Environmental *Change* Institute

Coastal state indicators interdependencies

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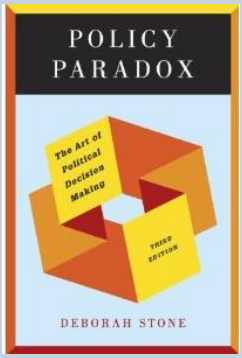
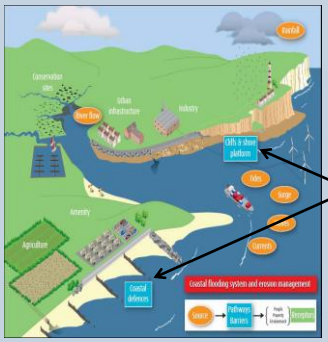
"Interpretations are more powerful than facts"



Management at **decadal and longer** time scale is plenty of interpretations and short on facts

We aim to develop tools that minimize interpretations and maximize use of facts

Motivation: iCOASST project



- Bottleneck for better vulnerability assessment at decadal and longer time scale
- What Indicators should be used?

http://www.icoasst.net

Background on Coastal State Indicators (CSIs)

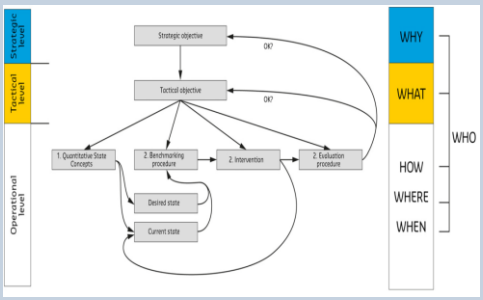
Large amount of information available

Project	Framework*	Study cases	Scale	Number of CSIs
EUROSION	DPSIR	60	Local-regional	13
DEDUCE	SPRC	8	Local	46
CONSCIENCE	DPSIR	6	Local to regional	15+
DELTA ALLIANCE	DPSIR+3Layers	10 deltas (globally)	Delta scale	43+
TE2100	Adaptation pathways	Thames estuary	Thames, UK	10
PEGASO	DPSIR	Mediterranean, Black Sea	Local-regional	15

Operational definition of Coastal State Indicators

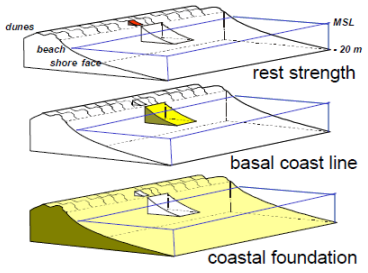
"CSIs are a reduced set of measurable parameters that can simply, adequately, and quantitatively describe the dynamic-state and evolutionary trends of a coastal system"

(Marchand et al., 2011)



Frame of reference (Van Koningsveld *et al.* 2005**)**

CSIs not only hierarchical but also scale dependent



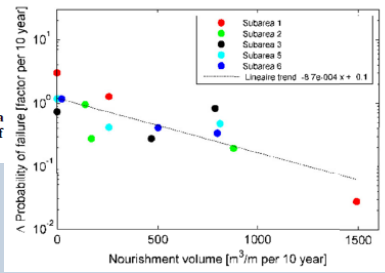
Small scale: Coastal safety
Flood defence act (TK, 1996)

Medium scale: Coastline maintenance
Dynamic Preservation (Min V&W, 1990)

Large scale: Coastal foundation
National Spatial Strategy (NSS

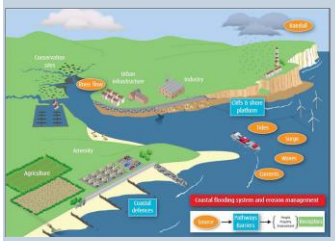
Figure 3. Schematic representation of the spatial scales associated with the coastal mana for dune strength (1 year), coastline preservation (5 – 10 years) and preservation of Foundation (50 – 200 years) (Mulder *et al.*, 2006).

(Santinelli *et al.* 2012)

