



Soclimpact
This project has received funding from the European Union's
Horizon 2020 research and innovation programme under grant
agreement No776661



The use of Impact Chains for Representing the Effects of Climate Change on the Sustainability of Blue Economy Sectors

Dr Constantinos Stylianou (Interfusion Services)

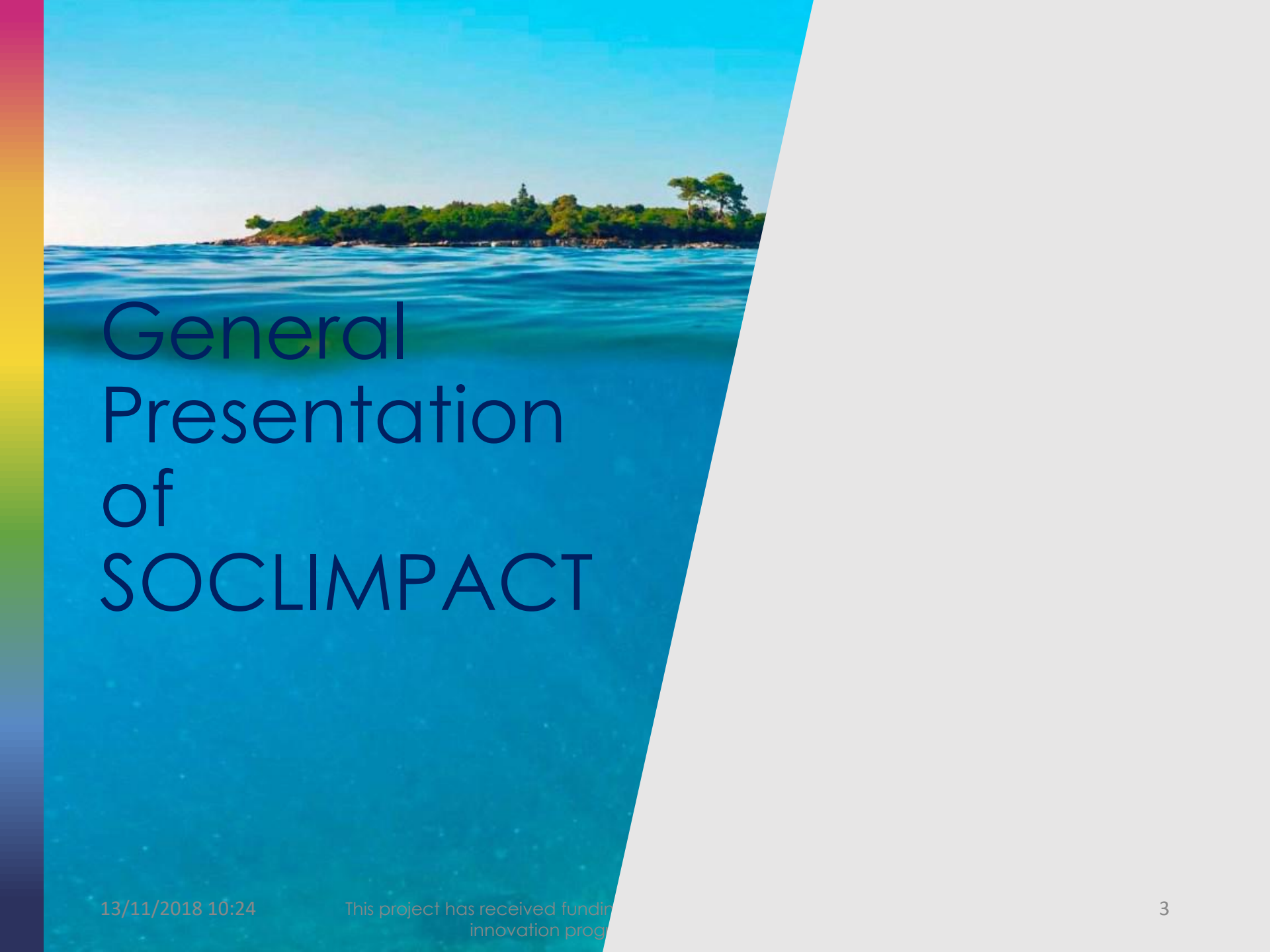
Lefkosia, Cyprus

Friday, 9 November, 2018



Agenda

- General presentation of the project
 - Project Overview
 - Partners
 - Islands
 - Blue Economy Sectors
- Impact Chains
 - General Goals of WP3
 - What are Impact Chains?
 - Impact Chains for SOCLIMPACT
 - Blue Economy Sector Impact Chains



General Presentation of SOCLIMPACT

SOCLIMPACT Project Overview

European research project Horizon 2020 under “Climate Action, Environment, Resource Efficiency and Raw Materials”

SOCLIMPACT

DownScaling CLimate ImPACTs and decarbonisation pathways in EU islands, and enhancing socioeconomic and non-market evaluation of Climate Change for Europe, for 2050 and Beyond.

Aim of the project

Modelling downscaled Climate Change effects and their economic impacts in European islands and archipelagos for 2030 – 2100 in the context of the EU Blue Economy, and assess corresponding decarbonisation and adaptation pathways, thus complementing current available projections for Europe, and nourishing actual economic models with non-market assessment.

