Dr Luciana S. Esteves
Senior Lecturer in Physical Geography
Faculty of Science & Technology
lesteves@bournemouth.ac.uk

MANAGED REALIGNMENT: A SUSTAINABLE APPROACH TO RESTORE COASTAL HABITATS AND MANAGE FLOOD RISK?

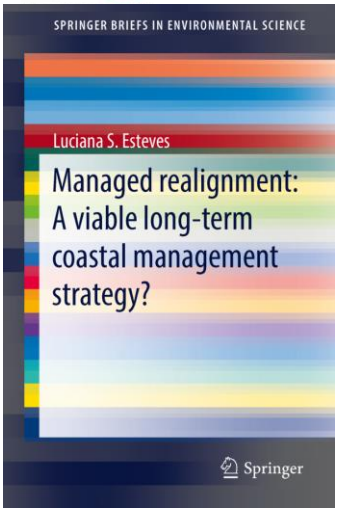
- What is managed realignment (MR)?
- How is it implemented?
- Where has MR being implemented?
- Is MR efficient, effective and sustainable?

Confusing/Inconsistent use of terminology

Regional preferences - changes through time - spelling

- managed realignment
- coastal realignment
- managed retreat
- set back
- de-embankment
- depoldering
- controlled embankment retreat
- regulated tide exchange (RTE)
- controlled reduced tide (CRT)

Thanks to my collaborators



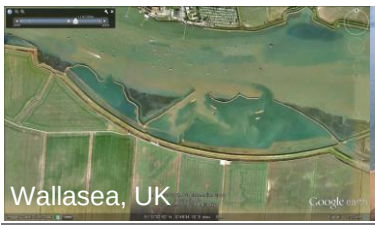
Thorne Abbott, Coastal Planners, Hawaii, USA
Phil Dyke and **Tony Flux**, The National Trust, UK,
Nigel Pontee, CH2M HILL, UK
Karen Thomas, The Environment Agency, UK
Joost Stronkhorst and **Jan P. M. Mulder**, Deltares, Netherlands

John Akerman, UK
Olivier Beauchard, University of Antwerp, Belgium
Steve Burdett, Royal HaskoningDHV, UK
Olivia Burgess, Crown Estate, UK
Andy Coburn, Western Carolina University, USA
Katharina Jacob, IBA Hamburg
Texas General Land Office, USA
and many others that provided information/photos

Look at the Springer stand for it!

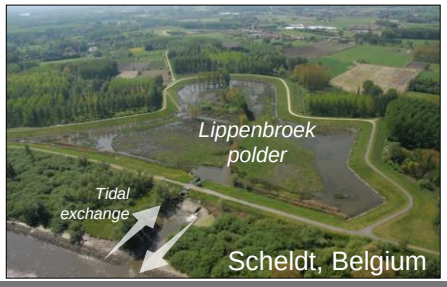
Most common understanding of managed realignment

MR is "*a process of establishing a new flood defence line for river corridors or coastlines, often set back from the existing position, with the aim of improving the long-term sustainability of the defence, or contributing to other aims such as habitat creation*" (Defra 2005; p. 44)



MR can reduce flood risk by creating space for

- flood storage areas
- the development of coastal habitats able to provide flood regulation and dissipation of wave energy
- relocation of people/assets at risk



Where has MR being implemented?

Country	Projects	Type	Area (ha)
Belgium	15	CRT: 5; Realignment: 8 Breach: 1; Removal: 1	2743.6
Denmark	2	Breach: 2	206.0
France	4	RTE: 1; Retreat: 1 Breach: 1; Removal: 1	484.0
Germany	29	RTE: 3; Realignment: 1 Breach: 12; Removal: 13	5066.7
Netherlands	11	CRT: 1; Realignment: 3 Breach: 7	1086.0
Spain	1	Removal: 1	23.0
UK	54	RTE: 18; Realignment: 19 Breach: 15; Removal: 2	2275.6
total	**116**		**11,884.9**

MR in the UK

Total: 54 projects (2,275 ha)

2 Removal of defence

14 Breach of defence

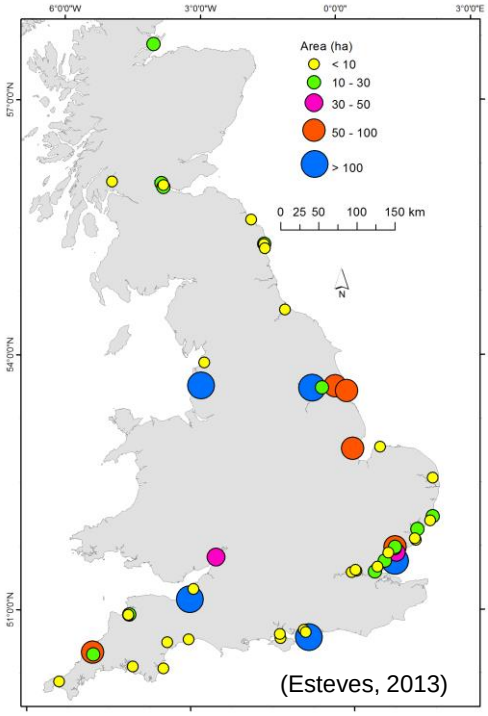
18 Regulated tidal exchange

20 Realignment of defence

Great majority: small size and low-lying.