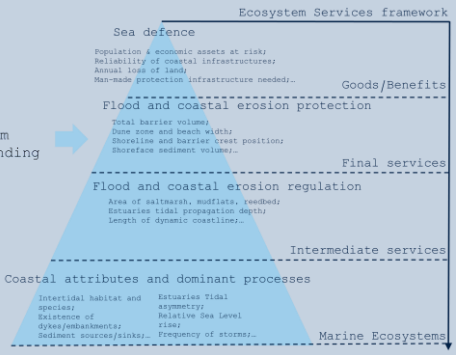


CSIs are also Ecosystem Service depenendent

Source-Pathway-Receptor framework



System understanding

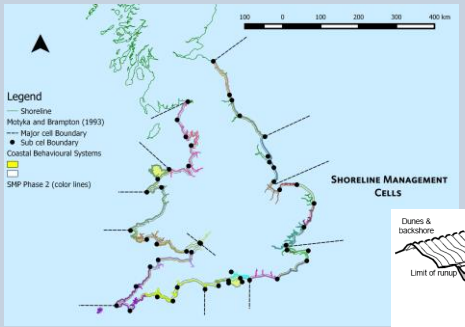


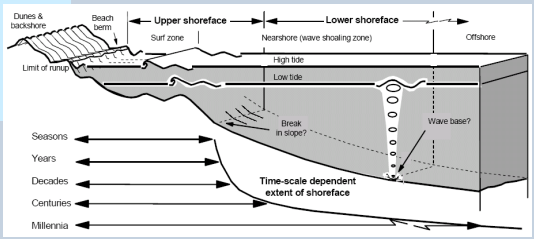
Linking DPSIR with Ecosystem service (Turner *et al.* 2014)

The stakeholder and modeller paradox

Where are the limits of the coastal system?

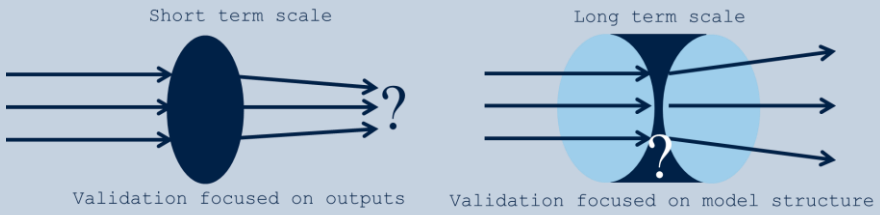
Spatial connectivity





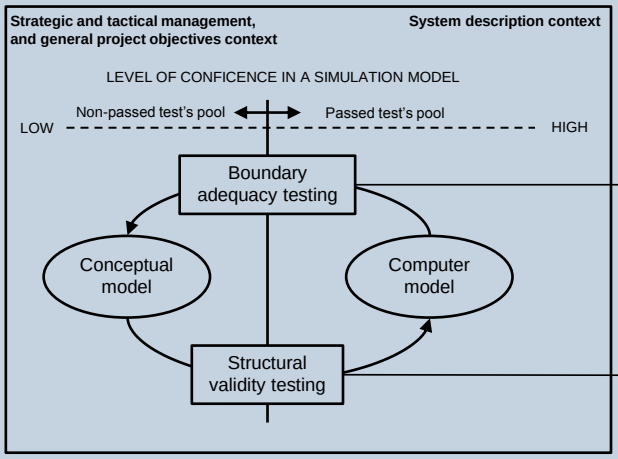
Modelling decadal & longer is a wicked problem

System understanding prone of interpretations



System approach to model validation

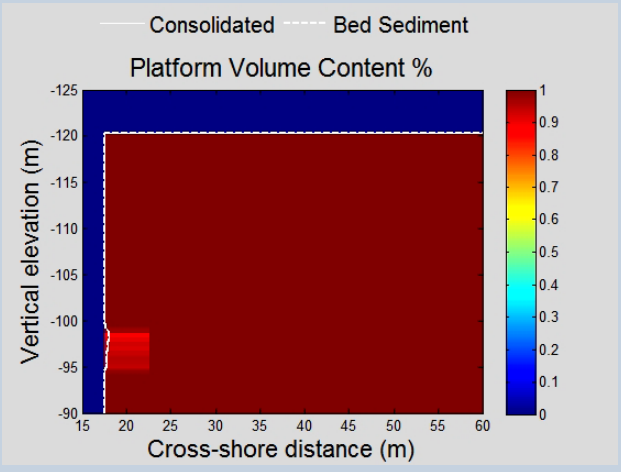
Structural and boundary adequacy

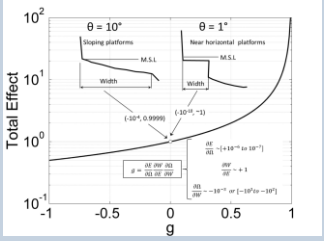


Is model aggregation appropriate and includes all relevant feedback structure?

Does the model include all the key elements? (Coastal System Maps)