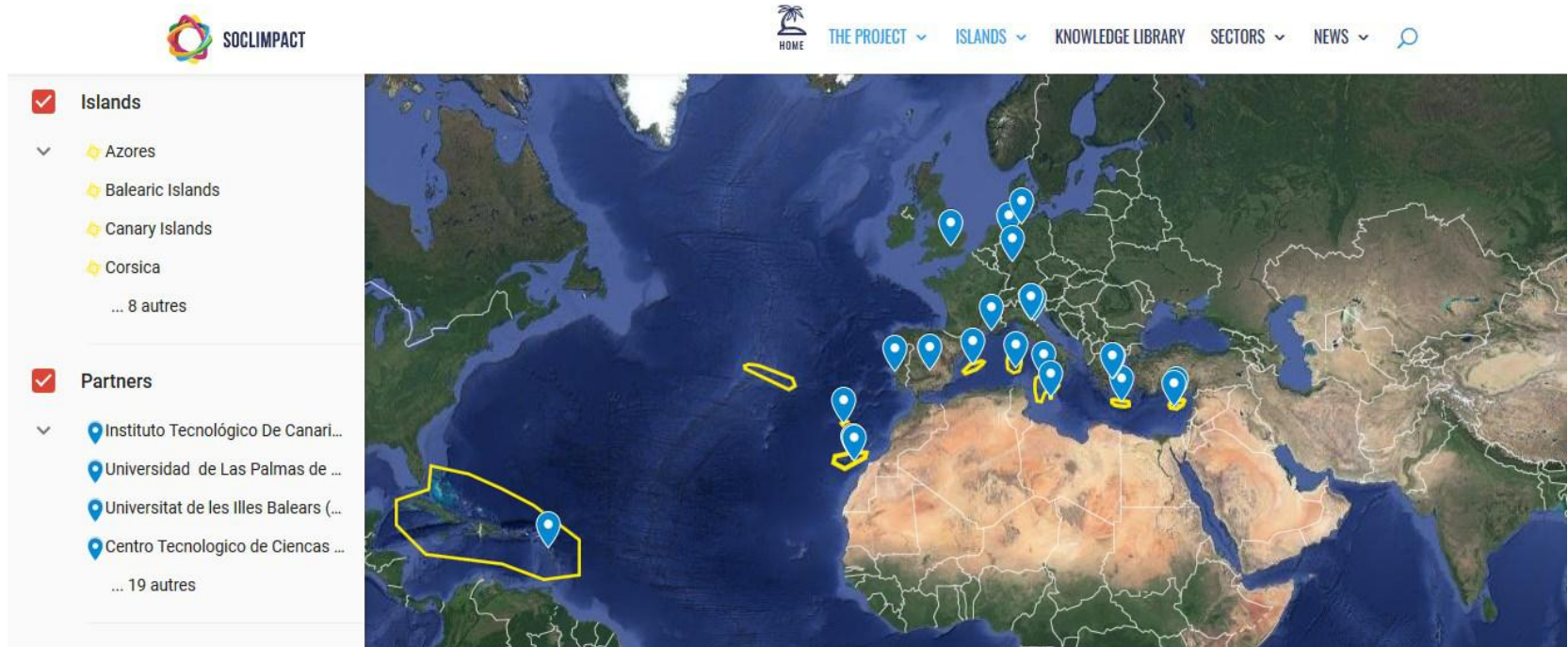
Duration

36 months (1 December 2017 – 30 November 2020)

Kick-off

30 January 2018 in Las Palmas de Gran Canaria

Participating Organizations



24 Partners

A/A	Οργανισμός	Ακρωνύμιο	Χώρα
1	UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA (Συντονιστής)	ULPGC	ES
2	INSTITUTO TECNOLÓGICO DE CANARIAS S.A.	ITC	ES
3	UNIVERSITAT DE LES ILLES BALEARS	UIB	ES
4	CENTRO TECNOLÓGICO DE CIENCIAS MARINAS	CETECIMA	ES
5	UNIVERSIDAD DE CASTILLA LA MANCHA	UCLM	ES
6	INSTITUTE OF ECONOMIC STRUCTURES RESEARCH	GWS MBH	DE
7	TOURISME TERRITOIRES TRANSPORTS ENVIRONNEMENT CONSEIL	TEC	FR
8	AGENCIA REGIONAL DA ENERGIA E AMBIENTE DA REGIAO AUTONOMA DA MADEIRA	AREAM	PO
9	CYPRUS INTITUTE: THE ENERGY, ENVIRONMENT & WATER RESEARCH CENTRE	CYI	CY
10	NATIONAL OBSERVATORY OF ATHENS	NOA	GR
11	OSSERVATORIO SUL TURISMO DELLE ISOLE EUROPEE	OTIE	IT
12	ANCI SARDINIA	ANCI	IT
13	AQUABIOTECH	ABT	ML
14	INTERFUSION	IF	CY
15	BUCKINGHAMSHIRE NEW UNIVERSITY	BNU	UK
16	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE	ENEA	IT
17	UNIVERSITÉ DES ANTILLES	UA	FR
18	E3-MODELLING IKE	e3modelling	GR
19	BALTIC ENVIRONMENTAL FORUM	BEF Germany	DE
20	UNIVERSITY OF BOLOGNA -	UNIBO	IT
21	CENTRO EURO-MEDITERRANEO SUI CAMBIAMENTI CLIMATICI	Fondazione CMCC	IT
22	UNIVERSITY OF LISBON - Fundacao da Faculdade de Ciencias	F Ciencias ID	PO
23	UNIVERSITY OF FRANKFURT	GUF	DE
24	REGION OF CRETE	Kriti	GR

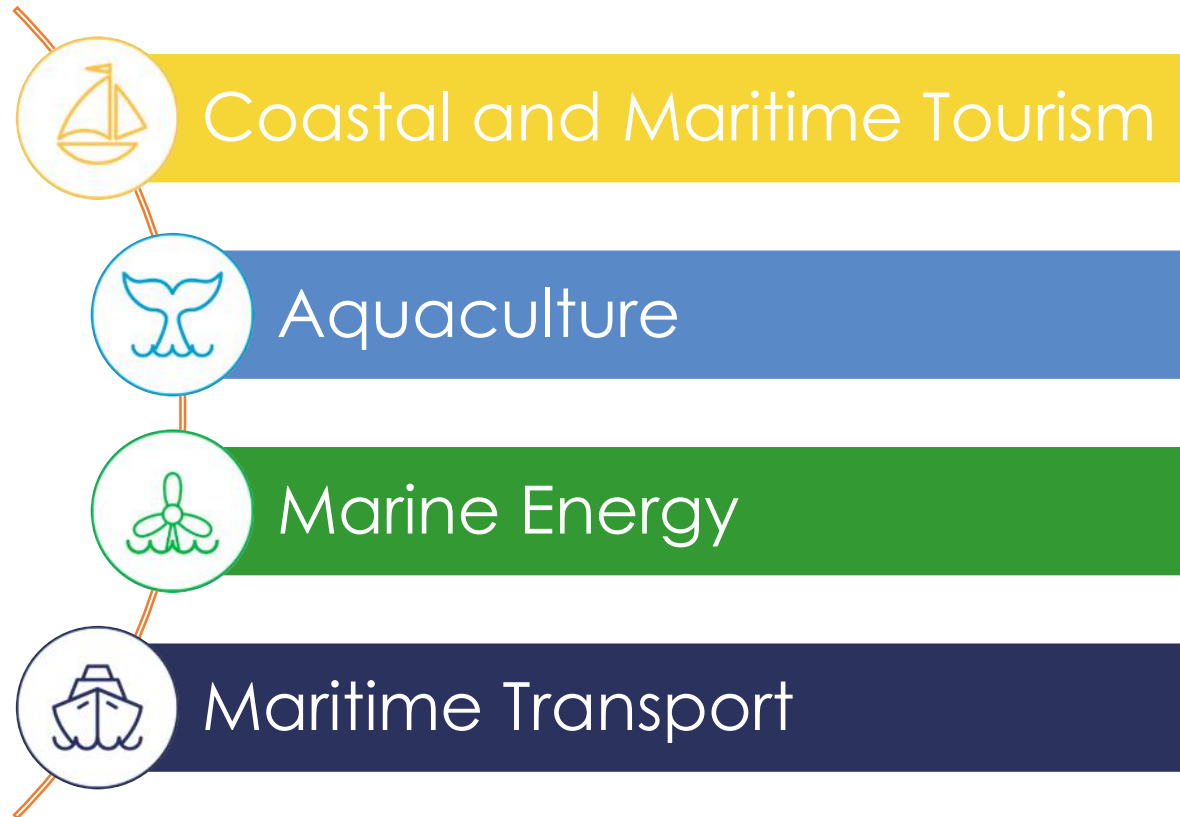


12 European Islands

Azores	Balearic Islands	Fehmarn
Canary Islands	Corsica	Crete
Cyprus	West Indies	Madeira
Malta	Sardegna	Sicily

