

Climate Services for Beach Management and Climate Change Adaptation

Sea Level Conference, June 5 – 7, 2023

Presented by David Cabana

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Physicochemical parameters direct affected by climate change

- Air temperature
- Solar radiation
- Winds
- Surges
- Precipitation

- Water temperature
- Sea ice
- River run-off
- **Sea level rise**
- Salinity in the water
- Sediment transportation

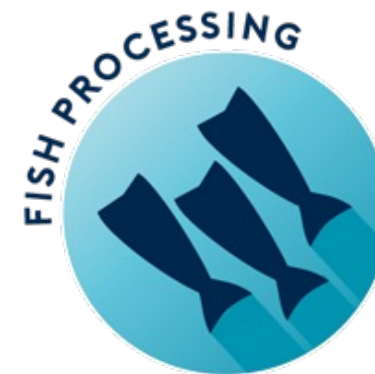


Ecosystem parameters indirectly affected by climate change

-
- Marine mammals
 - Water birds
 - Coastal fish
 - Benthic habitats
 - Microbial community
 - Nutrients concentration
 - Non-indigenous species



Coastal economic sectors and services impacted by climate change



In Blue Economy terms, coastal tourism is the biggest growing sector across Europe in terms of GVA and employment.

Tourism as a percentage of GDP

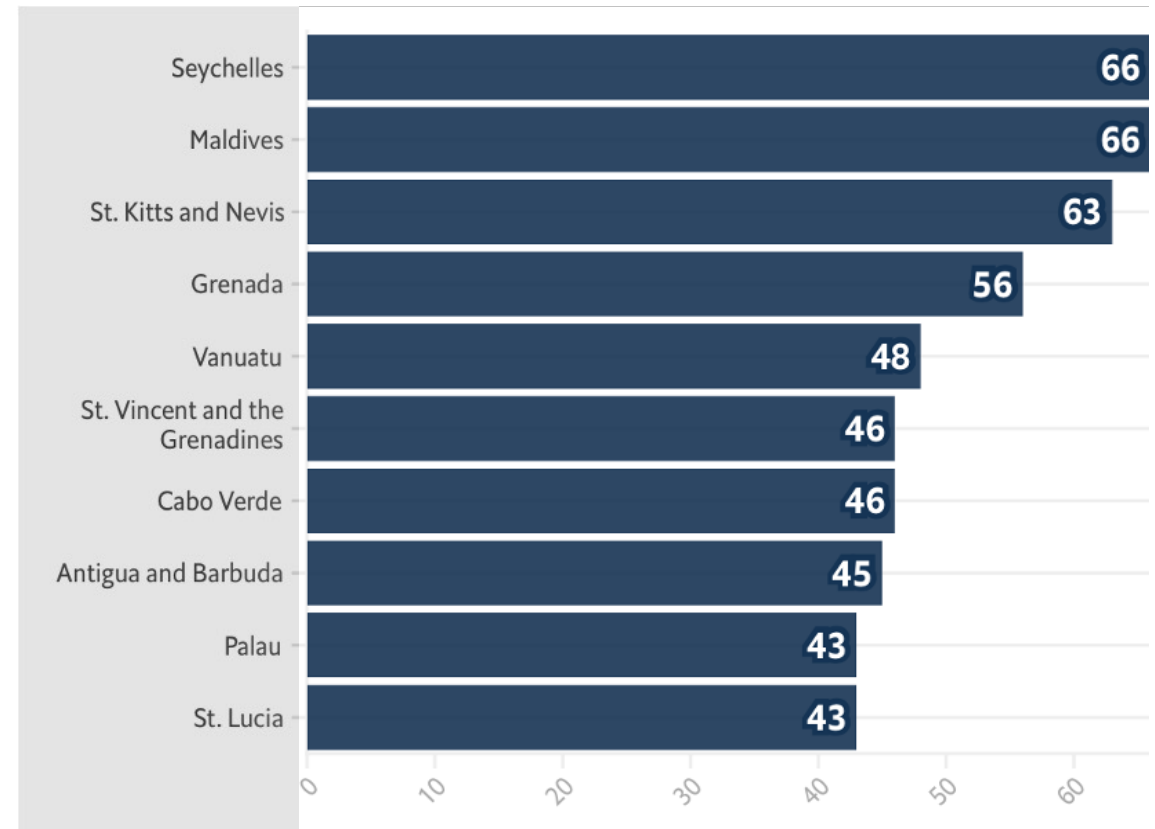
- EU member states (Tourism, % of GDP)

Member States	% of GDP
HR	25 %
CY	22 %
EL	21 %
PT	19 %
ES	15 %
EE	15 %
AT	15 %
IT	13 %
SI	12 %
BG	12 %
MT	11 %
FR	10 %
DE	9 %

In the EU **coastal areas accounted for more than three-quarters** of the total nights spent in tourist accommodation.

