



ReMeMaRe 2025

Restoring estuarine, marine & coastal habitats



Ocean
and Coastal
Futures



Environment
Agency



THE CROWN
ESTATE



Welcome – Roger Proudfoot

Head of Estuaries and Coast,
Environment Agency



Ocean
and Coastal
Futures



Environment
Agency

THE CROWN
ESTATE

Re

Me

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Re

Roger Proudfoot
Head of Estuaries & Coast
Environment Agency



Credit: Michael Vos

Credit: Nicola Shearer

Credit: Paul Naylor



Ministerial Address – Emma Hardy MP, Minister for Water and Flooding

ReMeMaRe

Hannah Westoby
ReMeMaRe Technical Lead
Environment Agency



Credit: Michael Vos

Credit: Nicola Shearer

Credit: Paul Naylor

ReMeMaRe Team



Roger Proudfoot
Head of Estuaries & Coast



Eve Leegwater
Regulatory Lead



Hannah Westoby
ReMeMaRe Lead



Africa Gomez Castillo
Blue Carbon Lead



Paula Dobin
Programme support



Jo Ratcliffe
Programme Office



Jon Davies
Programme Office

Vision

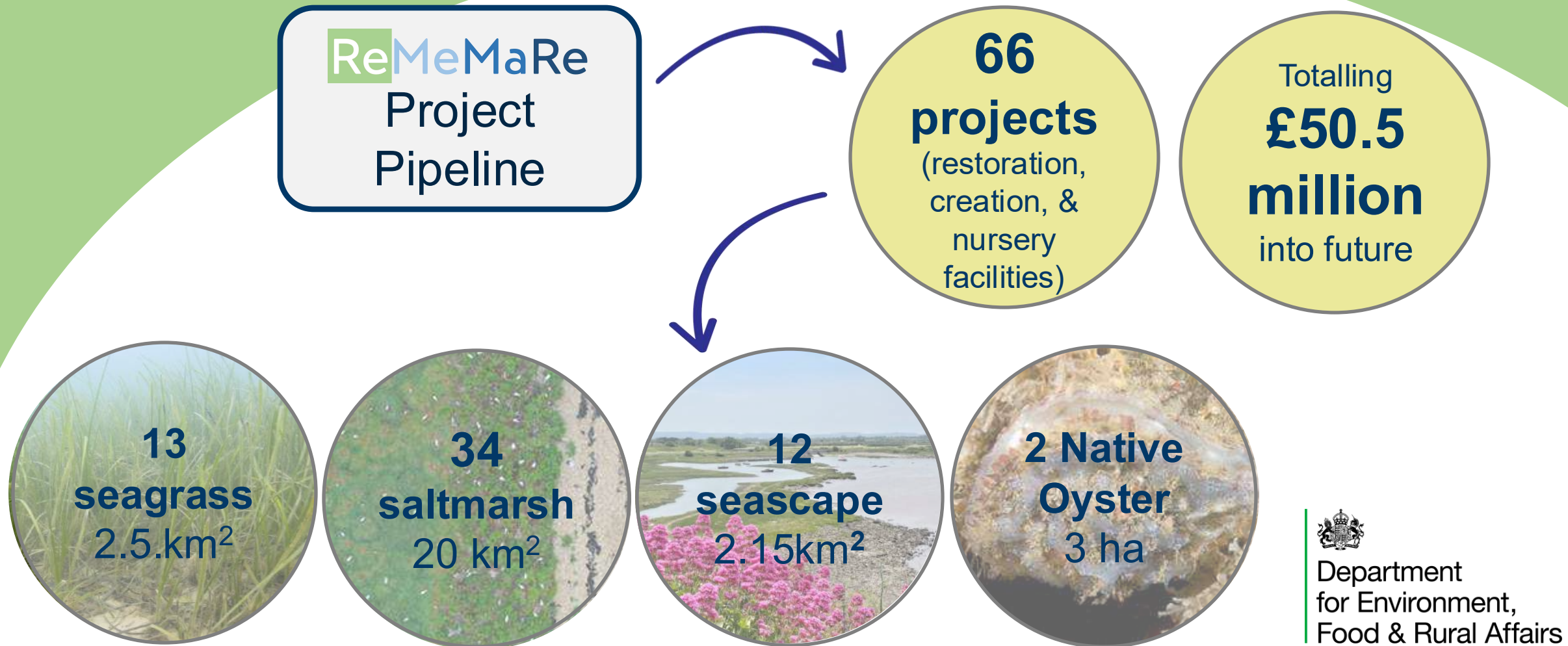
Restored estuarine & coastal habitats that benefit people & nature

Mission

Restore at least 15% of our priority habitats along the English coast by 2043

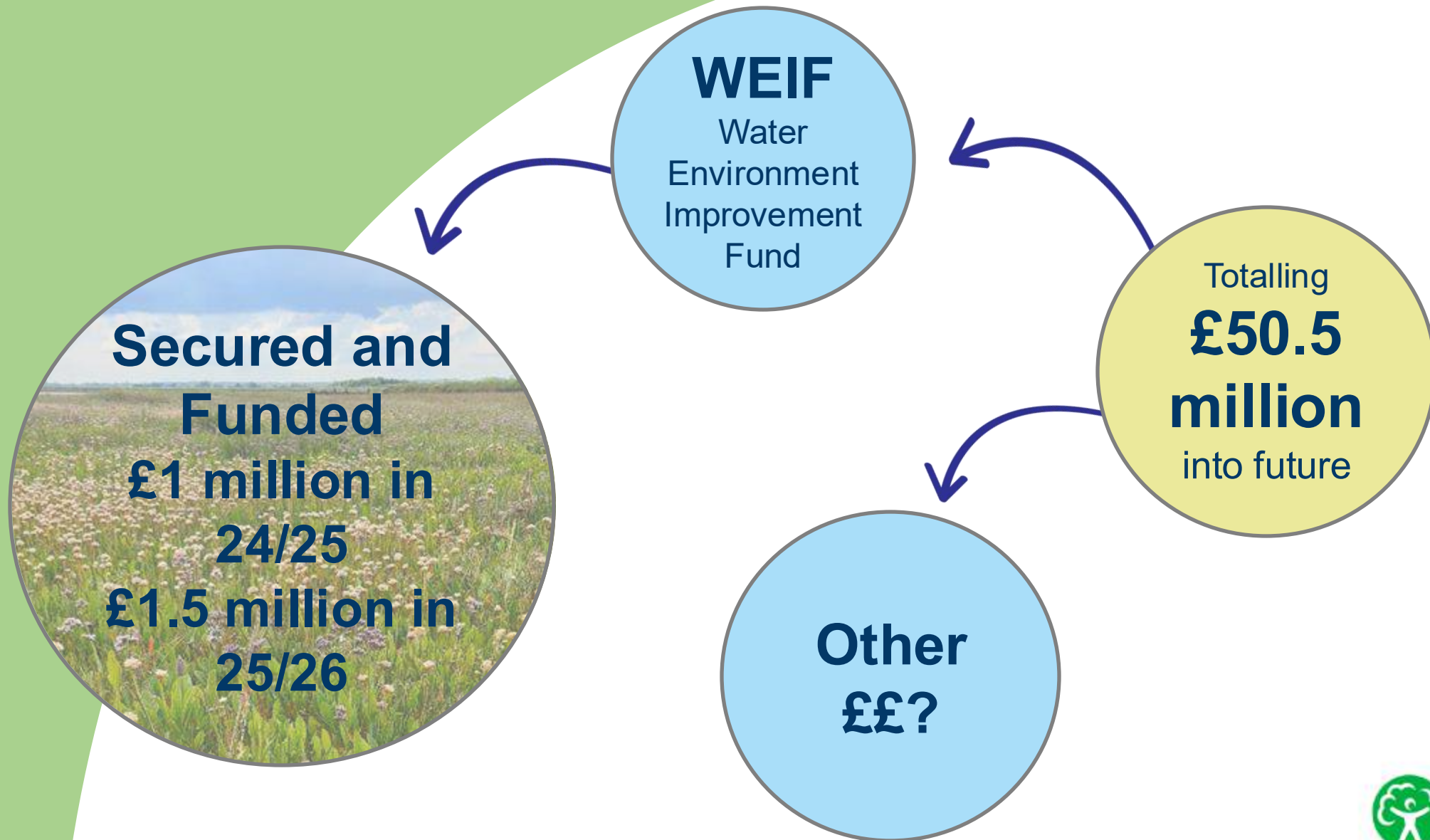
ReMeMaRe Programme

Established in 2024, with a focus on practical restoration on the ground

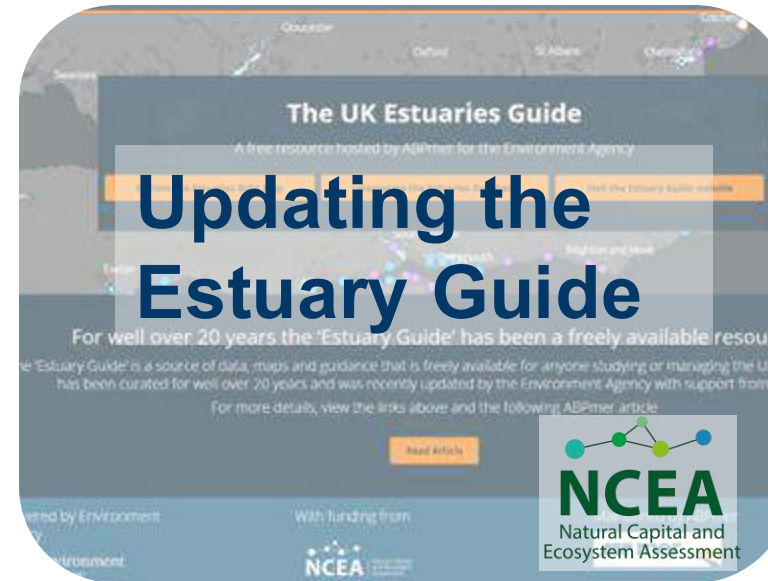
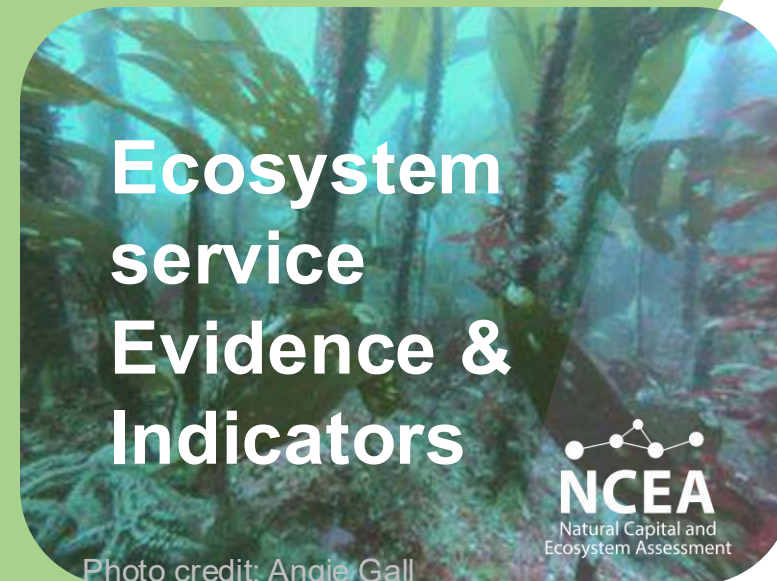


Department
for Environment,
Food & Rural Affairs

ReMeMaRe Programme



Other work supporting ReMeMaRe in 24/25





Marine Enhancement Directory (MEnD)



Phase 1 – Review of existing platforms/databases (August 2023)



Phase 2 – Stakeholder engagement (September 2023 – April 2024)



Phase 3 – The build (December 2024 – present)



Project Funders:



Working with:





Marine Enhancement Directory (MEnD)

The UK's central repository for estuarine, coastal and offshore habitat creation and restoration projects





Marine Enhancement Directory (MEnD)

It will help;

- Encourage collaboration
- Allow sharing of project successes and failures
- Report against national and international targets/commitments
- Support marine spatial planning

Sign up and register now, visit
our stand or email
mend.eco@outlook.com



Project Funders:



Working with:



