



**Deltares**

# **‘Building with Nature’ for coastal erosion challenges**

**System knowledge and dealing with uncertainties in relation to BwN**

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**THAILAND AND THE NETHERLANDS  
CLIMATE ADAPTATION CONFERENCE**

# Sense of urgency

- Thai coastline is prone to erosion
- Affected by upstream dams, (illegal) sand mining, land use changes, coastal activities, etc.
- Accelerated by SLR (/ climate change)
- Existing man-made structures and developments along the coasts have disturbed the equilibrium of erosion and accretion
- **Improved system understanding: data and advanced tools are available**  
-> dealing with uncertainty



# PABUK 2019



## Effects of Tropical Storm Pabuk

4 Jan 2019 - Pak Phanang, Nakhon Si Thammarat



5 Jan 2019 - The Upper Gulf of Thailand

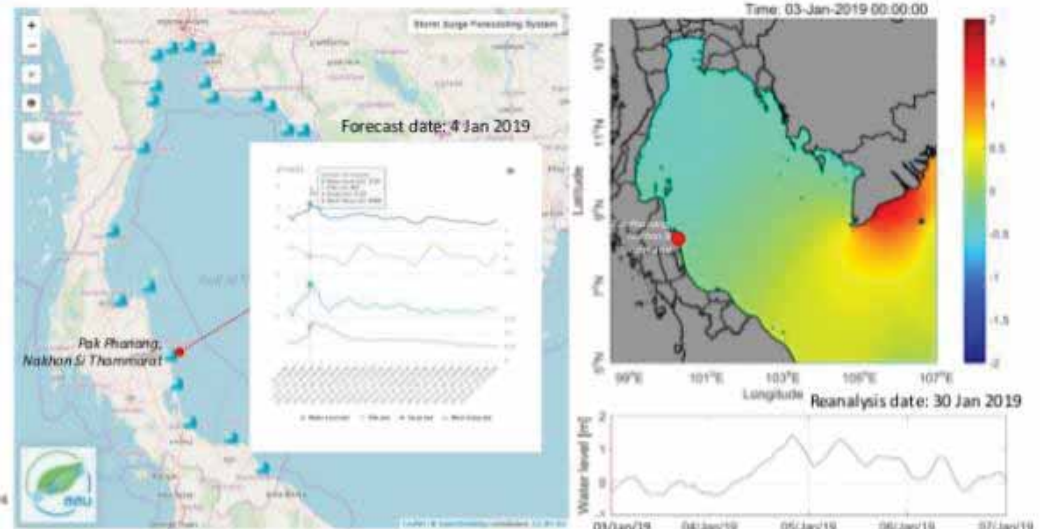


19 | Bridging Policy Gaps through Software and Modeling

Hydro-Information Institute (Public Organization)