Flood defences were in poor conditions at all sites.

About 80% of all projects are within or adjacent to conservation areas of European importance.



(Esteves, 2013)

Managed realignment and ecosystem services

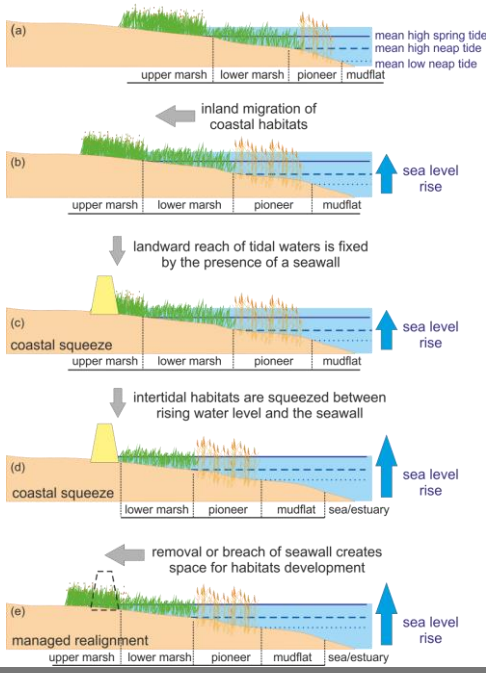
The great value of MR is related to its multiple functions and the ecosystem services the created habitats can provide (e.g. Luisetti *et al*., 2011).

The provision of these services depends on the size, shape, adjacent environments, connectivity with water and other factors (Schleupner and Schneider, 2013).

Habitat creation is the focus of over 90% of the MR projects in the UK.

MR is expected to create intertidal habitat (especially saltmarshes) to offset habitat lost due to coastal squeeze, meeting the statutory duty placed by the EU Habitats Directive.

Coastal squeeze

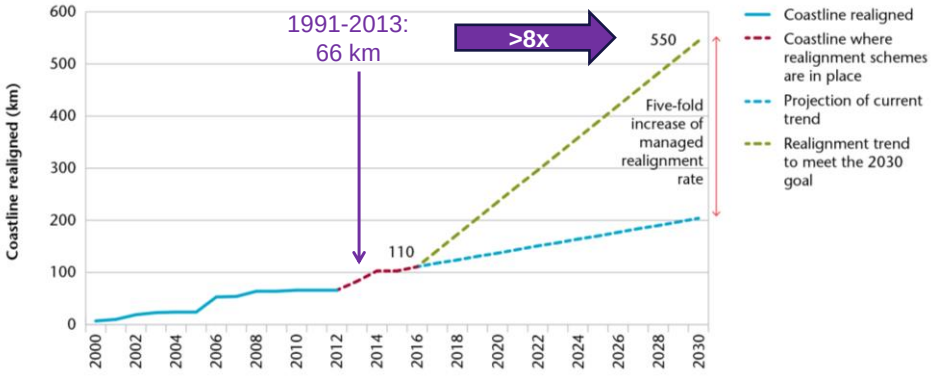


Habitat creation

The sustainability of the new intertidal habitats depends on whether sediment availability (and other variables) will allow vertical accretion at rates that will cope with rising sea levels

How will these habitats evolve in the long-term?

Shoreline Management Plans in England and Wales envisage realignment along 550 km by 2030, resulting in the creation of over 6,200 ha of habitat



Committee on Climate Change (2013), http://www.theccc.org.uk/charts-data/adaptation-indicators/coastal-indicators/length-of-coastline-realigned-km/

What do we know?

- Literature search on 8 Sep 2014
- Science Direct + Web of Science

= 322 articles or books

- 108 MR on title, abstract or keyword
- 122 sediment on the title, abstract or keywords.
- only 55 results were actually addressing MR
- merely 33 presented data measured at realigned sites
- 94% - Scheldt CRT; Blackwater; Humber; Freiston Shore

Flood risk = 0

Re-created habitats are not as good as natural ones

Small areas (<30 ha) have < 50% of the species. Biodiversity increases at sites >100 ha and with the largest range of elevations between MHWN and MHWS (Wolters *et al*., 2005).

Infauna abundance in MR mudflats **one order of magnitude lower** (Mazik et al., 2010).

When compared with natural systems, the functioning of re-created saltmarshes was found to be "**significantly impaired**" affecting their ability to deliver ecosystem services (Spencer and Harvey 2012).