Understanding the impact of Climate Change and adaptation options in under-investigated areas

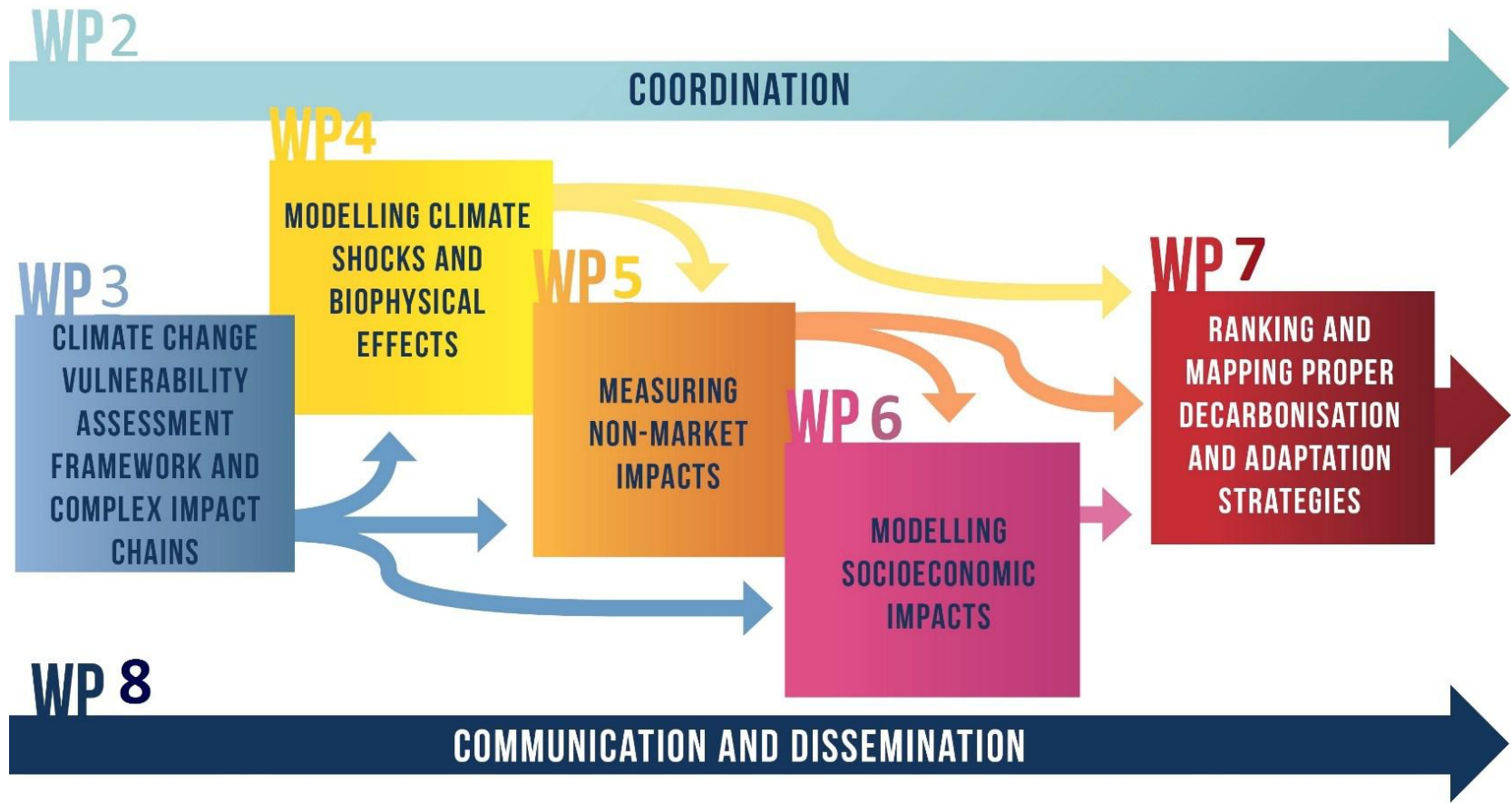
4 Blue Economy Sectors



Understanding the sensitivity of the blue economy to Climate Change

8 Work Packages

SOCLIMPACT'S PERTCHART





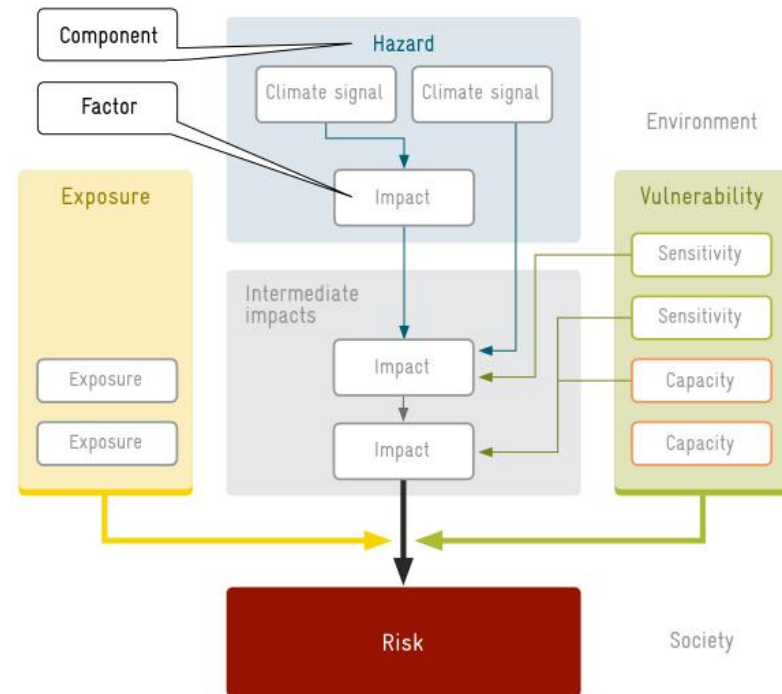
Impact Chains

General Goals of WP3

- Research on the Blue Economy sectors (definition, statistics, etc.)
- Give the project a scientific governance structure
 - Establish subteams for each Blue Economy sector
 - Specify “Island focal points”
 - Form "local working groups"
 - Create a Sector-Island matrix
- Provide a modelling approach
 - Describe the concept of impact chains
 - Provide input and output specifications (graphs, maps, etc.)