(Blue Economy Report 2022)

- Small Island Developing States (Tourism, % of GDP)



United Nations Conference on Trade and Development (UNCTAD)

Climate change threatens beach and coastal tourism



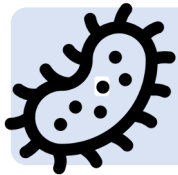
Loss of **attractiveness of the coastal environment**



Loss of **species and degradation** of landscape



Loss of **tourist experience** related to human comfort



Increase emerging **infectious diseases**



Change in the **quality of the infrastructures** and facilities



The availability and/or **cleanliness of domestic water**

Coastal tourism sector.

Potential climate services beneficiaries and users



Governmental institutions (Local, Sub-national, National, Regional)



NGOs (e.g., environmental organisations)



Tourism Industry (hotels, resorts, restaurants, tour operators, travel agencies, tourism support organisations, airports, marinas, etc)



Coastal communities



Tourist



Research institutions



Media

Related economic sectors

Transport
Insurance
Construction
Wholesale and retail
Energy
Water

Tourism sector, gaps to climate change adaptation

Improving the integration of climate change information for informed decision-making in the beach and coastal tourism sector

1. Lack of ad-hoc, easy to access information

2. Low level of awareness on CC risk

3. Lack of knowledge of existing services and their benefits

4. Lack of applicability of the existing services

5. Short decision cycle

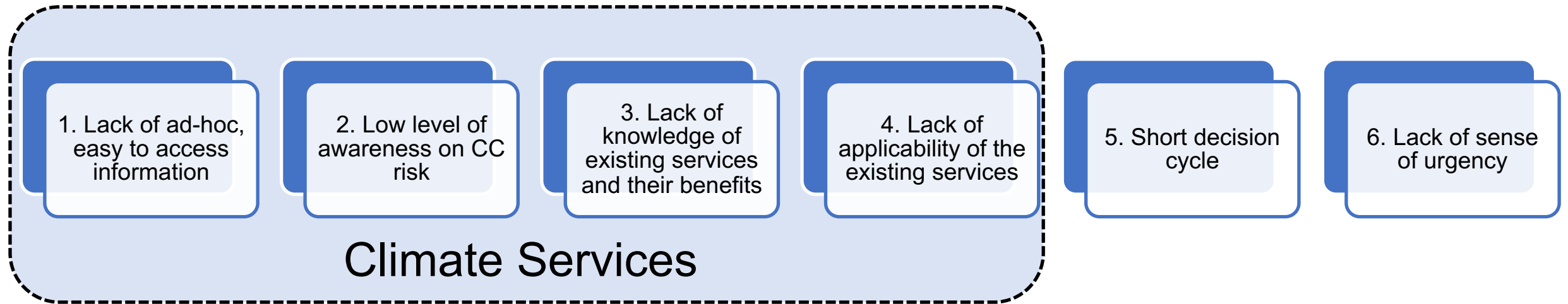
6. Lack of sense of urgency

A consultations with key tourism stakeholders regarding requirements for climate services and the key gaps in their utilisation revealed 6 major gaps.

(Damm et al., 2020).

Tourism sector, gaps to climate change adaptation

Improving the integration of climate change information for informed decision-making in the beach and coastal tourism sector



(Damm et al., 2020).

Air temperature

Solar radiation

Winds

Surges

Precipitation

Water temperature

Sea ice

River run-off

Sea level rise

Salinity in the water

Sediment transportation

- Lack of ad-hoc, easy-to-access information
- Low level of awareness of climate change risks
- Lack of knowledge of existing services and their benefits
- Lack of applicability of the existing services

CLIMATE SERVICES **USERS**

**Climate change
Science**

Boundary organisations

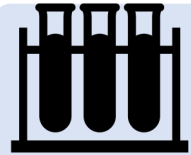
**Potential
climate services
beneficiaries**

Case study. The Blue Flag Award

- The Blue Flag eco-label is a globally recognisable voluntary award for beaches, marinas, and sustainable boating tourism operators. In order to qualify for the Blue Flag, a series of stringent criteria must be met and maintained.