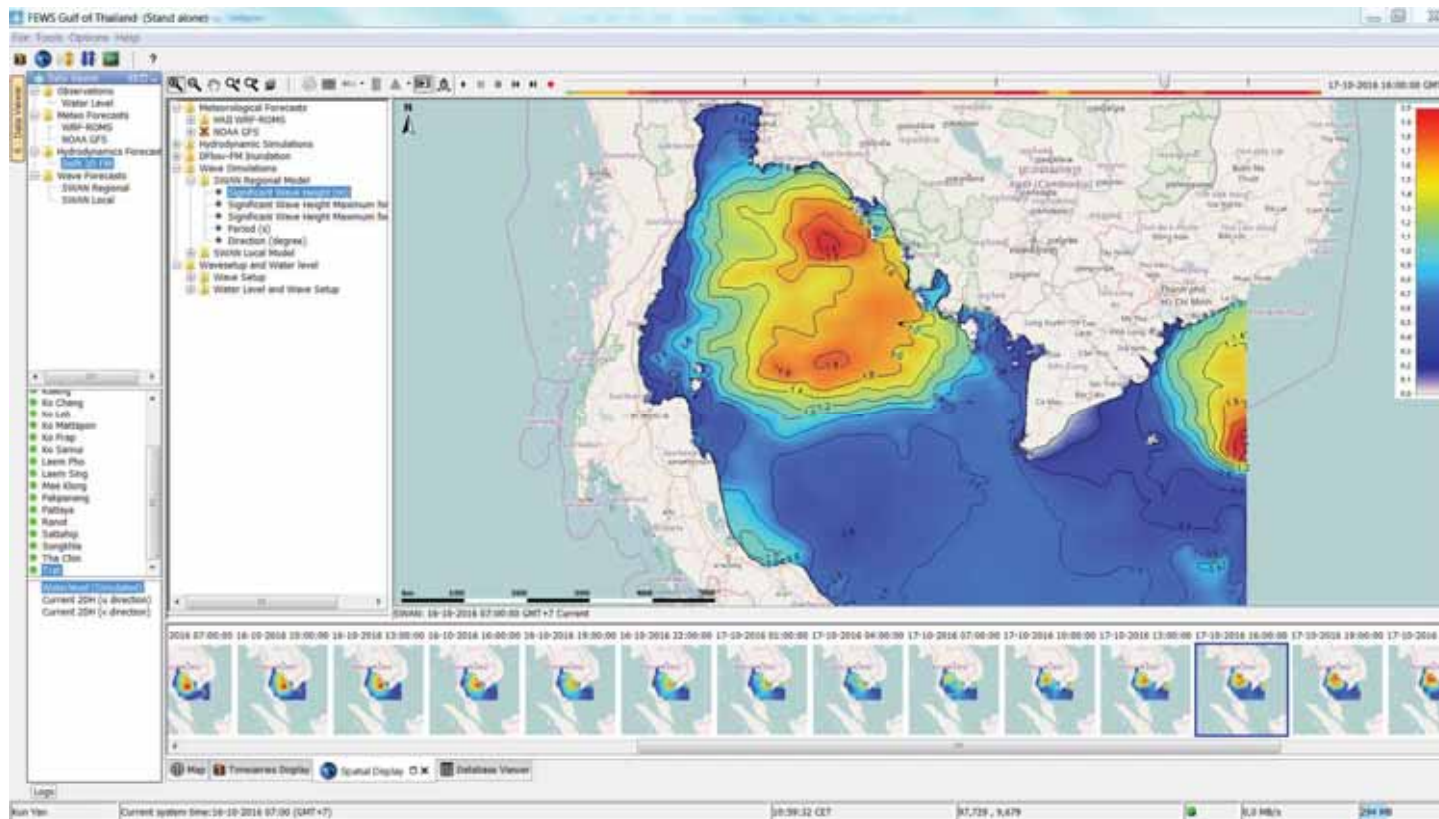


## Water level forecast in the Gulf of Thailand

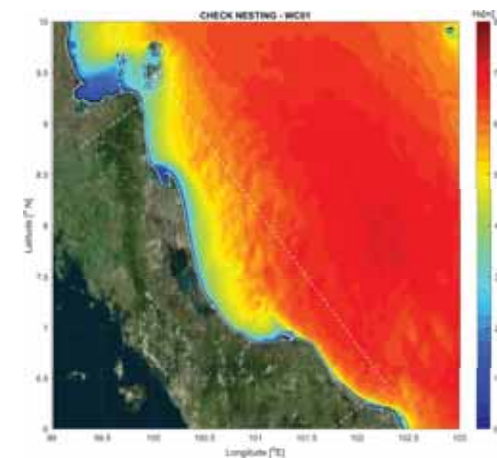




# Operational forecasting system GoT



Coastal flood forecasting along the Gulf of Thailand together with the Hydro-Informatics Institute (HII)