What are Impact Chains?

- An impact chain is an analytical tool that helps us better understand, structure and rank the factors that drive the risks in a specific system
- They visualize the cause-effect relationships between the external factors and their impacts on persons
- During the development of an impact chain, it is important to obtain the special knowledge of experts and a strong understanding of the problem

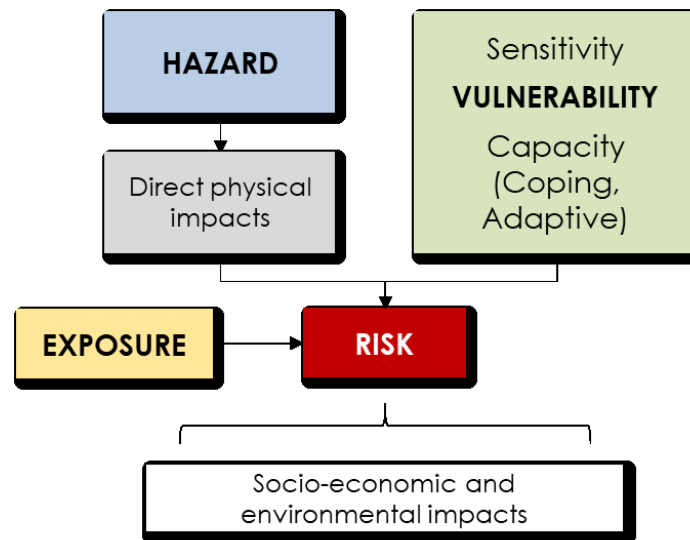


Impact Chains in SOCLIMPACT

- Evaluation of the climate risks based on the 5th Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC)
- There is a need to formalize how to approach the impacts and our adaptations activities on a scientific level
- References
 - Vulnerability Sourcebook AR4:
 - <http://www.adaptationcommunity.net/vulnerability-assessment/vulnerability-sourcebook/>
 - IPCC AR5:
 - http://www.adaptationcommunity.net/wp-content/uploads/2017/10/giz_sbv_EN_suppl_v171019_screen_NEU-3.pdf

Impact Chain Hazards

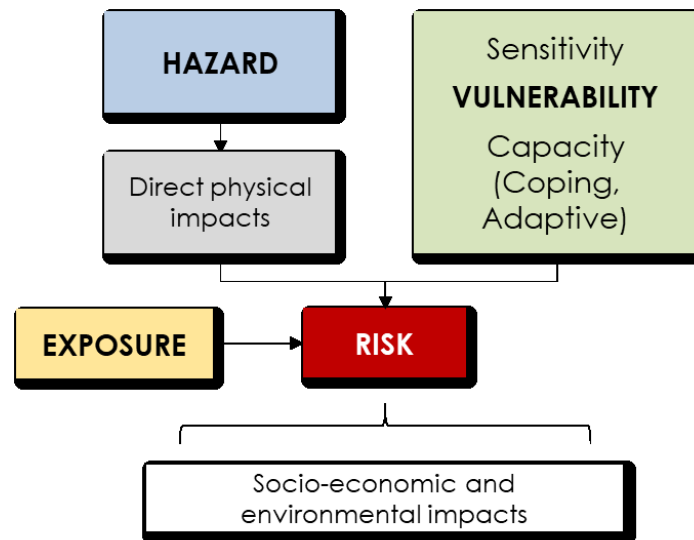
- The **potential occurrence** of a **climate-related physical event or trends** or their **physical impacts** that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.



- A hazard is not necessarily an **extreme weather event** (e.g., a storm, flooding), but can also be a **slow onset trend** (e.g., less water from snow melt, increase in average temperature, sea-level rise).
- The impacts of climate change on **geophysical systems**, including floods, droughts, and sea-level rise, are called **physical impacts**.

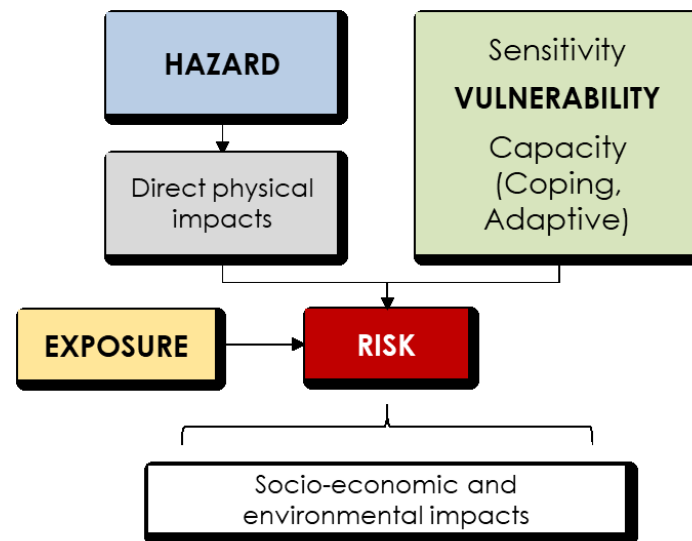
Impact Chain Risks

- The **potential for climate-related consequences** (climate impacts) for something of value (e.g., people, assets, ecosystems, culture, etc.).



Impact Chain Exposure

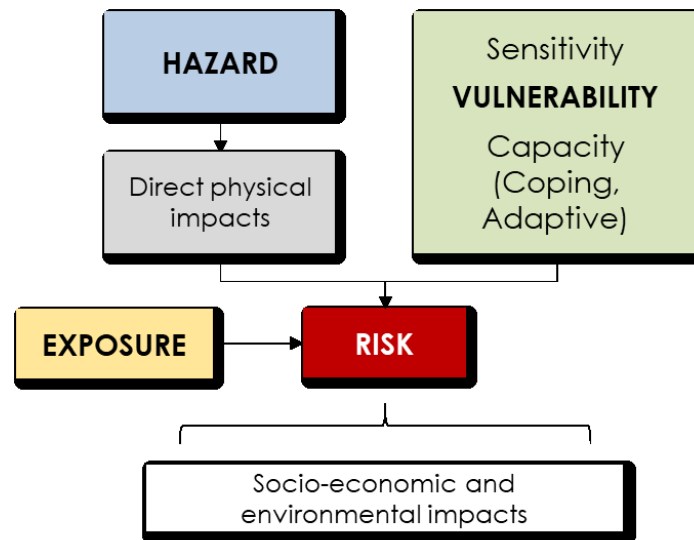
- The **presence** of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.



- Exposure is related to specific **exposed elements** (or elements at risk), e.g., people, infrastructure, ecosystems.
- The **degree of exposure** can be expressed by absolute numbers, densities or proportions, etc., of the elements at risk (e.g., population density in an area affected by drought)

Impact Chain Vulnerability

- The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including **sensitivity** or **susceptibility to harm** and **lack of capacity to cope and adapt**.

