

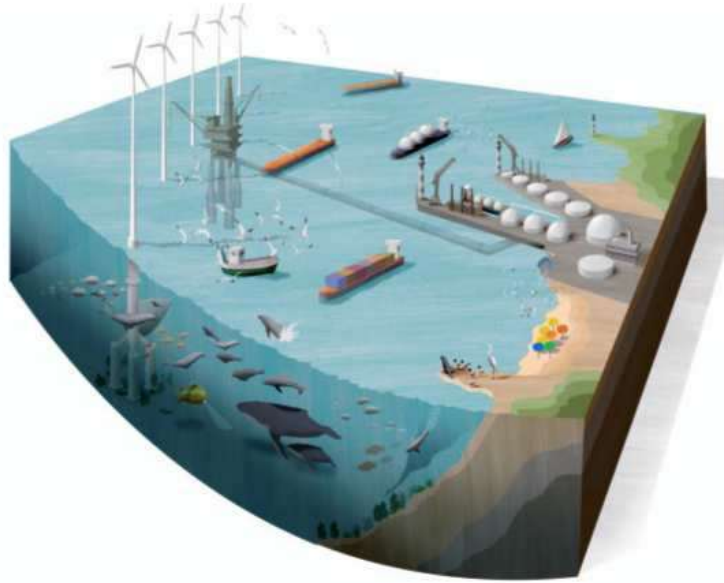
# The Humber Estuary - environmental management in the context of local, regional, national, European, international and global developments (management in an age of uncertainty!)

Professor Mike Elliott

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& International Estuarine & Coastal Specialists Ltd.



## Challenges for science & management:



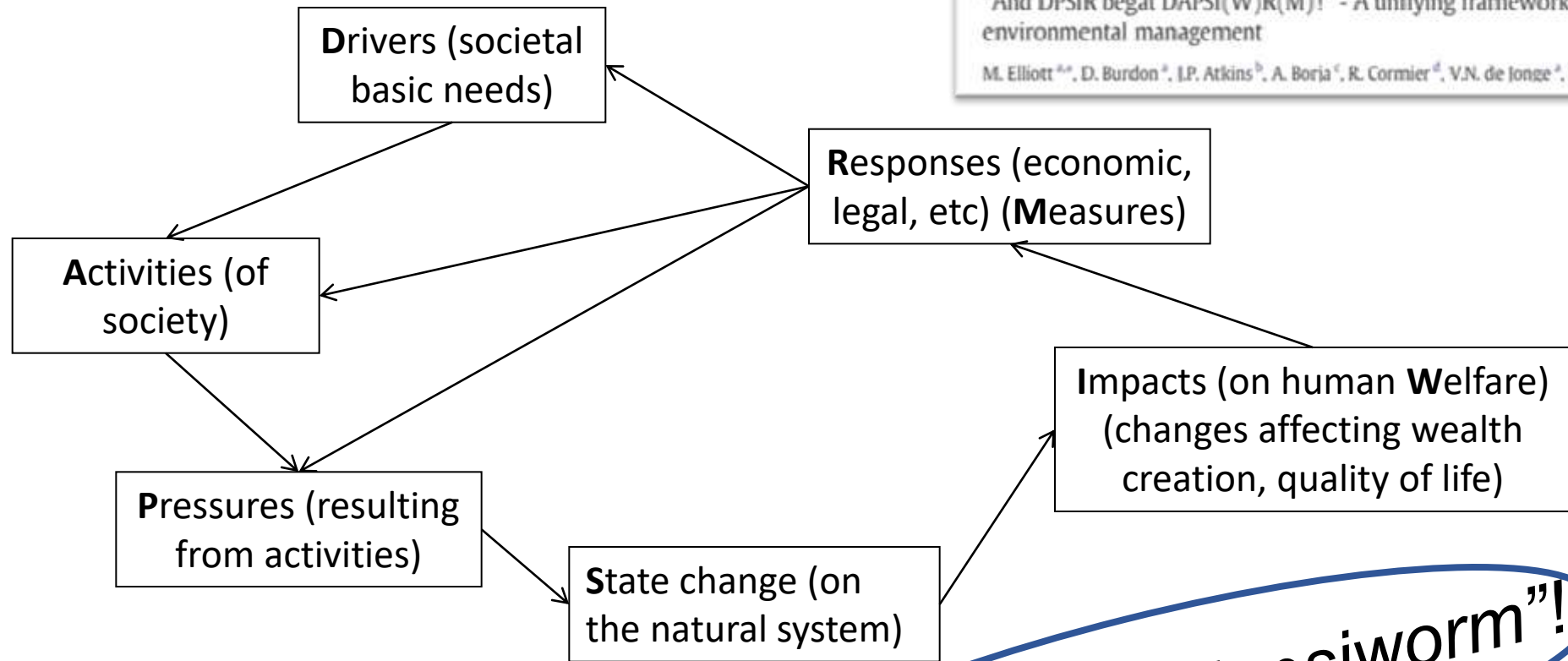
There is only one big idea in marine and estuarine management: *how to maintain and protect ecological structure and functioning while at the same time allowing the system to produce ecosystem services from which we derive societal benefits.*

- Recovery/coping with historical legacy
- Endangered coastal and marine ecosystem functions
- Legal & administrative framework
- Economic prosperity and delivery of societal goods & benefits
- Coping with climate change & moving baselines

*In other words:*

*“to look after the natural stuff and deliver the human stuff”*

# Underpinning framework Sub-system (DAPSI(W)R(M))



(for each EnMP cf. Ex)

Pronounced "dapsiworm"!



# The 10-tenets for societal marine management responses:

**To be successful, management measures or responses to changes resulting from human activities should be:**

- Ecologically sustainable
- Technologically feasible
- Economically viable
- Socially desirable/tolerable
- Legally permissible
- Administratively achievable
- Politically expedient
- Ethically defensible (morally correct)
- Culturally inclusive
- Effectively communicable

(cf. PESTLE)



Marine Pollution Bulletin 62 (2011) 651–655

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**Marine Pollution Bulletin**

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ELSEVIER

Editorial

Marine science and management means tackling exogenic unmanaged pressures and endogenic managed pressures – A numbered guide

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ELSEVIER

Editorial

The *10-tenets* for integrated, successful and sustainable marine management

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ENVIRONMENTAL SCIENCE & POLICY 51 (2015) 181–191

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

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

ELSEVIER

**The 10-tenets of adaptive management and sustainability: An holistic framework for understanding and managing the socio-ecological system**

Steve Barnard\*, Michael Elliott

CrossMark

## **Marine and Estuarine Management and Governance Sub-system** *(who, how)*

**incorporating internationally recognised policies, politics, legislation and administration** by horizontal and vertical integration of the management organogram to accomplish the vision of The Ecosystem Approach.

