MARINE SABRES

Aiming to reverse biodiversity decline by strengthening the conservation of coastal and marine areas, balancing human and ecosystem needs, and upscaling ecosystem-based management

Workshop on SES application in the Demonstration Areas

Angel Borja and Bruno Meirelles de Oliveira - AZTI
Michael Elliott and Gemma Smith - IECS Ltd.

Funded by the European Union

AZTI MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

International Estuarine and Coastal Specialists IECS

UKRI

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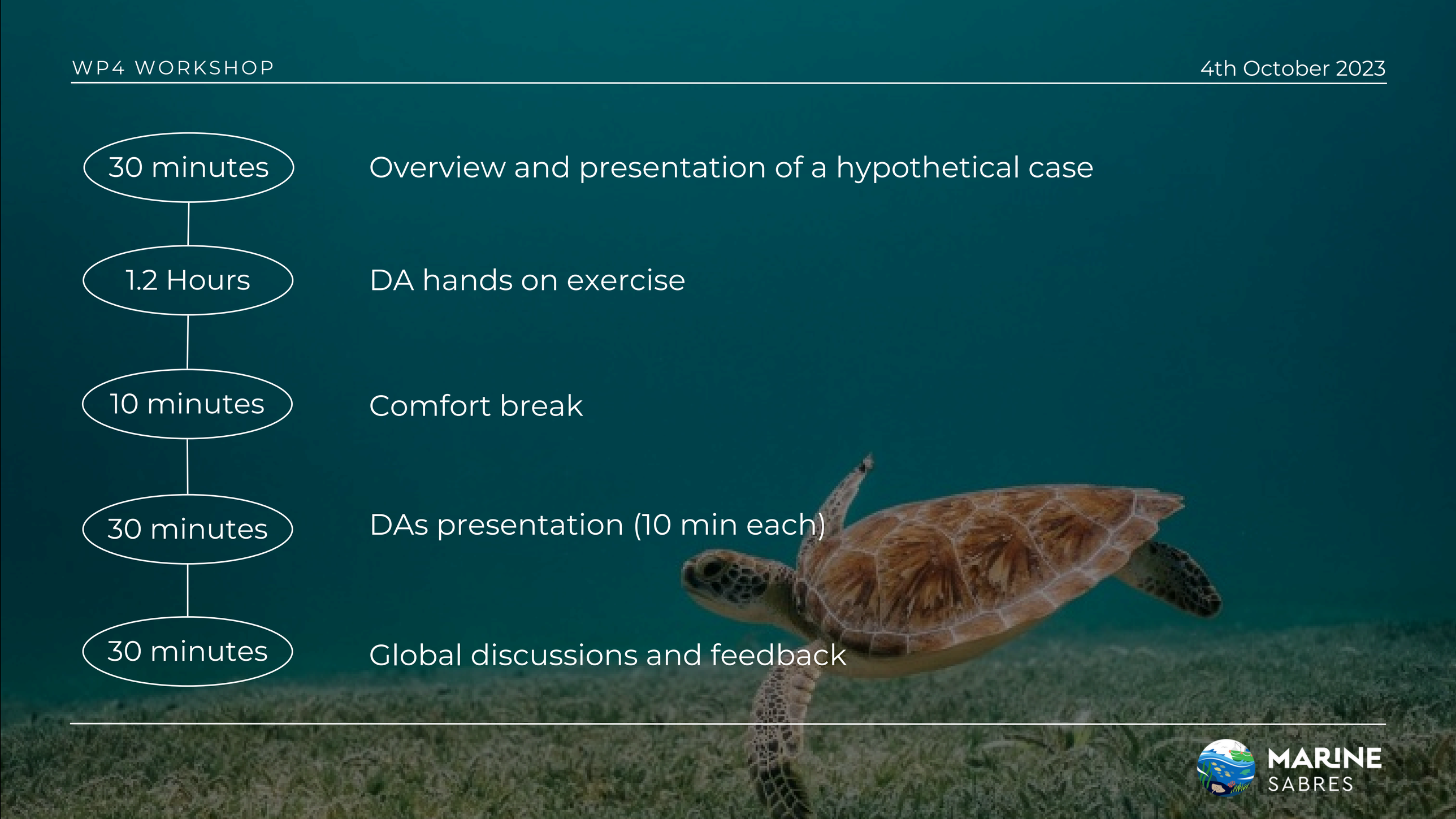
30 minutes	Overview and presentation of a hypothetical case
1.2 Hours	DA hands on exercise
10 minutes	Comfort break
30 minutes	DAs presentation (10 min each)
30 minutes	Global discussions and feedback



