



# SEA THE VALUE

MARINE BIODIVERSITY BENEFITS  
FOR A SUSTAINABLE SOCIETY

## CPN Training Workshop #3: Participatory Mapping

Prof Tavis Potts (UoA) & Dr Daryl Burdon (DB Ltd.)

12:00-14:00, Wednesday 19 June 2024.

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- 12:00-12:10 Welcome and introductions (TP)
- 12:10-12:30 Overview of participatory mapping approach (DB)
- 12:30-13:00 Activity 1: Features and benefits mapping (TP)
- 13:00-13:10 Comfort Break
- 13:10-13:40 Activity 2: Beneficiaries mapping (DB)
- 13:40-13:45 How can outputs be used? (TP)
- 13:45-14:00 Q&A Session & workshop close (TP & DB)

**Note: You will need a pen and paper for the Activities!**





## Vision...

“To determine novel and policy relevant pluralistic values for marine biodiversity and apply these values to co-develop green investment options, leading to a transformative shift in our understanding and utilisation of the economics of biodiversity”

**aka....what benefits does biodiversity provide, who benefits from it, how do we value it, and what do we do with it?**

- **Quantify the interlinkages between marine biodiversity, natural capital, and ecosystem services**, taking quantity & quality into consideration.
- **Determine the economic and social values associated with the benefits of carbon sequestration and bioremediation of waste** and apply these values to support natural capital accounting and community benefits.
- **Connect the ecological, economic, and social values of biodiversity to decision-making** through co-design and supporting of green investment to enhance biodiversity.



## The Cromarty Firth

Photo: D. Burdon



## The Solent

Photo: A. Van Der Schatte Olivier

## **CPN Workshop Series**

WS0: 'Sea The Value' Introductory Workshop (Tuesday 12 March)

WS1: Natural Capital & Understanding Value (Wednesday 5 June)

WS2: Interlinkages between Biodiversity & Natural Capital (Wednesday 12 June)

### **WS3: Participatory Mapping (Wednesday 19 June)**

WS4: Funding nature's needs (Wednesday 26 June)



<b>Q1 - What approaches have you used to collect local knowledge from coastal communities in the management of your area?</b>	<b>Q2 – How do you currently use local knowledge in the management of your area?</b>	<b>Q3 – Do you see a role for participatory mapping methods to capture additional local knowledge of your area?</b>
<ul style="list-style-type: none"> <li>• Local estuary/coastal forums.</li> <li>• Cetacean surveys.</li> <li>• Listen to local community.</li> <li>• Talking to young people.</li> <li>• Co-designed workshops.</li> <li>• Online forms and QR codes.</li> <li>• Citizen science projects.</li> <li>• On-site meetings.</li> <li>• Marine plan working groups.</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate meetings of local experts to share their data.</li> <li>• Community engagement.</li> <li>• Input from members of coastal partnerships into plans, strategies and projects.</li> <li>• Not enough – so really intrigued by this!</li> <li>• Local knowledge doesn't always know the local science!</li> </ul>	<ul style="list-style-type: none"> <li>• Absolutely!</li> <li>• To find community groups which exist and who we need to engage with.</li> <li>• Currently use 'Maptionnaire' for online participatory mapping over several weeks.</li> <li>• Yes, but resources (time and money) are limited.</li> <li>• Yes – both to capture insight and gain active engagement.</li> </ul>





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# Overview of Participatory Mapping

Dr Daryl Burdon (Daryl Burdon Ltd.)

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Marine Research,  
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Natural  
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Research Council



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and Social  
Research Council

1495  
 UNIVERSITY OF  
ABERDEEN



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**Environmental Science and Policy**

Journal homepage: [www.elsevier.com/locate/envsci](http://www.elsevier.com/locate/envsci)

**Linking natural capital, benefits and beneficiaries: The role of participatory mapping and logic chains for community engagement**

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<sup>b</sup> Institute of Estuarine and Coastal Studies, University of Hull, Hull HU6 7RX, UK  
<sup>c</sup> School of Geosciences, University of Aberdeen, Aberdeen AB24 3UF, UK  
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**ARTICLE INFO**

**Keywords:**  
Natural capital  
Benefits  
Beneficiaries  
Participatory mapping  
Stakeholder engagement  
Logic chains

**1. Introduction**

**1.1. Background to natural capital, ecosystem benefits**

There has been increasing international concern over the diversity and quality of natural capital, ecosystem benefits. For example, Costanza et al. (1997) world's ecosystem services and natural capital Ecosystem Assessment categorised ecosystem regulating, cultural and supporting ecosystem services since developed frameworks which identify ecosystem structure and functioning and ecosystem services and societal benefits (e.g. UKNEAFO, 2014; Turner et al., 2015; Halpern, 2019; Cullhane et al., 2019; Defra, 2022).

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E-mail address: [darylburdon@gmail.com](mailto:darylburdon@gmail.com) (D. B)

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The Marine Pioneer

Testing ways to deliver the 25 Year Environment Plan vision to restore and sustainably manage the environment

- Participatory mapping is a stakeholder-driven approach.
- Developed as part of the MMO Marine Pioneer Project.
- It aims to capture the local knowledge of coastal communities.
- Results in the spatial mapping of ecosystem features, benefits and discussion of values.



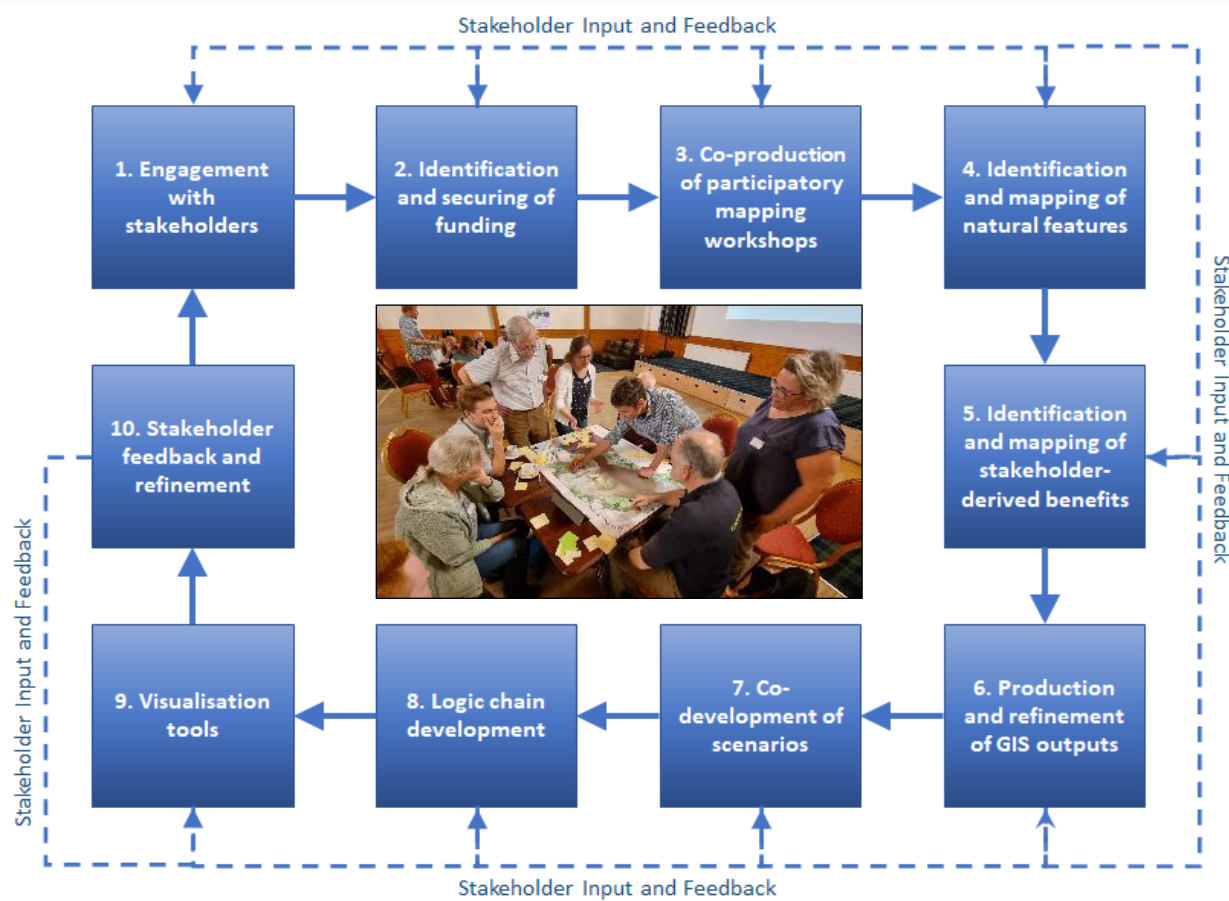


Figure 1: The Participatory Mapping Approach (Burdon et al., 2022\*)