ReMeMaRe Next 5 years





Keynote - Clare Dinnis

Director Of Wetland Conservation,
WWT The Charity For Wetlands And Wildlife



Ocean
and Coastal
Futures



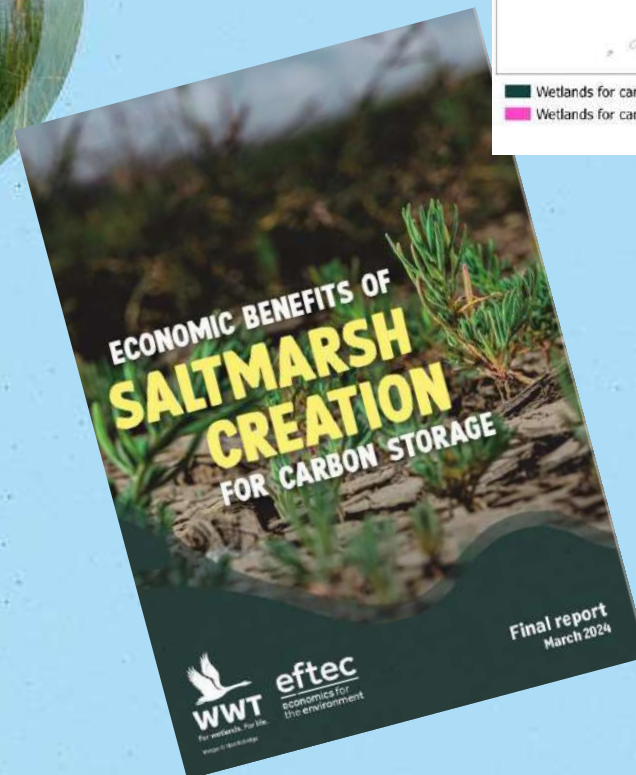
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A pathway to restoring saltmarsh

Clare Dinnis
Director of Wetland Conservation





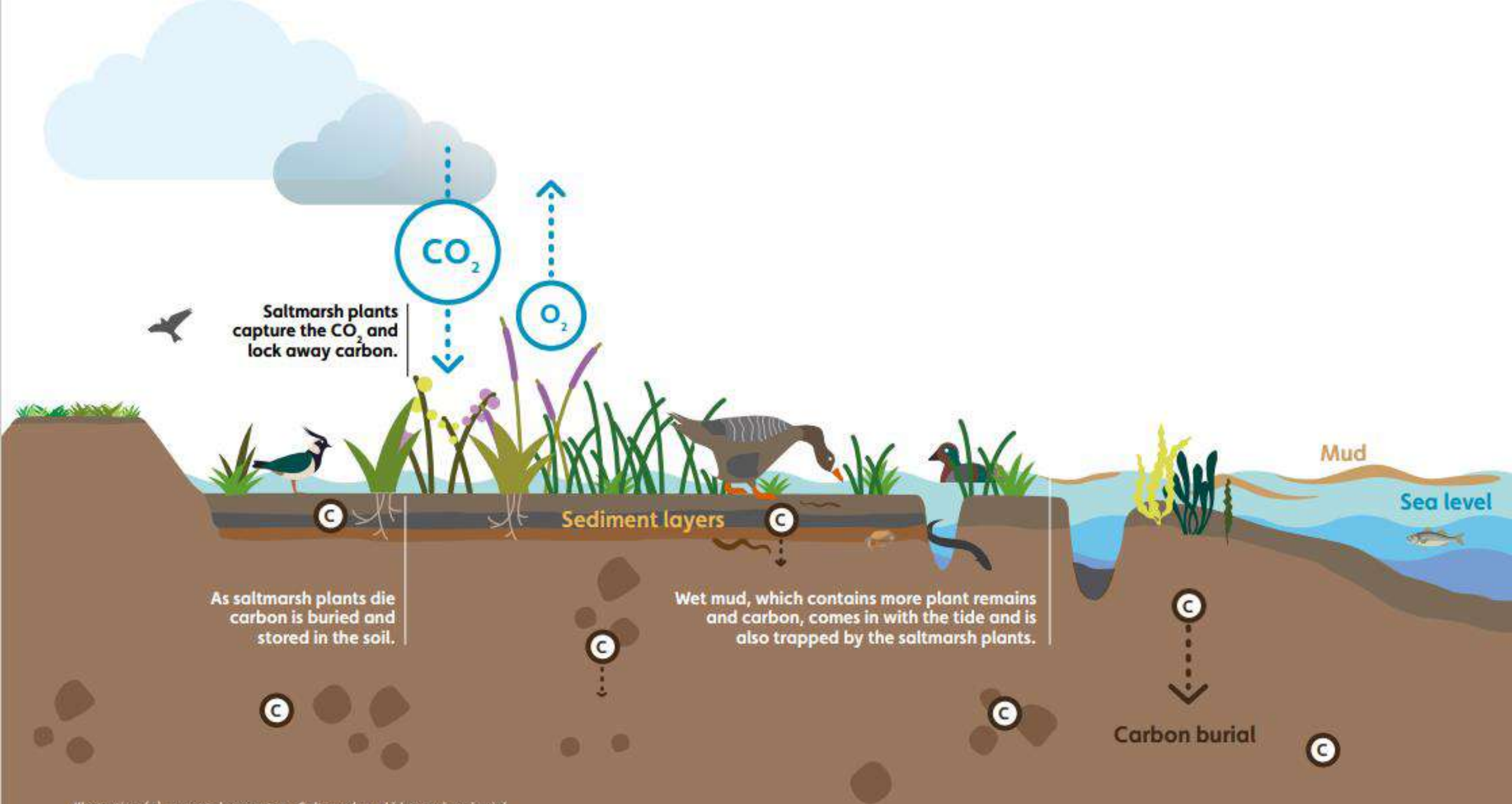


Illustration (a) – coastal ecosystem. Saltmarsh and blue carbon burial.



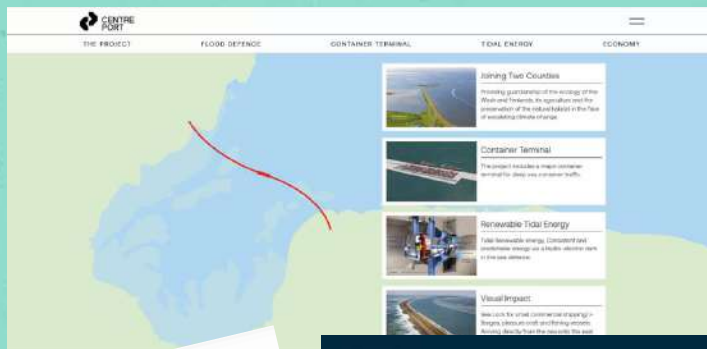


Table (2). A 2011 estimate of the monetary value of ecosystem services provided by worldwide coastal marshes (shown in hectares per year or ha⁻¹yr⁻¹)³⁷



£15.27 ha⁻¹yr⁻¹

Raw materials (including food provisioning)

Generates biological productivity and diversity



£7,200 ha⁻¹yr⁻¹

Natural hazard regulation

Attenuates and/or dissipates waves



£1,700–32,200 ha⁻¹

Regulation of pollution and water purification

Provides nutrient and pollution uptake, as well as retention, particle deposition



£2,100–13,900 ha⁻¹

Maintenance of fisheries

Provides sustainable reproductive habitat and nursery grounds, sheltered living space



£26 ha⁻¹yr⁻¹

Organic matter accumulation

Generates biogeochemical activity, sedimentation, biological productivity



£32.80 person⁻¹

Recreation and aesthetics

Provides unique and aesthetic submerged vegetated landscape, suitable habitat for flora and fauna





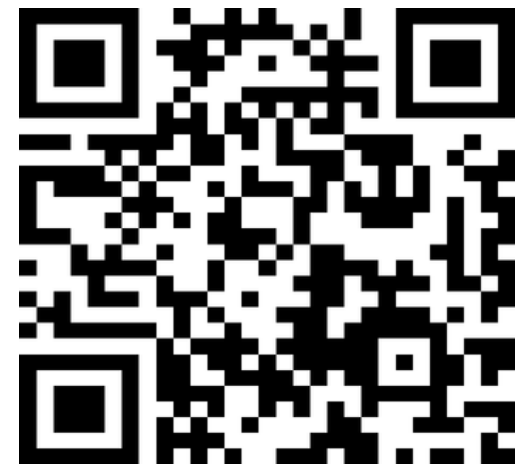
Creating the pathway

- Common data sources and shared platforms
- Create a regulatory market in which people want to invest
- Strong leadership – with shared ownership



WWWT

For wetlands. For life.



Session 1: Source to Sea

Chair - Anne Dacey

Deputy Director, Water Futures
Environment Agency



Ocean
and Coastal
Futures



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From Munros to Modiolus – A Scottish Source to Sea journey

Dr Chris Leakey
Marine Sustainability Manager

July 2025
ReMeMaRe



Different routes into the same issues, opportunities, and challenges...



Embed in policy and practice

- **Data & Evidence**
- **Governance systems**

TENACITY

[te·nac·i·ty] noun

The quality of being persistent and stubborn in the pursuit of a goal.

2023: a three-month internship project

- Exploring S2S approaches that reflect land-sea connectivity
- Examining the policy context and drivers
- Opening dialogue, internally and externally



Solutions

Challenges

Opportunities

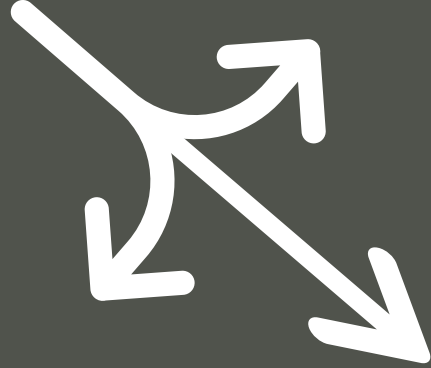
Enablers

Lots of good S2S intent in high-level government strategies...

... but there is much to be done to operationalise S2S thinking in policy & practice



Since 2023



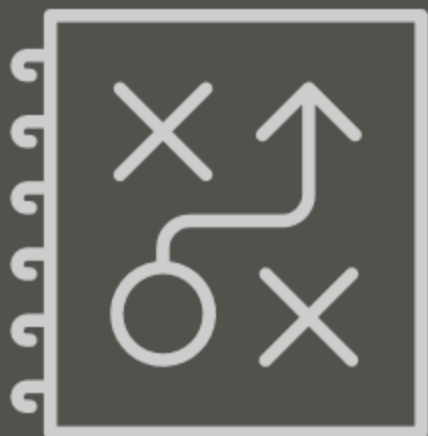
Policies, Plans & Strategies

Internal Collaborations

Finance

Outreach & Engagement

Policies, Plans & Strategies



- **Upcoming revisions to Scotland's...**
 - (a) National Marine Plan
 - (b) Land Use Strategy, and
 - (c) River Basin Management Plan
- **Seeking clarity on responsibilities across jurisdictions**

Internal Collaborations

- **S2S modelling in a landscape natural capital tool (maximising benefits from nature-based solutions)**
- **S2S thinking for privately financed large-scale catchment restoration**



Finance

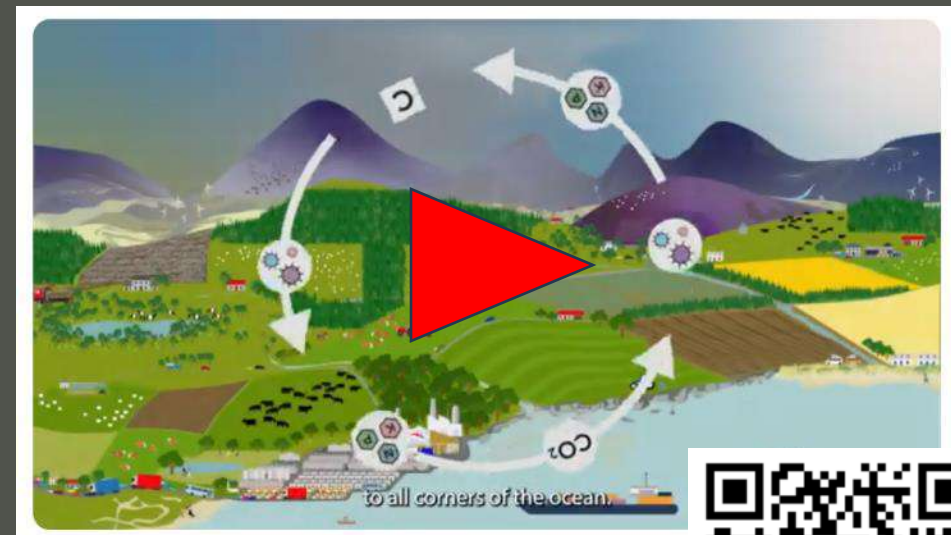
- How do we get nature finance to ‘flow’ in a way that reflects effects & dependencies between land and sea?