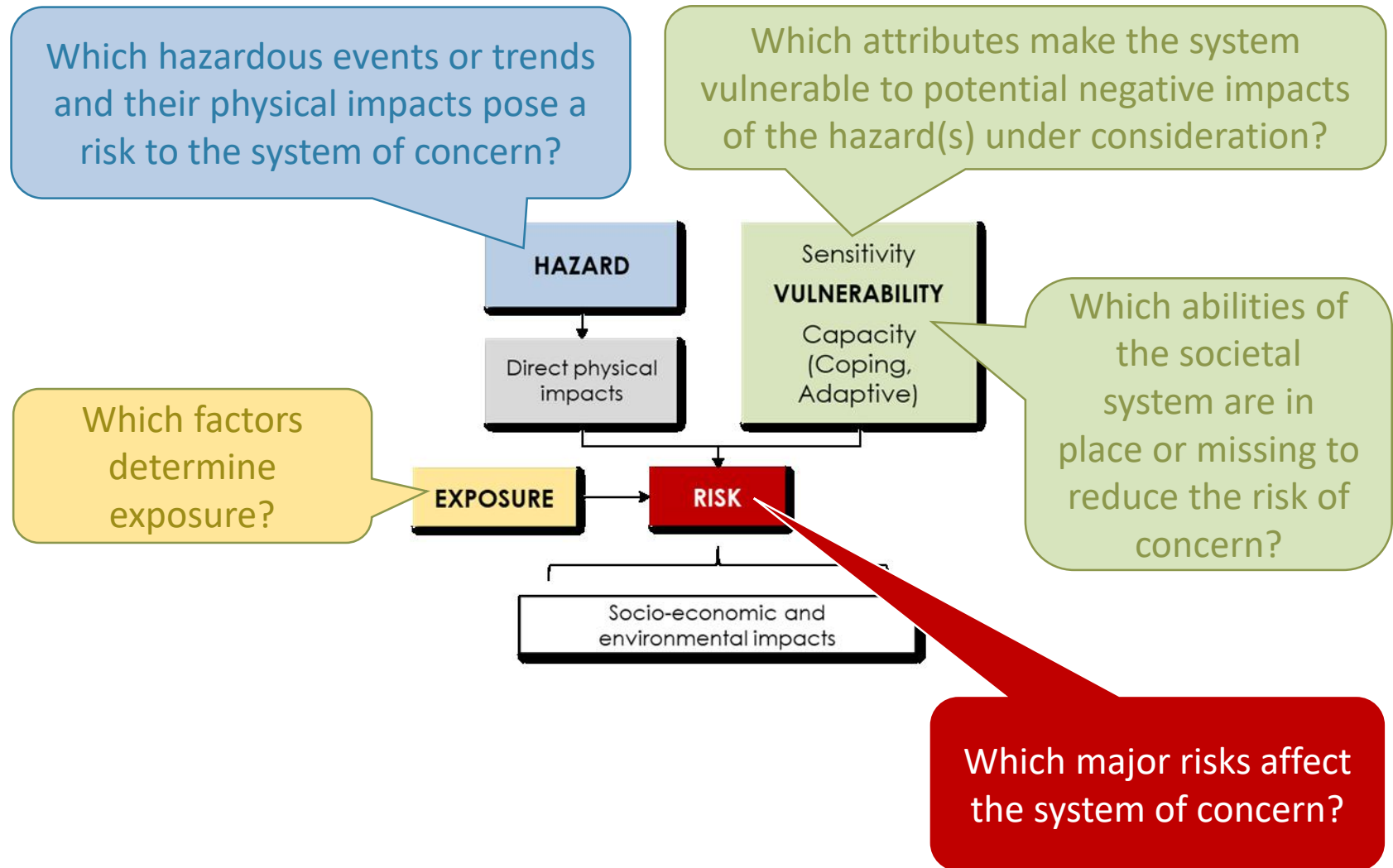


- Sensitivity** may include **physical attributes of a system** (e.g., building materials of houses, type of soil on agriculture fields), as well as **social, economic and cultural attributes** (e.g., age structure, income structure).
- Capacity** refers to the **ability of societies and communities to prepare for and respond to current and future climate impacts**.

Impact Chain Guiding Questions



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Coastal and Maritime Tourism Hazards and Impacts



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Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Increase of temperatures		<ul style="list-style-type: none"> • Changes in plant-wildlife-insect populations and distribution (environmental impacts) • Larger range of infectious disease • Altered seasonality 	<ul style="list-style-type: none"> • Heat stress for tourists affecting comfort perceptions, demand and receipts • Increased cooling costs for tourism facilities
Sea surface temperature rise		<ul style="list-style-type: none"> • Increased coral bleaching with degradation of biodiversity and sea landscapes • Arrival of exotic species and depletion of local biodiversity 	<ul style="list-style-type: none"> • Loss of attractiveness in sea landscape-based destinations (diving, snorkeling, glass-bottom ships) leading to negatively affected demand and receipts
Sea level rise	<ul style="list-style-type: none"> • Increased coastal erosion (more or less as human activity impacts coastal erosion) 		<ul style="list-style-type: none"> • Loss of beach area negatively influencing tourism demand • Higher maintenance costs for tourist facilities to protect and maintain waterfronts

Coastal and Maritime Tourism Hazards and Impacts



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Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Increased droughts due to reduced rainfall and increased evapotranspiration		<ul style="list-style-type: none"> • Degradation of natural habitats • Increased erosion and desertification • Increased wildfires • Reduced water availability for human usage 	<ul style="list-style-type: none"> • Water shortage and overpricing • Landscape degradation and sightseeing devaluation affecting demand • Increased costs of operations in tourism facilities caused by loss of local food supply for tourism
Increased frequency and intensity of extreme climate events (storms, flooding)	<ul style="list-style-type: none"> • Abrupt changes in coastal sedimentary processes • Beaches degradation due to inland waste and materials depositions 		<ul style="list-style-type: none"> • Business interruption costs • Demand decrease due to risks • Damages to tourism facilities, historic assets, beaches and infrastructure increasing costs of maintenance and insurance

Coastal and Maritime Tourism Sector Priority Impacts



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1. Loss of attractiveness affecting the touristic reputation of the destination on an environmental scale

- i. Loss of attractiveness of touristic marine environments
- ii. Loss of attractiveness due to increased danger of forest fires in touristic areas
- iii. Loss of attractiveness due to reduction in endemic and flag species and/or increase in exotic invasive species
- iv. Loss of attractiveness due to deterioration of cultural and patrimonial heritage (monuments, gastronomy, etc.)