- Explores the links between marine ecosystems (natural capital) and the wide range of benefits they provide, in the context of local communities (**Workshop #1**).
- Explores the trade-offs between benefit provision under different management interventions and scenarios (**Workshop #2**).
- Gains understanding of how communities can access, use and benefit from the natural capital and design future schemes that improve biodiversity and social welfare (**Workshop #3**).
- **The Participatory Mapping approach is driven by the stakeholders at every stage through the workshops.**



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# The Sea the Value Project



- **Workshop 0** (online) to introduce the project team, the Sea the Value project and the Cromarty Firth workshops to local stakeholders.



- **Workshop 1** (in person) to examine the broader benefits provided by local coastal ecosystems (features) in the Cromarty Firth and the Solent.



- **Workshop 2** (in person) to develop and explore potential scenarios and trade-offs around the wider benefits with Cromarty Firth and Solent stakeholders.



- **Workshop 3** (in person) to identify how benefits are distributed amongst stakeholders and support local knowledge on how natural capital measures can be delivered in the local context of the Cromarty Firth and the Solent.





## NATURAL FEATURES

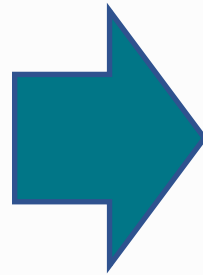
Features as Identified and Mapped in Workshop #1 and Refined in Workshop #2

## BENEFITS

Benefits as Identified and Mapped in Workshop #1 and Refined in Workshop #2

## BENEFICIARIES

Stakeholder relationships with benefits mapped and assessed in Workshop #3



**IMPORTANCE ('Natural Capital Lens')**

**RELIANCE / DEPENDENCE ('Beneficiaries lens')**

## Identifying Natural Features

- Beach
- Seagrass
- Mudflats
- Saltmarsh
- Sandbanks
- Channel
- Sand dunes
- ...

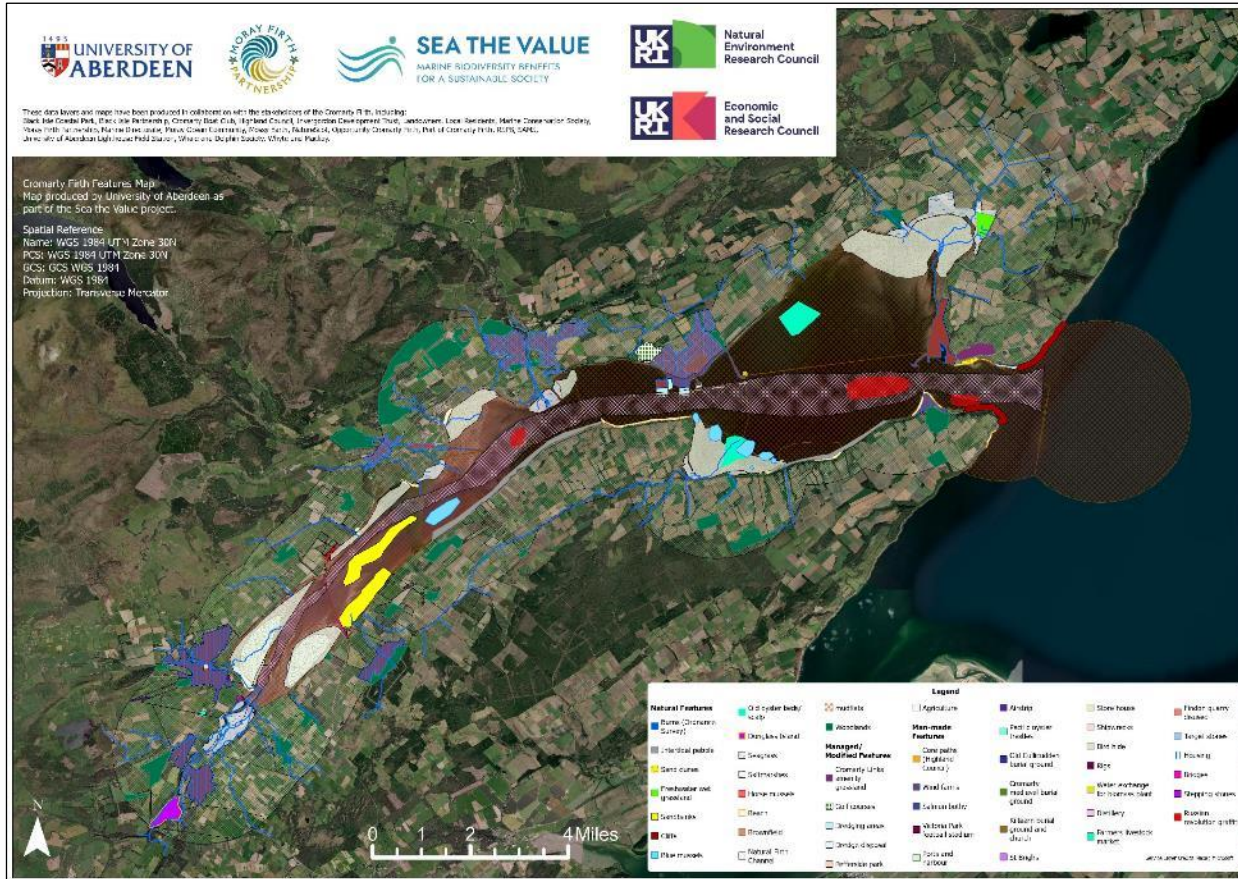
## Identifying Benefits

- Food
- Carbon sequestration
- Sea defence
- Bioremediation
- Tourism
- Education
- Health benefits
- ...