Environmental Education



Water Quality



Environmental Management



Safety & Services

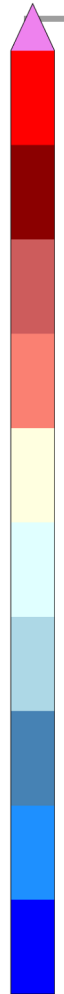


Climate change



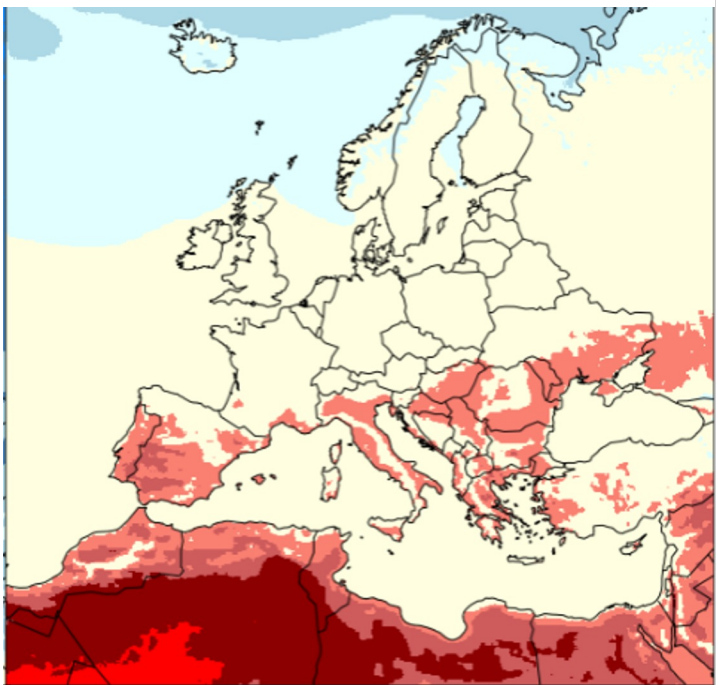
Seasonal Universal Thermal Comfort Index

UTCI (°C)	Stress Category
> 46	Extreme heat stress
38 – 46	Very strong heat stress
32 – 38	Strong heat stress
26 – 32	Moderate heat stress
9 – 26	No thermal stress
0 – 9	Slight cold stress
-13 – 0	Moderate cold stress
-27 – -13	Strong cold stress
-40 – -27	Very strong cold stress
< -40	Extreme cold stress

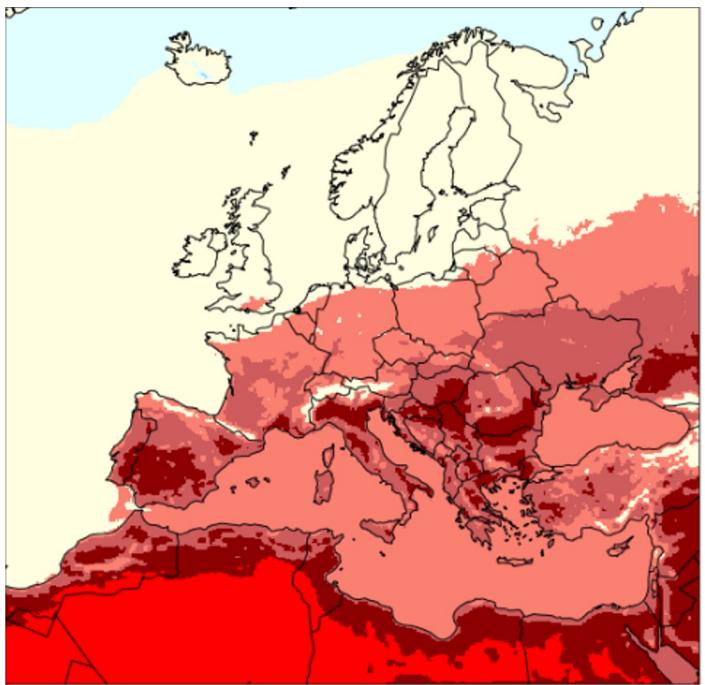


CanESM2 - CCLM4-8-17. Seasonal Average (JJA)