**FIRNS - The Facility for Investment
Ready Nature in Scotland**



- Scrutinising Scottish Government's Natural Capital Market Framework for marine (and S2S) applicability

Outreach & Engagement



2025 CIEEM Scotland Conference - Source to Sea: Working Across Landscapes



ENVIRONMENTAL
Standards Scotland
Ìrean Àrainneachdail na h-Alba

'Source-to-sea' approach needed to clean up Scotland's marine litter

Environmental Standards Scotland (ESS) is calling on the Scottish Government to embed a 'source-to-sea' approach into future policy and legislation to tackle the marine litter which is polluting Scotland's beaches and seas.

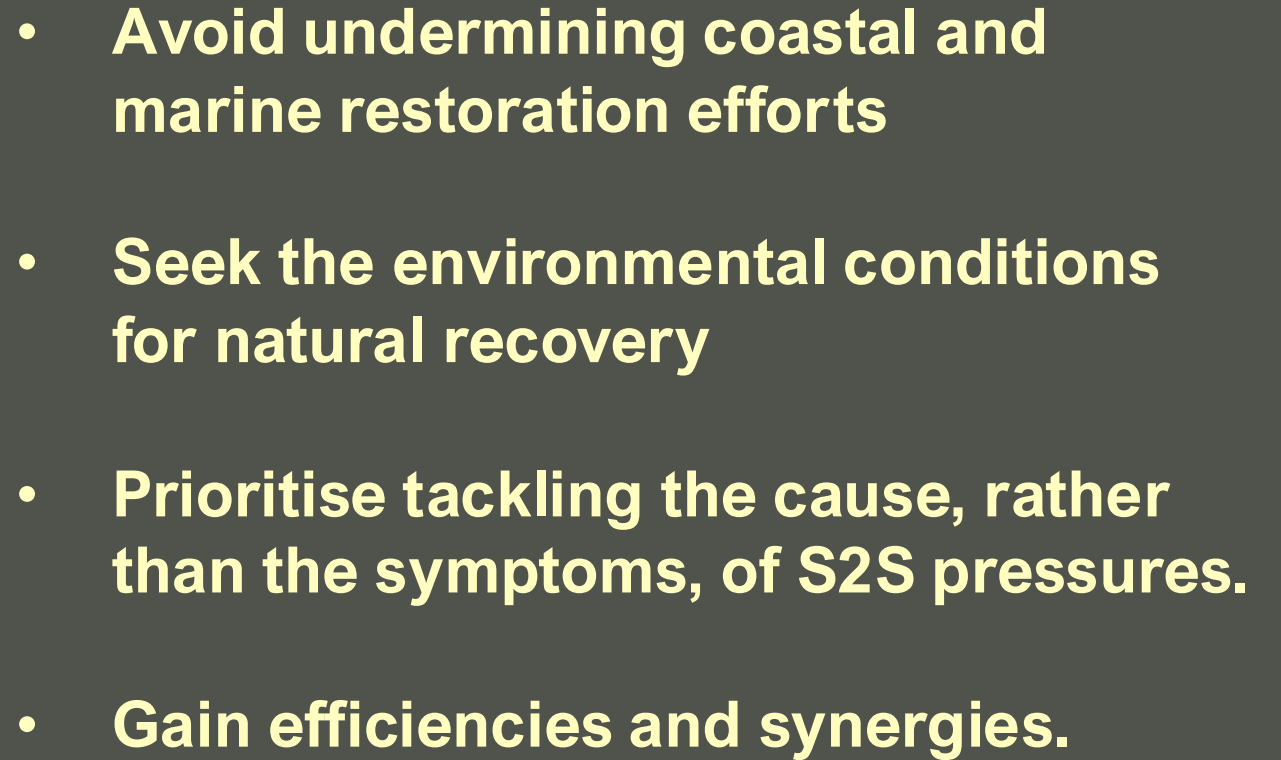
Other work from Scottish organisations
Our collective impact = > Sum of parts



**Keep Scotland
Beautiful**







Applying a Natural Capital Approach from Source to Sea: Blackwater and Colne Case Study



Jo Bayes
Natural Capital Team
Environment Agency



Natural Capital
and Ecosystem
Assessment

Why do we need to take a Natural Capital approach from Source to Sea?



Smashing siloes! New connections and partnership opportunities.



Knowledge sharing.

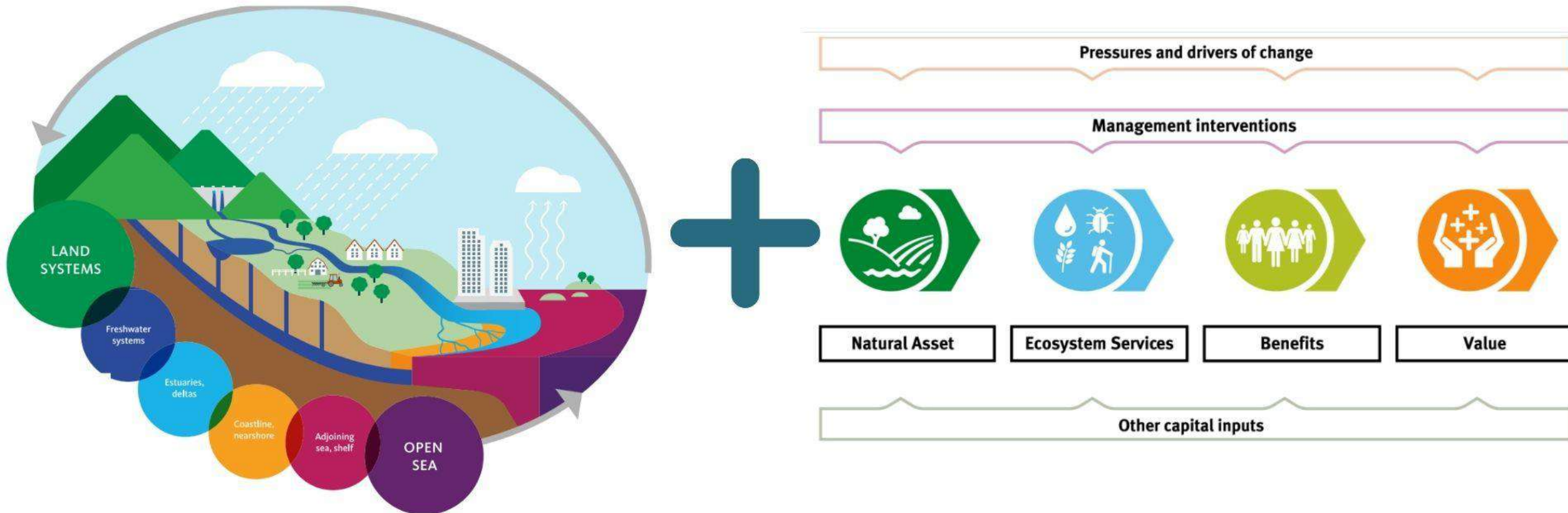


Single system - make the most of interventions.



Making public money go further and collaborative funding.

Why do we need to take a Natural Capital approach from Source to Sea?



A framework that connects the water environment **from source to sea** with other asset attributes, pressures, ecosystem services and the value resulting benefits provide to society.

What we've done, know and learnt...

Natural Capital **Natural Capital Evidence**

Natural Capital
Data discovery tool

Natural Capital
Geospatial evidence

Natural Capital
Register and account tool

Natural Capital
Metrics catalogue

Natural Capital
Water industry

5. Act
Make it happen

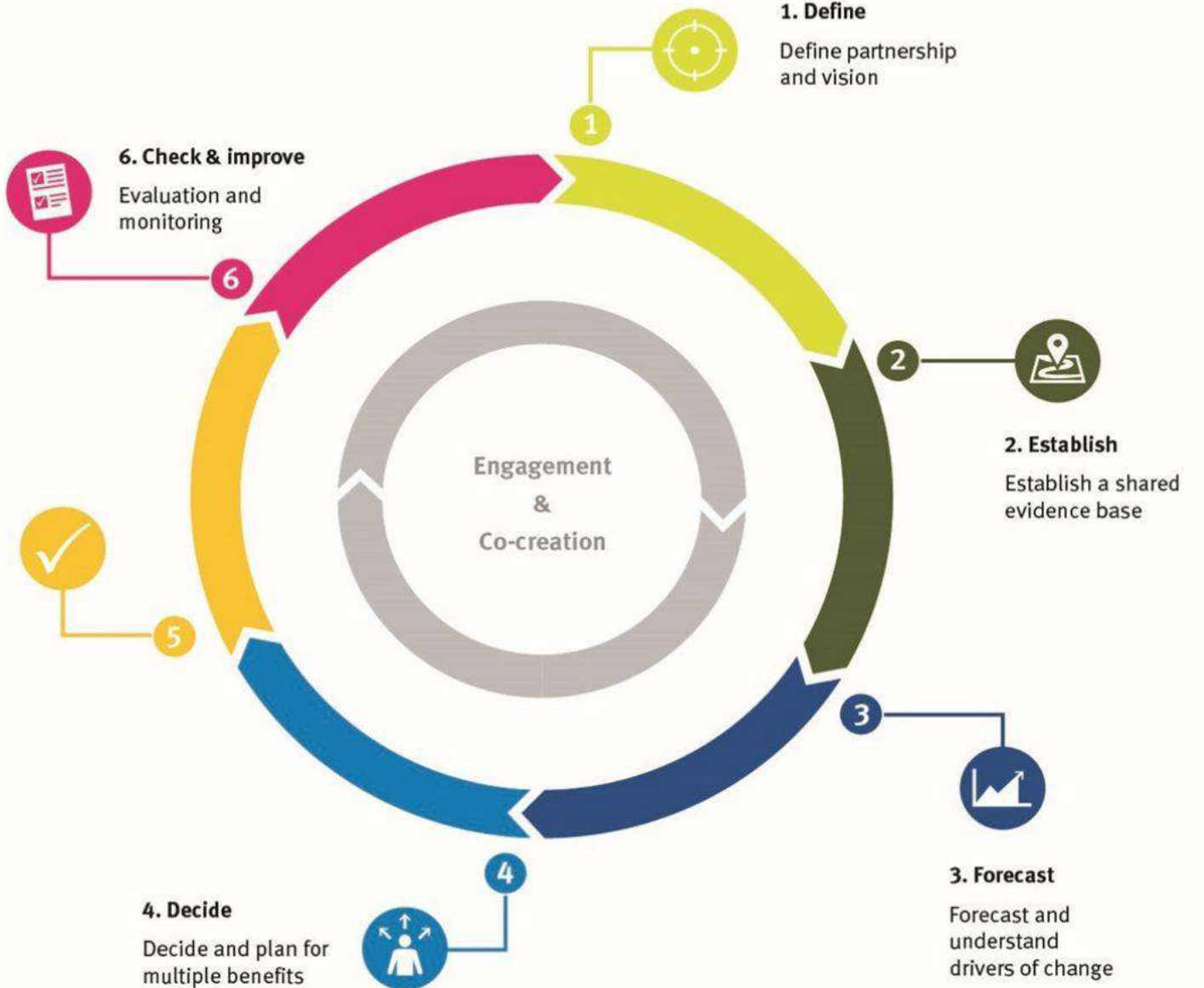
6. Check & improve
Evaluation and monitoring

