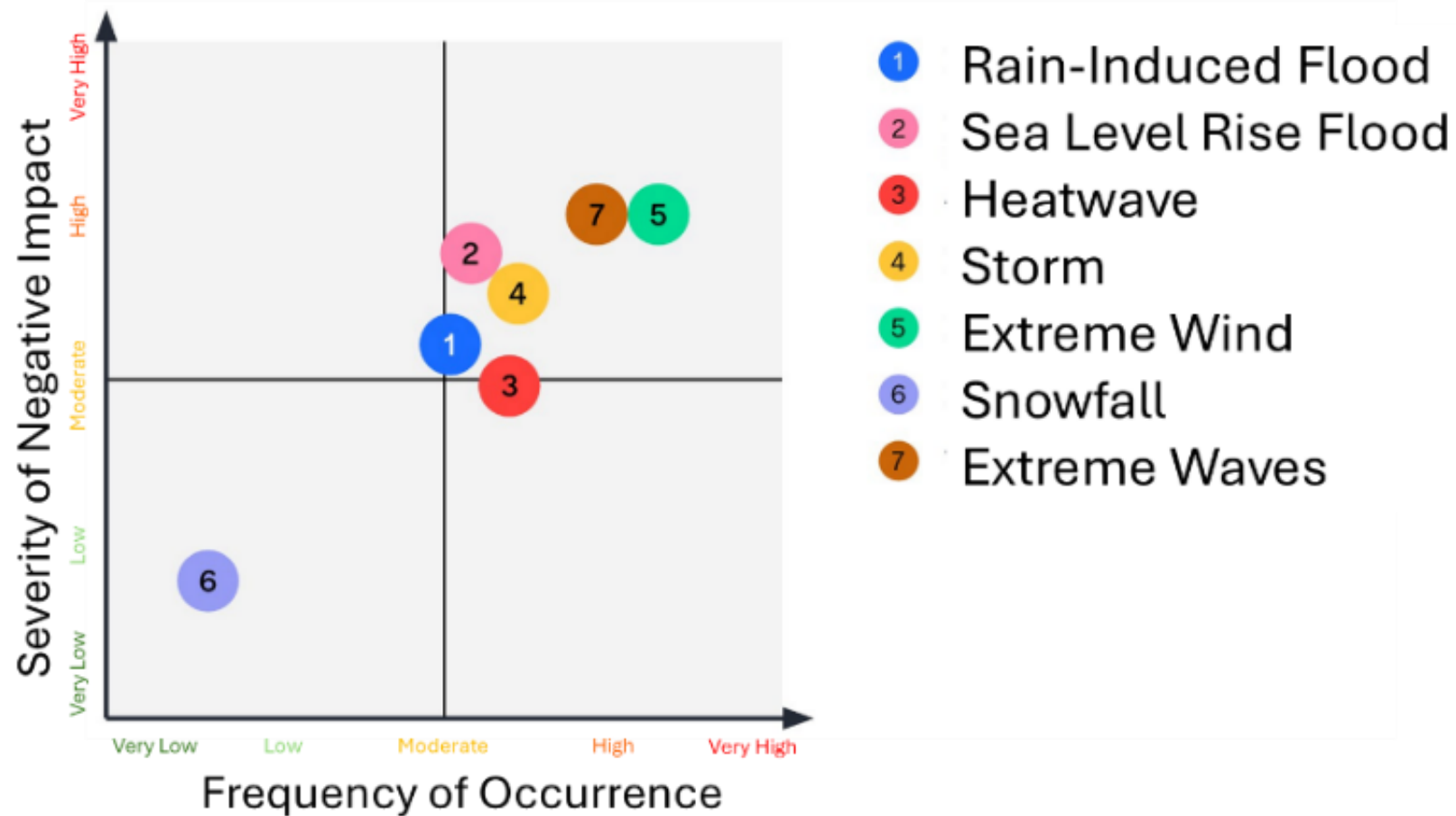
## Living Labs as a Supportive Tool

Simulations were created using the LISFLOOD-FP to assess the flood inundation in the harbour areas using the pessimistic (RCP8.5) climate change scenario (reference year 2050) for the Ports of Heraklion, Volos and Chios. The simulations are performed by prof. AF Velegrakis and the team of the Dpt. of Oceanography, Univ. of the Aegean (D. Chatzistratis, T. Chalazas, I. Monioudi)