Historical (1970-2000)

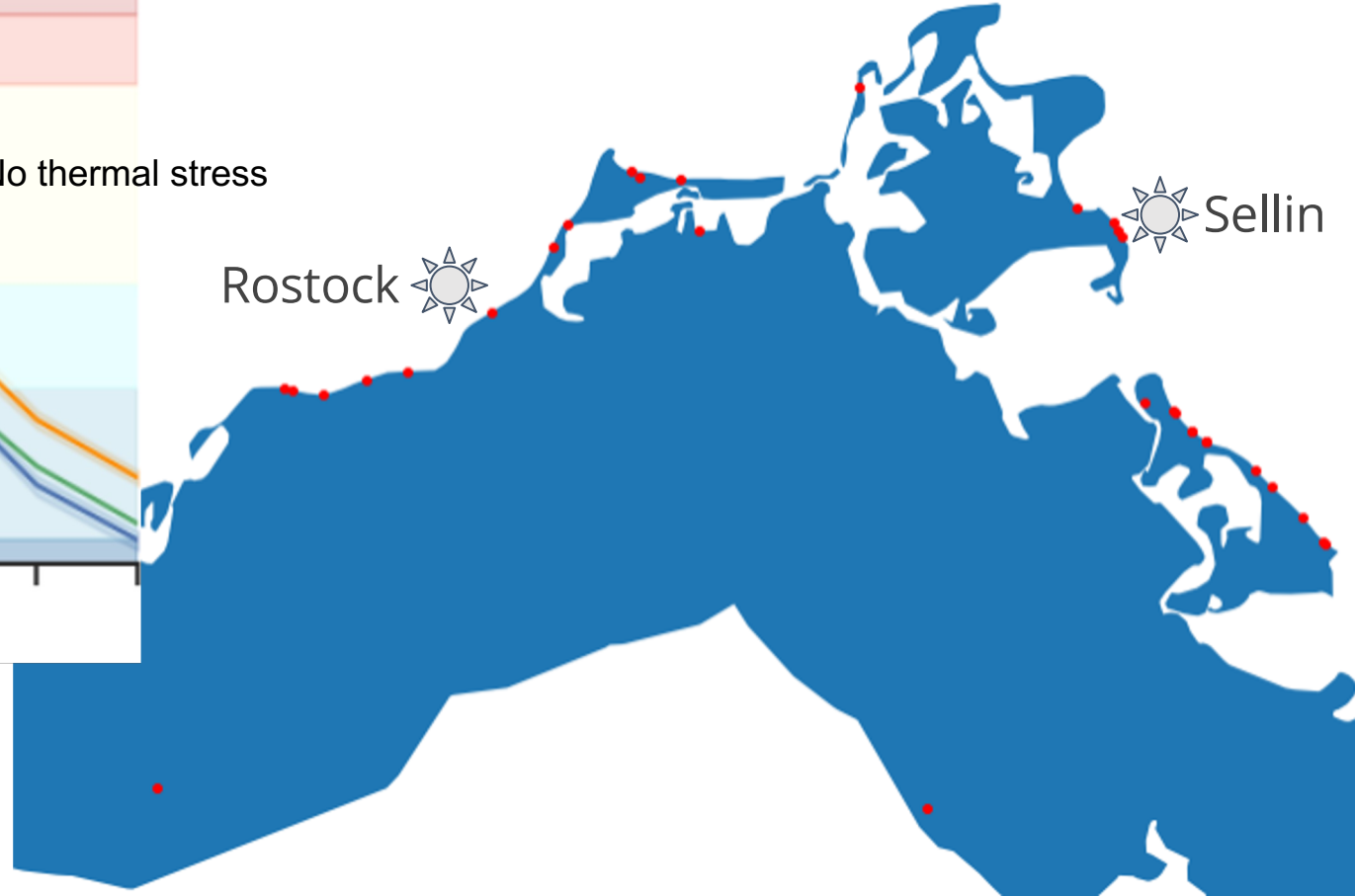
