

Shoreline change in coastal Natural World Heritage sites – a global assessment

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Natural World Heritage Sites

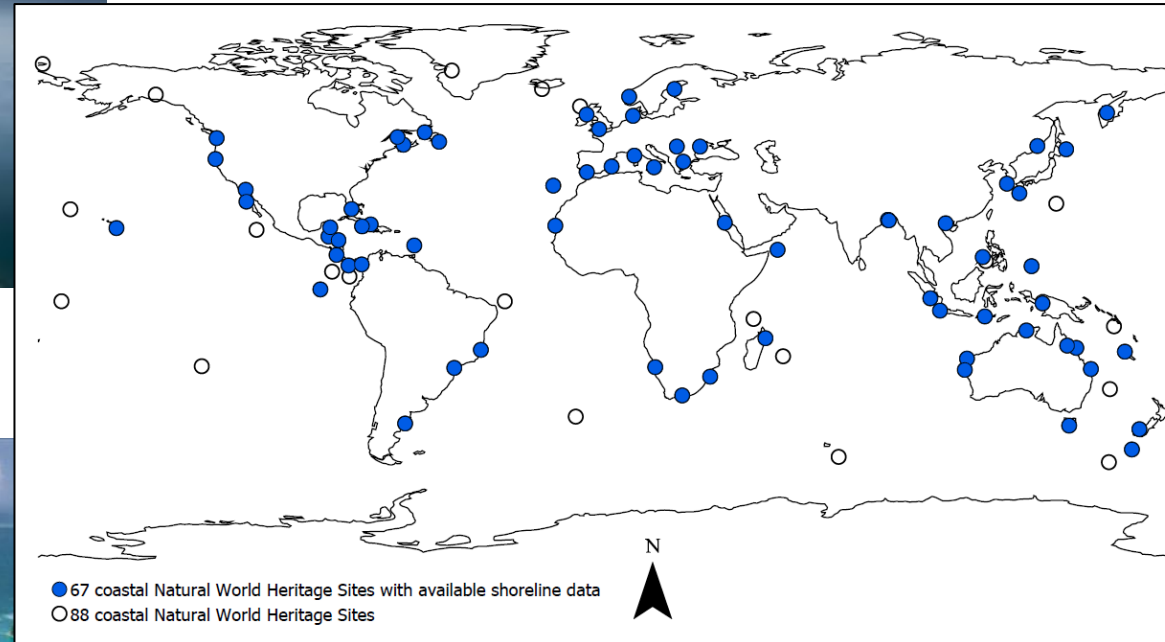
- Priceless and irreplaceable natural and cultural assets
- Unique biodiversity, geodiversity, natural beauty and cultural significance
- Foundation of life on earth alongside other protected areas