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Objectives of the Workshop

1. To provide DAs the opportunity to initiate the ISA process utilising the Excel sheets.

2. To evaluate the possible Causal Loop Diagrams (CLDs) that emerge from the exercise.

3. To enable DAs to ascertain valuable insights from both the diagrams and the process itself.

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Work Packages

↓

Demonstration Areas

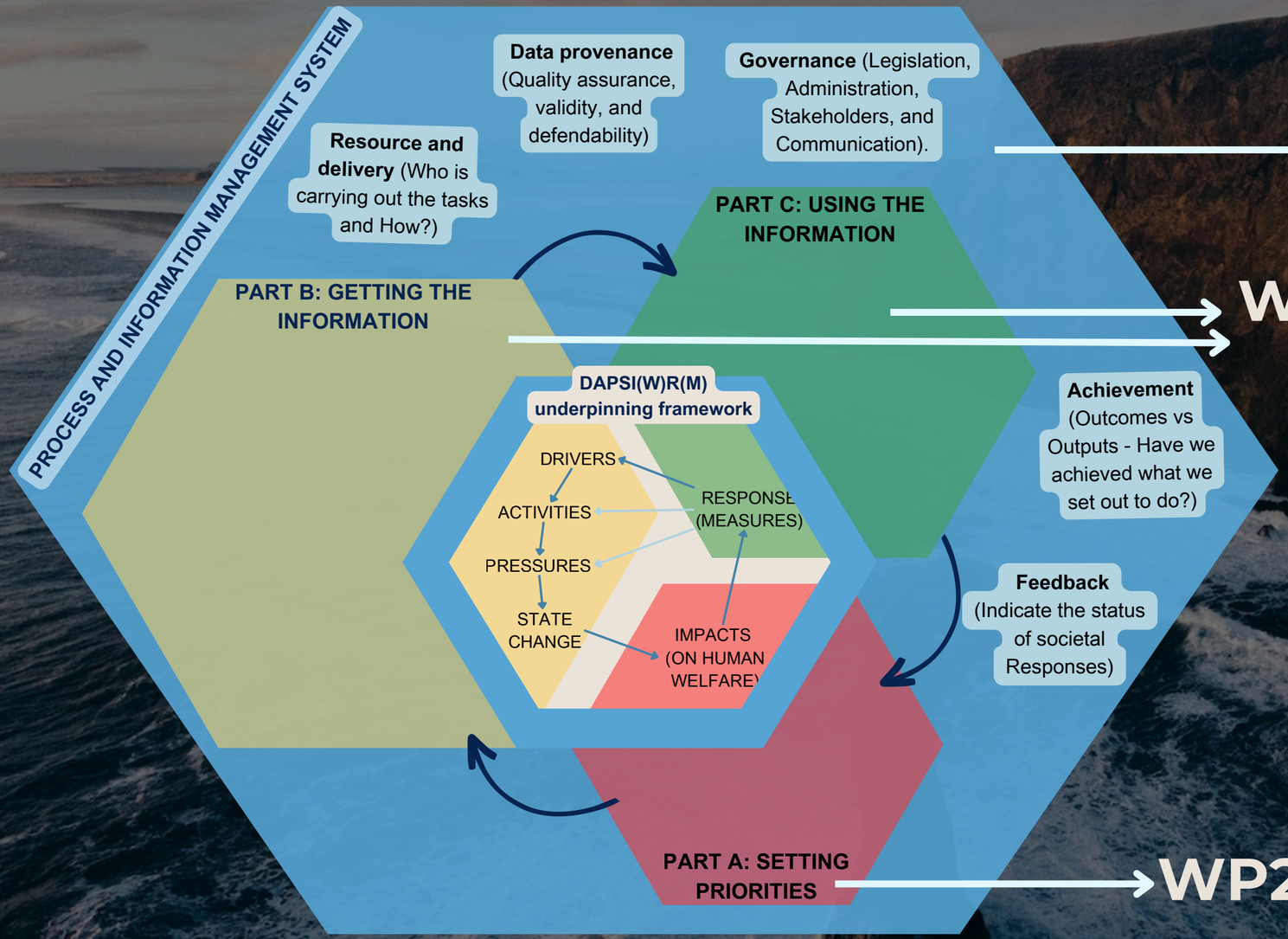
↓

Stakeholders

Meta Project-Level

SES guidance Level

SES Model Application Level



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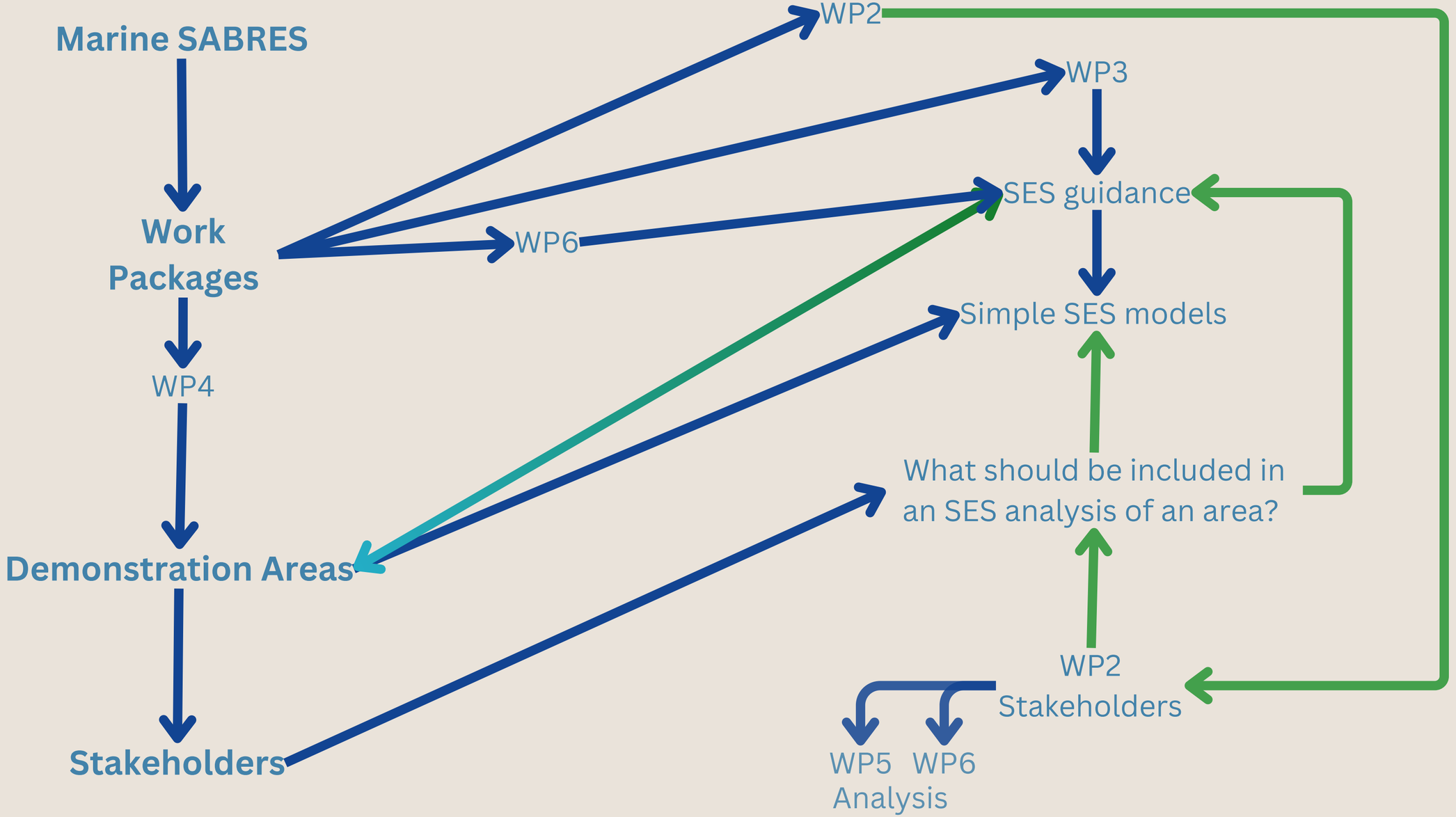
WP4, WP5, WP6 - analysis, DSTs

WP2 ‘priority components’