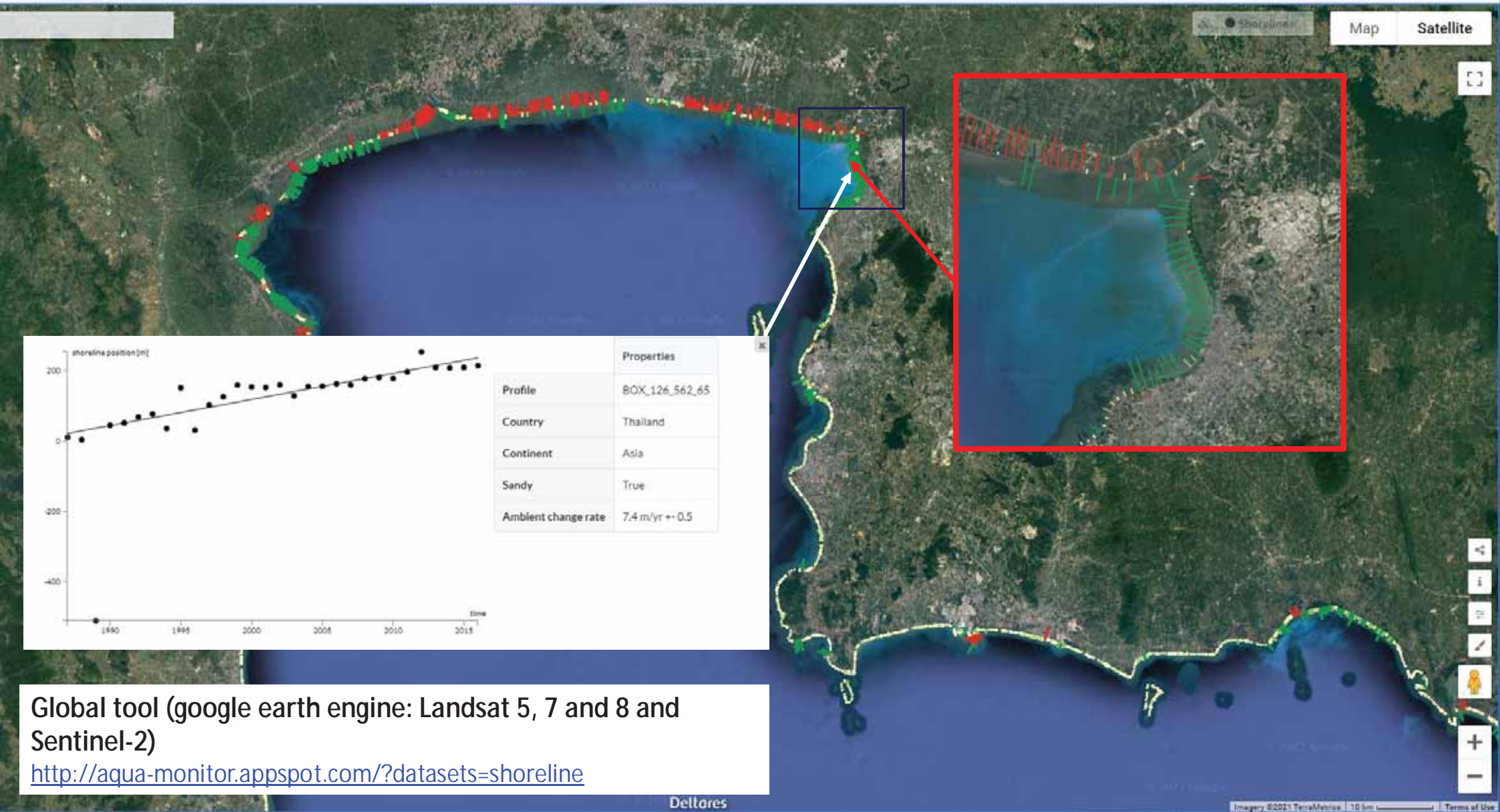




Global tool (google earth engine: Landsat 5, 7 and 8 and Sentinel-2)

<http://aqua-monitor.appspot.com/?datasets=shoreline>





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# Building with Nature opportunities