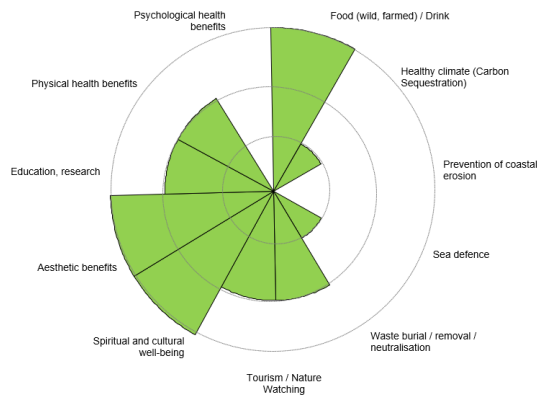
## Features Maps



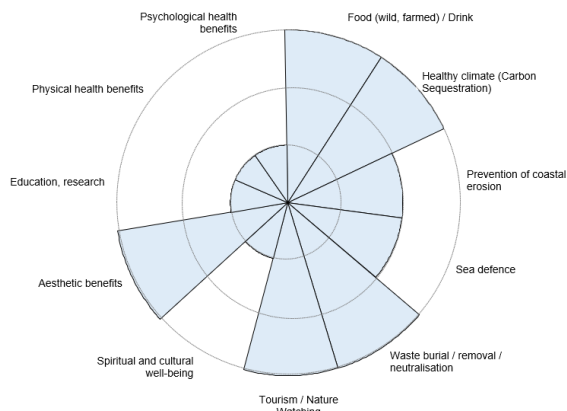
## Features vs Benefits Matrices

	Societal Benefits (SB)											Abiotic Benefits (AB)				Economic Benefits (EB)			Other Benefits (OB)																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21																			
	SB1	SB6	SB7	SB8	SB9	SB10	SB11	SB12	SB13	SB14	SB15	AB1	AB2	AB3	AB4	EB1	EB2	EB3	OB1	OB2	OB3																			
<b>Natural Features</b>												Food (wild, farmed) / Drink	Healthy climate (Carbon sequestration)				Prevention of coastal erosion	Sea defence	Waste burial / removal / neutralisation	Tourism / Nature Watching	Spiritual and cultural well-being		Aesthetic benefits	Education, research	Physical health benefits	Psychological health benefits	Wind energy	Water resources (quality and quantity)		Archaeology / Geology / Geomorphology		Transport	Place to live		Place to work	Industry	Habitat / species biodiversity		Intrinsic value	Functioning ecosystems
Beach		X	X	X	X	X	X	X	X	X	X			X	X		X	X	X	X	X	X	X																	
Seagrasses	X	X	X	X	X	X	X	X	X		X		X				X		X	X		X	X	X																
Mudflats	X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X		X	X	X																
Saltmarshes	X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X		X	X	X																
Blue mussels	X	X	X	X	X	X	X		X		X		X	X			X	X	X	X		X	X	X																
Sandbanks				X		X	X	X	X		X				X		X					X	X																	
Natural Firth channel	X	X				X	X		X	X	X		X		X		X	X	X	X	X	X	X	X																
Dunglass Island						X	X	X	X	X	X			X			X	X				X	X	X																
Burns						X	X	X	X	X	X		X	X			X					X	X	X																
Woodland		X					X				X		X	X			X	X				X	X	X																
Old oyster beds							X		X													X	X																	
Horsemussels		X			X		X		X				X									X																		
Cliffs			X	X		X	X	X	X	X	X			X			X	X				X	X	X																
Brownfield						X	X		X							X						X	X	X																

**Business As Usual Scenario:** Relative importance of agricultural land in delivering societal benefits.



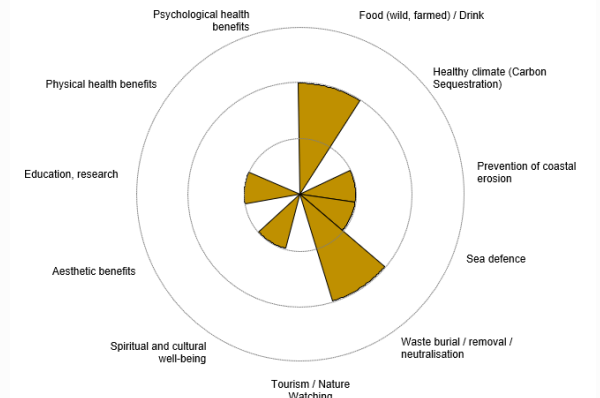
**Scenario 1 - Managed Realignment:** Relative importance of saltmarsh in delivering societal benefits.



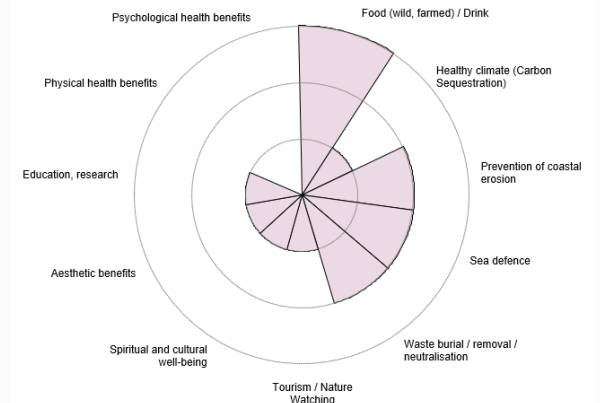
## Future scenarios assessments: Trade-offs

Co-developed Scenarios with Stakeholders	Coastal Managed Realignment	Native Oyster Restoration
Benefits of Interest	Carbon Sequestration (+ wider benefits)	Bioremediation of waste (+ wider benefits)
Cromarty Firth	✓	✓
The Solent	✓	✓

**Business As Usual Scenario:** Relative importance of subtidal mixed sediments in delivering societal benefits.



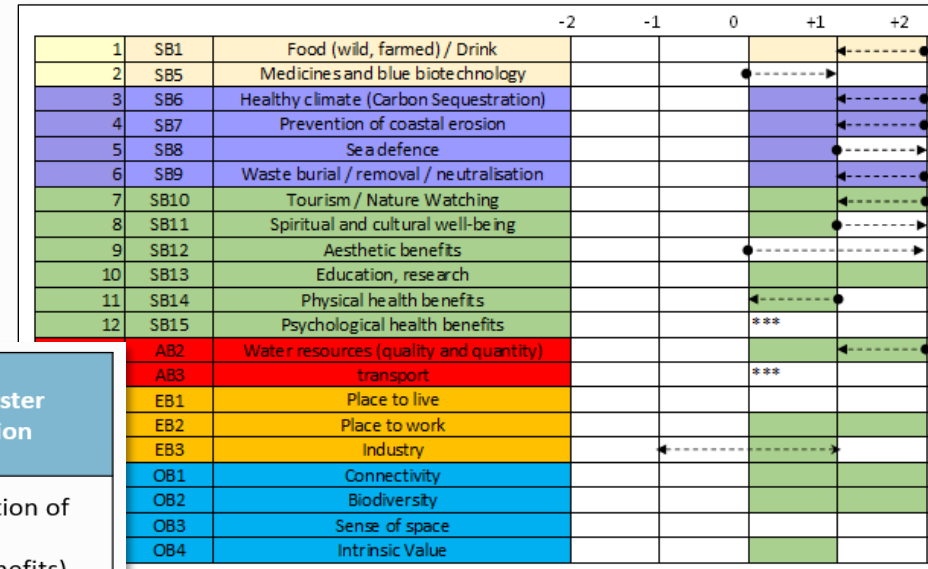
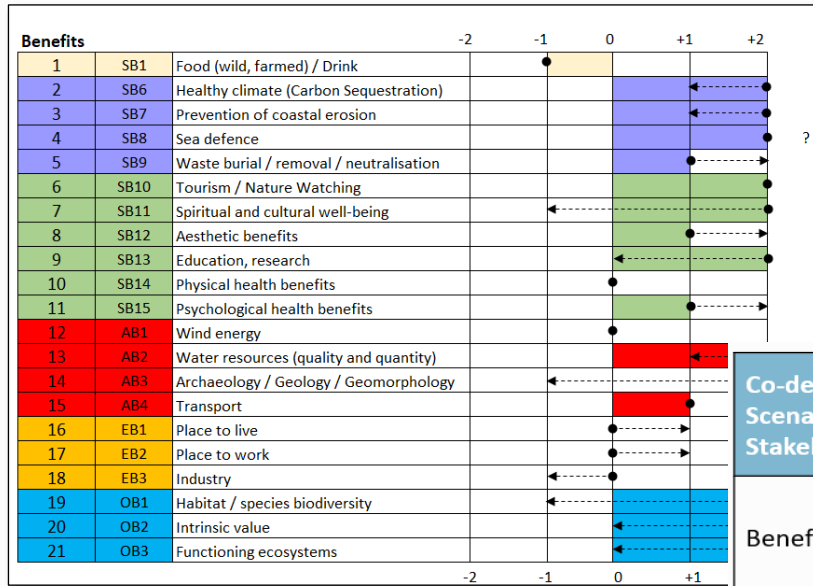
**Scenario 2 - Native Oyster Restoration:** Relative importance of Native oyster reefs in delivering societal benefits.