4. Decide
Decide and plan for multiple benefits

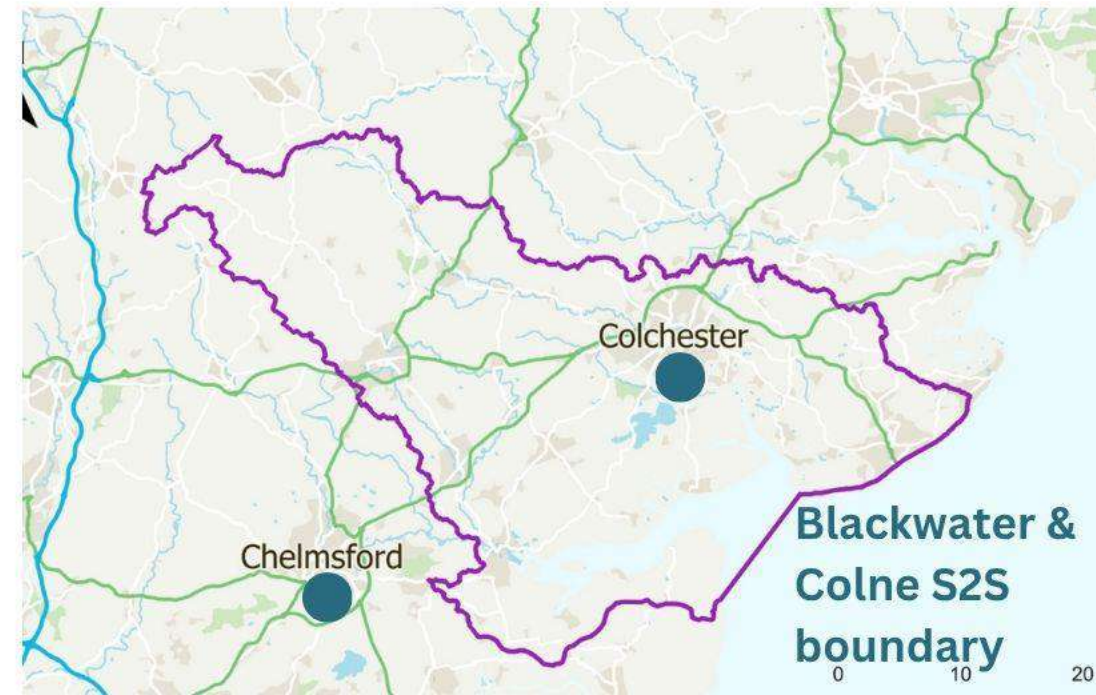
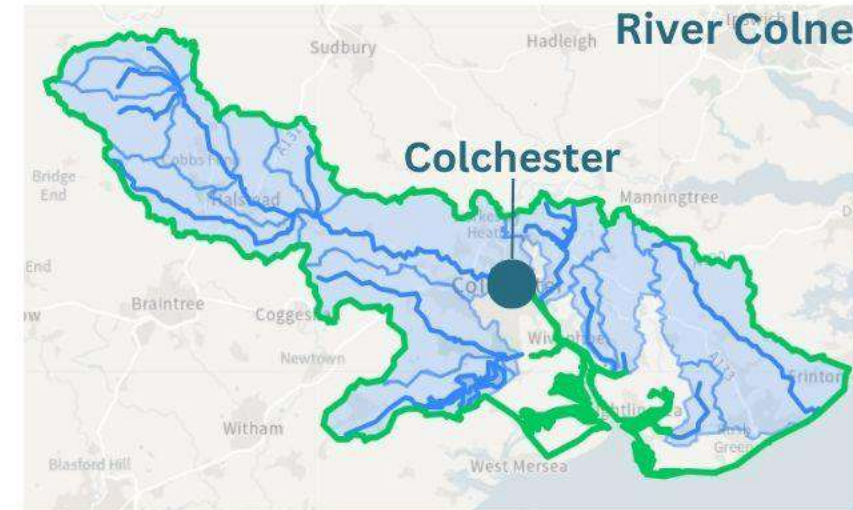
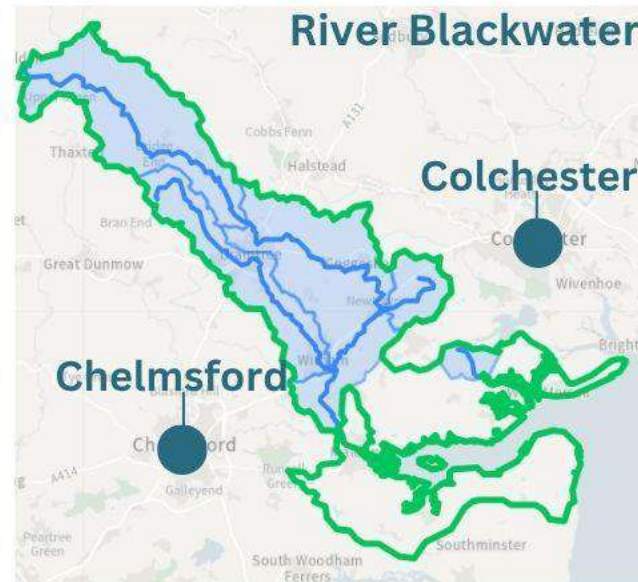
1. Define
Define partnership and vision

2. Establish
Establish a shared evidence base

3. Forecast
Forecast and understand drivers of change



Blackwater & Colne case study



Strong partnership - including The University of Essex, Essex County Council, eNGOs, water companies and farm clusters.



Carbon net zero targets and one of the first Local Nature Recovery Strategies (LNRS)

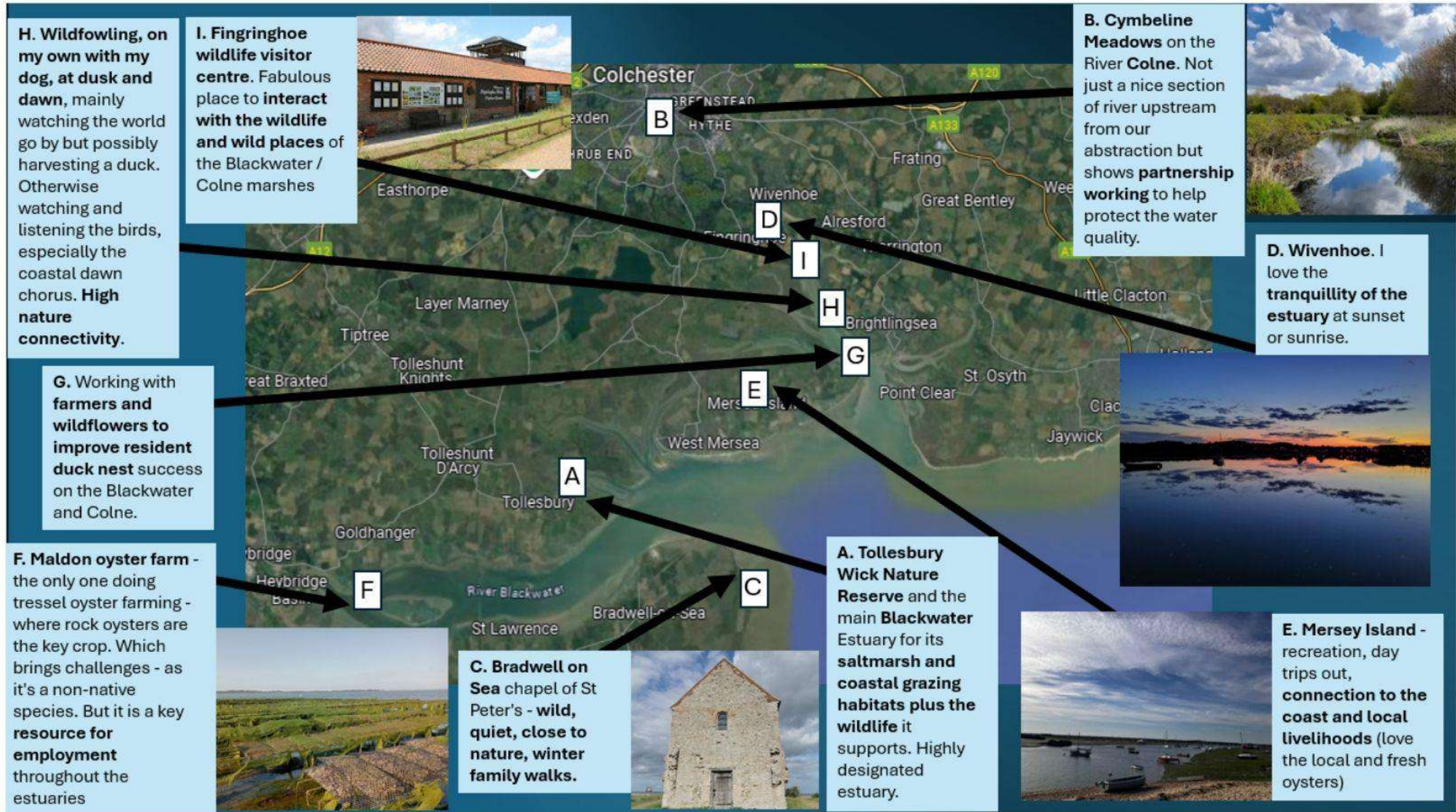


~60% is agricultural land but it is rich in natural assets.



Pressures from a growing urban population and limited water supply.

Blackwater & Colne case study

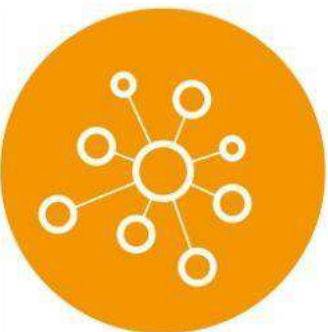


Three key areas of work



Natural Capital baseline of the estuary and coast:

Using a series of maps showing the quantity, quality and connectivity of assets and some of the key ecosystem services they provide will help us understand what we have in the BW&C and what restoration needs to be prioritised.



Source-to-Sea systems understanding:

Involving local partners to develop Participatory Systems Maps aids in engaging key stakeholders and providing them a greater understanding of (hidden) connections and opportunities in their place.