Marine SABRES
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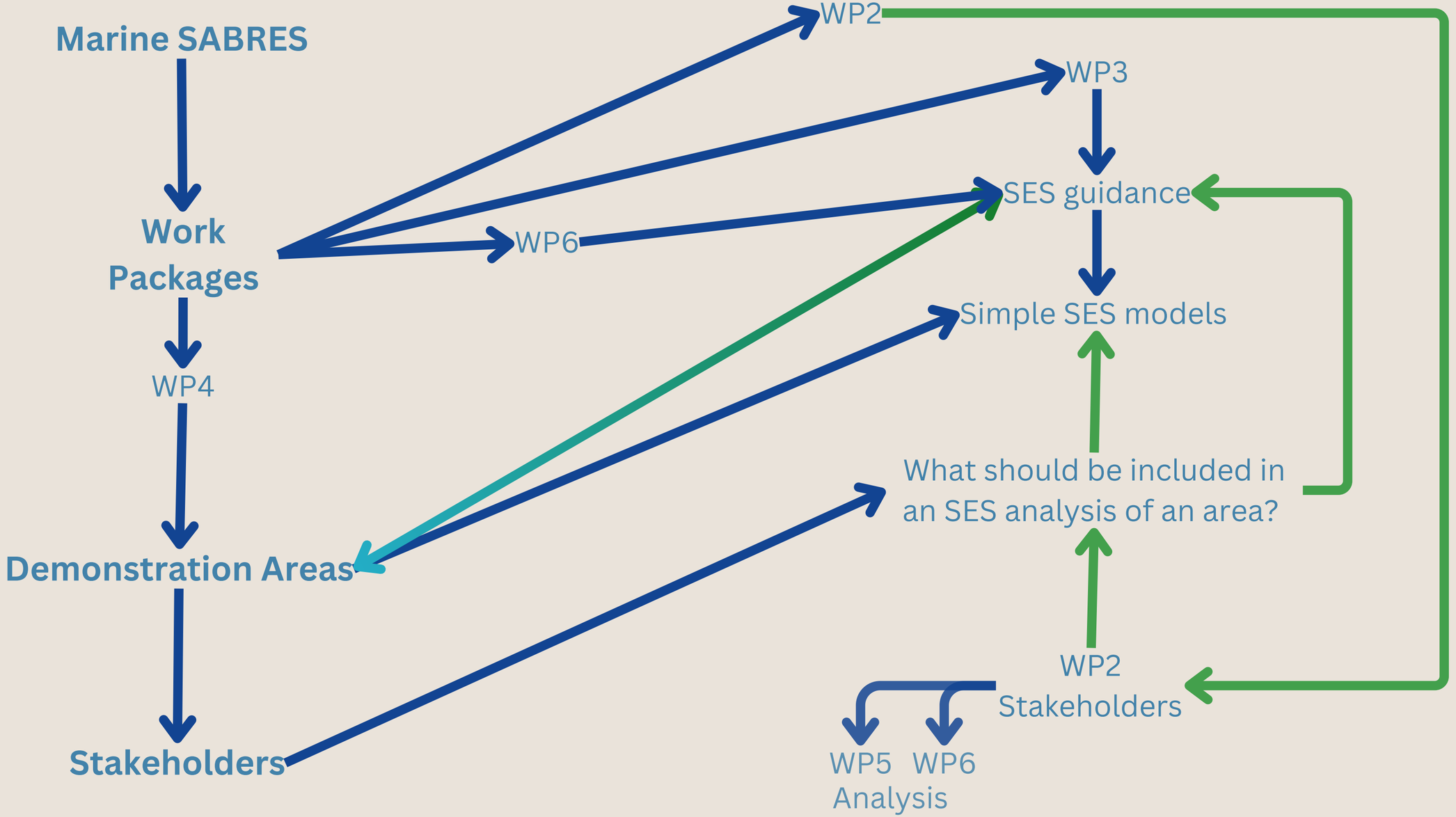
Simple SES models
What should be included in an SES analysis of an area?
WP2 Stakeholders
WP5 Analysis
WP6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Our assumptions for this workshop:

- We have organised our Process and Information Management System
- We have spoken with stakeholders to understand the issues we are looking to tackle.
- We have collected the relevant data for the approach

The DAPSI(W)R(M) Framework

The DAPSI(W)R(M) framework provides a structured approach for ecosystem-based management by categorising key elements of Drivers, Activities, Pressures, State changes, Impacts (on Welfare), and Response (Measures).

This framework utilises key indicators at each stage to inform management decisions, evaluate responses, and facilitate stakeholder communication, enabling conceptual and quantitative analyses.

Impacts (on human Welfare)

Definition: The changes affecting the goods and benefits, which affect the quality of life required to satisfy our needs. These are changes in the results of the provisioning and regulating ecosystem services; positive and negative influences on the human complementary assets/capital to extract societal goods and benefits from ecosystem services.

Examples:

- Tourism opportunities, fish breeding grounds, and storm surge protection.
- Food for human consumption
- Employment

Indicators:

- The number of tourists visiting a marine protected area
- Fish landed for human consumption (landings data at particular times and places in tonnes)
- Imports of goods and services (% of GDP)

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MPF

- Changes over time in community composition (abundance (number)

Indicator

- Hydrological processes
- Current speed (m/s) and direction

ES

- Coastal and marine biota
- Places and seascapes

Indicator

- Quality of the fish, shellfish (age profile; length profile)
- Number/area of specific seascape features (% of total natural seascape)

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Examples

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- Disturbance of species due to human presence.