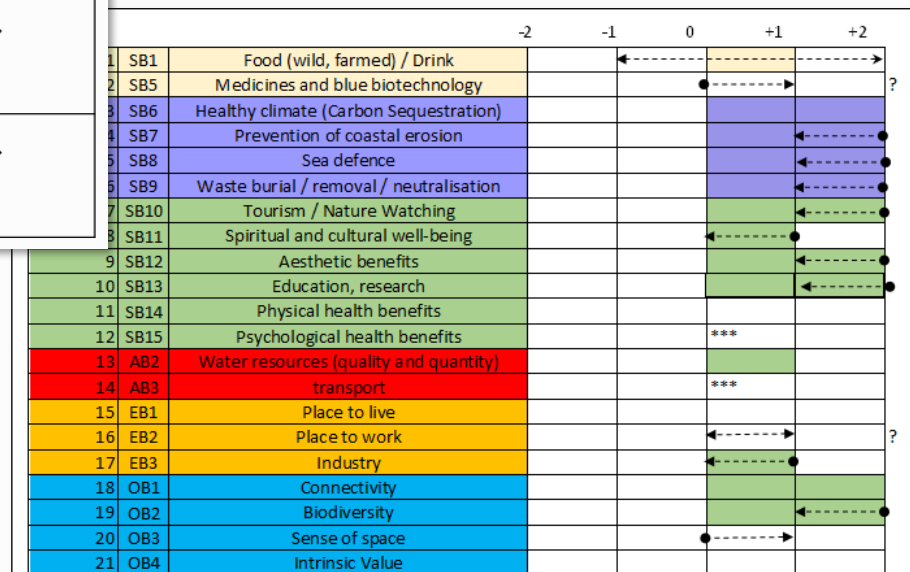
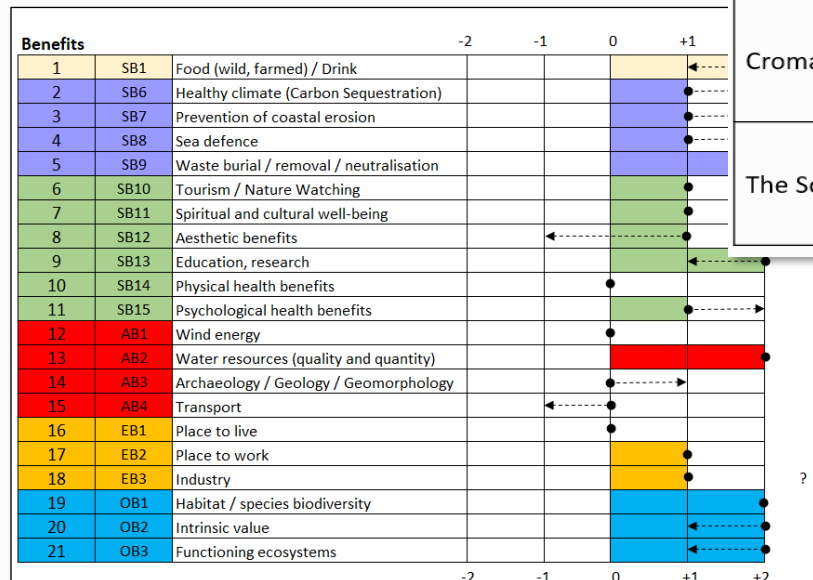




## Future scenarios assessments: Trade-offs



Co-developed Scenarios with Stakeholders	Coastal Managed Realignment	Native Oyster Restoration
Benefits of Interest	Carbon Sequestration (+ wider benefits)	Bioremediation of waste (+ wider benefits)
Cromarty Firth	✓	✓
The Solent	✓	✓



**Cromarty Outputs**  
←

**Solent Outputs**  
→











## NATURAL FEATURES

Beach
Seagrasses
Mudflats
Saltmarshes
Blue mussels
Sandbanks
Natural Firth channel
Dunglass Island
Burns
Woodland
Old oyster beds
Horsemussels
Cliffs
Brownfield

## BENEFITS

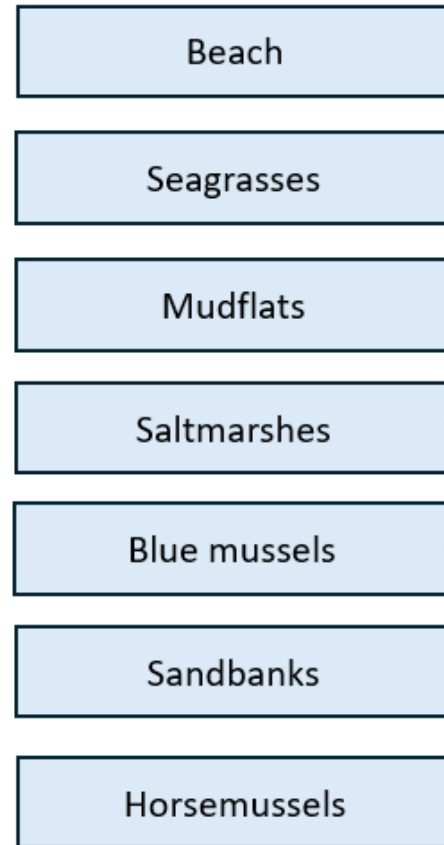
**Healthy Climate  
(Carbon Sequestration)**

-  High score
-  Moderate score
-  Low score
-  No score available

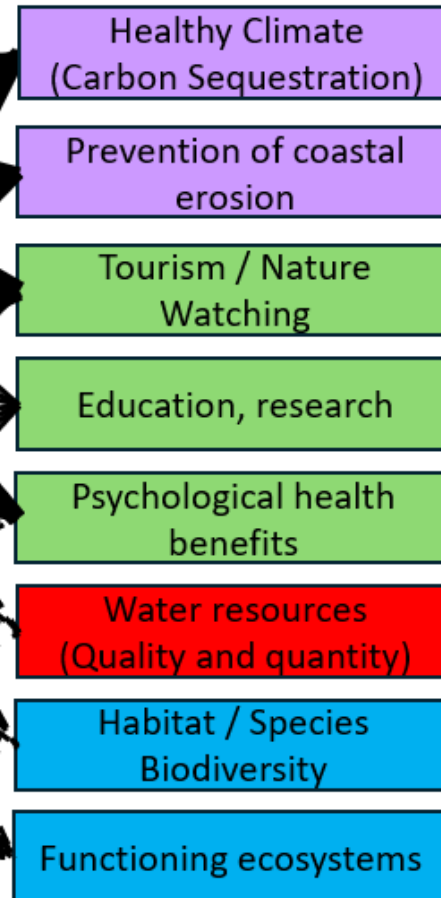
## BENEFICIARIES

Cromarty Boat Club
Moray Firth Coastal Partnership
SEPA
Highland Council
Port of Cromarty Firth
Whyte & Mackay
Scottish Water
RSPB
Moray Ocean Community
NatureScot
Marine Directorate
Academia
Landowners
Black Isle Partnership

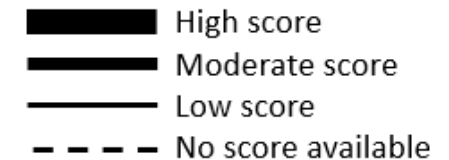
## NATURAL FEATURES



## BENEFITS



## BENEFICIARIES





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# Why use Participatory Approaches in Estuarine and Coastal Restoration Projects?

- Driven by stakeholders at all stages of the process.
- Creates a shared common language.
- Captures local knowledge and generates digital data.
- Generates outputs which can be used by coastal communities.
- Improves understanding of the links between natural features and benefits.
- Allows organisations to assess their own reliance on natural capital features.
- Identifies shared reliance on natural capital features and their benefits.







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# Participatory Mapping Workshop Feedback...