- ecologically sustainable development
- inter-generational equity
- the precautionary principle
- conservation of biological diversity and ecological integrity
- ecological valuation
- economic valuation of environmental factors
- the 'damager debt' / 'polluter pays' principle
- waste minimisation, and
- public participation - the role of individuals and ethics.

## Examples of Priorities for the Humber:

**Exogenic unmanaged pressures**  
*(where the consequences are managed in the management area but the causes require global action)*

Alien species  
Sea level rise  
Increased temperature  
Increased storminess  
Flooding and erosion  
Changes to catchment run-off  
Repercussions of NAO  
Agricultural runoff in catchment  
Saline ingressions

**Endogenic managed pressures**  
*(where the causes and consequences are managed within the management area)*

New infrastructure  
Energy generation  
Petrochemical industries  
Dredging and navigation  
Wetland loss and gain  
Urban discharges  
Mine-water discharges  
Subsidence  
Historical pollution residues

Hard engineering sea defences

Land claim

New industries – alternative energy, employment

Light & noise pollution

Conventional power generation

Older features petrochemical plant

Migratory fish passage area

Old & dilapidated sea defences

Ecology – bird feeding area

Flood protection by beach

Recreation – cultural services

Hydrographic mixing area (fronts)

Nutrient cycling & sequestration

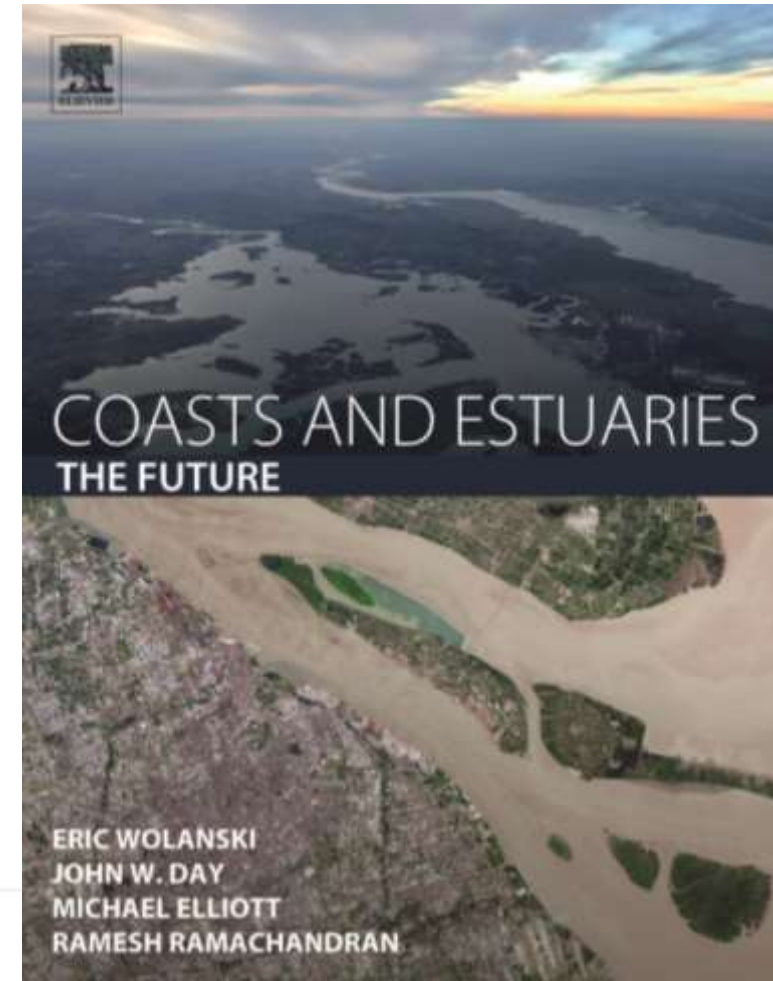
Resident fish and shellfish feeding & refugia areas

# Urbanisation and Industrialisation of Estuaries and Coastal Seas



# The 'Triple Whammy' – Future threats for estuaries and coasts worldwide

- Increased industrialisation and urbanisation
- Increased use of physical (space, energy, water, etc.) and biological (fish, shellfish) resources
- Decreased resistance and resilience to climate change (temperature, acidification, storminess, species distribution changes, alien species, etc)



## Chapter 1

### A Synthesis: What Is the Future for Coasts, Estuaries, Deltas and Other Transitional Habitats in 2050 and Beyond?

Michael Elliott<sup>1</sup>, John W. Day<sup>2</sup>, Ramesh Ramachandran<sup>1</sup>, Eric Wolanski<sup>3</sup>