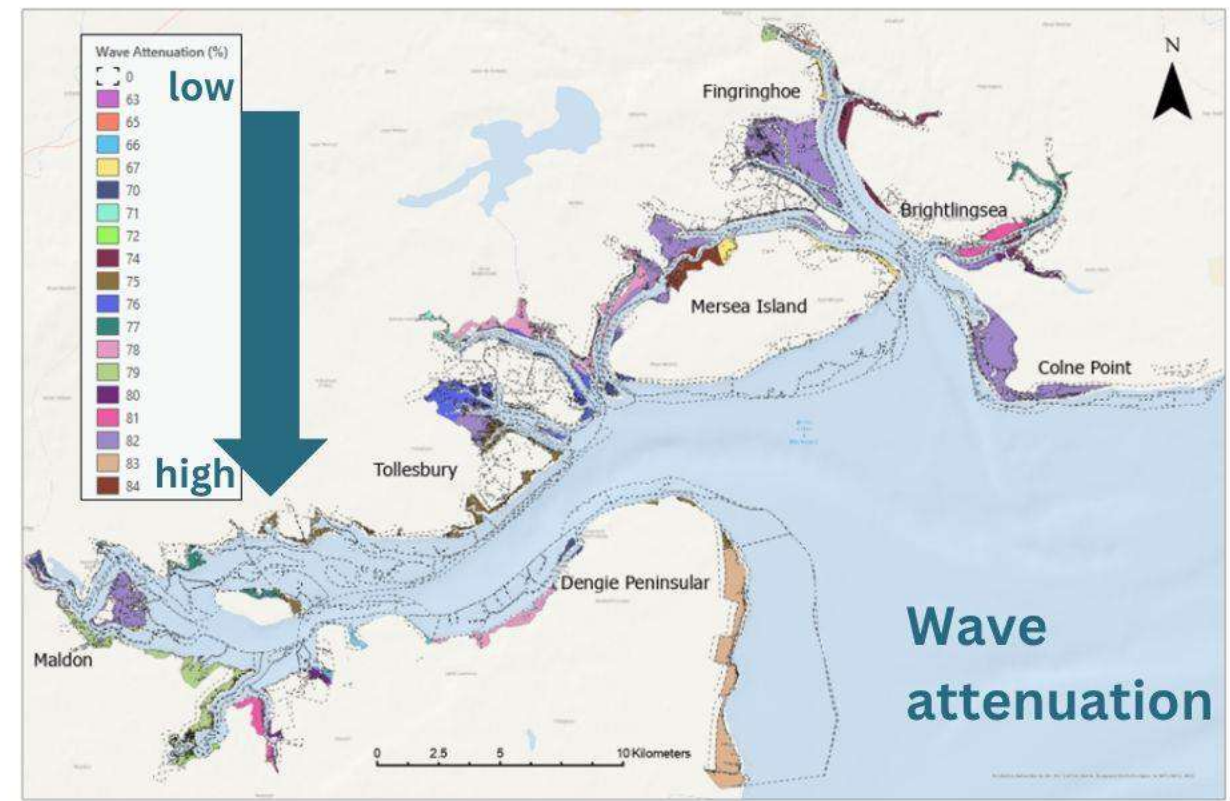
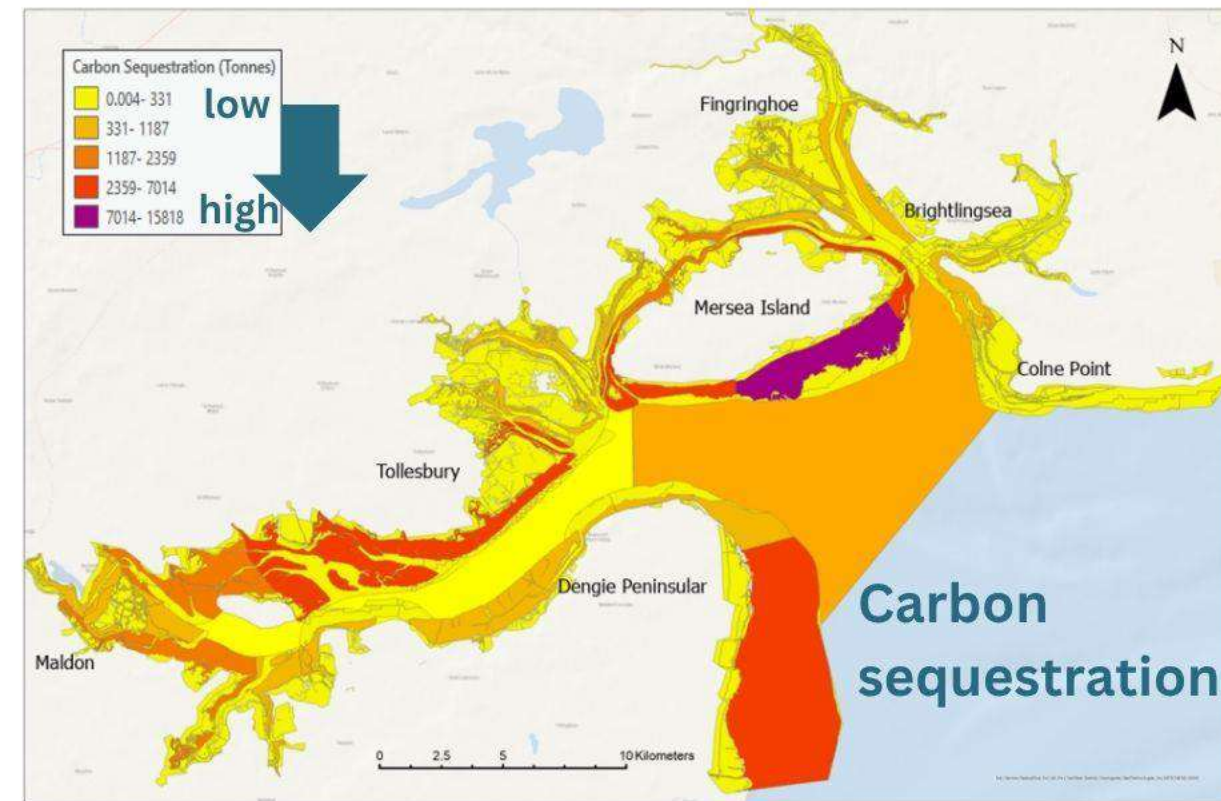
Source-to-Sea Integrated Appraisal:

A NC Integrated Appraisal considers the cost of interventions (NbS) and the value of the resulting multiple benefits to calculate a benefit cost ratio for a series of management options.

Natural Capital baseline of the estuary and coast



Natural Capital and Ecosystem Assessment



The relationship between asset **quantity**, **quality**, **location**, and **connectivity** and the provision of ecosystem services. Potential pressures impacting this area.



Removes ~62,000 tonnes of carbon per year. This has an annual value of ~£1.68 million.



Removes ~723 tonnes of nitrogen per year. The cost to remove this would be ~£213K



Saltmarsh provide an average of 76% reduction in wave height, reducing the potential for coastal flooding.

Participatory Systems Mapping



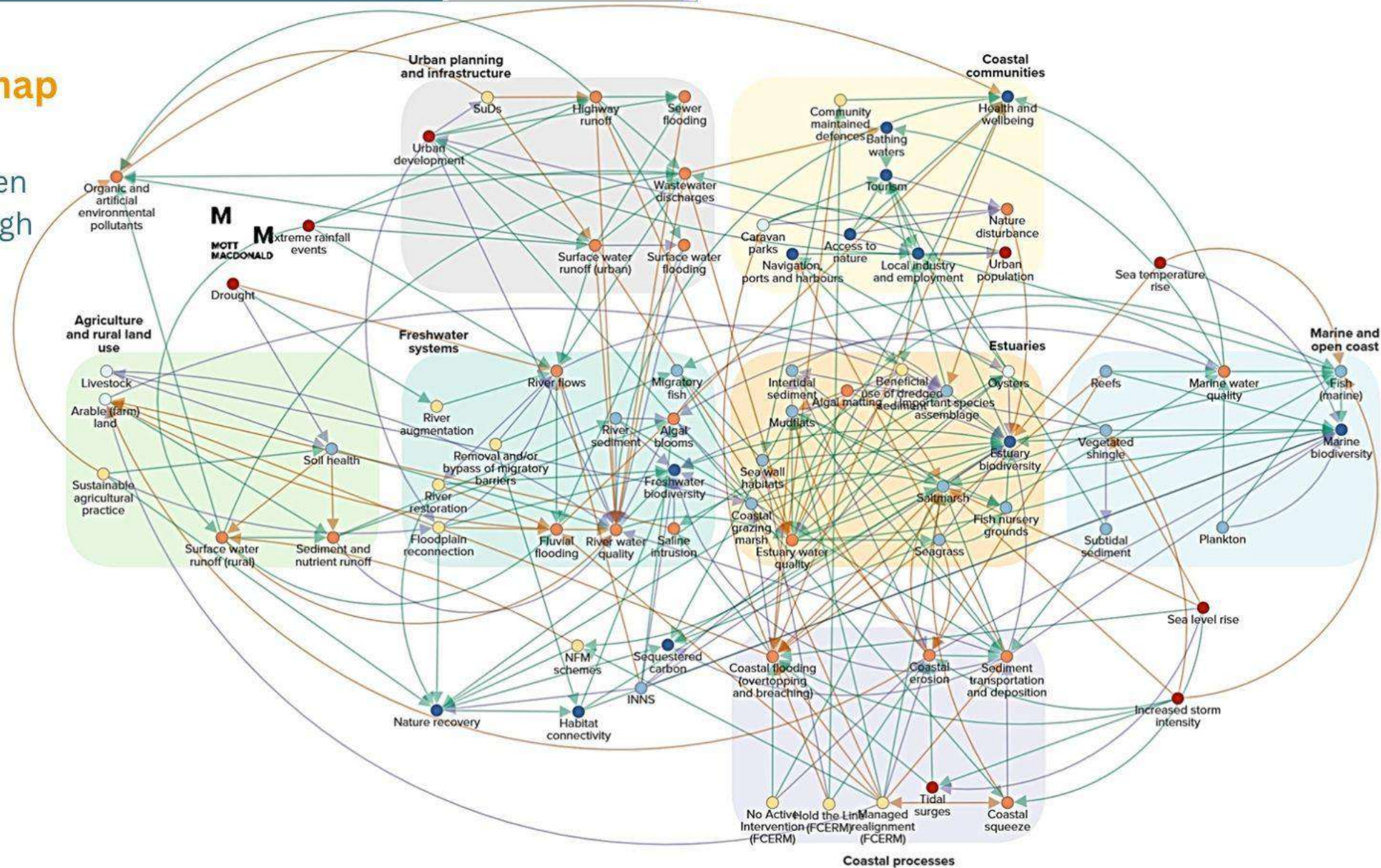
M
MOTT
MACDONALD



Natural Capital and Ecosystem Assessment

Unfiltered complete map

Identify the links between all the factors in each high level area.



Legend

- Drivers
- Pressures
- Responses
- Socioeconomic assets
- Natural assets
- Benefits
- Positive correlation link
- Negative correlation link
- Complex correlation link
- - - Monitoring link
- Indicator

Participatory Systems Mapping



M M
MOTT
MACDONALD



Natural Capital Approach

NCEA

Natural Capital
and Ecosystem
Assessment

Hotspot map: e.g. Coastal realignment

Filter the map to look at the connections between factors of interest.

M M
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Urban planning
and infrastructure

Coastal
communities

Agriculture
and rural land
use

Freshwater
systems

Estuaries

Marine and
open coast

Livestock
Arable (farm)
land

Freshwater
biodiversity
Saline
intrusion

Mudflats
Coastal
grazing
marsh

Important species
assemblage
Estuary
biodiversity
Saltmarsh
Fish nursery
grounds

Coastal flooding
(overtopping
and breaching)

Coastal processes

Managed
realignment
(FCERM)

Tidal
surges

Coastal
squeeze

Sea level rise
Increased storm
intensity

Legend

- Drivers
- Pressures
- Responses
- Socioeconomic assets
- Natural assets
- Benefits
- Positive correlation link
- Negative correlation link
- Complex correlation link
- - - - Monitoring link
- Indicator



Develop Management Scenarios



1: Do nothing - assets
will deteriorate



2: Water quality (FW)

3: Water quality (S-2-S)



4: Hazard regulation (FW)

5: Hazard regulation (S-2-S)



6: Biodiversity (FW)

7: Biodiversity (S-2-S)



8: Combined (FW)

9: Combined (S-2-S)

Determine interventions (NbS)



Using local and national
data and evidence, suites
of interventions using NbS
were developed to target
each of the management
scenarios.

Calculate costs of interventions



The cost of implementing
the interventions were
estimated using the EA's
long term costing tool -
and additional local
evidence.

Calculate value of benefits



The EA's Natural Capital
Register and Account Tool
(NCRAT) was used to
calculate the value of the
benefits for each
management scenario.
This was supplemented
with additional data where
necessary and possible.

BENEFIT: COST RATIO

Maximum benefits for the
best value for money





Qualitative results

Ecosystem Services	1	2	3	4	5	6	7	8	9
Agriculture	↓	↓	↓↓	↓	↓↓	↓	↓↓	↓	↓↓
Fish & shellfish landings	↓↓	○	↑	○	↑	○	↑	↑	↑↑
Climate regulation	↓	○	↑↑	○	↑↑	○	↑↑	↑	↑↑
Hazard regulation	↓	○	↑	↑	↑↑	○	↑	↑	↑↑
Water supply	↓	↓	○	○	○	○	○	○	○
Water quality - rivers	↓	↑	↑↑	○	○	○	○	↑	↑↑
Water quality - coastal waters	↓↓	↓↓	↑	○	○	○	○	↑	↑↑
Recreation	↓	↑	↑	↑	↑	↑	↑	↑	↑↑

Quantitative results

9: Combined (S-2-S)

2: Water quality (FW)

3: Water quality (S-2-S)

8: Combined (FW)

4: Hazard regulation (FW)

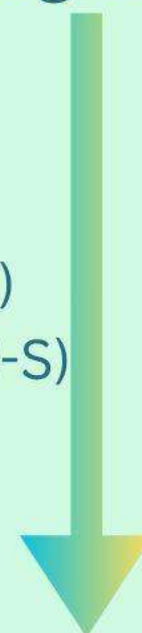
5: Hazard regulation (S-2-S)

7: Biodiversity (S-2-S)

6: Biodiversity (FW)

1: Do nothing - assets
will deteriorate

Highest



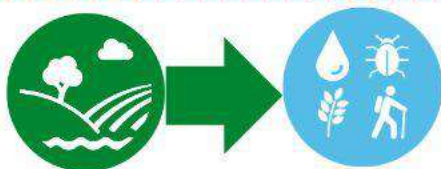
Lowest



INCA - Integrated Natural Capital Appraisal: Natural capital evidence to improve water management from source-to-sea



- INCA will develop a series of evidence tools- including a NC Metrics Catalogue and a NbS Impact Matrix.
- These will link with other NC tools and evidence to produce the INCA tool.
- The INCA tool will enable non-experts to complete Integrated Appraisals for their place or project. This means that environmental, social and economic benefits will be included, resulting in supporting more holistic decision making.