*“Meeting people from different organisations and the different points of views.”*

*“Getting local stakeholders around the same table – great connections made for future projects / partnerships.”*

*“Generate interest in the Cromarty Firth by showing that community groups and academia have studied its real potential.”*

*“The map is a good tool for showing the links between community and the environment.”*

*“Identifying opportunities for marine enhancement and linking with other partners.”*

*“Mapping outputs will be really useful to demonstrate to other parties about the features and benefits and the impacts change can have on all of the different beneficiaries.”*

*“Thanks, you for your time, help and expertise in making these workshops so informative and fun!”*



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## Activity 1: Features and Benefits Mapping

Prof Tavis Potts (UoA)

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Environment  
Research Council



Economic  
and Social  
Research Council

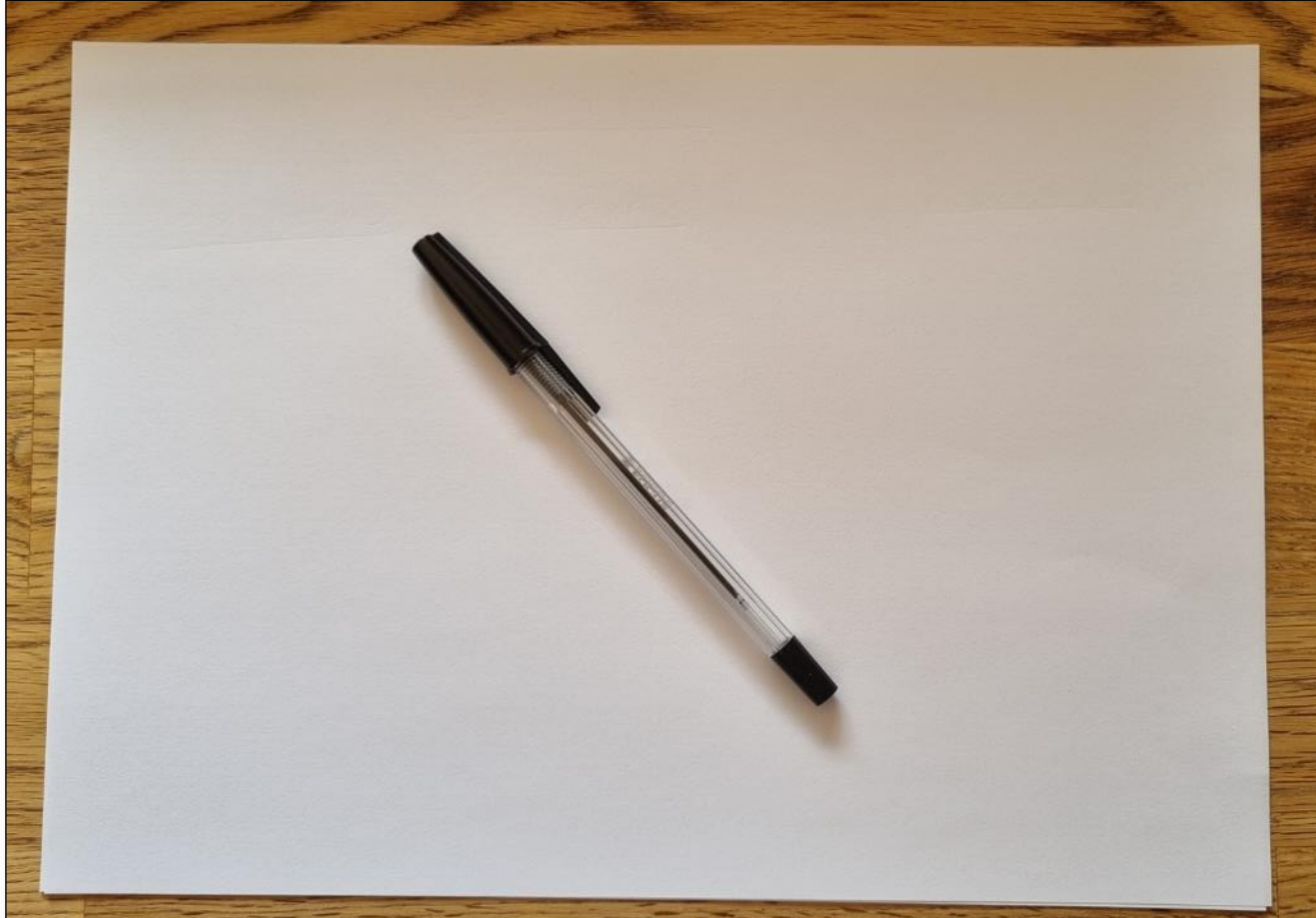


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- We want you to think about a local area of coast that you are most familiar with.
- Please write your coastal area in the MS Teams Chat!
- You will then need a pen and paper for this exercise!



CROMARTY FIRTH

NATURAL FEATURES

BENEFITS

BENEFICIARIES



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## Features and Benefits Mapping



- Firstly, in the left-hand column, list the **Natural Features** that are present within your chosen area of coast.
- For example, mudflats, saltmarshes, water channel, seagrass, etc.
- Spread the list out down the first column.
- Spend 5 minutes doing this task.



# CROMARTY FIRTH

## NATURAL FEATURES

BEACH

SEAGRASS

MUDFLATS

SALT MARSH

SANDBANKS

CHANNEL

SAND DUNES

## BENEFITS

## BENEFICIARIES





- Secondly, in the middle column, list the **Benefits** that society gains from your area of coast.
- For example, food, sea defence, tourism, carbon sequestration.
- Spread the list out down the middle column.
- Spend 5 minutes doing this task.

## CROMARTY FIRTH

### NATURAL FEATURES

BEACH

SEAGRASS

MUDFLATS

SALTMARSH

SANDBANKS

CHANNEL

SAND DUNES

### BENEFITS

FOOD

CARBON SEQUESTRATION

SEA DEFENCE

BIOREMEDIATION

TOURISM

EDUCATION

HEALTH BENEFITS

### BENEFICIARIES





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# Features and Benefits Mapping



- Now, think about which **Natural Features** are responsible for delivering each of the **Benefits**.
- Draw a line between the **Natural Features** and the **Benefits** they deliver.
- Spend 15 minutes doing this task.



# CROMARTY FIRTH

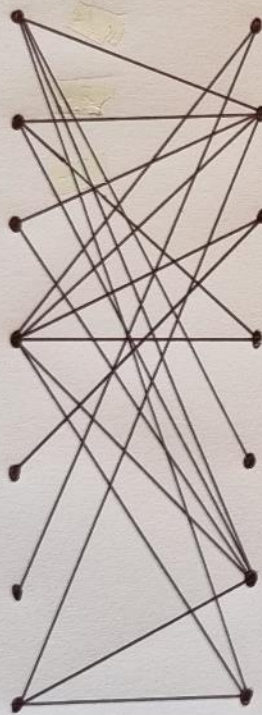
## NATURAL FEATURES

BEACH  
SEAGRASS  
MUDFLATS  
SALTMARSH  
SANDBANKS  
CHANNEL  
SAND DUNES

## BENEFITS

FOOD  
CARBON SEQUESTRATION  
SEA DEFENCE  
BIOREMEDIATION  
TOURISM  
EDUCATION  
HEALTH BENEFITS

## BENEFICIARIES





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**Comfort Break 13:00-13:10**





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## Activity 2: Beneficiaries Mapping

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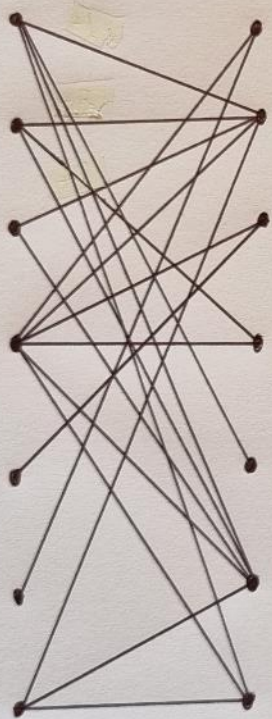
- Think about who the **Beneficiaries** are in your coastal area who gain from the **Benefits** identified before the break.
- For example, local authorities, statutory authorities, wildlife charities, recreational groups, industry, etc.
- Write them in the right-hand column of your sheet.
- Spend 5 minutes doing this task.



# CROMARTY FIRTH

## NATURAL FEATURES

BEACH  
SEAGRASS  
MUDFLATS  
SALTMARSH  
SANDBANKS  
CHANNEL  
SAND DUNES



## BENEFITS

FOOD  
CARBON SEQUESTRATION  
SEA DEFENCE  
BIOREMEDIATION  
TOURISM  
EDUCATION  
HEALTH BENEFITS

## BENEFICIARIES

- CROMARTY BOAT CLUB
- MORAY FIRTH COASTAL PACT.
- HIGHLAND COUNCIL
- NATURE SCOT
- PART OF CROMARTY FIRTH
- RSPB
- LANDOWNERS





- Draw a line between the **Beneficiaries** and the **Benefits** they are reliant upon to fulfil their remit.
- For example, the Environment Agency would be reliant on natural forms of sea defence and bioremediation of waste given flood defence and water quality are within their statutory remit.
- Spend 20 minutes doing this task.