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- Median total number of littered items per $100m^2$
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Examples

- Demand for fish as a primary protein source due to population growth and dietary preferences.
- The need for safe places and protection from erosion and flooding.

Indicators

- Proportion and/or number of households located below 2m above sea level, which reflects the vulnerability to rising sea levels due to climate change, which is itself driven by human activities.
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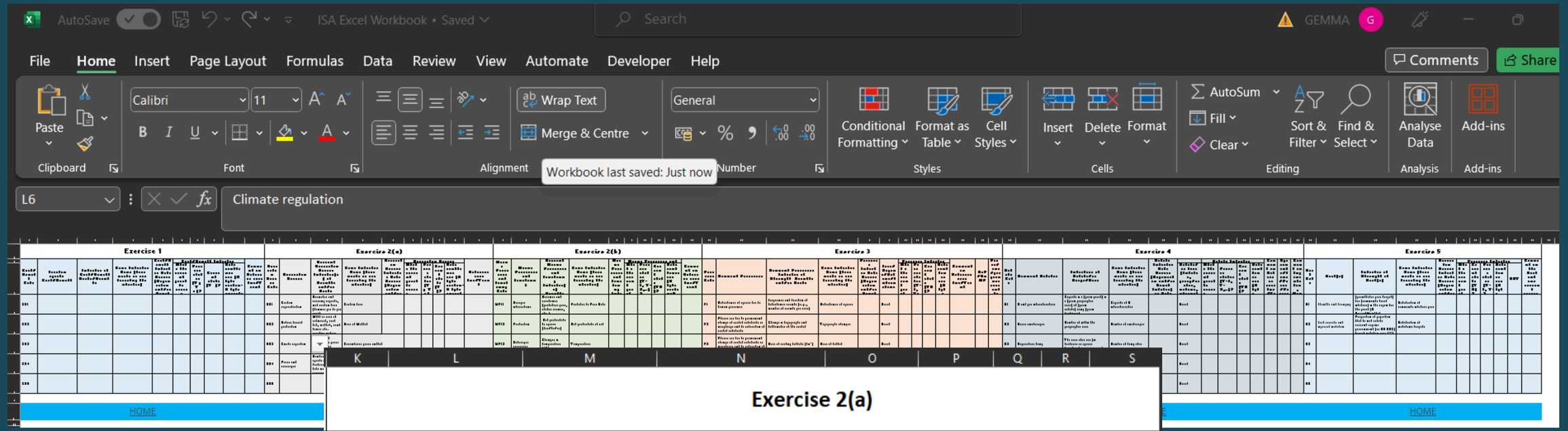
The ISA Excel 'Master Data Sheet'



Exercise 2(a)

Ecosystem Service Code	Ecosystem Service	Relevant Ecosystem Service Indicator(s) of Quantity and/or Quality	Kumu Indicator Name (Four words or less describing the indicator)	Ecosystem Service Indicator Data Source (Organisation and/or Named Individual) or Data Gap	Ecosystem Service Indicator Behaviour ove			
					What is the relevant period to assess indicator change?	Previous states (T_{-1}, T_{-2},...)?	Current state (T_0)?	Data confidence level (5 high certain-0 highly uncertain)
ES1	Carbon sequestration	Assimilative and recycling capacity, net carbon burial (tonnes per ha per year)	Carbon burial					
ES2	Natural hazard protection	Width or area of saltmarsh, reed bed, mudflat, sand dunes etc. providing natural hazard protection (m,	Area of Mudflat					

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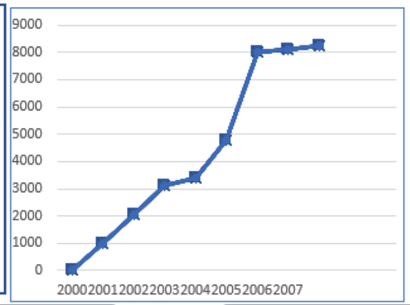
Behaviour Over Time (BOT) graphs

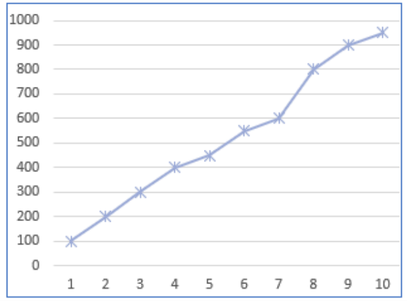
Goods & Benefits Behaviour Over Time Graphs