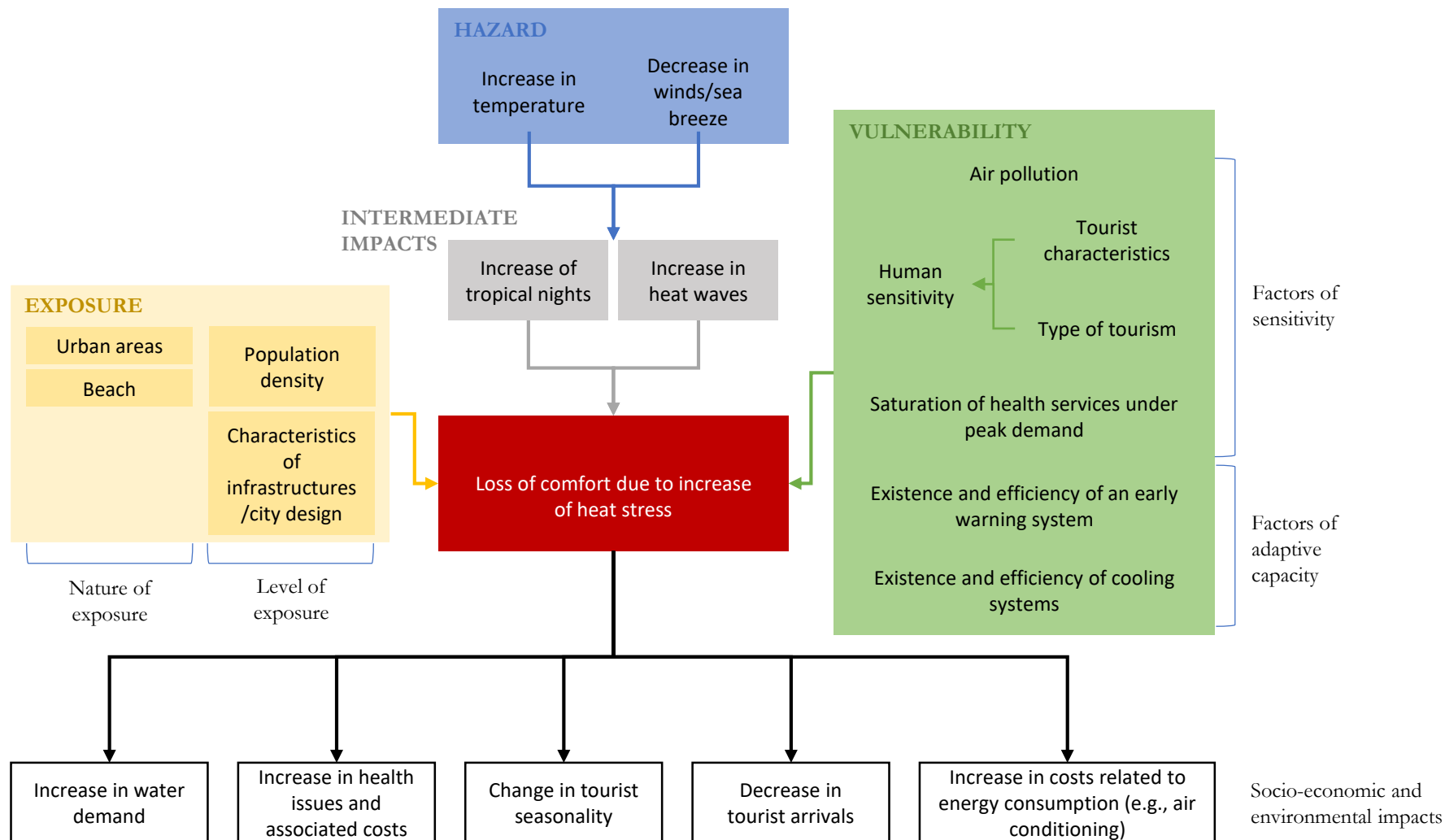
2. Loss of comfort affecting the touristic reputation of the destination on a human scale

- i. Loss of comfort due to increase of heat stress
- ii. Decrease of available domestic water for the tourism industry
- iii. Loss of comfort due to beach surface reduction
- iv. Increase of health issues due to emergent diseases
- v. Increase of damages to infrastructures (accommodations, etc.) due to coastal erosion

Coastal and Maritime Tourism Impact Chain Example



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Aquaculture Hazards and Impacts

Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Temperature changes of sea water	<ul style="list-style-type: none"> Decreased oxygen level Increased Food Conversion ratio 	<ul style="list-style-type: none"> Increase harmful algal blooms Increase in diseases and parasites Changes in ranges of suitable species Increased growth rate Longer growing season 	<ul style="list-style-type: none"> Changes in production levels (decrease or increase in production) Increase in fouling and pests
Changes in currents and waves	<ul style="list-style-type: none"> Decreased flushing rates (shell fish) 		<ul style="list-style-type: none"> Accumulation of waste under cages
Increased frequency and intensity of extreme weather events	<ul style="list-style-type: none"> Higher waves and storm surges Salinity changes 		<ul style="list-style-type: none"> Stock loss Damage to facility/structure Need to invest in stronger constructions Higher insurance costs Changes in suitability of sites