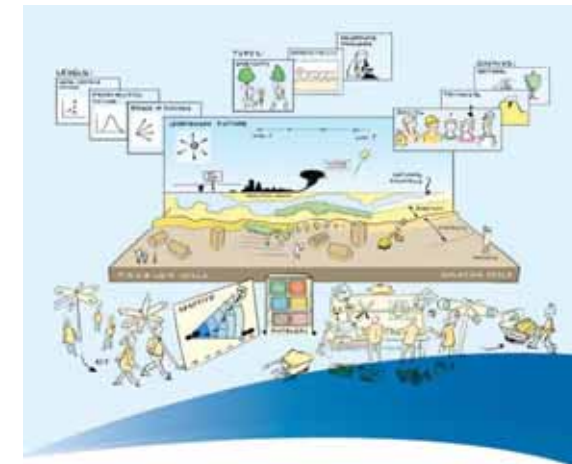


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# Why addressing uncertainties today?

Identifying uncertainties is important for the success of both **Building with Nature** and traditional **Design and Implementation**.



**Building with Nature: a future proof strategy for coping with a changing and uncertain world**

*Working with uncertainties*



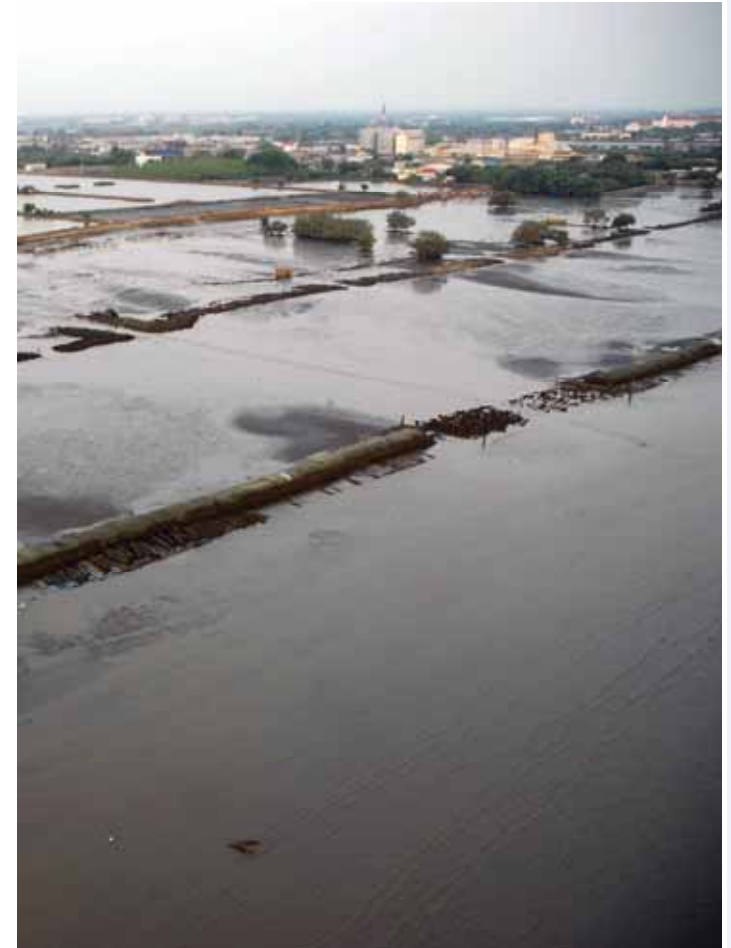
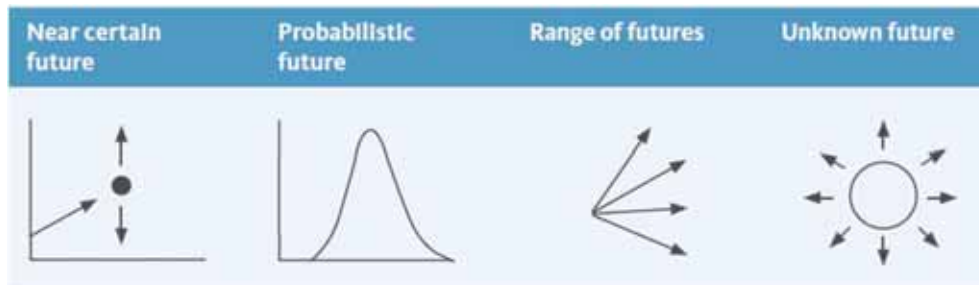
*Cado van der Lely A, van Eekelen E, Honingh D, Leenders J, McEvoy S, Penning, E, Sterk M, Voskamp I, Warren A and van Zelst V (2021). Building with Nature: a future proof strategy for coping with a changing and uncertain world. Ecoshape White Paper*