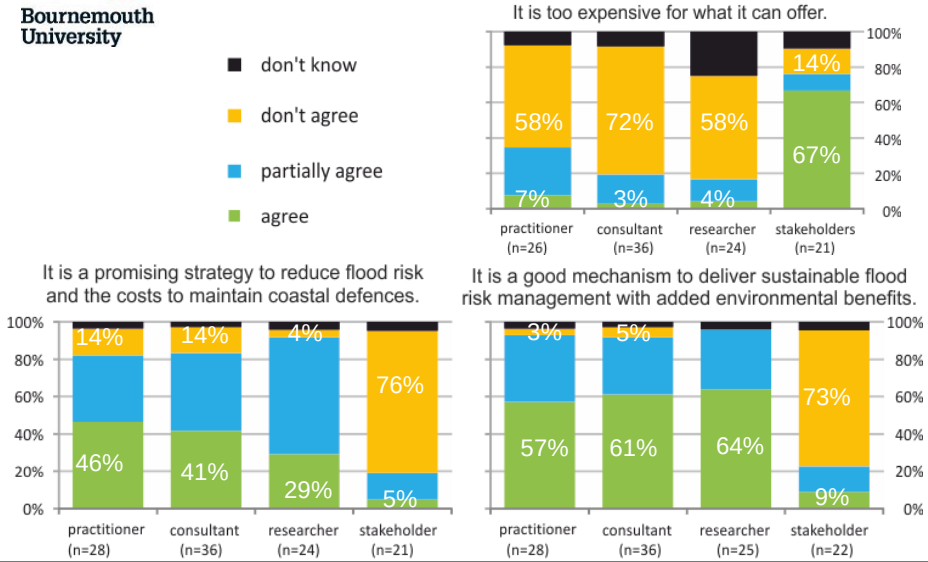
Marshes created by MR do not satisfy the requirements [equivalent biological characteristics] of the EU Habitats Directive (Mossman et al., 2012).

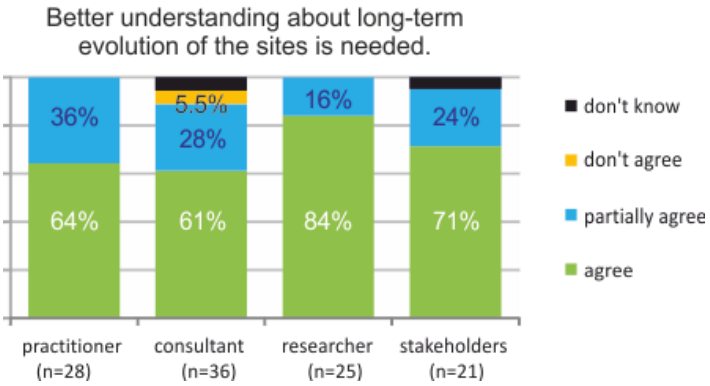
Is MR efficient, effective and sustainable?

Even if you have the most efficient solution at hand, it will only be effective if it is implemented widely (wisely?).

- Finding space – land availability
- Creating viable long-term plans
- **Public perception**
- Providing evidence of benefits acquired

Contrasting views – UK
(Esteves and Thomas, 2014)

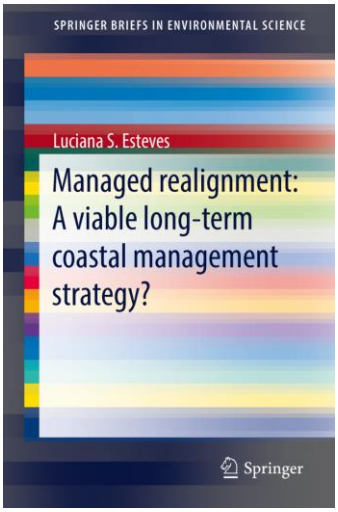




Reduction of flood risk depends on:

- Sediment accretion patterns/rates
- Development of habitats
- Changes in the volume capacity of flood storage

Final remarks



Look at the Springer stand for it!

The need for:

- Consistent message-communication-engagement
- Equal emphasis on all benefits
- Provide evidence of benefits acquired at existing projects
- Transparency

- Better understanding of long-term evolution of sites

Thank you!

Defining *managed realignment*

- It is a soft engineering approach aiming to promote (socio-economic, environmental and legal) sustainability of coastal erosion and flood risk management by creating opportunities for the realisation of the wider benefits provided by the natural adaptive capacity of coastlines that are allowed to respond more dynamically to environmental change.

'managed' - to take deliberate actions, to plan, implement and monitor projects.

'realignment' - the position of the shoreline and/or the line of defences. (Esteves, 2014)

How is it implemented?

Removal, breach or realignment of existing defences

Controlled tidal restoration

a) *Regulated tidal exchange*: tidal flow into embanked areas is controlled through culverts and sluices

b) *Controlled reduced tide*: linked to flood control areas (Belgium).

Managed retreat: relocation of structures and people at risk to areas of lower risk.