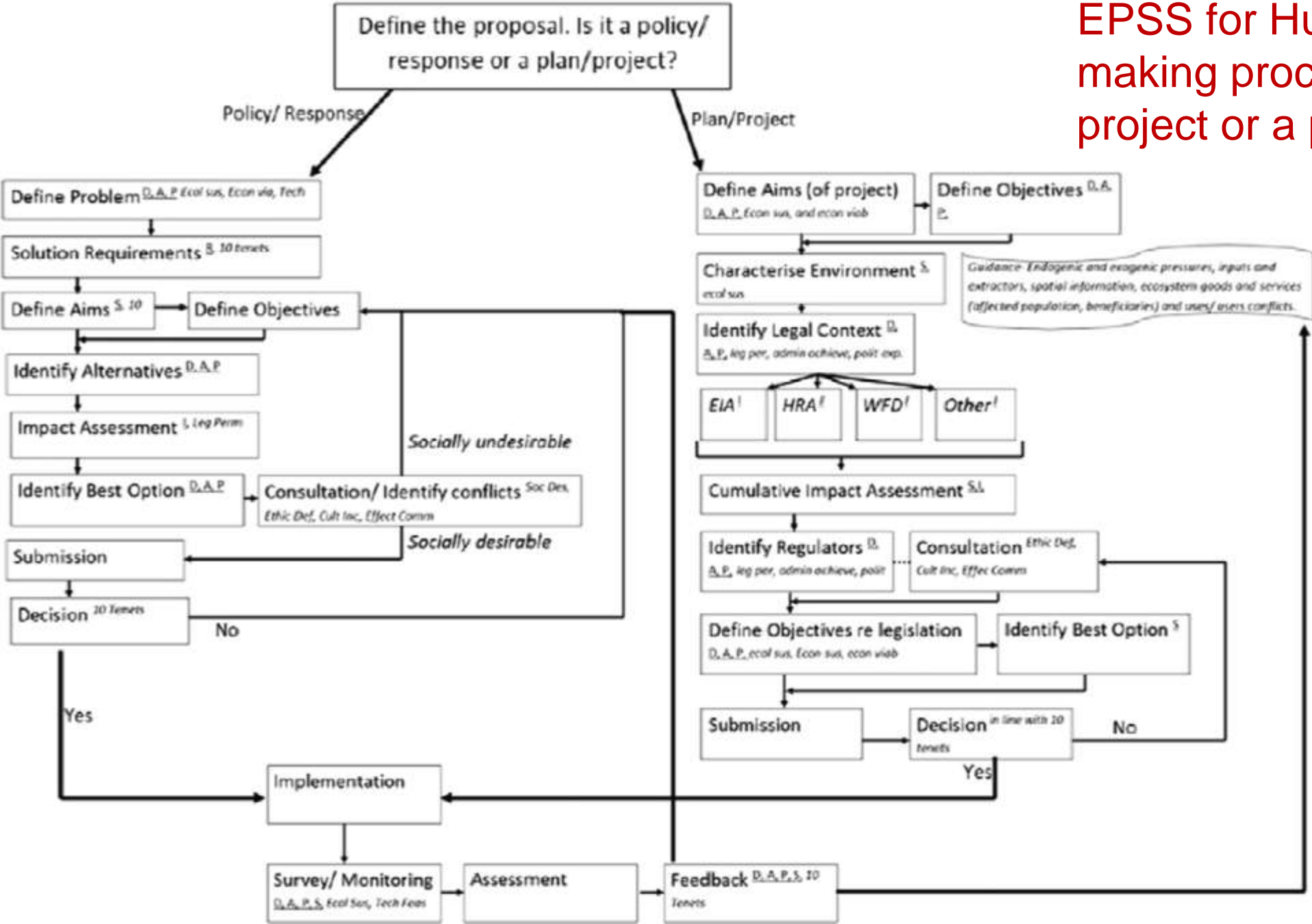


# The Marine Assessment Paradox and Assessment Cycles:

*“That there are more and more initiatives requiring assessments (below) but there is less funding for achieving them (or the funding is put on to industry)”*

- Catchment quality (e.g. Water Framework Directive, Clean Water Acts)
  - Habitat and species conditions (e.g. Habitats Directive, Conservation legislation)
  - Marine regional quality (e.g. Marine Strategy Framework Directive, Oceans Acts)
  - Cumulative impacts assessment (e.g. CIA Directive)
  - Strategic environmental assessment (e.g. SEA Directive)
  - Environmental Impact Assessment (e.g. EIA legislation worldwide)
  - Permit conditions for industry and marine activities
- 
- **Humber – carry out cost-effective monitoring and assessment**

# EPSS for Humber decision making process of a plan/project or a policy/response



(Lonsdale et al.,  
Mar. Poll. Bull,  
2015)

# Major Modification – Lagoon Hull

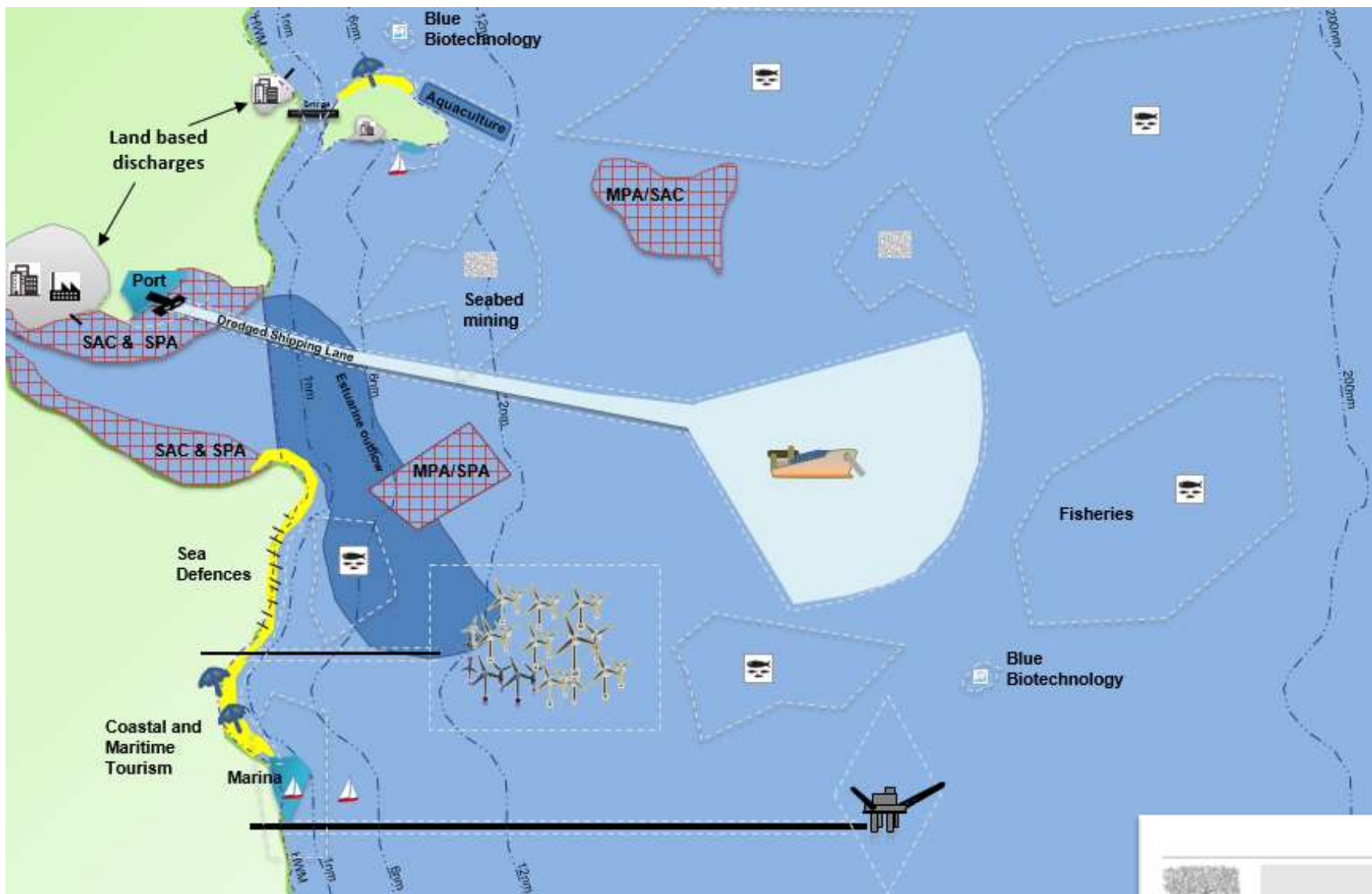
Waterfront development, environmental enhancement, fluvial and tidal flood protection, traffic management, port and development jobs



That once in a lifetime, single vision that is big and bold enough to change our region's future.

At first glance, Lagoon Hull is a 'big road' that breaks out from the A63 into the middle of the River Humber, stretching all the way from Hessle foreshore to Victoria Dock. However, this road will lead to much more than that.