<https://www.ecoshape.org/en/building-with-nature-a-future-proof-strategy-for-coping-with-a-changing-and-uncertain-world/>

# Introduction uncertainty

- Urban-Coastal environments are complex systems
- Climate Change comes in many forms, magnitudes and rates

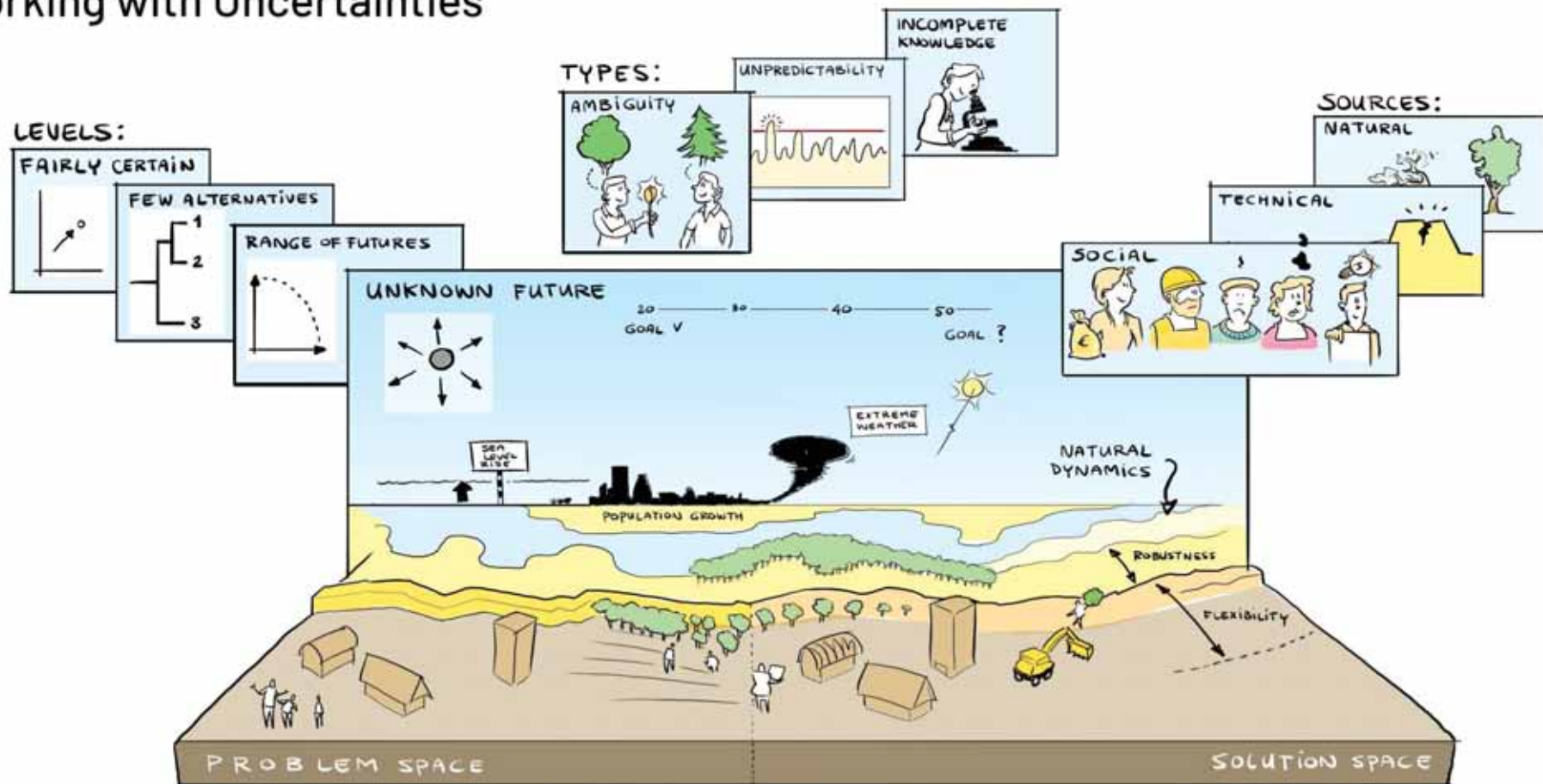
Results in an **Unknown Future** and **Uncertainty**