Asset-service matrix (ASM):

- An ASM is a framework that catalogues relationships between assets and the ecosystem services they support.
- The freshwater ASM identifies which assets contribute to ecosystem services, enabling users to understand how changes in asset condition impact ecosystem service potential.
- In 2025/26 we aim to expand the current **Freshwater ASM** to include key coastal and estuarine assets enabling it to be used across the whole water system from source-to-sea.



Ecosystem Service Map Explorer (ESME)

- ESME is a tool that enables users to explore (currently) three different catchments to identify the potential ecosystem services being delivered.
- In 2025/26 we aim to add saltmarsh and seagrass to the current version of ESME and explore any correlations between river condition and coastal and estuarine condition in the BW&C S-2-S area.

Big thank you to....



Laura Hayton



Chris Graham



Mike Nelson



Ruth Jones



Roger Proudfoot



Graham Underwood
Stephen Watson
(PML)
Shereece Kesner
Nikki Slee



Brendan Bromwich
Justin Brassett
Kate Rice
Xanthe Polaine



Jenny Broomby
Lydia Burgess-
Gamble
Steph Horner
Angus Pettit



The Blackwater Partnership, including:
Anglian Water, Environment Agency, Essex Wildlife Trust, Essex Rivers Trust, Essex County Council, National Trust, Natural England, North Essex Farm Cluster, Northumbrian Water, RSPB, University of Essex - **plus** Defra, Cefas, JNCC, ZSL

Connecting Source to Sea: The North Devon UNESCO Biosphere's System-Based Approach to Ecosystem Restoration

Hannah Nash – Marine Project Coordinator





unesco



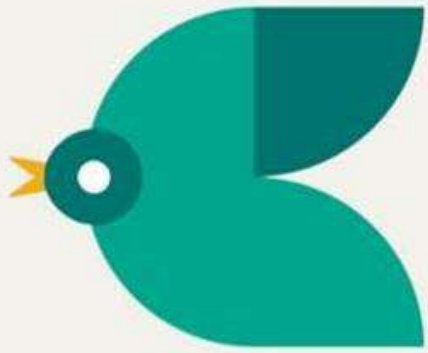
“In nature, nothing exists alone.”

- Rachel Carson, *Silent Spring*, 1962



NatureScot
NàdarAlba

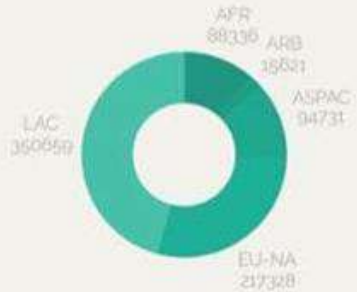
Scotland's Nature Agency
Buidheann Nàdair na h-Alba



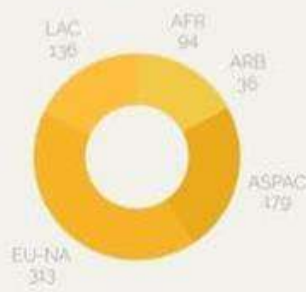
759
biosphere reserves
including **25 transboundary**
biosphere reserves

136
countries
Covering a total of
7,667,281 km²

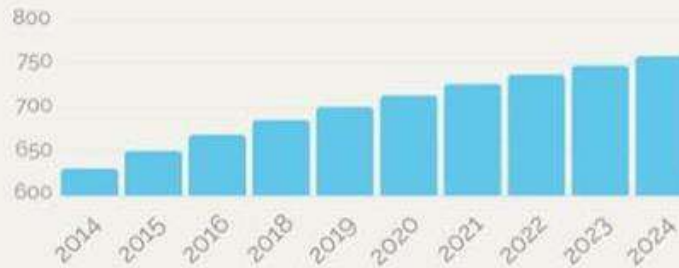
Regional distribution
(by 1000 km²)



Regional distribution
(by number of sites)



Increase in number of sites
(2014-2024)



CONSERVE

biological & cultural diversity

DEVELOP

healthy & sustainable livelihoods

LEARN & INSPIRE

research, education, monitoring and
awareness-raising efforts



Home to more than
300 million people

7

**Biosphere
Reserves**

5 Islands



22 million
visitors per year



300+ Sites of Special
Scientific Interest

20 Marine Conservation
Zones

16 Rivers

50 Designated Wild
Lands Areas (Scotland)

**850,000 people
in the UK call**

Biosphere Reserves their home



10%
of the UK's land surface
or 25,000km² are
covered













Who are the UNESCO Biosphere Reserve?

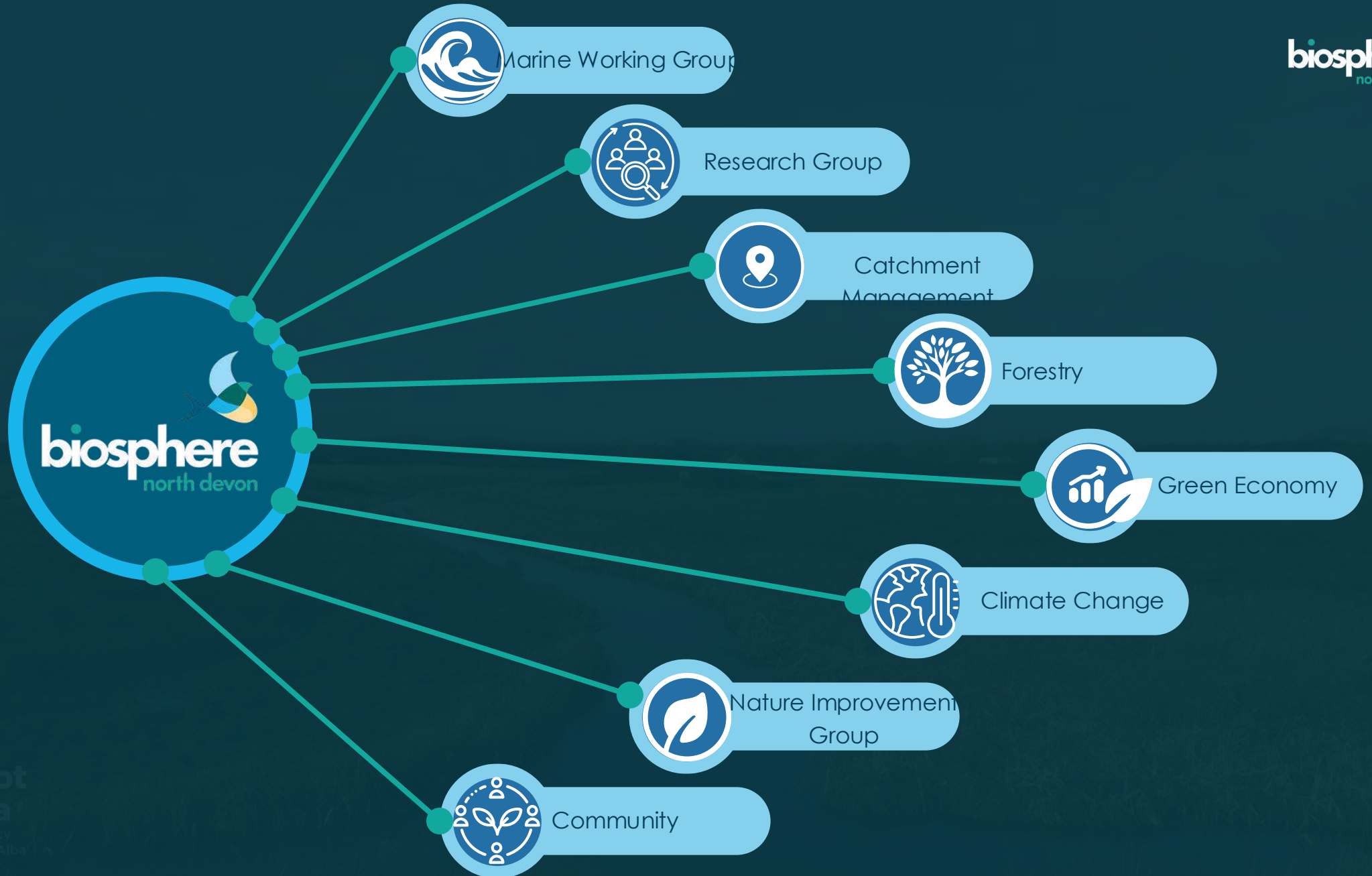


WAVES FOR ALL FOREVER™



Marine
Management
Organisation





What is Source to Sea thinking?



Integrated
Management



Aligns with natural
systems and
ecological connectivity



Builds long-term
resilience and
supports recovery

Peatland
Restoration

Devon Woods

Natural Solutions /
DRIP

Biosphere Community
Projects

CRITTER

SMART Biosphere

Marine
Management

The SMART Biosphere

NEAR REAL-TIME FEED
FROM BIOSPHERE
SENSORS

INTEGRATED DATA FROM
EA, MET OFFICE & OTHER
PARTNERS

SUPPLEMENTED DATA
FROM AD-HOC CITIZEN
SCIENCE TESTING

Choose a basemap

Mapnik

Site Type Filter

- ☒ Water Level
- ☐ Trend
- ☒ Water Quality
- ☒ Soil Moisture
- ☒ Rain
- ☒ Storm Overflow [Off|On]

Time Filter

- ☐ Last 6 Hours
- ☐ Last 24 Hours
- ☒ Last 7 days
- ☐ Last 30 days
- ☐ Custom

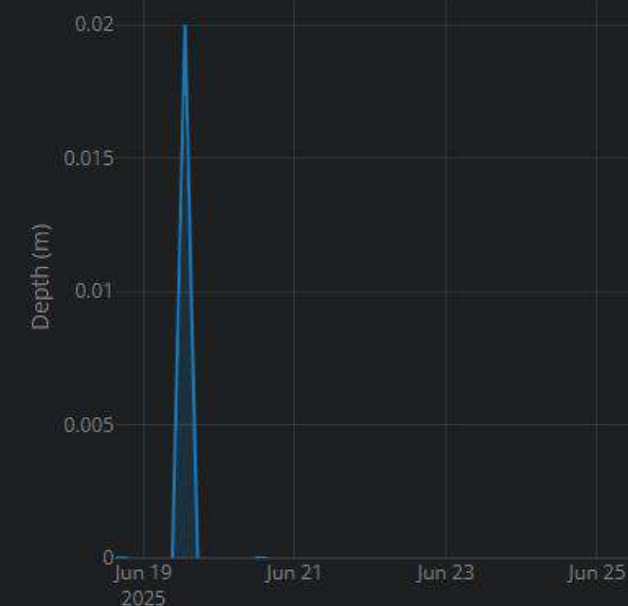
Thumbnail plots

- ☐ Show Hydrographs
- ☐ Show Soil Moisture

Interactive Map



Sensor Data



Site Details

ID	Name	Type
466	DEP050 caged.theory.darts (GSM)	water level

Download

Next Steps: Croyde Marine Buoy

COLLABORATION

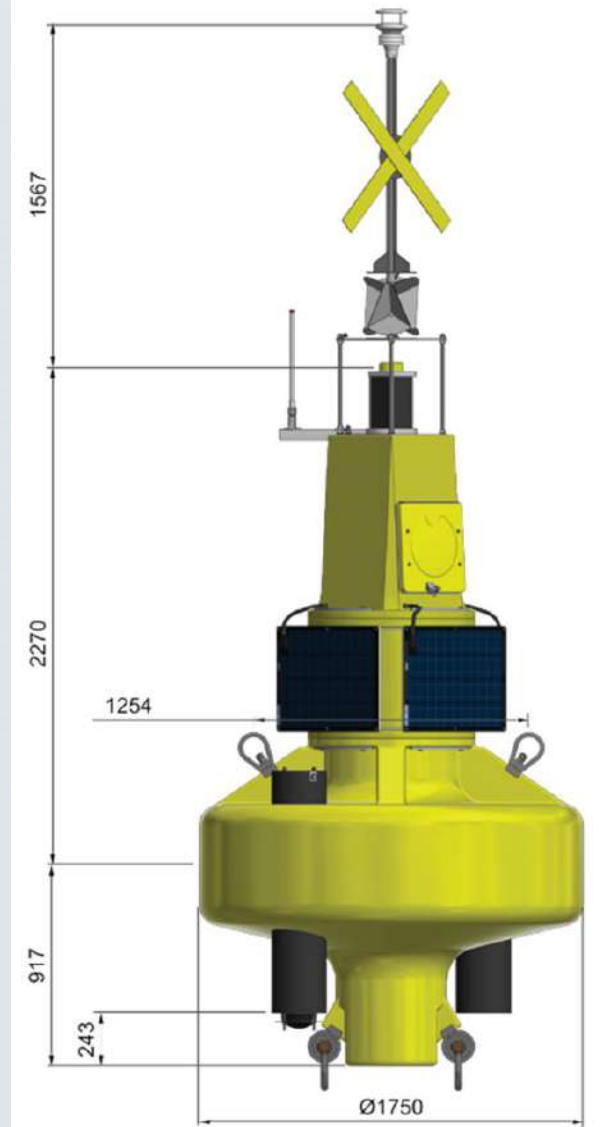
Data transparency empowers action

SCALABLE MODEL

Across other Biospheres and catchments

COSTS

Sensors and maintenance



Key Points

- Healthy seas start upstream
- Support collaborative tools
- Collaborative, systems-based approach is key to marine restoration

Contact details:

hannah.nash@devon.gov.uk

www.northdevonbiosphere.org.uk



The Tees Rivers Trust



www.teesriverstrust.org

















MAKING CONNECTIONS

When this....