- <https://www.lagoonhull.co.uk/>

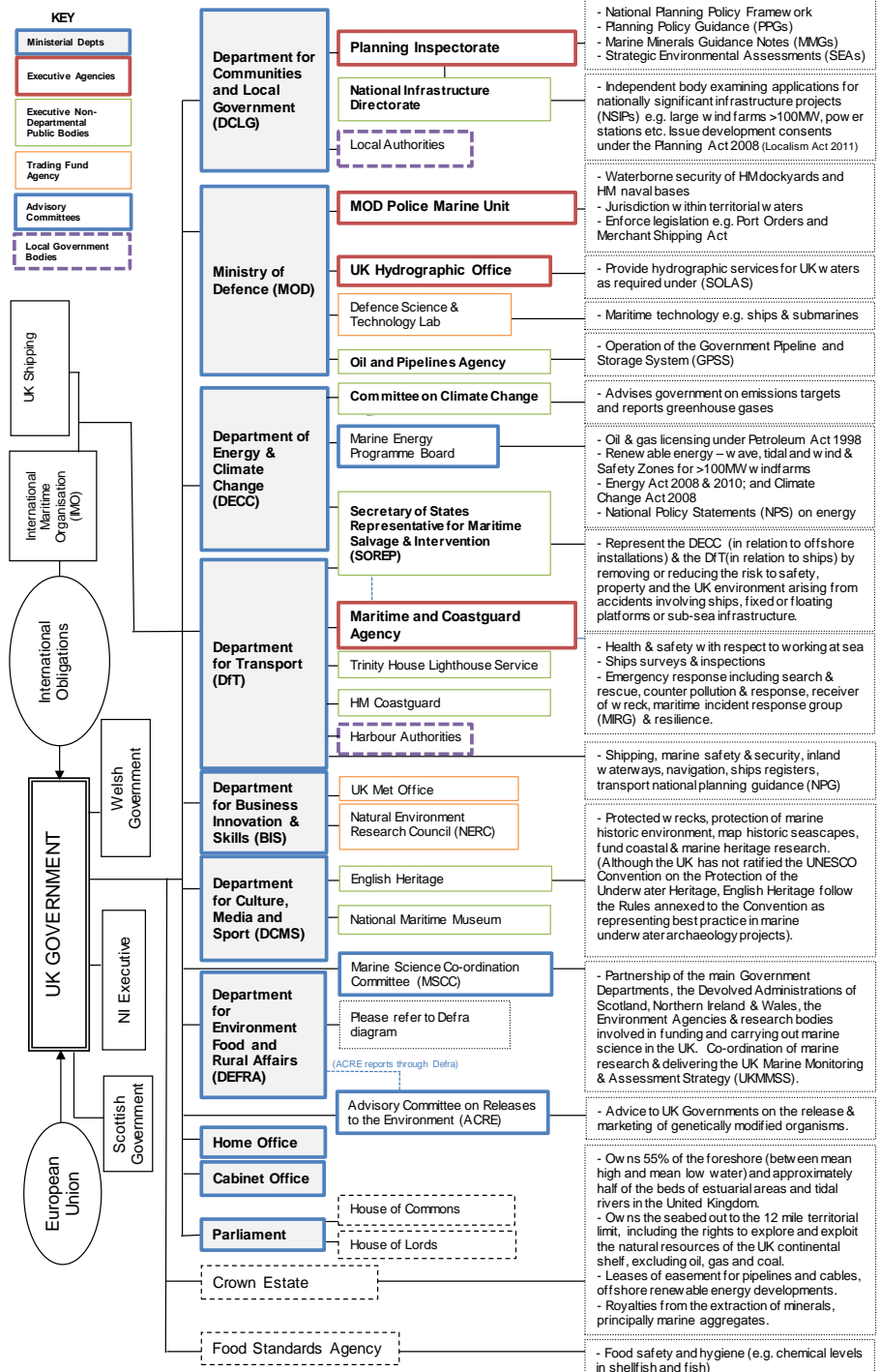


# Urbanisation and Industrialisation of Estuaries and Coastal Seas

(Elliott et al.,  
Mar Poll. Bull.,  
2018)

Challenge – to merge environmental quality management (e.g. MSFD) with maritime spatial planning and Blue Growth initiatives (e.g. MSPD)





# Administrative Sub-system (horizontal integration)



Viewpoint

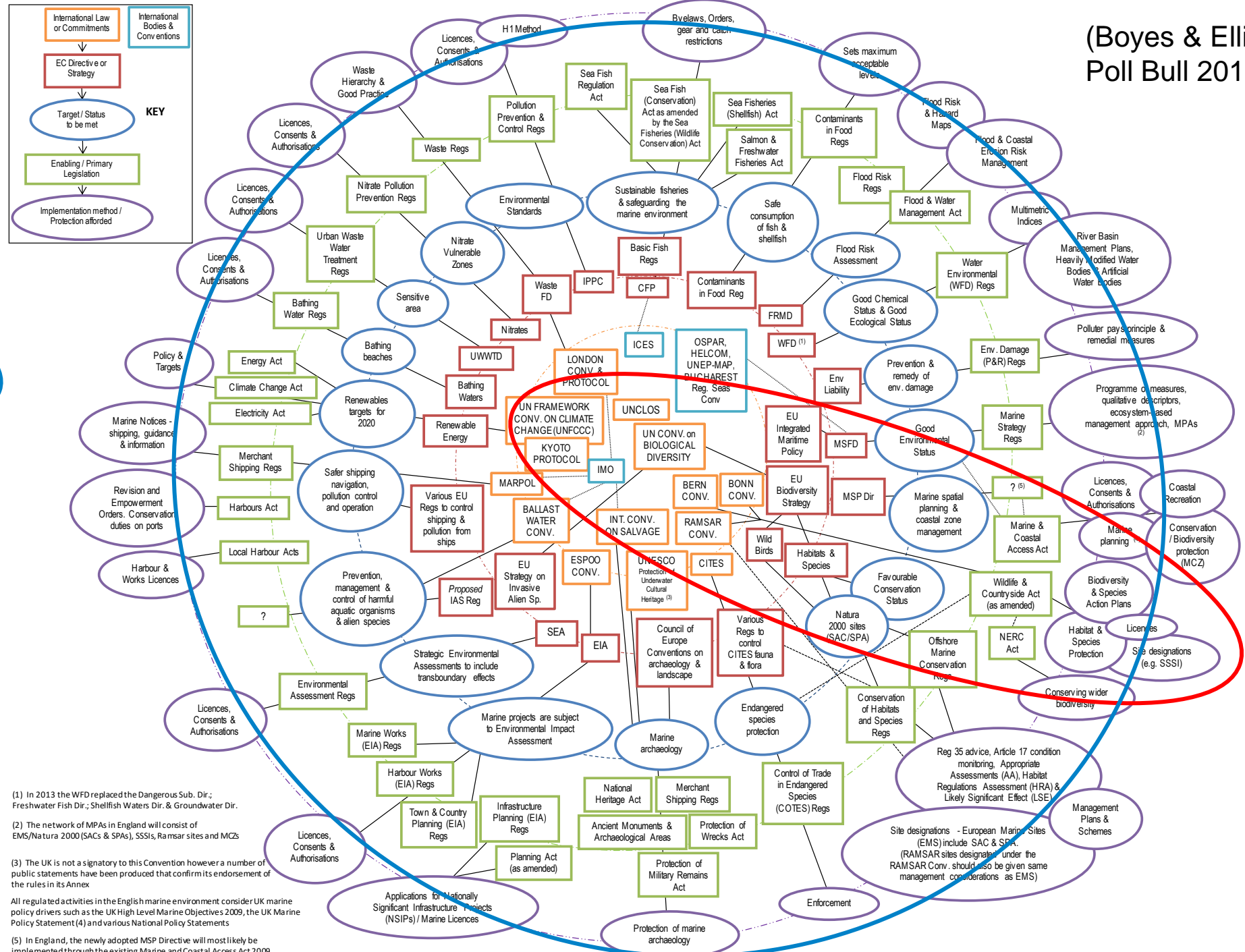
Marine legislation – The ultimate 'horrendogram': International law, European directives & national implementation