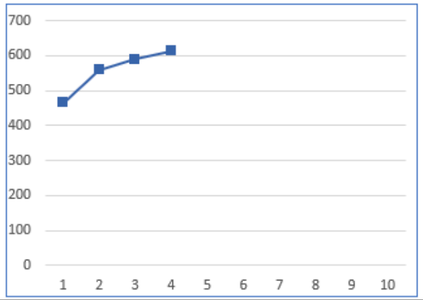
HOM

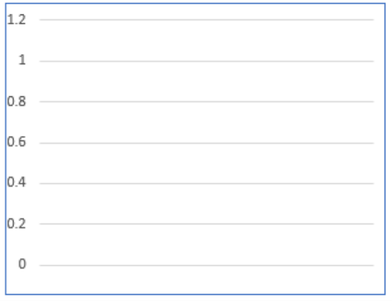
Benefit	Education and Research		Income and Employment		Human wellbeing		0		0	
Indicato	Scientific studies (number of research papers, subscriptions, library borrowing, on-line downloads)		Trends in job role dominance between marine sectors by sex, age, race, and persons with disabilities in the geographical area (%)		Sites with spiritual and/or religious significance/well-being (number of people who attach significance, degree of significance attached)		0		0	
	Month/Year	Measurement	Month/Year	Measurement	Month/Year	Measurement	Month/Year	Measurement	Month/Year	Measurement
	2000	1000	2001	100	2005	465				
	2001	2050	2003	200	2010	559				
	2002	3100	2005	300	2015	590				
	2003	3400	2007	400	2020	613				
	2004	4800	2009	450						
	2005	8000	2011	550						
	2006	8100	2013	600						
	2007	8230	2015	800						
			2017	900						
			2019	950						

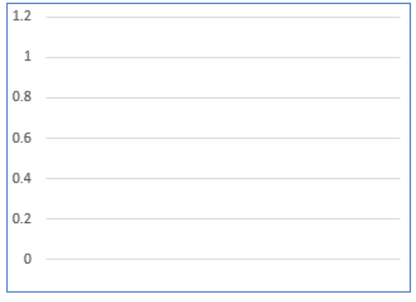
BOT Graph











GB BOT | ES BOT | MPE BOT | P BOT | A BOT | D BOT | Adjacency MatrixGB_ES | Adjacency matrix ES_MPE | Adjacency matrix MPE_P | Adjacency matri...

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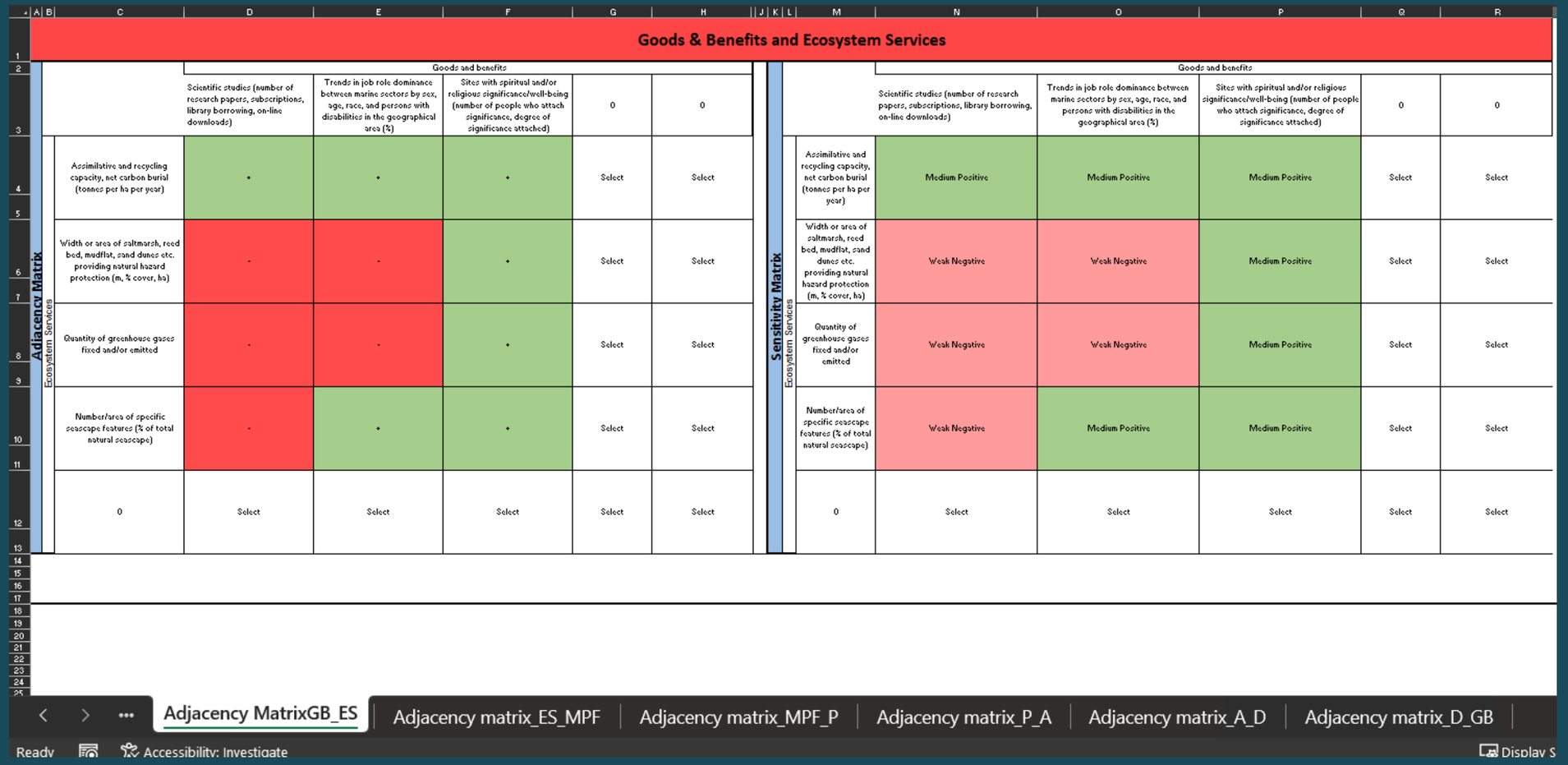
Adjacency Matrices