Ends up here....

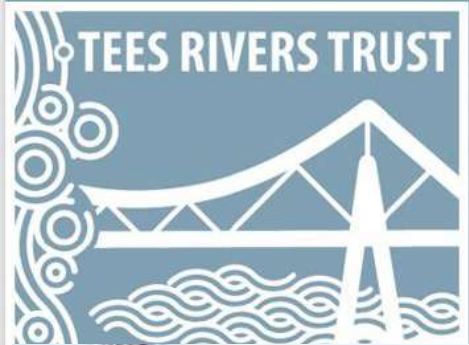


This tends to happen...



Instead of this...





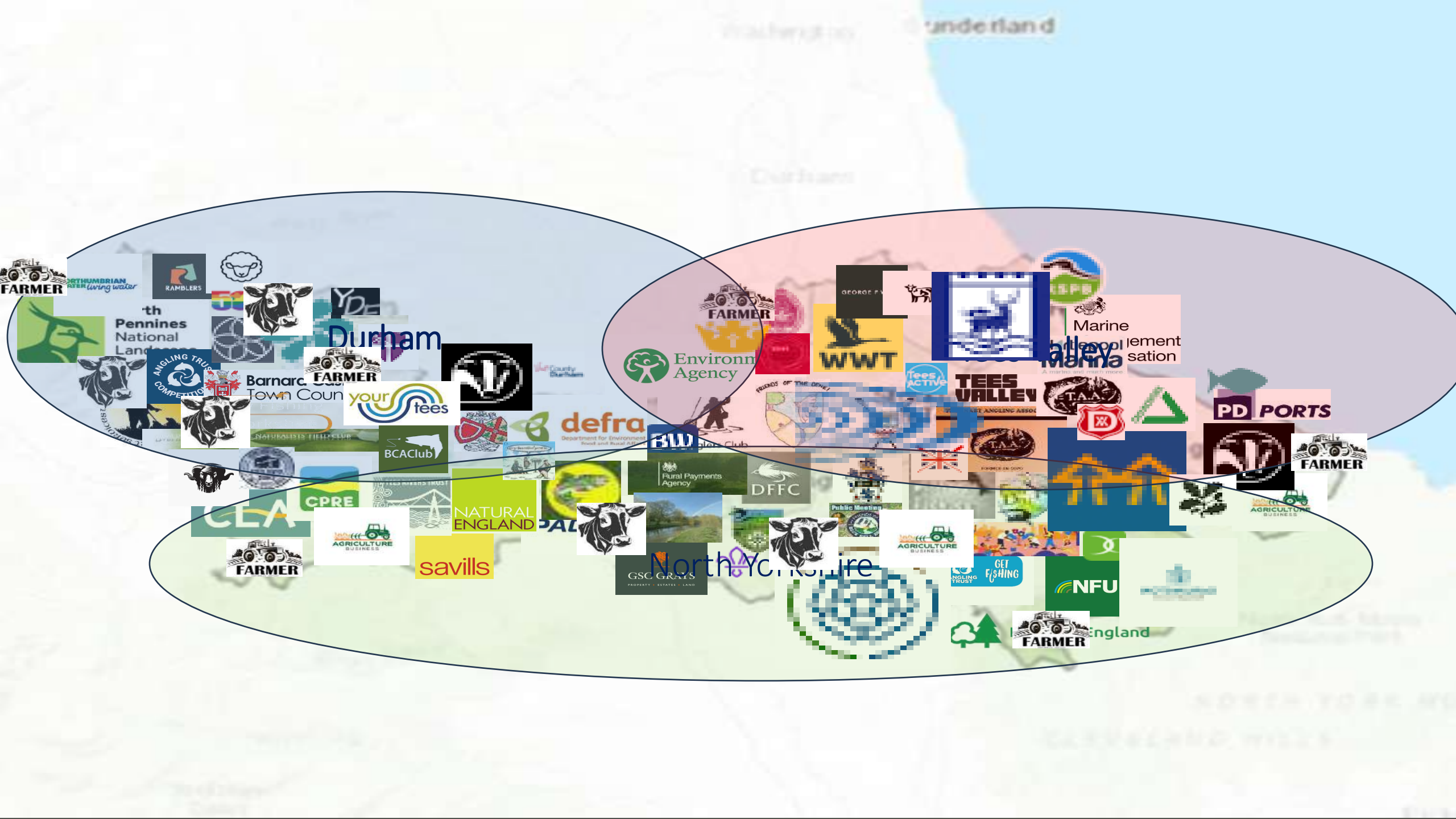








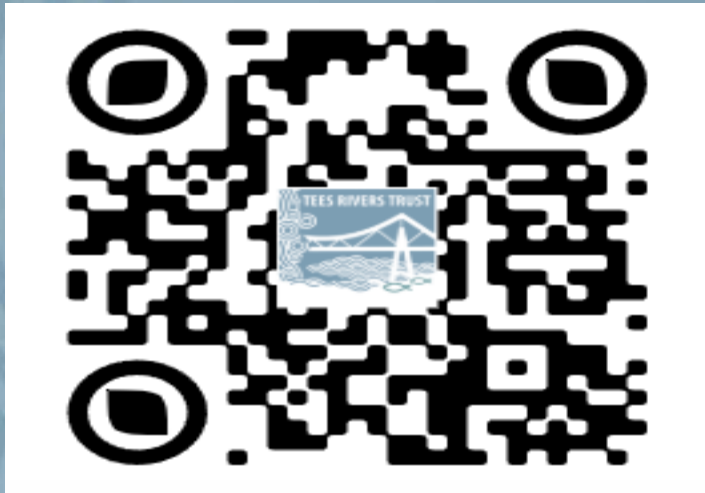








Thanks!



www.teesriverstrust.org



AARHUS UNIVERSITET



COWI



GEUS



KØBENHAVNS
UNIVERSITET

From Source to Sea: The implementation of the EU River Basin Management Plans through modelling

Trine Cecilie Larsen, Head of projects, Environmental Solutions, DHI DK
trcl@dhigroup.com

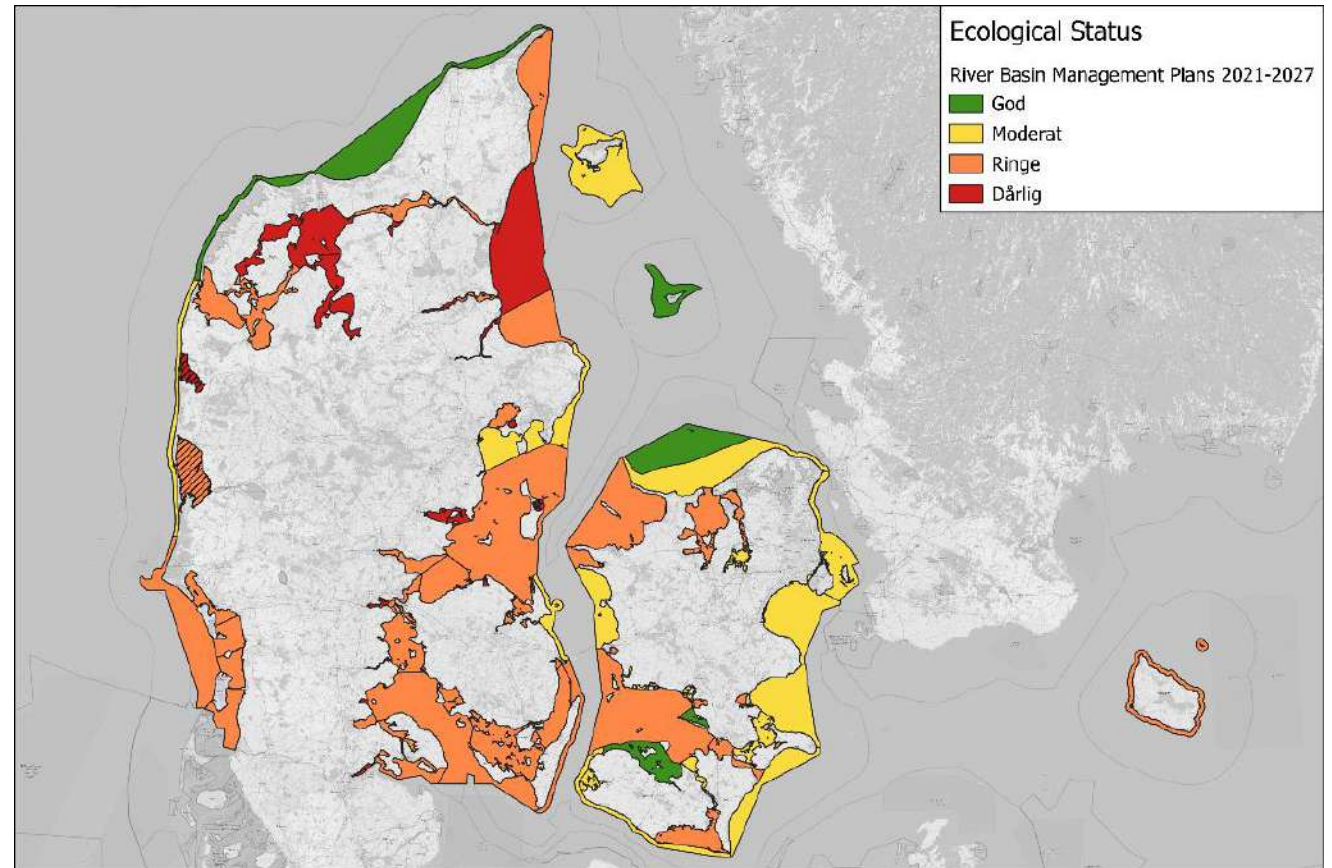
© DHI



Photo: Peter Bondo Christensen

The EU Water Framework Directive

The aim:
Achieve minimum Good
Ecological Status in all marine
water bodies by 2027



Ecology – what actually is Ecological Status?

And what are the indicators?

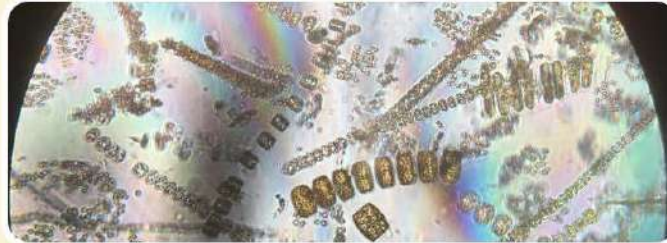
How are they impacted?

How can they be managed?

What do they indicate?