Suzanne J. Boyes<sup>\*</sup>, Michael Elliott



The excessive complexity of national marine governance systems – Has this decreased in England since the introduction of the Marine and Coastal Access Act 2009?

Suzanne J. Boyes<sup>\*1</sup>, Michael Elliott<sup>1</sup>



Horiz. int.

Vert. int.

(1) In 2013 the WFD replaced the Dangerous Sub. Dir., Freshwater Fish Dir., Shellfish Waters Dir. & Groundwater Dir.

(2) The network of MPAs in England will consist of EMS/Natura 2000 (SACs & SPAs), SSSIs, Ramsar sites and MCZs

(3) The UK is not a signatory to this Convention however a number of public statements have been produced that confirm its endorsement of the rules in its Annex

All regulated activities in the English marine environment consider UK marine policy drivers such as the UK High Level Marine Objectives 2009, the UK Marine Policy Statement (4) and various National Policy Statements

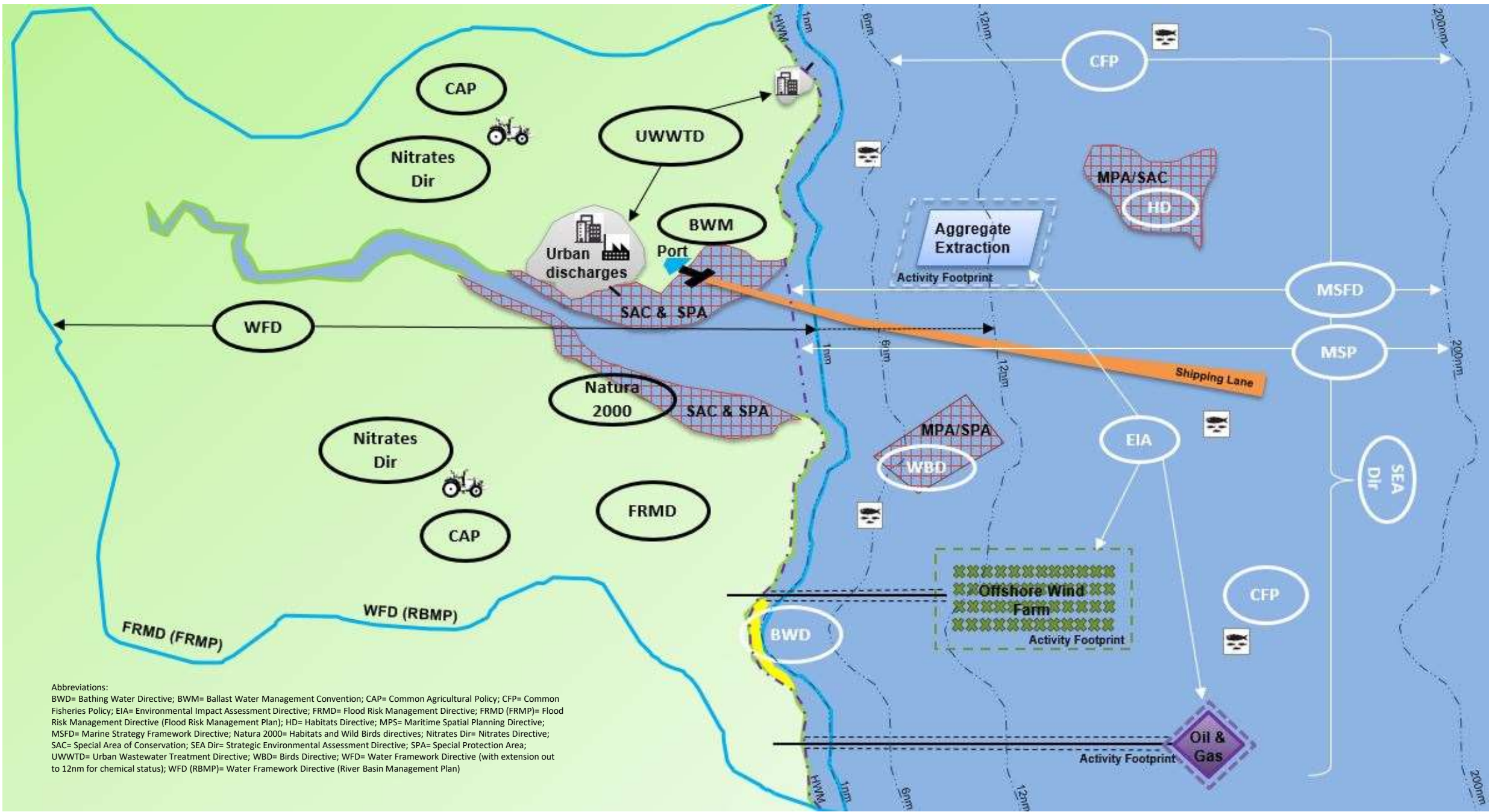
(5) In England, the newly adopted MSP Directive will most likely be implemented through the existing Marine and Coastal Access Act 2009

# Implementation & Harmonisation of EU Directives

- Start of discussions on BHD (FCS), WFD (GEcS) and MSFD (GEnS) – reporting and assessment cycles
- A Green Deal for Europe – leading to move from European Investment Bank to a Climate Bank to a Sustainable Europe Investment Plan (1 Tr € by 2030)
- EU Biodiversity Strategy 2020-2030
- Link to EEA Fitness Check for WFD (60% not in GES or GCS)
- Flood Protection maps not legally binding and slow progress in BHD