Banc d'Arguin National Park - Mauritania



Dorset and East Devon Coast
(including the Jurassic Coast) - UK



Great Barrier Reef - Australia

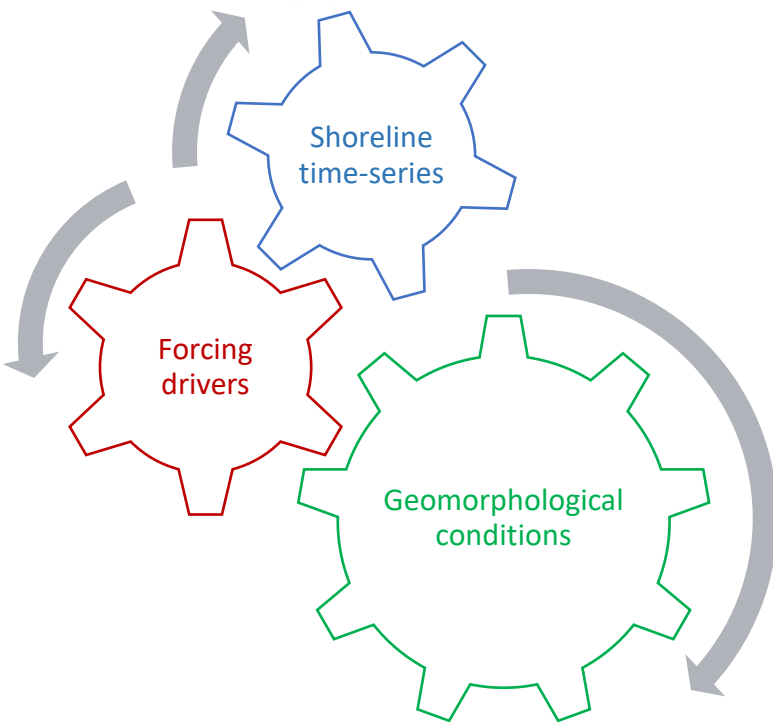


Galapagos Islands - Ecuador



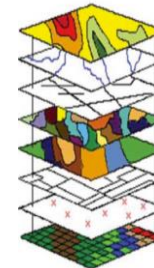
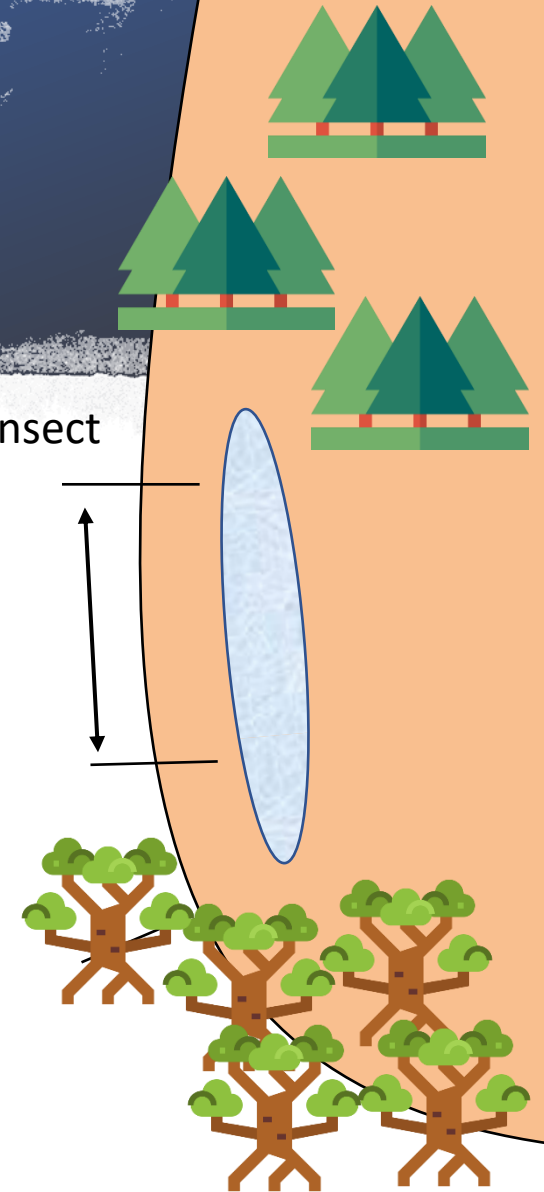
Sundarbans - Bangladesh

Methods



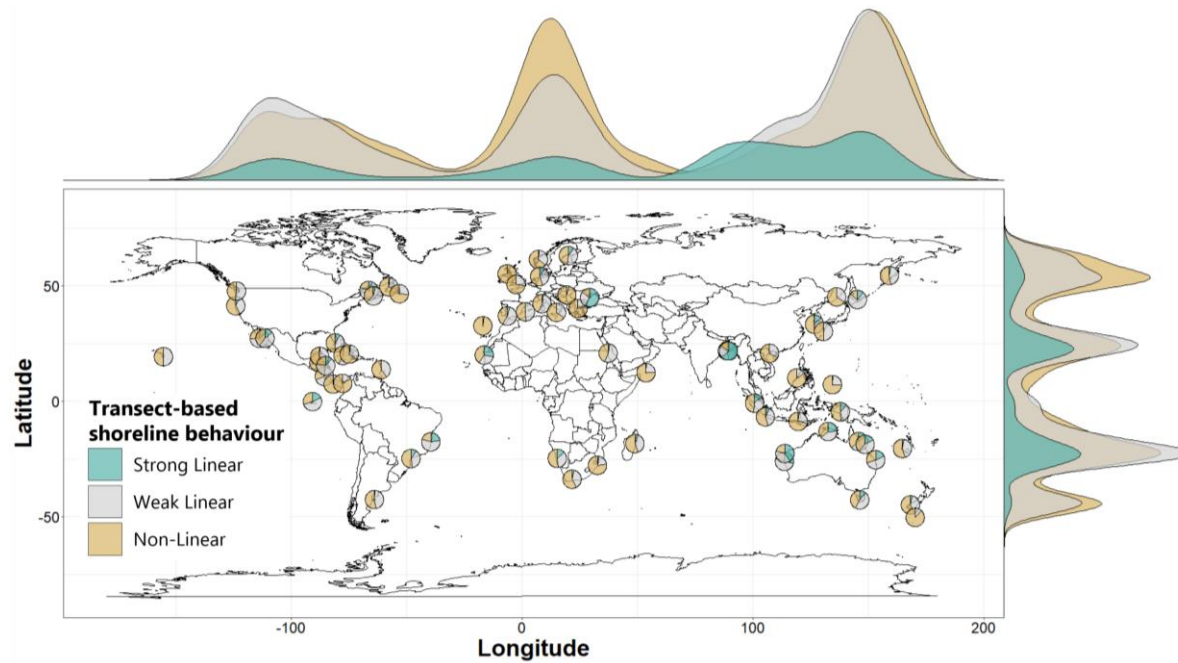
- Transect n°
- Geographical information
- Site information
- Time series of shorelines (1984-2016)
 - 67 sites out of 88 with available shoreline data
 - Strong linear, weak linear and non-linear shoreline behaviour
 - Accretive, recessive and stable shoreline trends
- Elevation
- Land cover
- Coastal type
- Lithology
- Sea level change (mm/y)
- 10 regional climate indices