# CROMARTY FIRTH

## NATURAL FEATURES

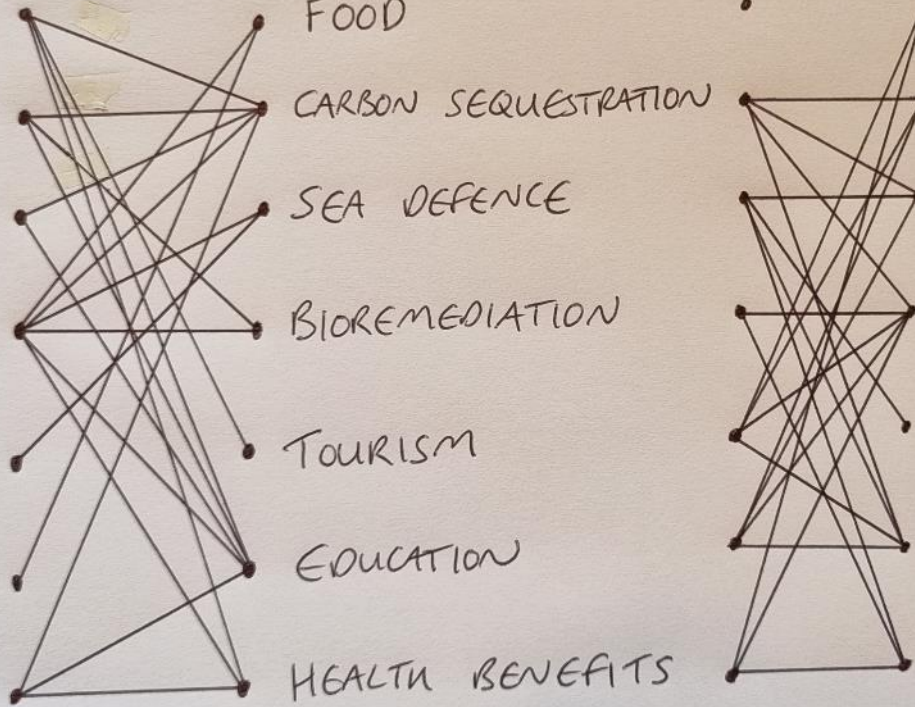
BEACH  
SEAGRASS  
MUDFLATS  
SALTMARSH  
SANDBANKS  
CHANNEL  
SAND DUNES

## BENEFITS

FOOD  
CARBON SEQUESTRATION  
SEA DEFENCE  
BIOREMEDIATION  
TOURISM  
EDUCATION  
HEALTH BENEFITS

## BENEFICIARIES

CROMARTY BOAT CLUB  
MORAY FIRTH COASTAL PACT.  
HIGHLAND COUNCIL  
NATURE SCOT  
PART OF CROMARTY FIRTH  
RSPB  
LANDOWNERS





# CROMARTY FIRTH

## NATURAL FEATURES

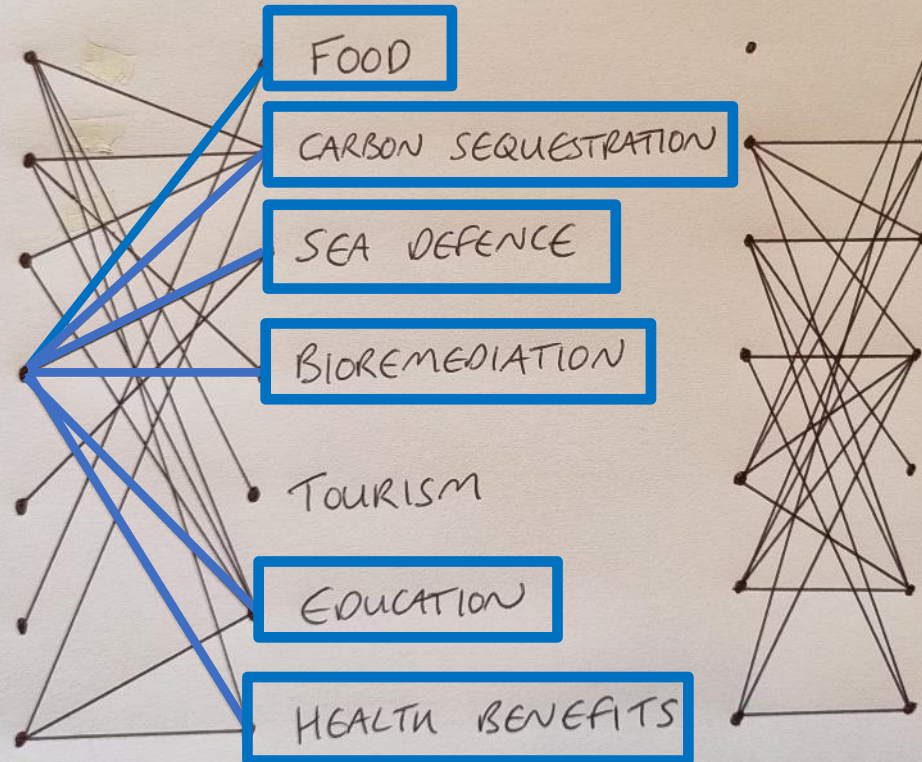
BEACH  
SEAGRASS  
MUDFLATS  
**SALT MARSH**  
SANDBANKS  
CHANNEL  
SAND DUNES

## BENEFITS

**FOOD**  
**CARBON SEQUESTRATION**  
**SEA DEFENCE**  
**BIOREMEDIATION**  
TOURISM  
**EDUCATION**  
**HEALTH BENEFITS**

## BENEFICIARIES

CROMARTY BOAT CLUB  
MORAY FIRTH COASTAL PACT.  
HIGHLAND COUNCIL  
NATURE SCOT  
PART OF CROMARTY FIRTH  
RSPB  
LANDOWNERS





# CROMARTY FIRTH

## NATURAL FEATURES

BEACH

SEAGRASS

MUDFLATS

SALTMARSH

SANDBANKS

CHANNEL

SAND DUNES

## BENEFITS

FOOD

CARBON SEQUESTRATION

SEA DEFENCE

BIOREMEDIATION

TOURISM

EDUCATION

HEALTH BENEFITS

## BENEFICIARIES

CROMARTY BOAT CLUB

MORAY FIRTH COASTAL PACT.