Ursula von der Leyen, EC President



Abbreviations:  
 BWD= Bathing Water Directive; BWM= Ballast Water Management Convention; CAP= Common Agricultural Policy; CFP= Common Fisheries Policy; EIA= Environmental Impact Assessment Directive; FRMD= Flood Risk Management Directive; FRMD (FRMP)= Flood Risk Management Directive (Flood Risk Management Plan); HD= Habitats Directive; MPS= Maritime Spatial Planning Directive; MSFD= Marine Strategy Framework Directive; Natura 2000= Habitats and Wild Birds directives; Nitrates Dir= Nitrates Directive; SAC= Special Area of Conservation; SEA Dir= Strategic Environmental Assessment Directive; SPA= Special Protection Area; UWWTD= Urban Wastewater Treatment Directive; WBD= Birds Directive; WFD= Water Framework Directive (with extension out to 12nm for chemical status); WFD (RBMP)= Water Framework Directive (River Basin Management Plan)



# *Brexit* – the damaging, rampant elephant in the room!

- Conundrums
- Cost and duplication
- Inconsistencies across regions
- New Regulator with or without the same ‘clout’ as ECJ?
- Divergence of directives and lack of harmonisation



**“I suppose I’ll be the one to mention the elephant in the room.”**

**“How come it’s always the old, bald-headed guy with glasses in cartoons?”**

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Viewpoint

**Brexit: The marine governance horrendogram just got more horrendous!**

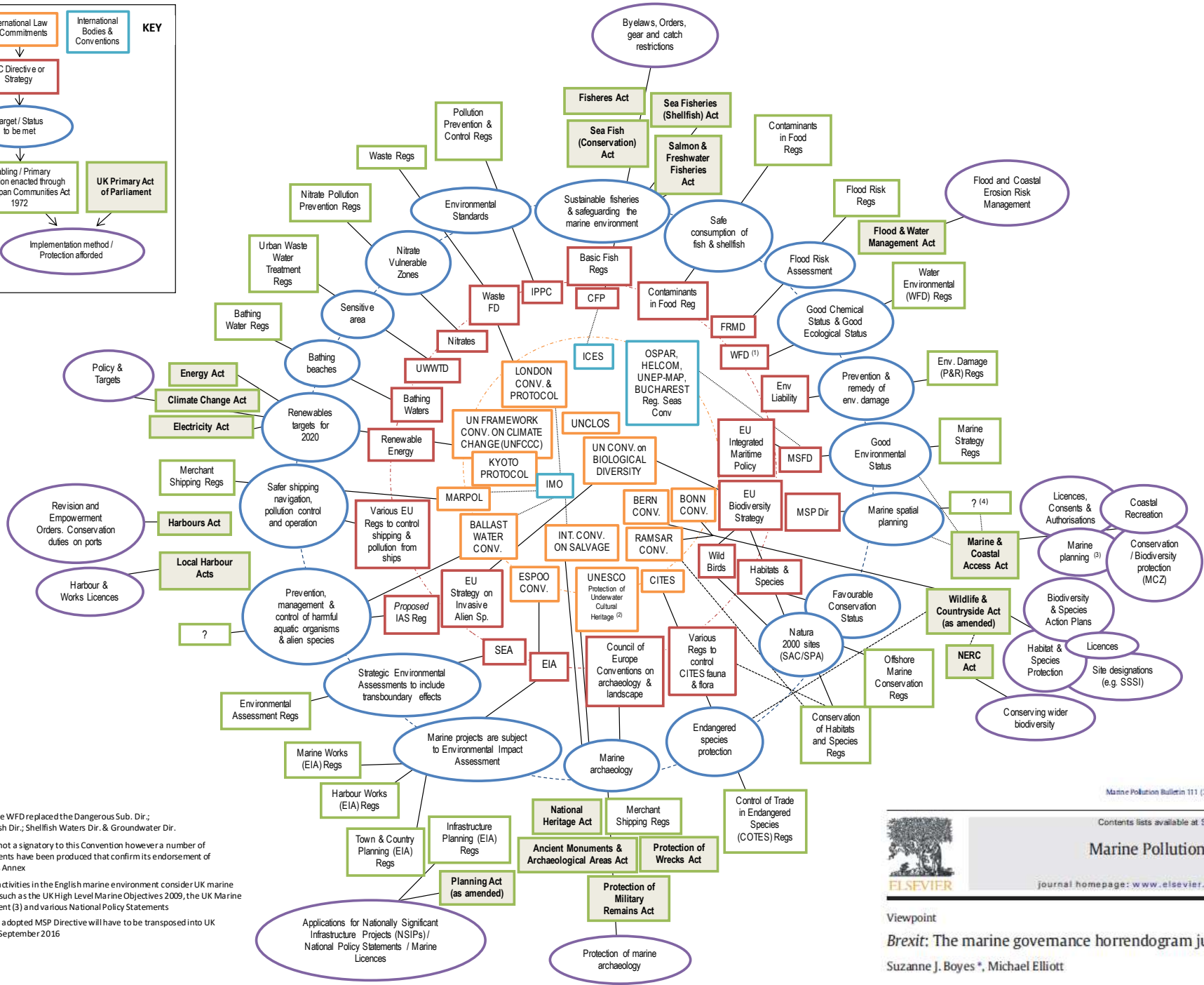
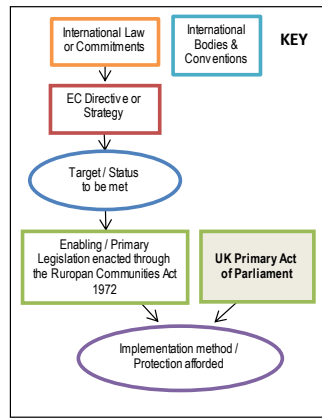
Suzanne J. Boyes \*, Michael Elliott



*..... those directives have been supported by the work of the Commission and the ECJ .....*

*..... a reasoned opinion being issued, infraction proceedings following and fines being generated. Outside the European Union the question is what replaces the Commission, how do we have the ECJ as a role replicated. This is an absolutely important question.*

*... recognising that you may well need an agency, a body, a commission that has the power potentially to fine or otherwise hold Government to account and certainly to hold public bodies other than Government to account. There is a legitimate question as to whether or not fining would be the right way of securing compliance.*