Goods & Benefits and Ecosystem Services

Adjacency Matrix — Ecosystem Services

	Goods and benefits				
	Scientific studies (number of research papers, subscriptions, library borrowing, on-line downloads)	Trends in job role dominance between marine sectors by sex, age, race, and persons with disabilities in the geographical area (%)	Sites with spiritual and/or religious significance/well-being (number of people who attach significance, degree of significance attached)	0	0
Assimilative and recycling capacity, net carbon burial (tonnes per ha per year)	+	+	+	Select	Select
Width or area of saltmarsh, reed bed, mudflat, sand dunes etc. providing natural hazard protection (m, % cover, ha)	-	-	+	Select	Select
Quantity of greenhouse gases fixed and/or emitted	-	-	+	Select	Select
Number/area of specific seascape features (% of total natural seascape)	-	+	+	Select	Select
0	Select	Select	Select	Select	Select

Sensitivity Matrix — Ecosystem Services

	Goods and benefits				
	Scientific studies (number of research papers, subscriptions, library borrowing, on-line downloads)	Trends in job role dominance between marine sectors by sex, age, race, and persons with disabilities in the geographical area (%)	Sites with spiritual and/or religious significance/well-being (number of people who attach significance, degree of significance attached)	0	0
Assimilative and recycling capacity, net carbon burial (tonnes per ha per year)	Medium Positive	Medium Positive	Medium Positive	Select	Select
Width or area of saltmarsh, reed bed, mudflat, sand dunes etc. providing natural hazard protection (m, % cover, ha)	Weak Negative	Weak Negative	Medium Positive	Select	Select
Quantity of greenhouse gases fixed and/or emitted	Weak Negative	Weak Negative	Medium Positive	Select	Select
Number/area of specific seascape features (% of total natural seascape)	Weak Negative	Medium Positive	Medium Positive	Select	Select
0	Select	Select	Select	Select	Select

Adjacency MatrixGB_ES | Adjacency matrix_ES_MPF | Adjacency matrix_MPF_P | Adjacency matrix_P_A | Adjacency matrix_A_D | Adjacency matrix_D_GB

Ready Accessibility: Investigate Display S

Excel and Kumu exercises.

- The ISA sheets
- Exporting and Importing
- Kumu and loop analysis

Hands on Exercise

- Three groups - one per DA
- Use the tools like an individual exercise per DA

Aim: To gain a better understanding of the Social-Ecological System for informing Response Measures.

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Indicators of the DAPSI(W)R(M) Framework for the Simple SES

A reference sheet in support of the Simple SES guidance.

Quantitative Indicators

Indicators are necessary to be quantitative because we will perform a loop analysis to understand reinforcing and balancing loops, so we need to base the analysis on data-driven indicators.