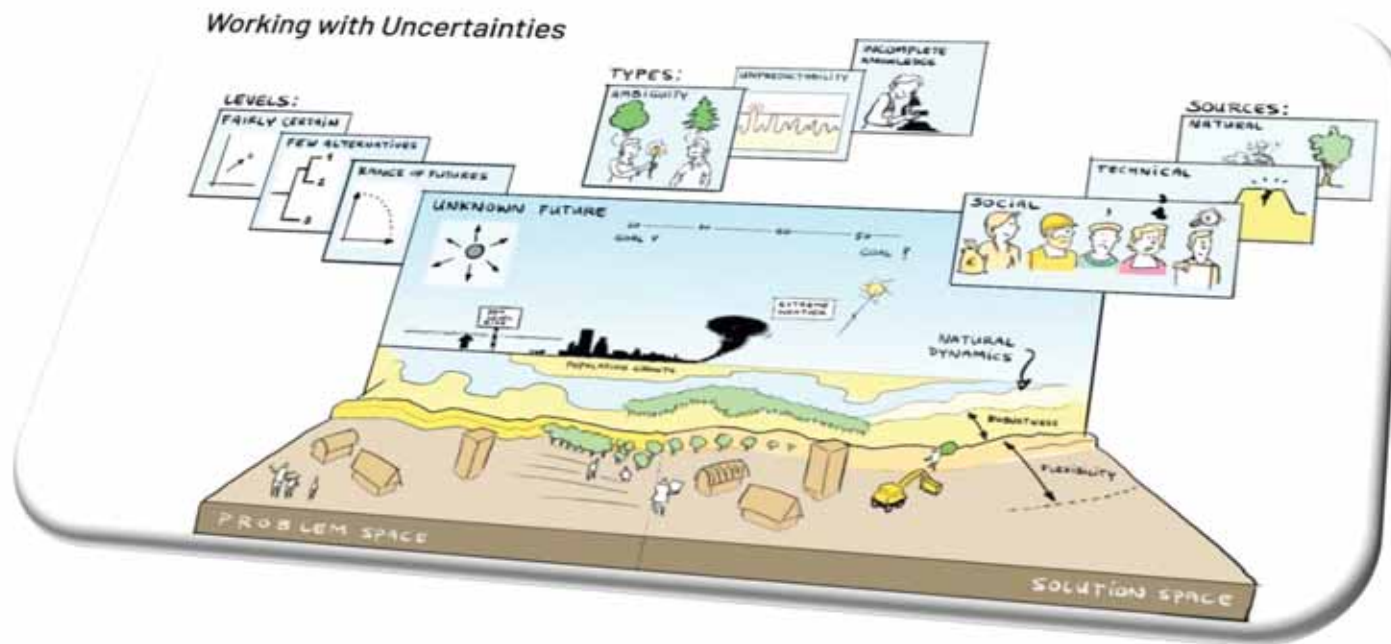
# Introduction uncertainty

## Working with Uncertainties



# Uncertainty of Building with Nature (BwN)

- The perceived uncertainty concerning BwN solutions, often hampers its implementation
- Yet, uncertainty of BwN solutions is more manageable, than uncertainty of the problem





# How to deal with uncertainty?

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- Desire to ignore uncertainties and to hold on to familiar **predict-and-design practices**
- With these conventional practices, the chances for **'regret'** are high