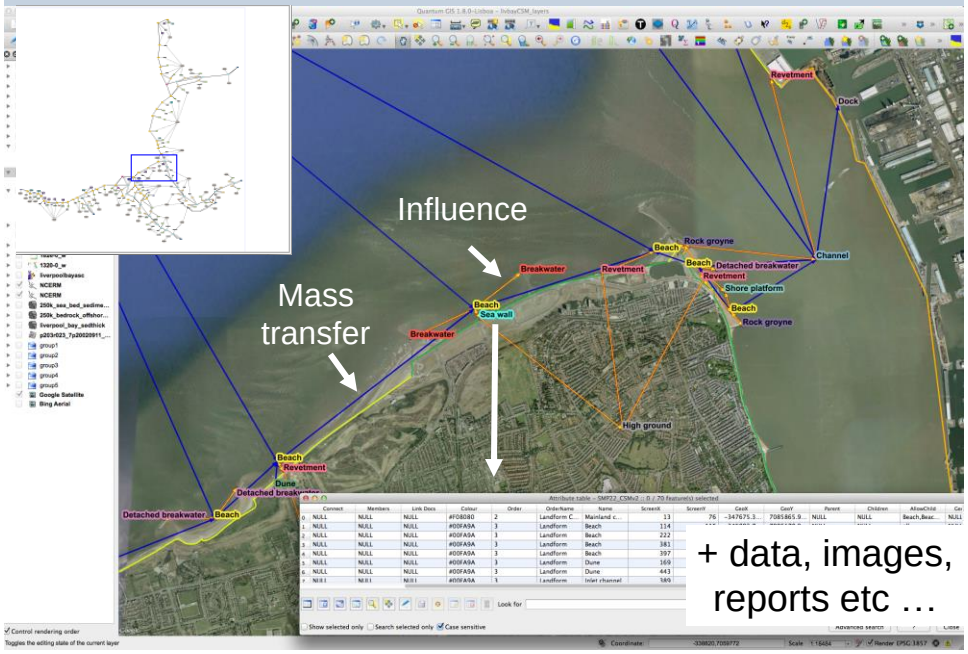
Feedbacks influences observed trends





Payo et al. (JCC, 2014)

Structural validity



Sediment and influence matrix

Interaction frequency

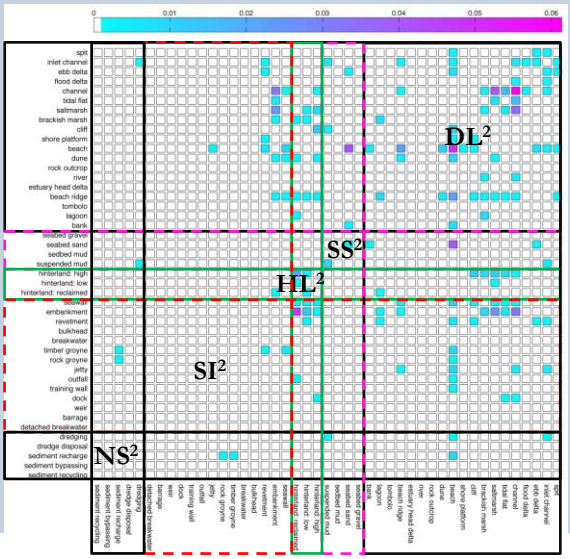
Dynamic Landforms (DL)

Sed. Stores (SS)

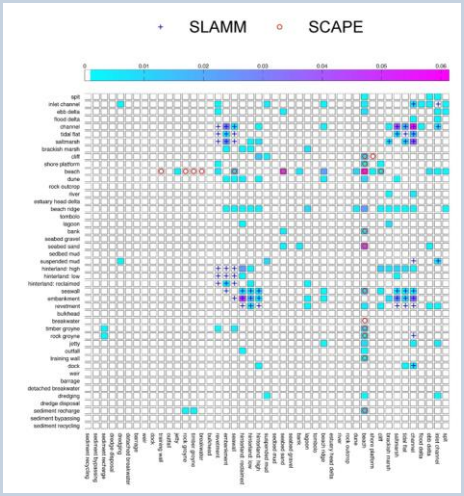
HinterLand (HL)

Structural Interventions (SI)

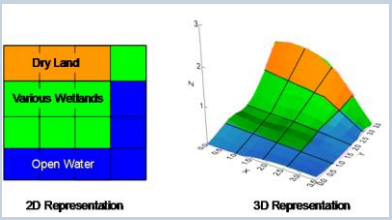
Non-Structural (NS)



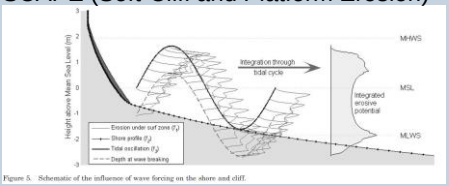
We can now compare model and system structure



SLAMM
(Sea Level Affecting Marshes Model)



SCAPE (Soft-Cliff and Platform Erosion)



Conclusions

- CSIs are hierarchical, multi-scale and service dependent and plays a key role in decision making
- Systematic approaches to include system functions in decision making exits (Frame of reference, DPSIR + ES)
- Integrated models increasingly being use to encapsulate system understanding

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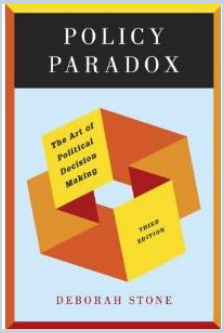
Take home message



Modeller-stakeholder duty is to minimize interpretations and maximize use of facts but structural validity and boundary adequacy test still embryonic.