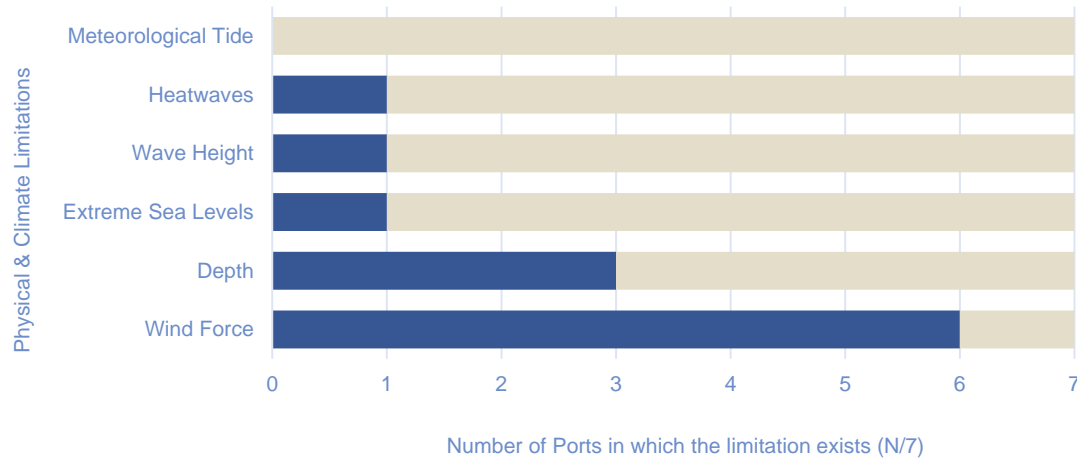
# Results

- Qualitative evaluation of the risk imposed by different climate events by the stakeholders during the Living Lab of Chios.

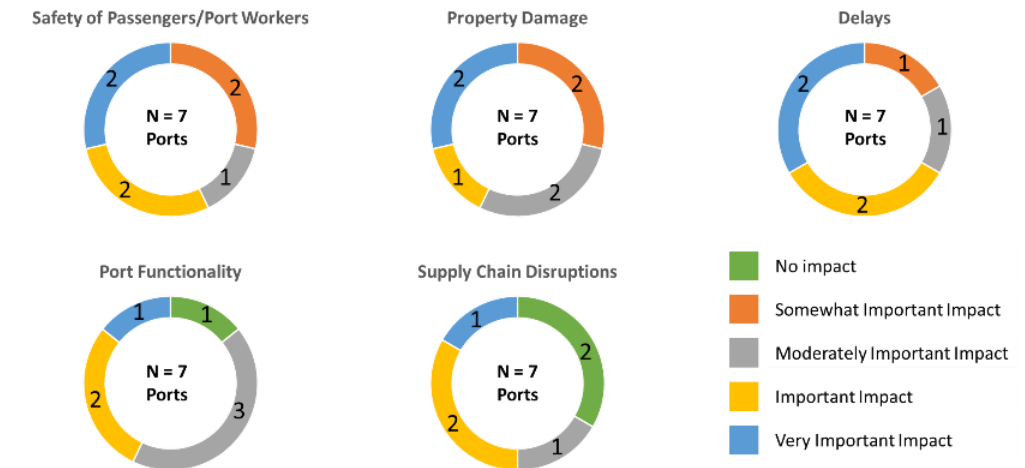


# Results

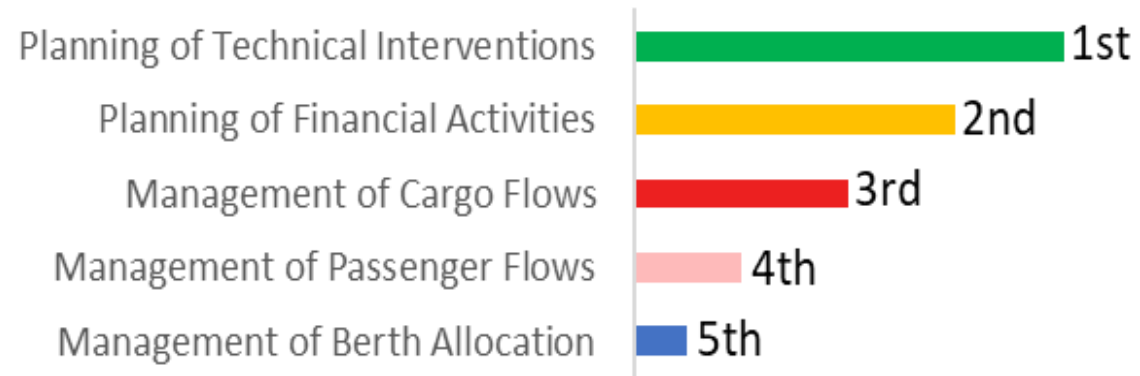
## Physical Limitations for Greek Ports



## Negative Impact of Extreme Winds to Port Operations



## Anticipated Benefits by the stakeholders relative to the DSS





## Conclusions

- Living labs offer a dynamic environment for testing and improving novel technologies and adaption techniques through on-site data collecting and baseline evaluations.
- Collaborating with local communities ensures that any solutions implemented are socially inclusive.
- By involving a wide range of stakeholders (port authorities, shipping companies, local authorities and communities and academia) a comprehensive response to the problems created by climate changes can be achieved.
- The development of a DSS is a useful tool empowering port authorities to make data-driven decisions ensuring continued efficiency, safety and prosperity.



**Thank you!**



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ΠΑΝΕΠΙΣΤΗΜΙΟ  
ΑΙΓΑΙΟΥ



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