Angiosperm and macroalgae
(seaweed – for the non-biologists)



Chlorophyll-a
(it's the green stuff in plankton)



Benthic fauna
(cribly-crawllys at the seabed)

ECO Lab template

Biogeochemical Model (Inner Danish waters)

Pelagic phase:

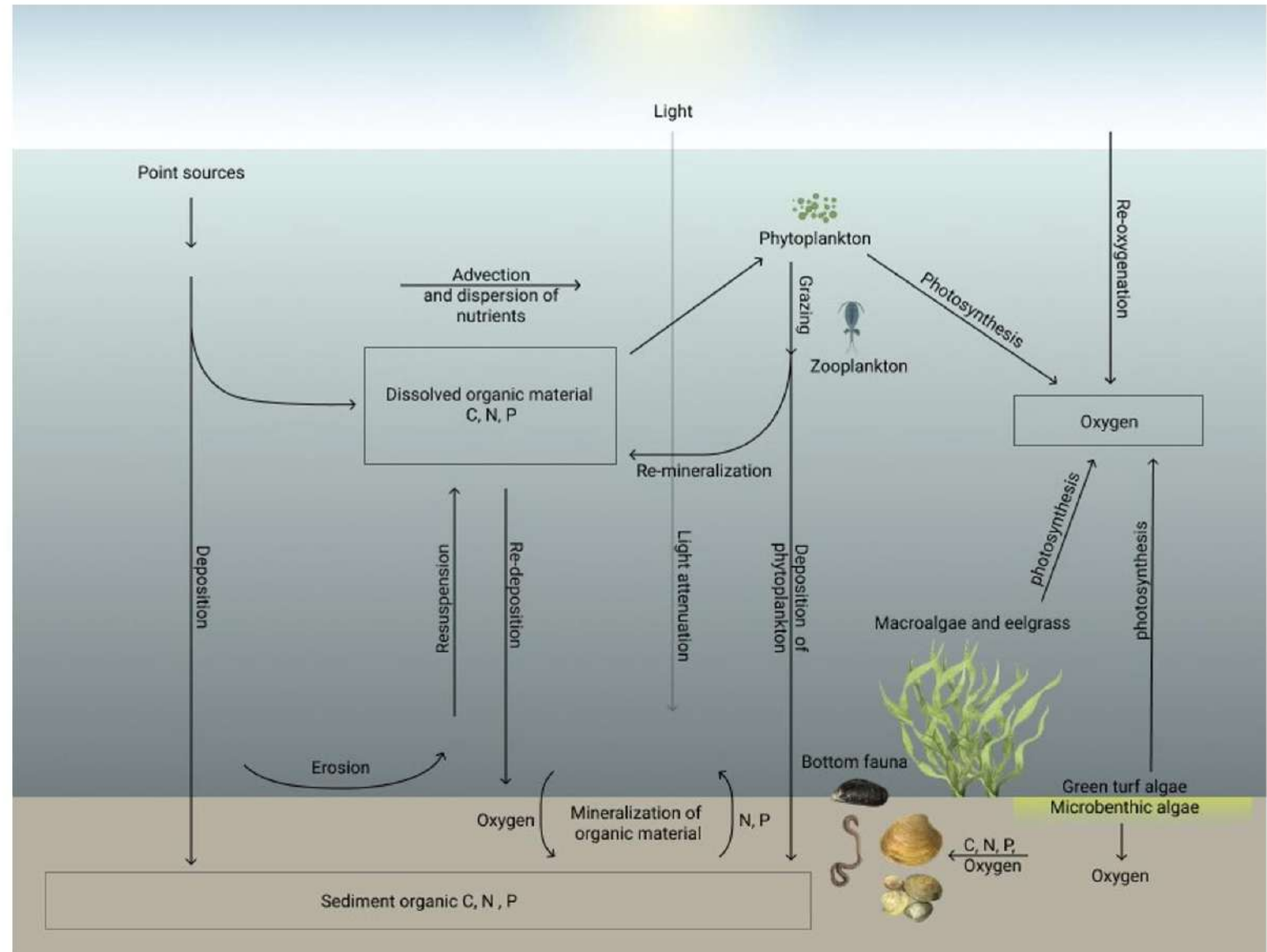
- Phytoplankton (C, N, P) – 3 groups
- Chlorophyll-a
- Zooplankton (C) – groups of micro & meso
- Detritus (C, N, P) - POM
- Ammonia (NH₄)
- Nitrate and Nitrite (NO_x)
- Inorganic P (PO₄)
- Dissolved Oxygen
- DOM (C, N, P) – refractory and labile

Sediment phase:

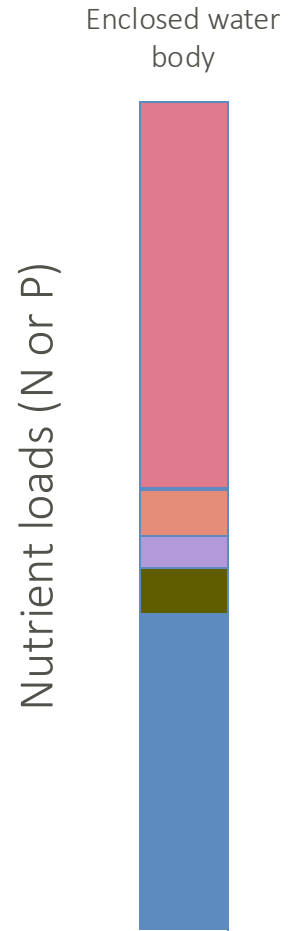
- Sediment organic material (C, N, P)
- Sediment inorganic nutrients (NH₄, NO_x, PO₄)
- Iron bound P
- Reduced substance
- Sediment inorganic material

Benthic vegetation:

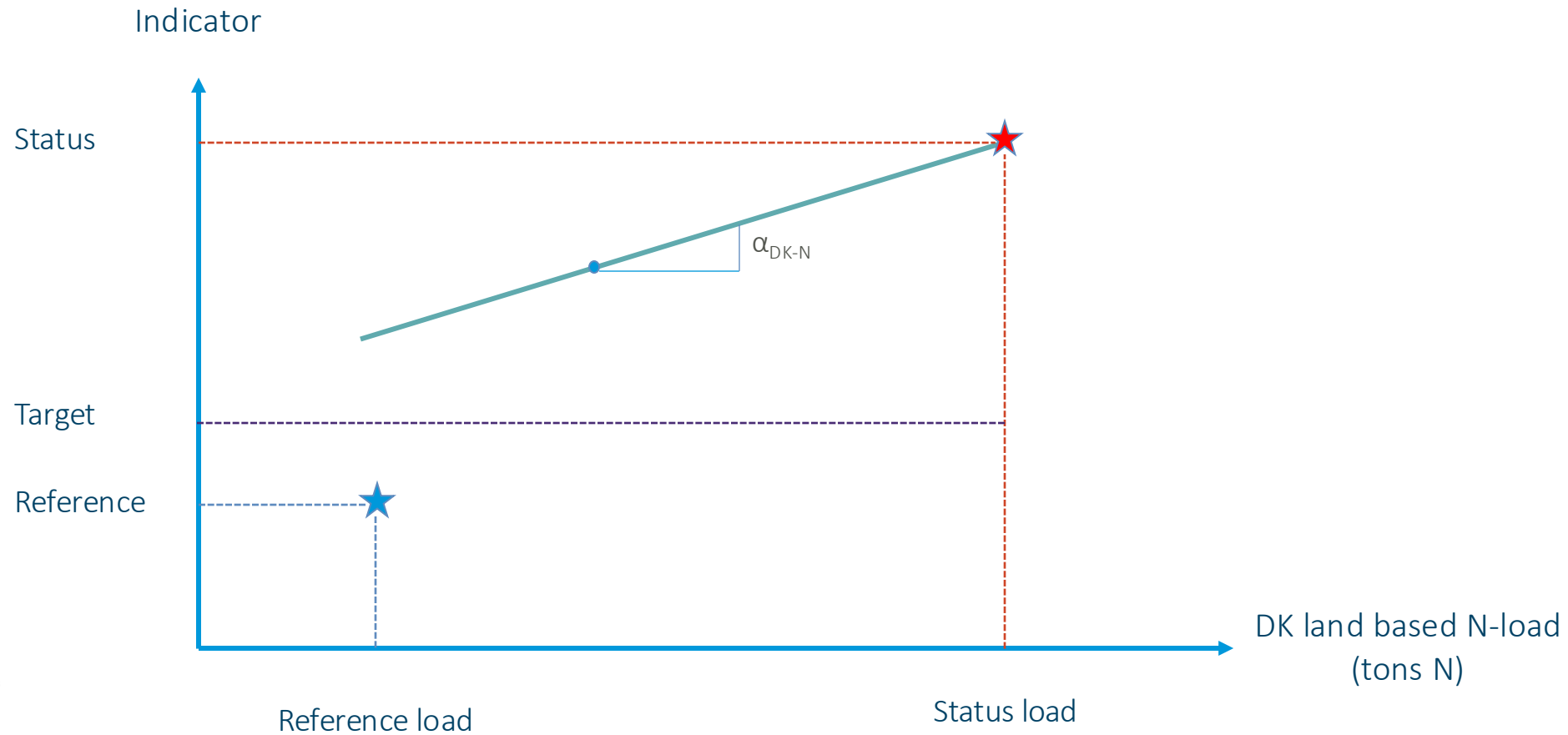
- Macro algae
- Sea grass
- Micro benthic algae



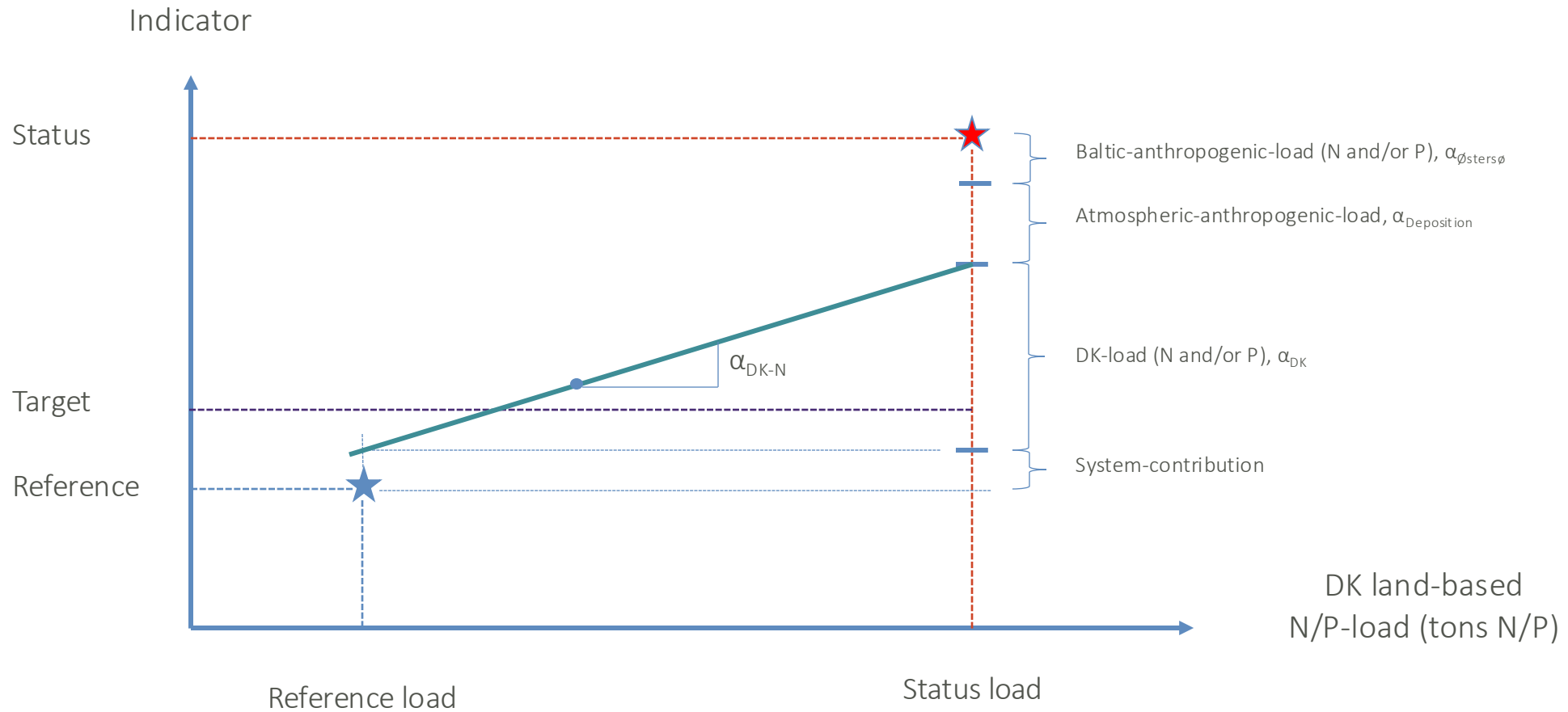
Status Nutrient Loads (any individual water body)



Dose-response (DK-N)



System contribution



System contributions – lag time