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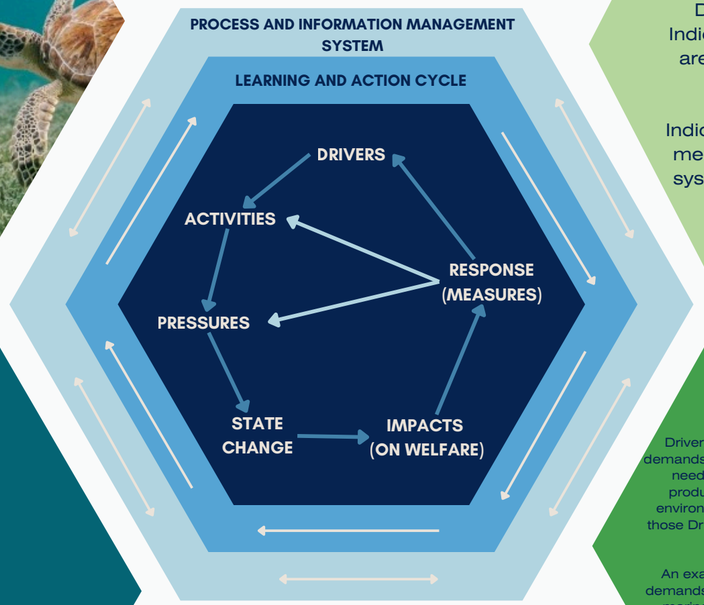
Specific indicators

It's essential to differentiate indicators for the various components of the DAPSI(W)R(M) framework. SMART Indicators refer to measurements which are Specific, Measurable, Achievable, Relevant, and Timebound.

Indicators within this approach are proxy measurements of our social-ecological system, so they must be meaningful to the circumstances.



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State Change

Definition: State changes include the underlying Marine Processes and Functions (MPF) alongside the Ecosystem Services (ES). State changes relate to the natural system (as the ecology and its supporting physio-chemical aspects). These are the resulting spatial and temporal changes in the environmental and ecological structure (situation at one time) and functioning (rate processes), the changes in the natural aspects of the supporting and regulating ecosystem services.

MPF

- Changes over time in community composition (abundance (number)

Indicator

- Hydrological processes
- Current speed (m/s) and direction

ES

- Coastal and marine biota
- Places and seascapes

Indicator

- Quality of the fish, shellfish (age profile; length profile)
- Number/area of specific seascape features (% of total natural seascape)

The DAPSI(W)R(M) Framework

The DAPSI(W)R(M) framework provides a structured approach for ecosystem-based management by categorising key elements of Drivers, Activities, Pressures, State changes, Impacts (on Welfare), and Response (Measures).

This framework utilises key indicators at each stage to inform management decisions, evaluate responses, and facilitate stakeholder communication, enabling conceptual and quantitative analyses.

The difference between drivers and goods and benefits

Drivers are the causes; they represent the human-induced demands put on the environment due to societal behaviours and needs. Whereas Goods and Benefits are the effects and products of the ecosystem services; they depict what the environment provides in return, either as a direct response to those Drivers which warrant Activities or as inherent products of Ecosystem Services.

An example is that an increasing coastal population (Driver) demands more seafood. In return, through human Activities, the marine ecosystems provide fish as a resource; the food for human consumption (Goods and Benefits). However, overfishing (Activities) might deplete fish stocks, reducing the ecosystem's capacity to provide this benefit in the long term.

Impacts (on human Welfare)

Definition: The changes affecting the goods and benefits, which affect the quality of life required to satisfy our needs. These are changes in the results of the provisioning and regulating ecosystem services; positive and negative influences on the human complementary assets/capital to extract societal goods and benefits from ecosystem services.

Examples:

- Tourism opportunities, fish breeding grounds, and storm surge protection.
- Food for human consumption
- Employment

Indicators:

- The number of tourists visiting a marine protected area
- Fish landed for human consumption (landings data at particular times and places in tonnes)
- Imports of goods and services (% of GDP)

For further information, see: Elliott, M., Burdon, D., Atkins, J. P., Borja, A., Cormier, R., de Jonge, V. N. & Turner, R. K. (2017) "And DPSIR begat DAPSI(W)R(M)!" - A unifying framework for marine environmental management. Mar Pollut Bull, 118(1-2), 27-, https://doi.org/10.1016/j.marpolbul.2017.03.049

International Estuarine and Coastal Specialists IECS

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BREAK

10:20 - 10:30

30 minutes	Presentation of a hypothetical case
1.2 Hours	DA hands on exercise
10 minutes	**Comfort break**
30 minutes	DAs presentation (10 min each)
30 minutes	Global discussions and feedback

Discussions and feedback

- What do you think went well?
- What do you think went not so well?
- Do you have any concerns?

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Thank you!

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