500 m transect

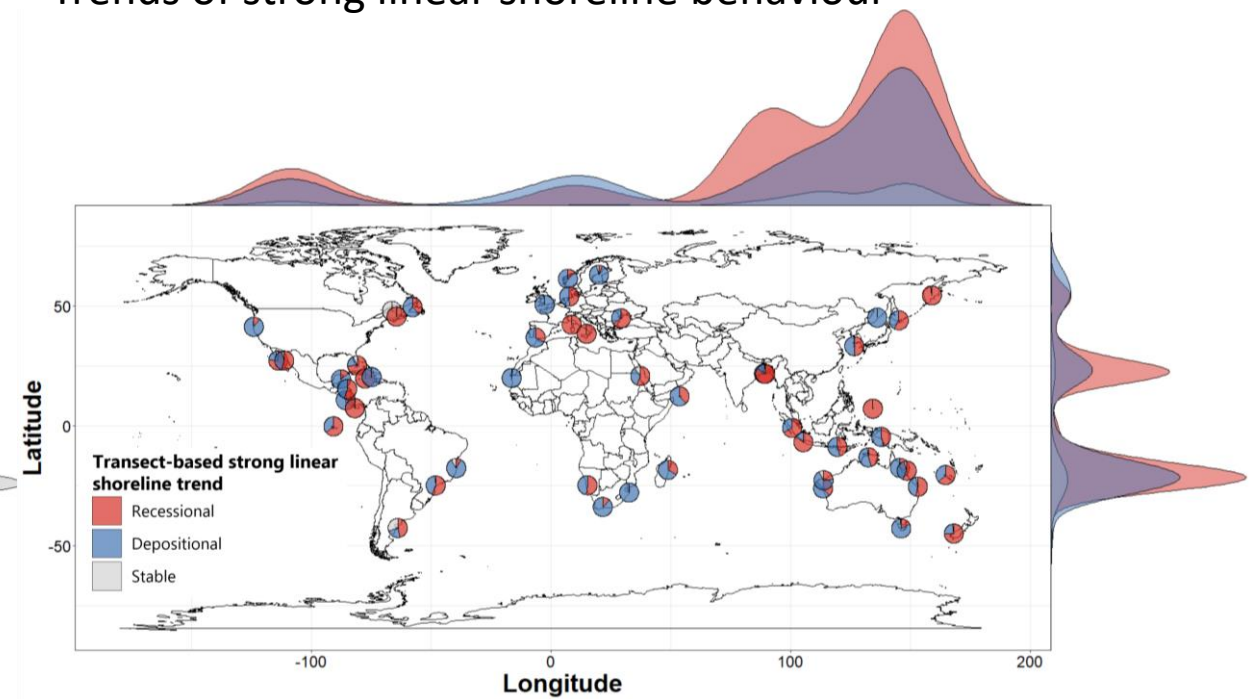


Results

Shoreline linear behaviours



Trends of strong linear shoreline behaviour



Categorical strong linear shoreline trends (m/y)

Topography and land cover

Topographical categories		Land cover categories											
		Coral reefs		Mangroves		Marshes		Vegetated		Non-vegetated		Urban	
0 ≤ elevation ≤ 1 m		-1	1	-3	3.7	-4.7	5.9	-5.9	7	-3.8	4.3		
-5.3	6.7												
1 < elevation ≤ 10 m		-1.5	1.6	-3.2	2.7	-3.1	2.9	-3.1	3.1	-3.3	2.4	-1.2	1.7
-3.1	2.7												
10 < elevation ≤ 50 m		-1.9	1.8	-2.4	2.5		1.7	-2.4	2	-1.7	1.2		
-2.3	2												

Categorical strong linear shoreline trends (m/y)

Coastal typology and land cover

	Coral reefs		Mangroves		Marshes		Vegetated		Non-vegetated		Urban	
Small deltas	-1.5	1.5	-2.8	2.5	-3.6	3	-2.9	2.9				
Tidal systems	-3.4	2.7	-3.7	2.5	-2.8	3.2	-6.8	8.2				
Lagoons			-2.15	2	-4.4	-	-5	3.1				
Fjords												
Large rivers					-5.7	5.4	-5.1	6.9				
Large river under tidal influence							-7	10.1	-4.6			
Karst			-1.6	2								
Arheic	-0.9	1.7	-2.8	2.6	-2.5	5.9	-1.6	3	-3.1	3.4		
Islands												

Key findings

- Significant shoreline change (strong linear behaviour) appears to be linked with
 - (1) natural coastal morphodynamics (e.g. inlet opening/closing and alongshore sediment transport)
 - (2) direct or indirect human effects (e.g. coastal structures, land reclamation and upstream damming and sediment starvation)
- The most stable soft coasts are associated with the protection of coral reefs ecosystems
- No statistically significant correlations between transect and site based shoreline change and 10 climatic indices of sea surface temperature and pressure anomalies
- The effects of contemporary sea-level rise are not yet widely apparent, but combined with increasing direct and indirect human interference this a concern for the future which requires continued monitoring

Questions

Thank you

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