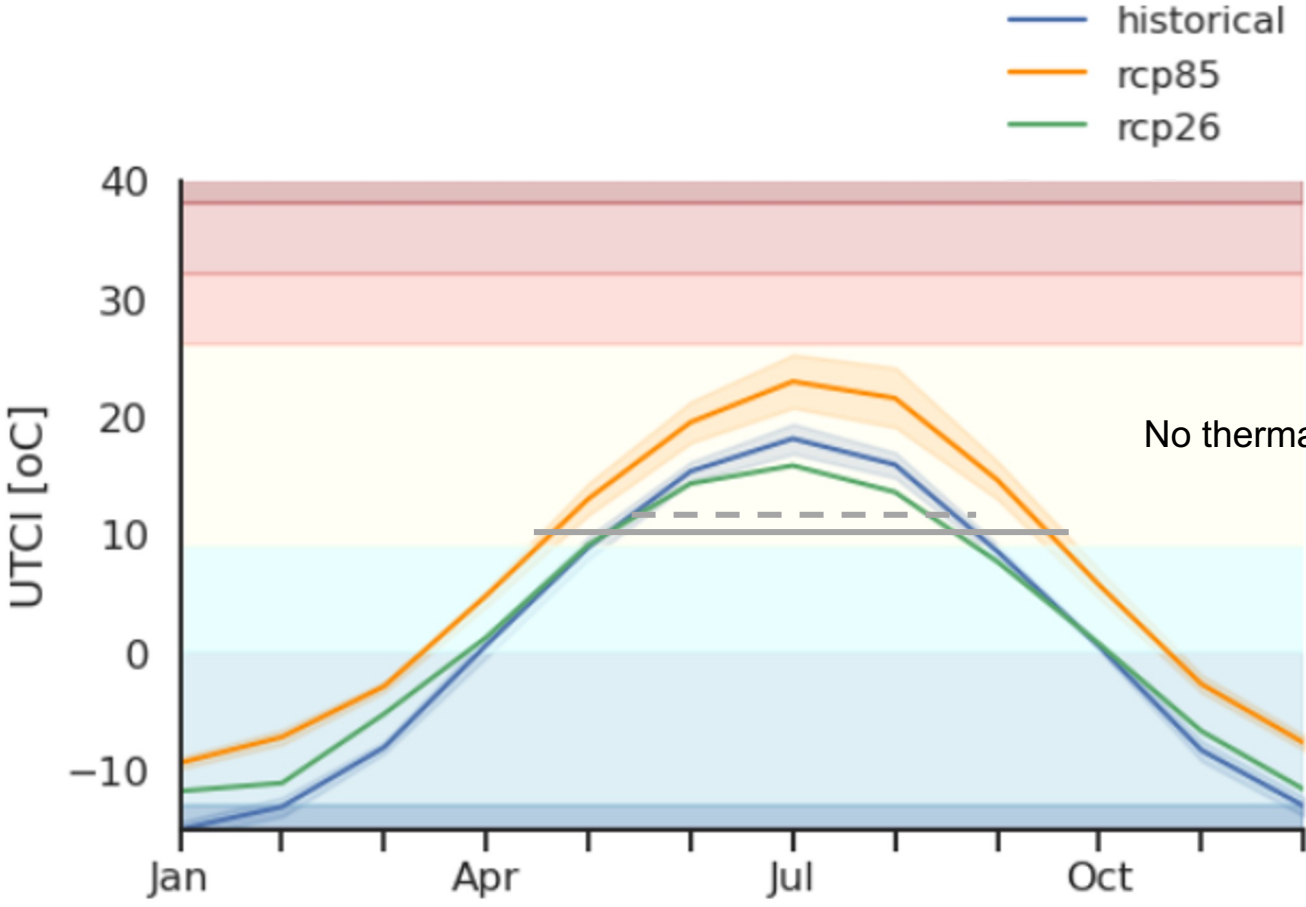