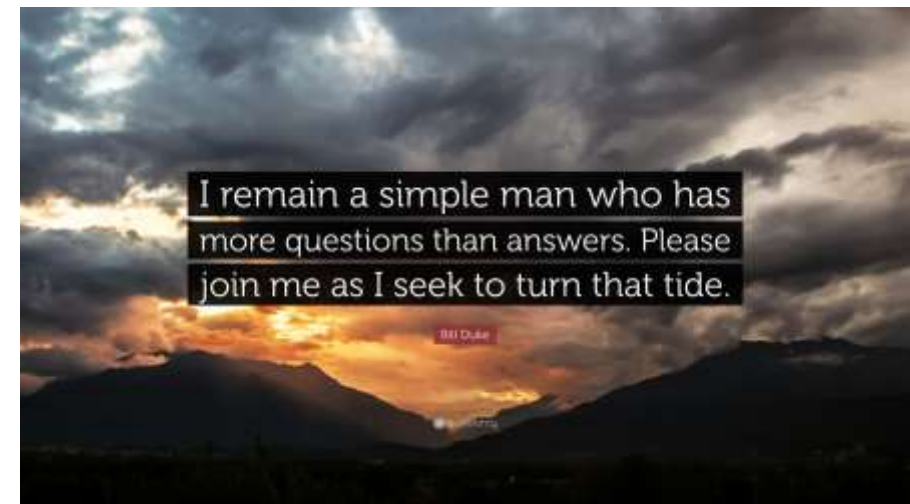
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 (2) The UK is not a signatory to this Convention however a number of public statements have been produced that confirm its endorsement of the rules in its Annex  
 All regulated activities in the English marine environment consider UK marine policy drivers such as the UK High Level Marine Objectives 2009, the UK Marine Policy Statement (3) and various National Policy Statements  
 (4) The newly adopted MSP Directive will have to be transposed into UK legislation by September 2016





## Brexited?:

- Will we get “a world-leading environmental watchdog, an independent, statutory body, to hold Government to account for upholding environmental standards”?
  - Is Defra already reconciled to an independent arbitration body for UK-EU settlements?
  - How will harmonising Good Ecological Status (WFD), Good Environmental Status (MSFD) and Favourable Conservation Status (HD) be achieved across international boundaries?
  - Is transnational harmonisation more important for open marine Directives than ‘territorial’ ones?
- and*
- What are the bottlenecks, showstoppers and train-wrecks to achieving coherence?



# United Nations Decade of Ocean Science for Sustainable Development (2021-2030)



2021  
2030 United Nations Decade  
of Ocean Science  
for Sustainable Development

- Aim: to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework
- To ensure ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean.
- To give scientific understanding of the responses to pressures and management action, to underpin the SDG.
- Observations and research are essential to predict the consequences of change, design mitigation and guide adaptation.
- Coordinated by the [Intergovernmental Oceanographic Commission](#) (IOC) of UNESCO and implemented in UK by NOC and MSCC.
- The Humber: research and observations will be included (e.g. seabed mapping, etc)

# UN Decade of Ecosystem Restoration 2021-2030

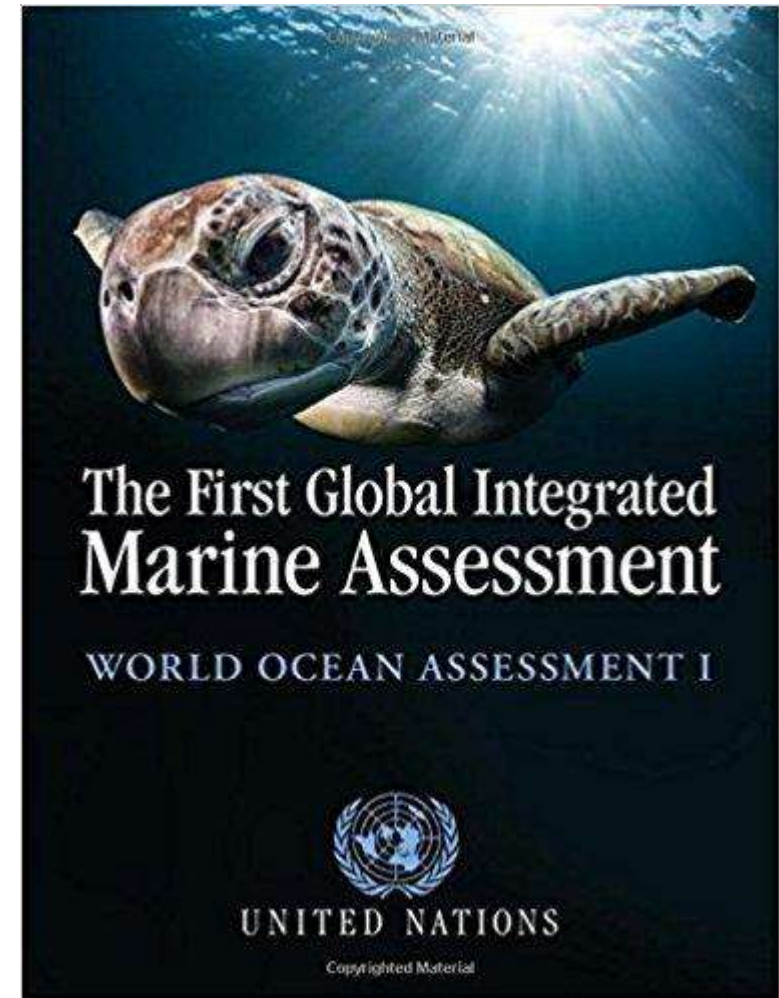
- **Declared by UN General Assembly on 1<sup>st</sup> March 2019 and led by UN Environment and FAO**
- To greatly increase the restoration of degraded and destroyed ecosystems to combat the climate crisis and enhance food security, water supply and biodiversity.
- Fundamental to achieving the SDG, mainly those on climate change, poverty eradication, food security, water and biodiversity conservation.
- To accelerate existing global restoration goals (to restore 3.50 M km<sup>2</sup> of degraded ecosystems by 2030\*). Currently, 57 countries, subnational governments and private organizations have committed to bring >2.90 M km<sup>2</sup> of degraded land under restoration by 2030.
- Humber contribution? – uncertain of how the UK will play its part?



(\* 169 x Wales!)

# UN World Oceans Assessment II

- Despite the role of oceans in climate and life support, the World Ocean Assessment I (2016) found that much of the ocean is now seriously degraded, with changes and losses in the structure, function and benefits from marine systems.
- WOAI - 31 Chapters, 500 pages+ including Recent Advances in Marine Management
- To help implement the 2030 Agenda for Sustainable Development, particularly its ocean related goals.
- Humber – as an example in several chapters?



<https://www.un.org/regularprocess/content/first-world-ocean-assessment>



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SUSTAINABLE  
DEVELOPMENT GOALS  
17 GOALS TO TRANSFORM OUR WORLD



The 17 SDG were adopted by the UN to be achieved by 2030 – SDG14 (*Life Below Water*) cover the marine with 10 targets and 10 indicators adopted by the UN

(ICES-UNECE Working Group on Risk Assessment and Management for SDG14)



e.g. TARGETS

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

e.g. INDICATORS

14.1.1 Index of coastal eutrophication and floating plastic debris density



*But (and there is always a 'but'!):*  
The targets and indicators are not SMART (specific, measureable, achievable, realistic or time-bounded) so how will management success be determined?

Humber – how will it play its part?

Marine Pollution Bulletin 123 (2017) 28–33

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Marine Pollution Bulletin

journal homepage: [www.elsevier.com/locate/marpolbul](http://www.elsevier.com/locate/marpolbul)

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Viewpoint

SMART marine goals, targets and management – Is SDG 14 operational or aspirational, is 'Life Below Water' sinking or swimming?