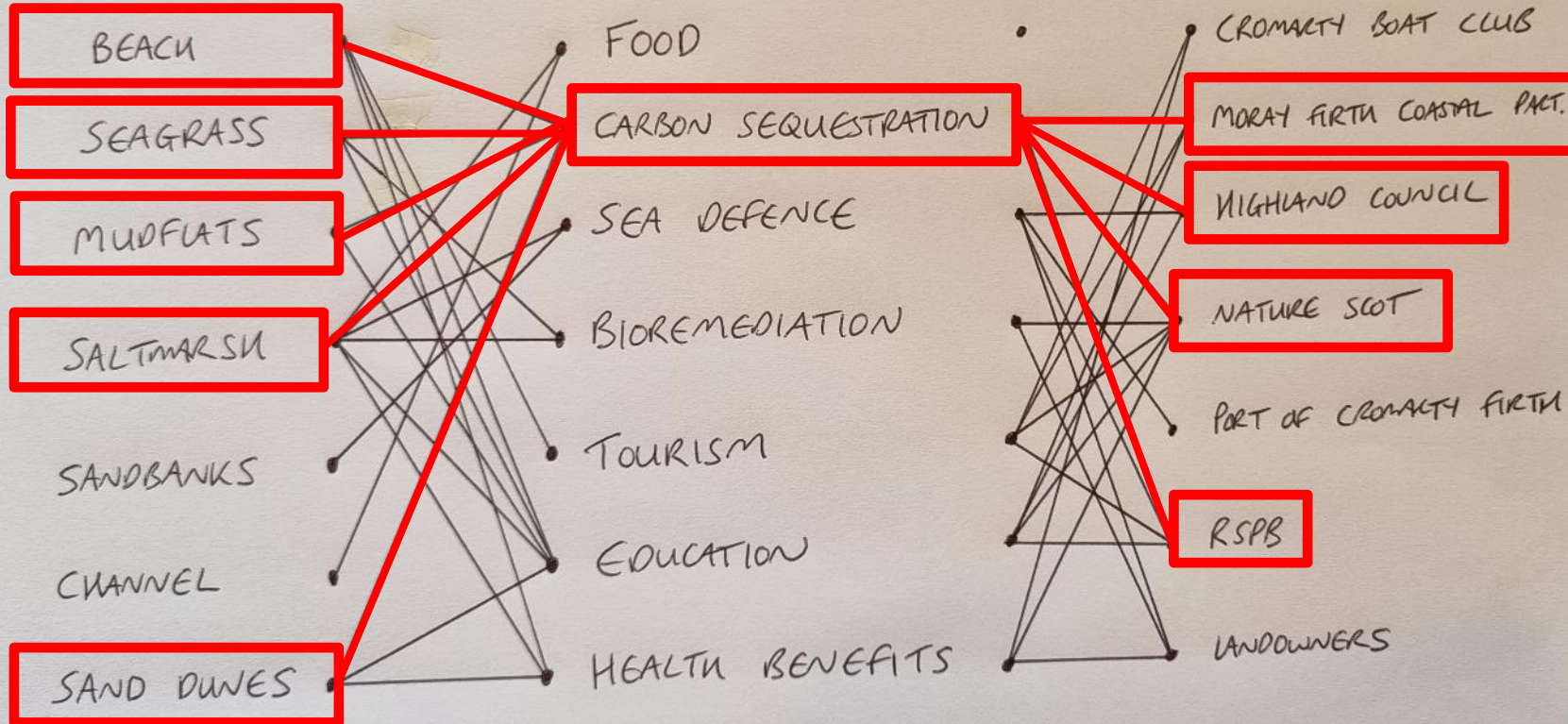
HIGHLAND COUNCIL

NATURE SCOT

PART OF CROMARTY FIRTH

RSPB

LANDOWNERS

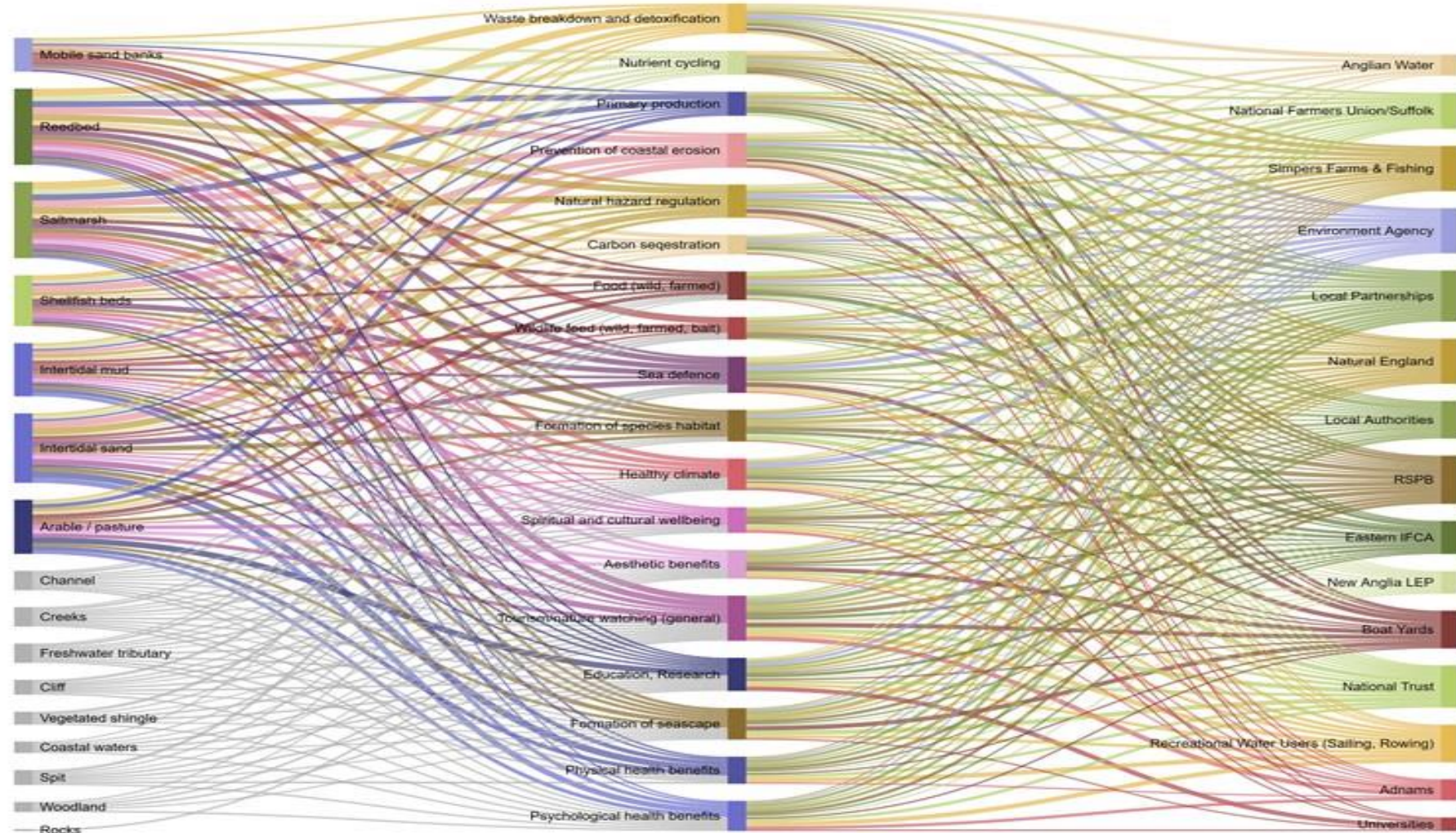




# Natural Capital

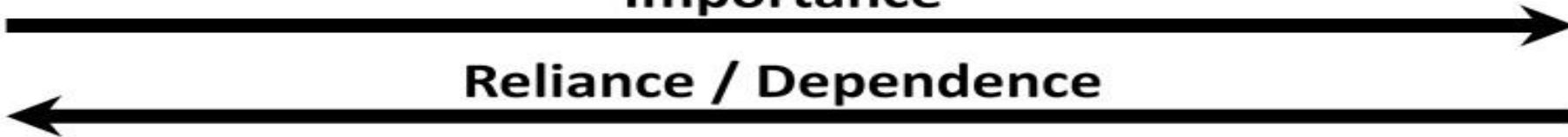
# Benefits

# Beneficiaries



Importance

Reliance / Dependence







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# How can participatory mapping outputs be used?

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Natural  
Environment  
Research Council



