AN ADAPTIVE PATHWAY TO COASTAL RESILIENCE

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The sustainability of our coastal communities and economy is depend upon extensive systems of human and natural infrastructure. These systems need to be reliable, resilient to extreme events and adaptive to future changes in economic and environment conditions as well as adaptable to potential future climate change.

The strategic coastal risk management framework which developed through Shoreline Management Plans (SMP) in the UK, has evolved with tailored applications in multiple locations globally, including Belize, the USA, Abu Dhabi and Singapore. These approaches each have a slightly different focus, with the outcomes for existing and future development always a key consideration. This development and infrastructure, and the associated communities, require confidence in their future flood and erosion exposure.

In making long term decisions, it is important to make and implement choices that are robust and adaptive. This paper considers approaches being adopted to deliver confidence in coastal management decision making, while providing the scope to adjust course as necessary in the face of future climate.

Adaptive management encourages decision makers to:

- take a 'long view' when exploring the decision-space within which current and future choices are made
- consider how current choices could affect the efficacy of future choices (e.g. by limiting them or leading to 'lock-in')
- consider how drivers of change (e.g. timescales over which drivers act, gradual or sudden rates of change, inherent uncertainty) affect future choices
- develop a coherent strategy that has scope to adapt through a planned sequence of cost-effective, no-regrets interventions (or responses) in the face of change and uncertainty.

Building on a number of recent applications, the paper will consider application of Adaptation Pathways and Robust Decision-Making to help in the strategic long-term adaptive planning of coastal risk management and water infrastructure systems. These tools provide a means to make investment decisions in infrastructure systems taking full account of the long-term uncertainties to make the best near-term decisions, as a start on the path towards achieving desired long-term outcomes.

The development of adaptation pathways is a staged process typically including:

a. Describe the planning problem – what are the components of the system, the current and future aims of the system and its expected performance?
b. Identify the expected operating and resilience thresholds within which the system needs to perform
c. Determine (by using modelling and /or analysis) what future changes in prevailing conditions could cause these thresholds to be crossed
d. Using modelling and/or change projections, estimate (approximately) when a threshold could be crossed – this identifies a decision-point
e. Identify what actions could be taken at each decision-point
f. Evaluate each action, noting which actions become un-attractive or no longer possible because of a preceding action, and use this information to evaluate each pathway
g. Use the results of the evaluation to select a preferred adaptation pathway

We consider the application of Adaptation Pathways in three case-examples: the development of the strategic flood risk management plan for the Thames Estuary in London (UK); a strategic project in Singapore to protect coastal infrastructure from the potential effects of climate change including sea level rise and an increase in future rainfall, and research for the UK Committee on Climate Change (CCC) (2018) to consider the application of adaptation pathways for coastal change management (Figure 1).

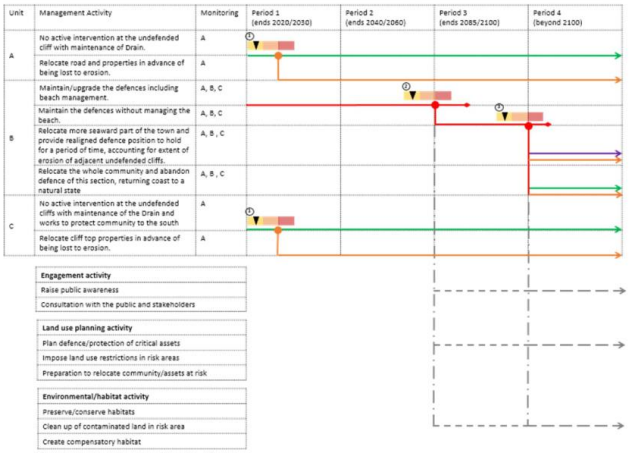

Figure 1 - Sample output from the CCC study.

The paper will give insights into these previous applications of these tools and set out recommendations for their application to the challenges facing coastal communities worldwide.

REFERENCES

Committee on Climate Change (2018) Managing the coast in a changing climate. Unpublished report.