RCP 8.5 (2070-2100)



Nam, C., Lierhammer, L., Bunttemeyer, L., Evadzi, P., Cabana, D., and Celliers, L. (submitted to *Climate Services*). Changes in Universal Thermal Climate Index from Regional Climate Model Projections over European Beaches. *Climate Services*

UTCI - Mecklenburg Vorpommern



Impacts on Blue Flag criterion

Changing season lengths:

- Increase #WaterQuality tests, especially if season length increases, or water temperatures increase.



Art Credit:
Dmytro Lukyanets

Changing Human Health stresses:

- Infrastructure criteria may include “shading options” (Nature Based Solutions)
- Lifeguard training includes heat stress (toddlers / elderly)



SLR and the Blue Flag award

- **Air temperature**
- **Solar radiation**
- **Winds**
- Surges
- Precipitation

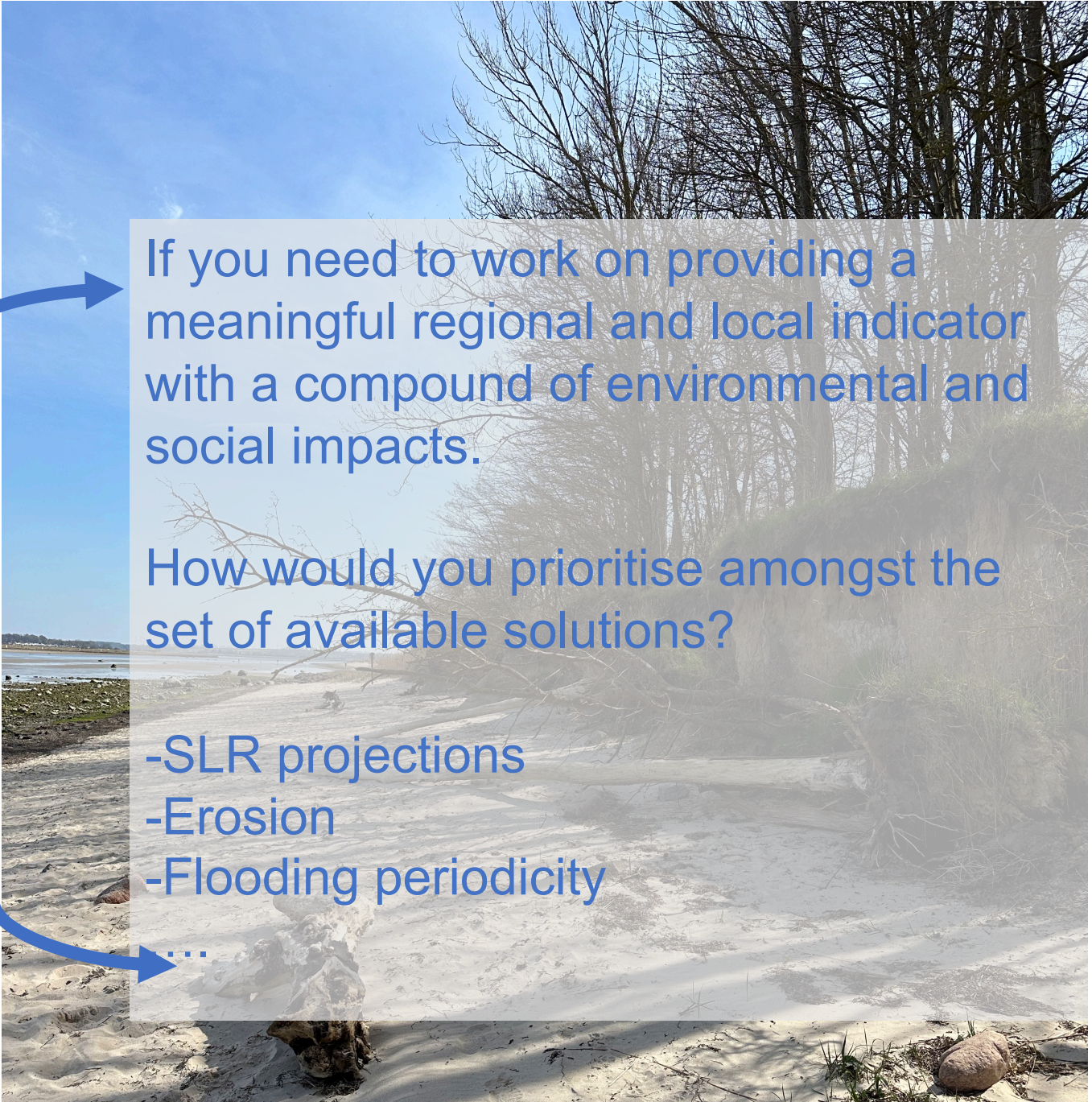
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If you need to work on providing a meaningful regional and local indicator with a compound of environmental and social impacts.

How would you prioritise amongst the set of available solutions?

- SLR projections
- Erosion
- Flooding periodicity

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