Aquaculture Sector Priority Impacts



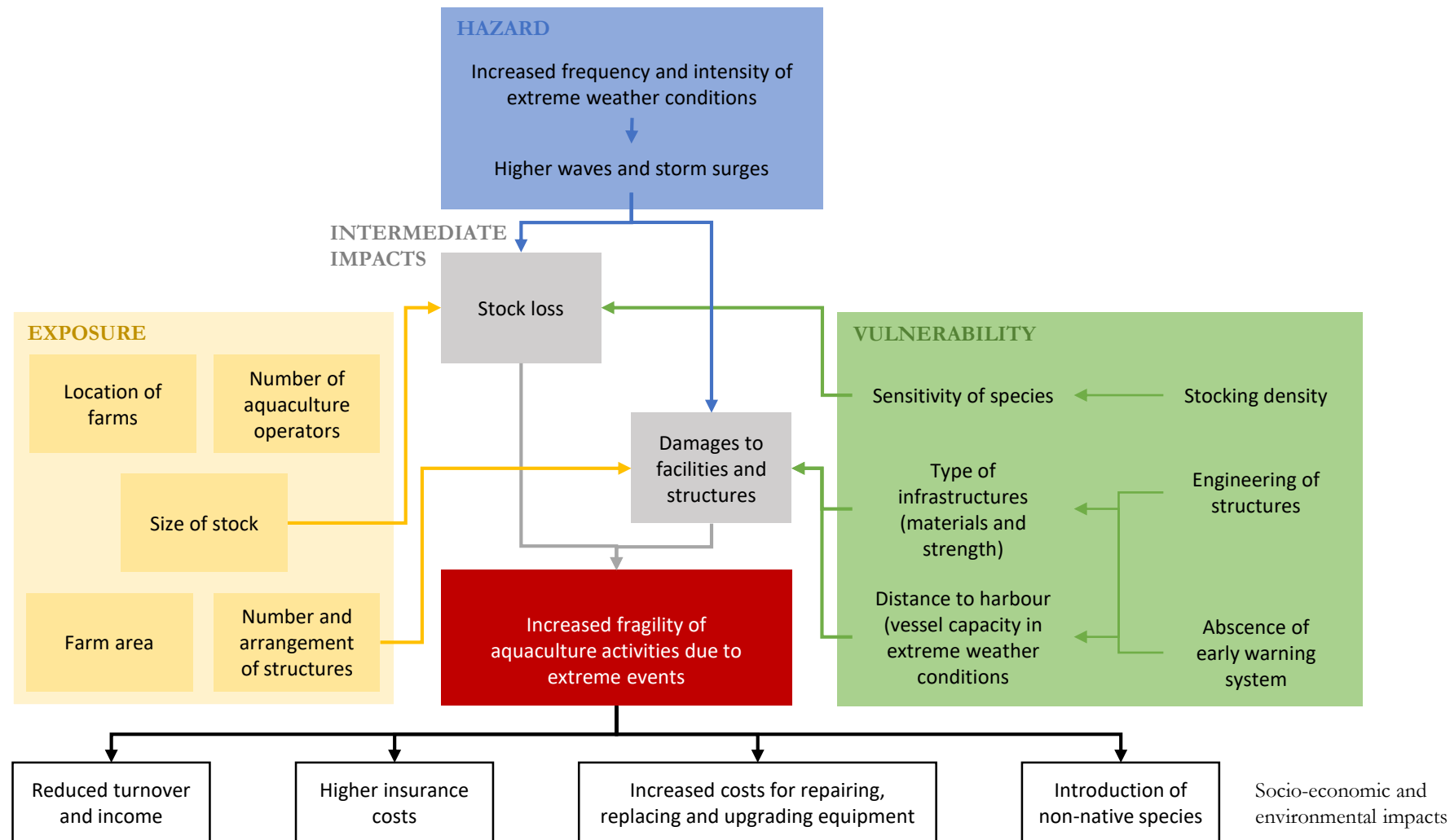
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- Decrease in fish production due to temperature change in surface water
- Increase in fish production due to changes in the characteristics and temperature of seawater (positive)
- Increased fragility of aquaculture activity due to extreme events
- Increased environmental pollution of aquaculture sites due to changes in coastal hydrodynamics

Aquaculture Impact Chain Example



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Marine Energy Hazards and Impacts

Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Increased frequency and intensity of extreme climate events			<ul style="list-style-type: none"> • Increase cost of maintenance, insurance and adaptation actions to increase resilience and reduce vulnerability of energy infrastructures
Temperature rise			<ul style="list-style-type: none"> • Stressed energy demand by demand rising for electricity • Higher energy demand for cooling and water production (sea and brackish water desalination)
Sea level rise			<ul style="list-style-type: none"> • Increased costs for design and implementation of measures/policies to reduce the vulnerability of energy infrastructure to flooding

Marine Energy Hazards and Impacts

Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Lack of rain and increased evapotranspiration			<ul style="list-style-type: none"> Increased costs of sea-water reverse osmosis desalination for covering water needs
Concentration of CO₂			<ul style="list-style-type: none"> Increased costs of operations due to electricity consumption for air-conditioning
Interannual variability of temperature			<ul style="list-style-type: none"> Higher variations in energy demand due to larger temperature variability will require more flexible energy systems (more expensive) Increase in the energy intensity, due to increase in air conditioning Increase in peak power demand

Marine Energy Sector Priority Impacts



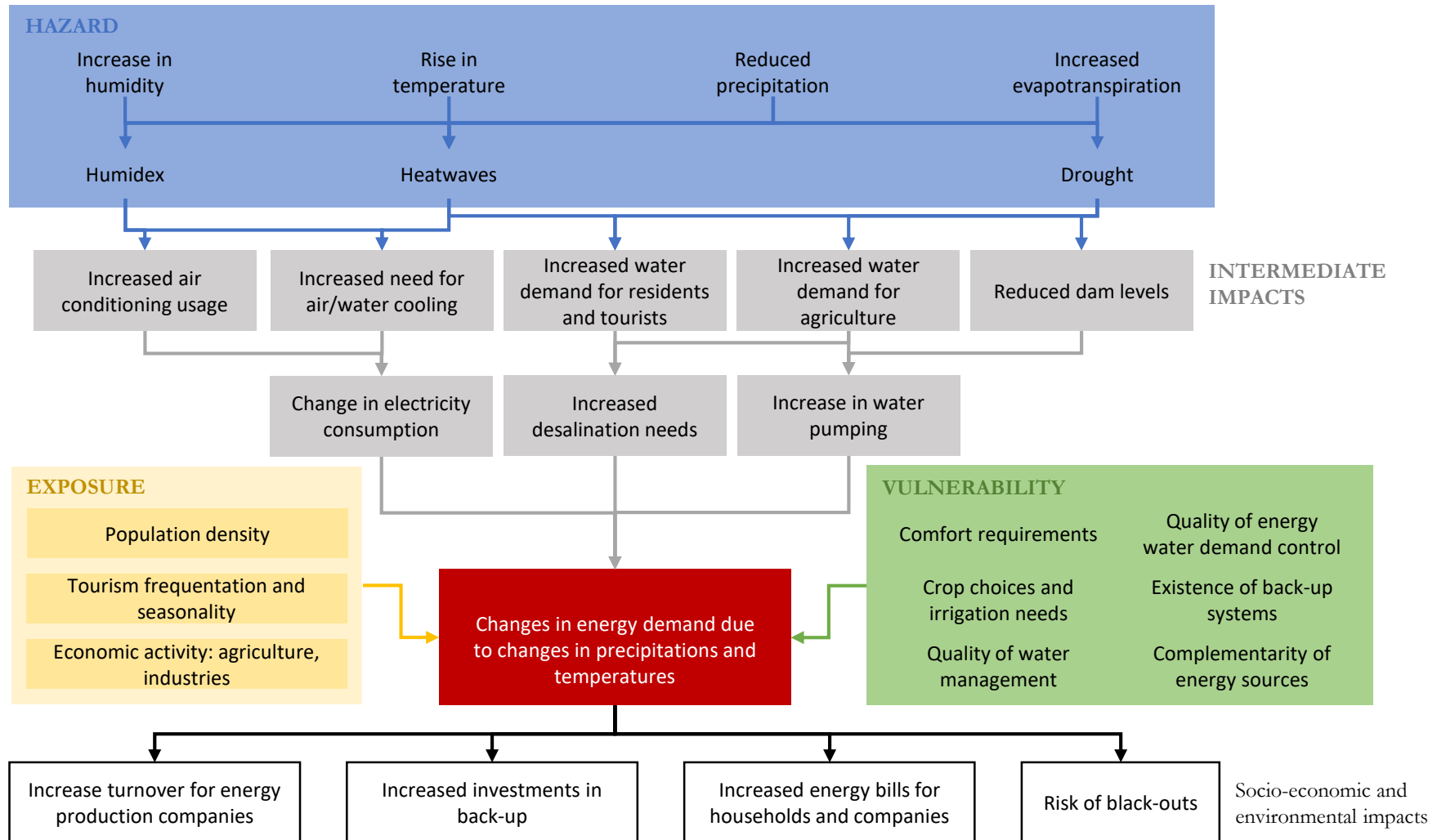
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- Changes in electricity production
- Damage to networks and electricity infrastructure due to extreme events
- Changes in energy demand due to changes in precipitations and temperatures