Instead:

- Acknowledge uncertainty and complexity
- Act now with low-regret (flexible) measures
- Formulate robust plans that can be adapted over time



# Planning and design principles

Three broad strategies for dealing with uncertainties in the solution space:

1. Over-dimensioning; assumes worst-case scenario
2. Diversification; a risk management strategy
3. Modularity; different components in a solution





# Diversification is key

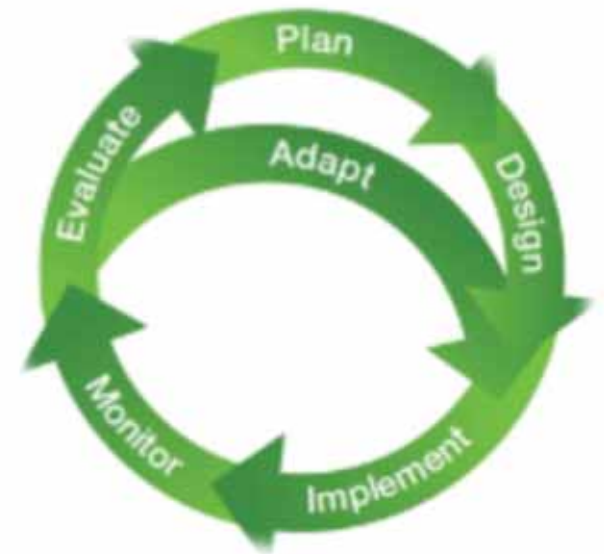
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- Diverse solutions provide robustness; e.g. combining a seagrass habitat with mangrove restoration
- Hybrid solutions give flexibility; e.g. combining mangroves with levees in the hinterland
- Especially if space is limited hybrid is the way to go
- Not only along the coast, but also in the urban environment



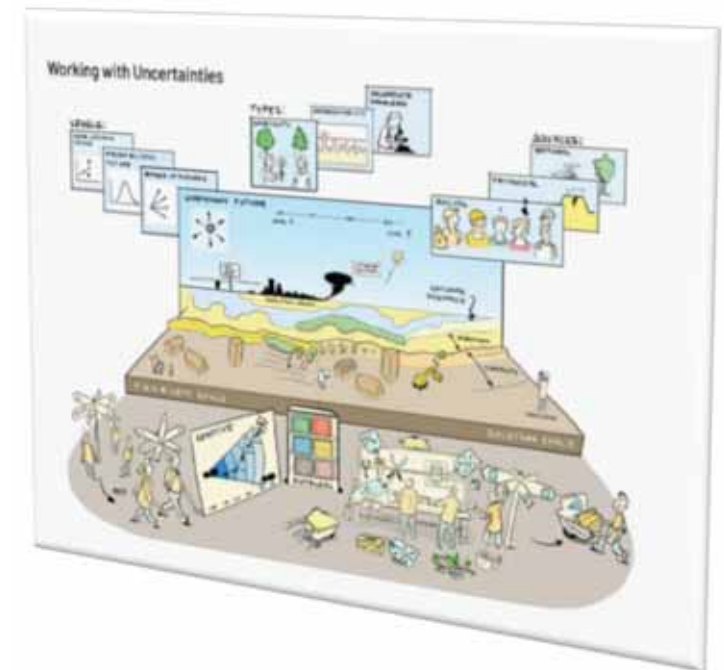
# Monitoring uncertainty and solutions

- The best way to reduce uncertainty on BwN solutions is by executing pilots / living labs
- It reduces the uncertainty caused by incomplete knowledge of the proposed solutions, through monitoring and research.
- Working with adaptive solution, also comes with a need for maintenance.
- This should be considered before a decision is made to implement such solutions.



# Conclusion

- Diversification of proposed solutions is key in dealing with uncertainties and risks, especially in urbanized coastal areas
- Building with Nature embraces natural dynamics and thus adapts to a changing environment.
- Identifying and managing uncertainties using Building with Nature is the most sustainable, resilient and future proof approach in the long run.





# Thank you for your attention!

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