Roland Cormier<sup>a,\*</sup>, Michael Elliott<sup>b,\*</sup>



*And:*

The EU will implement the SDG14 through the MSFD (Marine Strategy Framework Directive) *but* reduced to (only!) 5 indicators proposed by EUROSTAT:

*(but: what will the UK use?)*

- Surface of marine sites designated under NATURA 2000 (data source: DG ENV, EEA) (sdg\_14\_10)
- Estimated trends in fish stock biomass in NE Atlantic (data source JRC-STEFCF) (sdg\_14\_21)
- Assessed fish stocks exceeding fishing mortality at maximum sustainable yield (FMSY) in North East Atlantic (data source: JRC, STEFCF) (sdg\_14\_30)
- Bathing sites with excellent water quality by locality (data source: EEA) (sdg\_14\_40)
- Mean ocean acidity (data source: EEA) (sdg\_14\_50)

Thinking: blue skies or cloudy?



Oh, yeah???

**Achievement Sub-system (checking outcomes vs. outputs)**

E.g. Indicators:  
 Number of activities  
 Navigation routes  
 Size of fishing fleet

Drivers (societal basic needs)

Activities (of society)

Responses (economic, legal, etc) (Measures)

E.g. Indicators:  
 Number of regulations  
 Economic costs  
 10-tenets values

**Indicator-based DAPSI(W)R(M) framework**

Pressures (resulting from activities)

Impacts (on human Welfare) (changes affecting wealth creation, quality of life)

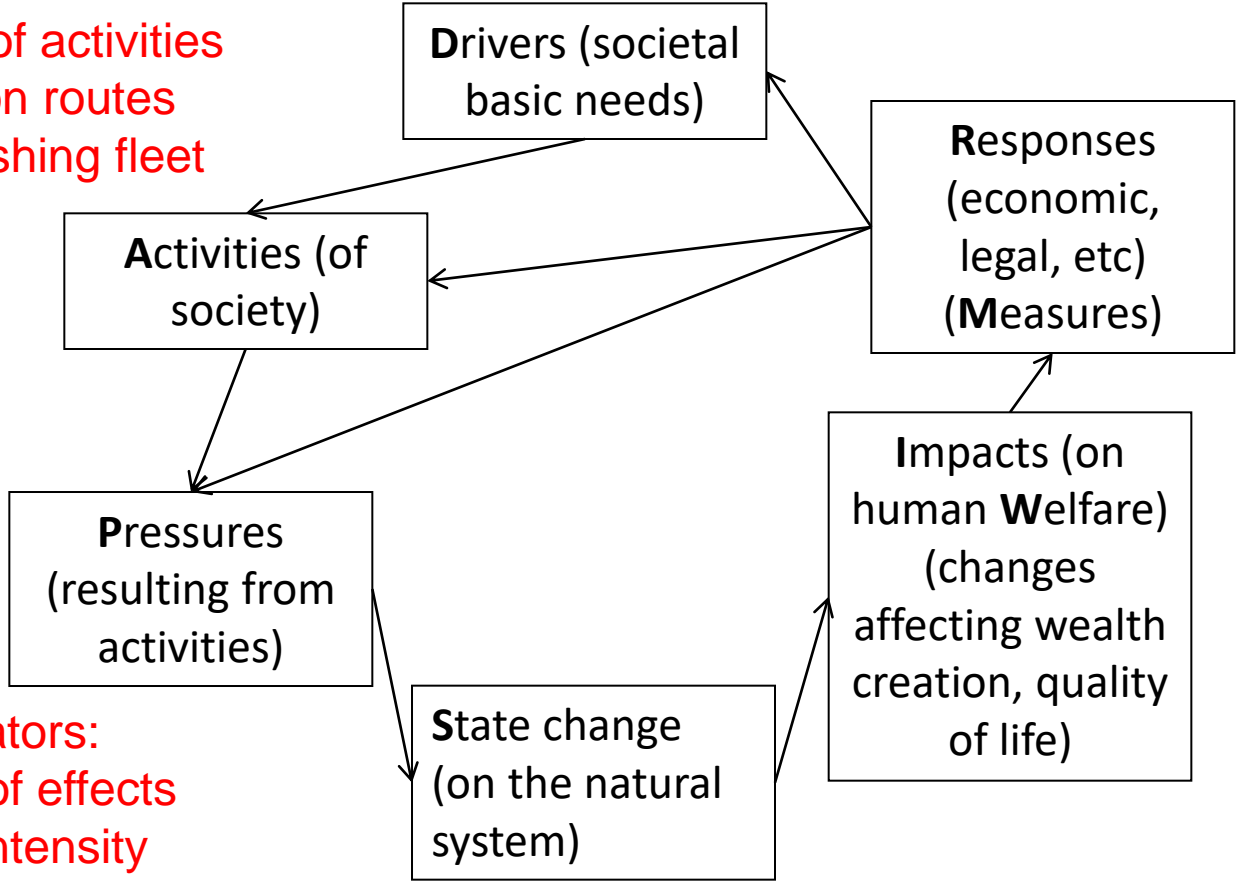
E.g. Indicators:  
 Ecosystem service  
 Societal benefits  
 Human health status

E.g. Indicators:  
 Footprint of effects  
 Stressor intensity

State change (on the natural system)

E.g. Indicators:  
 Natural health status  
 Population levels  
 Community structure

(NB - DEVOTES indicators catalogue – 500 indices!)



# Main messages in coping with future changes and challenges:

- Think Global, Act Local!
- Essence is Risk & Opportunity Assessment & Management
- Essence is in achieving connectivity (good water conditions, ecological well-being, conditions fit-for-purpose)
- Estuarine, catchment & marine measures have to be used together
- Ensure local, regional, national, European, international (OSPAR) and global initiatives are used
- Need for long-term vision, objectives, definition of success built into a management plan
- Be aware and take advantage of leverage
- Q. but who takes the lead?



# ECSA 58 & EMECS 13

**Estuaries and coastal seas in the Anthropocene**

Structure, functions, services and management

Submit  
your abstract!  
Deadline:  
27 March 2020

7–11 September 2020 Hull, UK

Join us for ECSA's next major symposium, **ECSA 58 - EMECS 13: Estuaries and coastal seas in the Anthropocene – Structure, functions, services and management.**

The structure and functioning of our estuaries and seas are shifting within what is now termed the Anthropocene due to diverse drivers and pressures from local to global scales. The resulting threats to the natural and human features of these systems are often all too apparent, yet such changes can also present new opportunities.

The challenge is to harness these opportunities through new ways of thinking, scientific developments, innovative technology and more effective integration of science and management.

ECSA 58 & EMECS 13 brings together a global multi-disciplinary community of researchers, educators and practitioners to address issues of outstanding importance in the science (both natural and social) and management of estuaries and coastal seas in this rapidly changing world.

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For further details see our website and overleaf.

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