Marine Energy Impact Chain Example



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Maritime Transport Hazards and Impacts

Hazard	Direct Geophysical Impacts	Intermediate Impacts	Socioeconomic Impacts
Sea level rise		<ul style="list-style-type: none"> • Floods at ports • Damage to storage capacity • Damage to ports' infrastructures and equipment (navigation) 	<ul style="list-style-type: none"> • Increased users' risk perception leading to lower rates of moorings and turnover • Increased costs of maintenance in nautical installations and equipment
Increased frequency and intensity of extreme climate events (storms, flooding)		<ul style="list-style-type: none"> • Damage to storage capacity • Damage to ports' infrastructures and equipment (navigation) 	<ul style="list-style-type: none"> • Increased costs for new investment and insurance • Carbon tax affects fossil fuel prices. • Less turnover from maritime transport activities. • Disruption costs
Increased frequency and intensity of extreme weather events	<ul style="list-style-type: none"> • Higher waves and storm surges • Salinity changes 		<ul style="list-style-type: none"> • Stock loss • Damage to facility/structure • Need to invest in stronger constructions • Higher insurance costs • Changes in suitability of sites

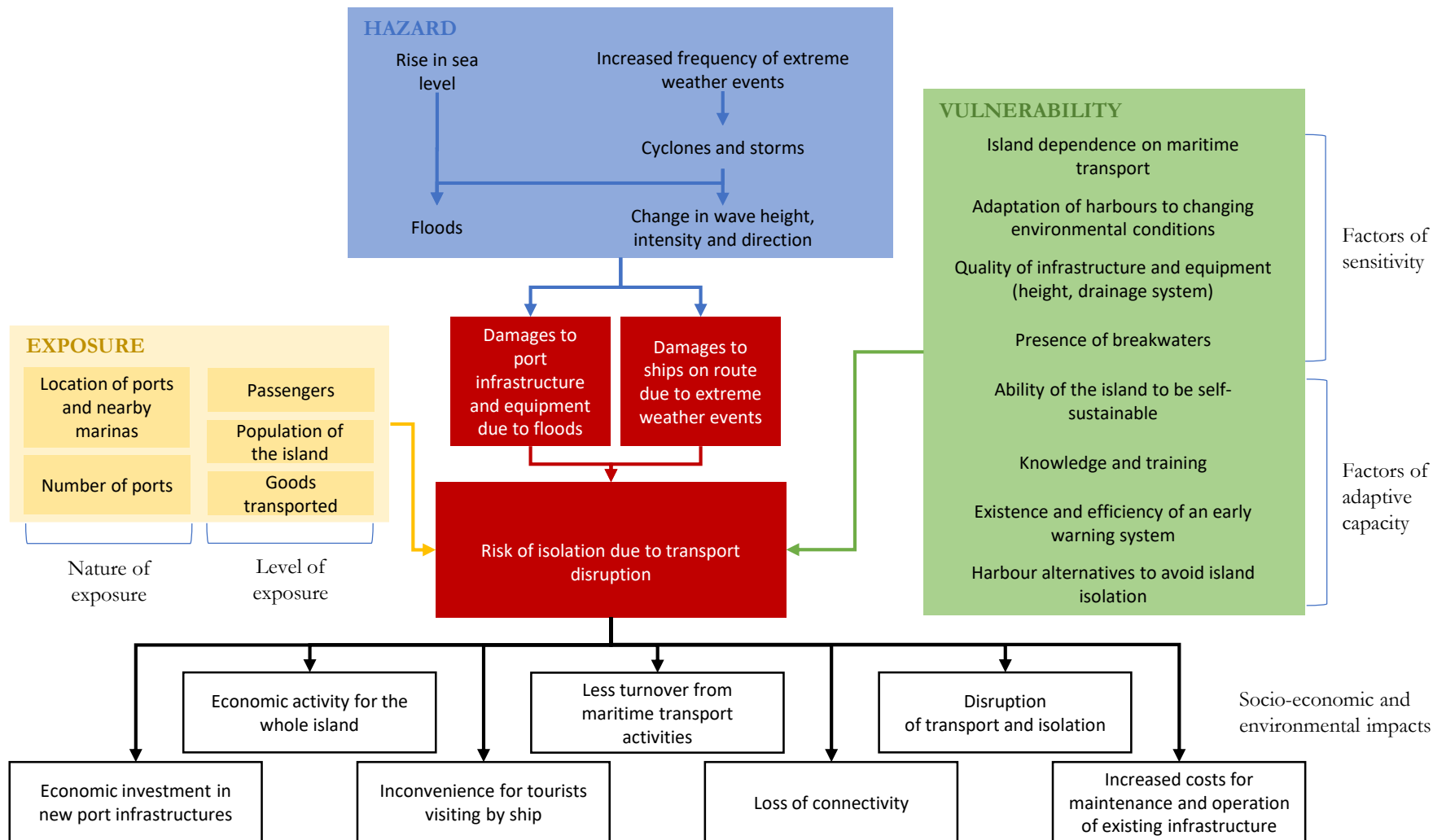
Maritime Transport Sector Priority Impacts

- Damage to port infrastructure and equipment due to flooding (sea-level rise)
- Damage to ships (open water and near the coast) due to extreme weather events
- Risk of isolation (of goods and services) due to transport disruption

Maritime Transport Impact Chain Example



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Providing Support to Decision Makers



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- Non-market costs and benefits (WP5)
 - Measuring non-market costs of Climate Change and benefits of climate actions for Europe
- Modelling socioeconomic impacts (WP6)
 - Modelling socioeconomic impacts for the EU islands and Blue Economy sectors, over the longer term 2030-2100
- Ranking and mapping policies (WP7)
 - Ranking and mapping transition pathways in islands and enabling networking and information system for regional and EU policy design
 - Development of a common framework for smarter governance of Blue Economy sectors
- Raising social awareness and supporting decision making processes of policymakers and practitioners (WP8)
 - Development of a Regional Exchange Information System (REIS) including a decision-making support tool for policy makers



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Comments or Questions?

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