Economic  
and Social  
Research Council

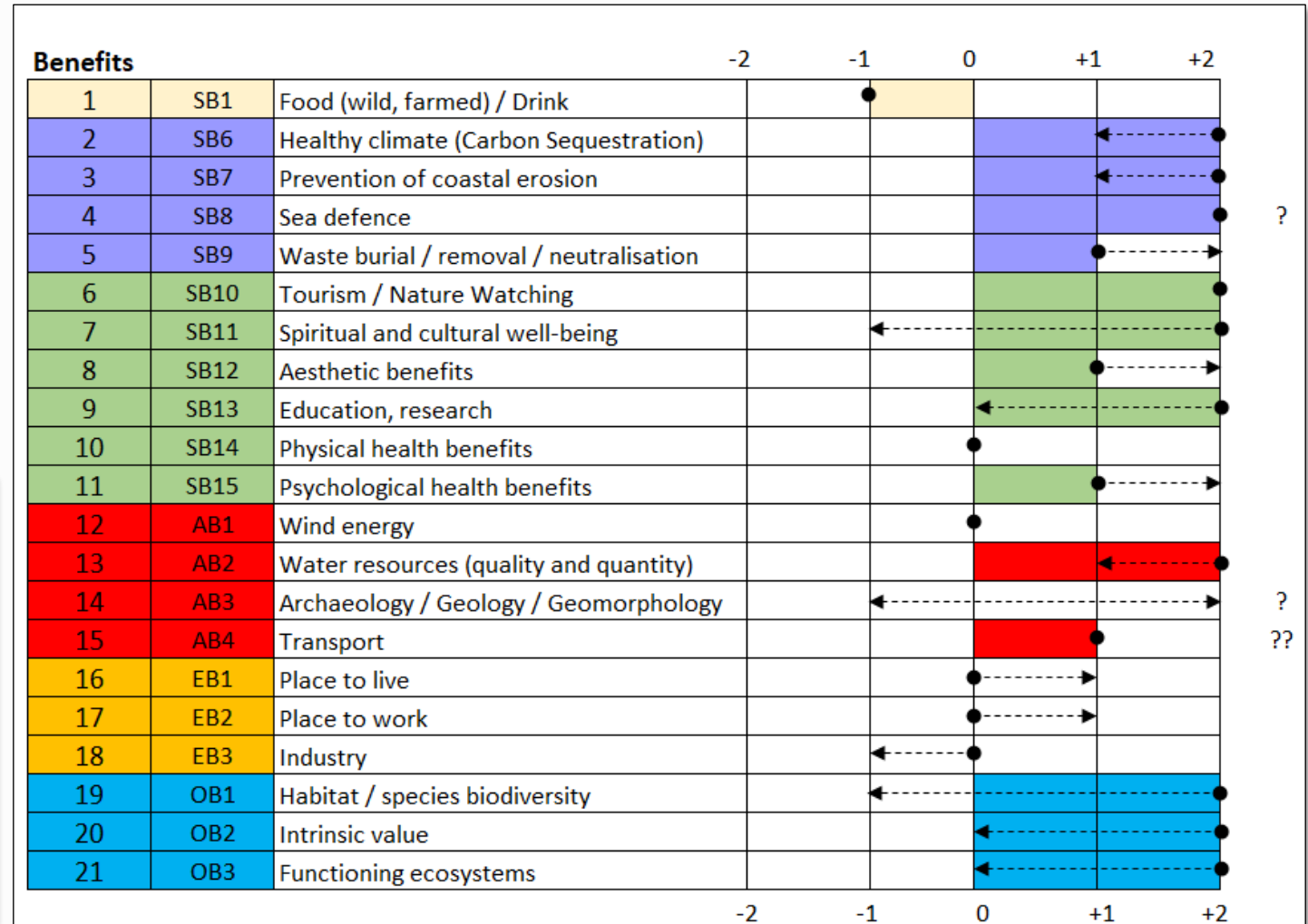
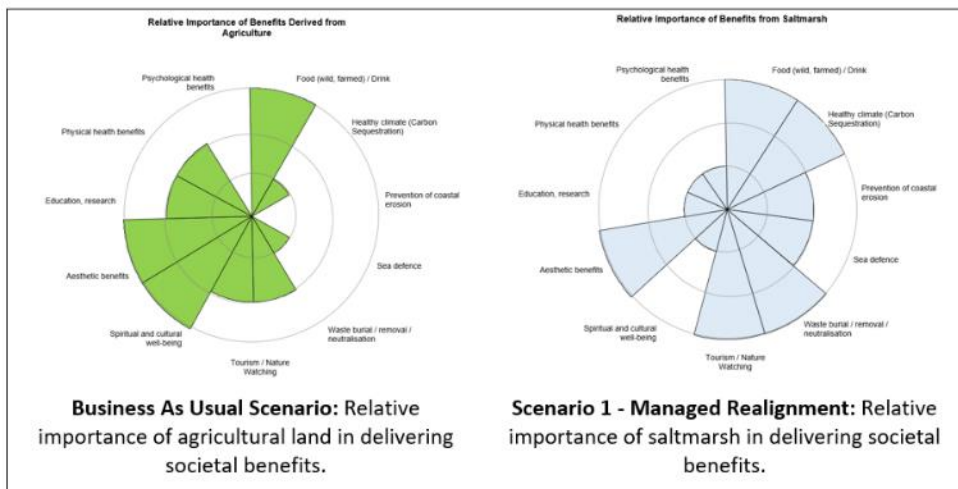






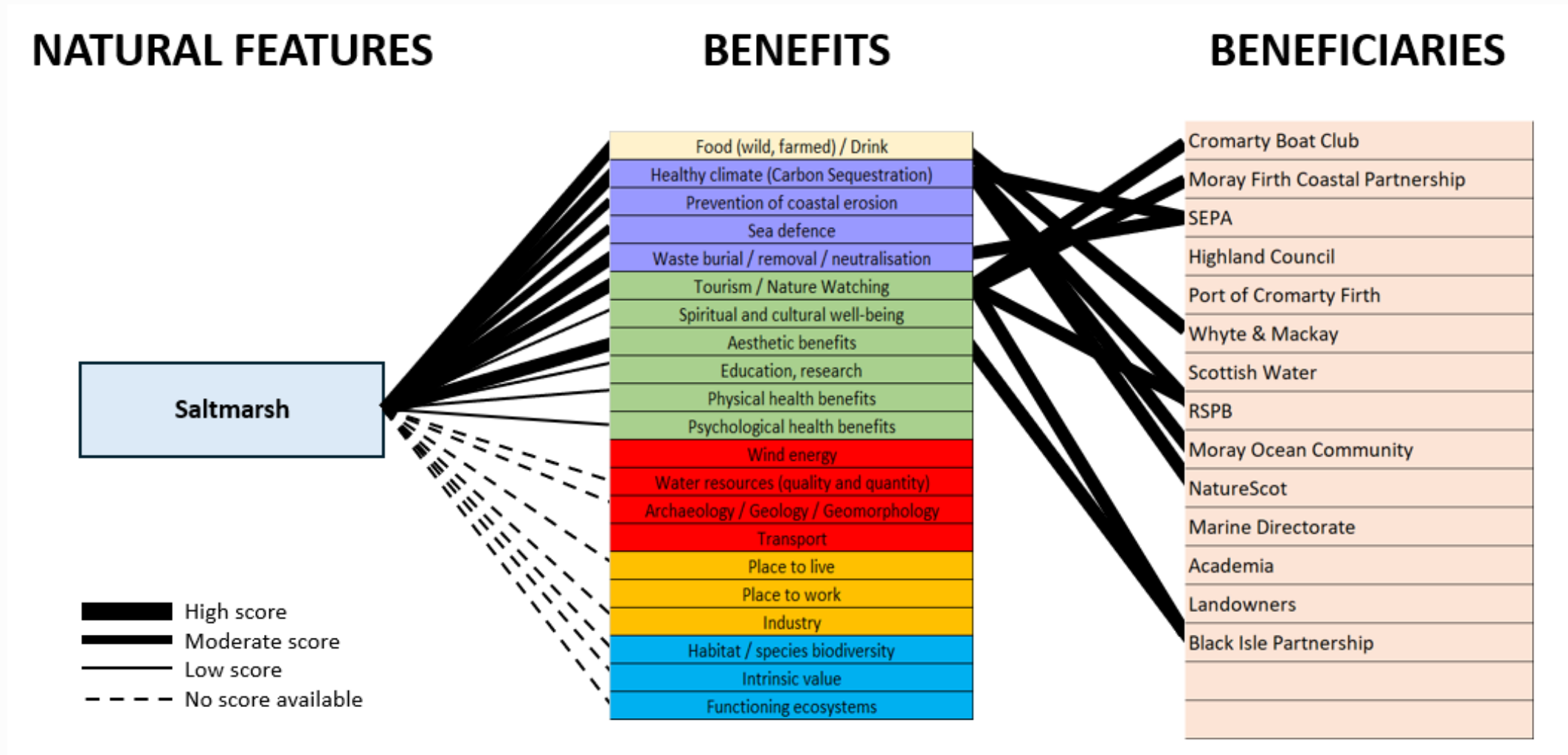
## Scenario 1: Managed Realignment

- A nature-based intervention whereby existing sea walls are breached to allow tidal inundation.
- Can be used for flood and erosion management, habitat compensation and/or habitat restoration.
- It can be seen as a triple-win for the environment, society and the economy.





## Scenario 1: Managed Realignment





# SEA THE VALUE

MARINE BIODIVERSITY BENEFITS  
FOR A SUSTAINABLE SOCIETY

## Q&A Session & Workshop Close

Prof Tavis Potts (UoA) & Dr Daryl Burdon (DB Ltd.)

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