

Coastal Resilience

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Introduction

The Coastal Resilience Model was developed to help make the concept of resilience an operational tool. This uses a set of Performance Measures to define a Coastal Resilience Index, thereby providing a way of measuring progress towards enhancing coastal resilience, as we adapt to future changes. The Performance Measures are combined using a set of stakeholder weightings that reflect the varying importance that different stakeholders place on the contributions that make up the Coastal Resilience Index. This is necessary when seeking to quantify performance across the complex and interacting social, economic and environmental domains.

The purpose of the portal (Figure 3) is to allow users to explore (i) the implications of future change on local and national resilience and (ii) their own view of the relative importance of the Performance Measures that make up the Coastal Resilience Index. By exploring the influence of these weightings it is hoped that Stakeholders can develop a shared understanding of what is important for coastal communities.

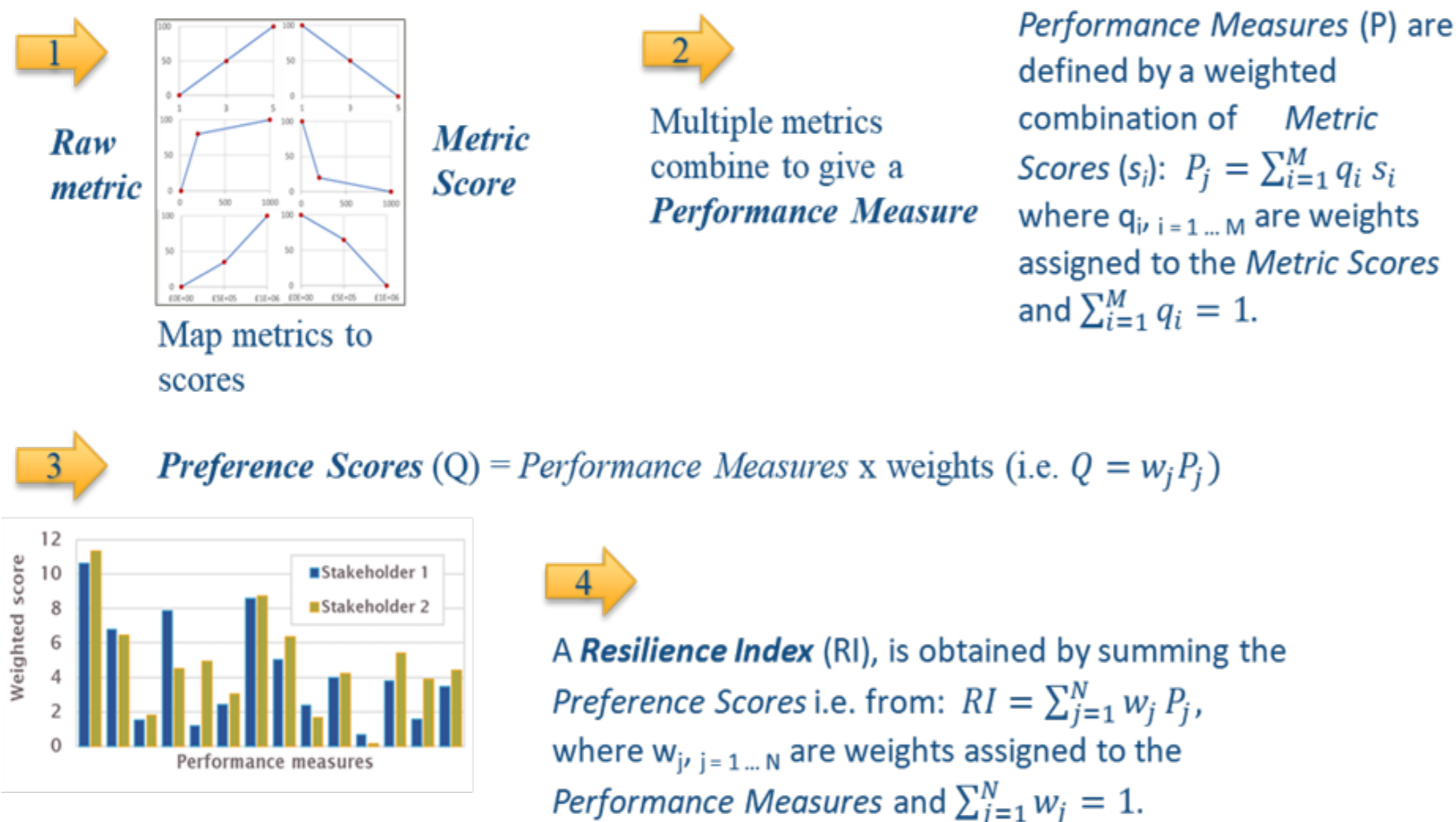


Figure 2: Steps used to calculate a Resilience Index from a set of Metrics, by first converting the raw metrics to scores, combining them into performance measures and using the stakeholder weightings to establish Preference Scores, which are summed to give the Resilience Index.

Methodology

The **Coastal Resilience Model** was one of the outputs from the UK Climate Resilience Programme, funded by UKRI. The 'CoastRes' project examined how an operational interpretation of resilience might be applied to the coast, building on existing approaches to Shoreline Management. With a stated objective of seeking to enhance coastal resilience the project explored how to quantify resilience to reflect the contributions made by the social, economic and environmental dimensions of resilience. The overall process is summarised in Figure 1. This shows how the raw data (Metrics) are first mapped over the range of the data, such that all data values can be given a Score between 0 and 100. This conversion can be linear or bi-linear in the current model and the user can adjust the change point of a bi-linear mapping. These metrics are combined to give a performance measure, using a set of weights that reflect the contribution each metric is thought to make towards the various measure of performance. Each performance measure is intended to reflect progress to at least one of the objectives that collectively contribute to the aim of enhancing resilience. The creation of metric scores and measure weights requires detailed consideration of each metric and the underlying data. This aspect is therefore the subject of ongoing research to identify a more rigorous methodology. The option to change these settings provides the ability to explore the relative importance of the various metrics.

The way in which the Performance Measures are combined to give a Resilience Index, also makes use of weightings. Applying a weighting to a Performance Measure results in a Preference Score. This reflects the Users/Stakeholders view of the contribution that a specific Performance Measure makes towards the delivery of Coastal Resilience. The resulting Performance Scores are summed to give the Resilience Index. The steps in the calculation are summarised in Figure 2.

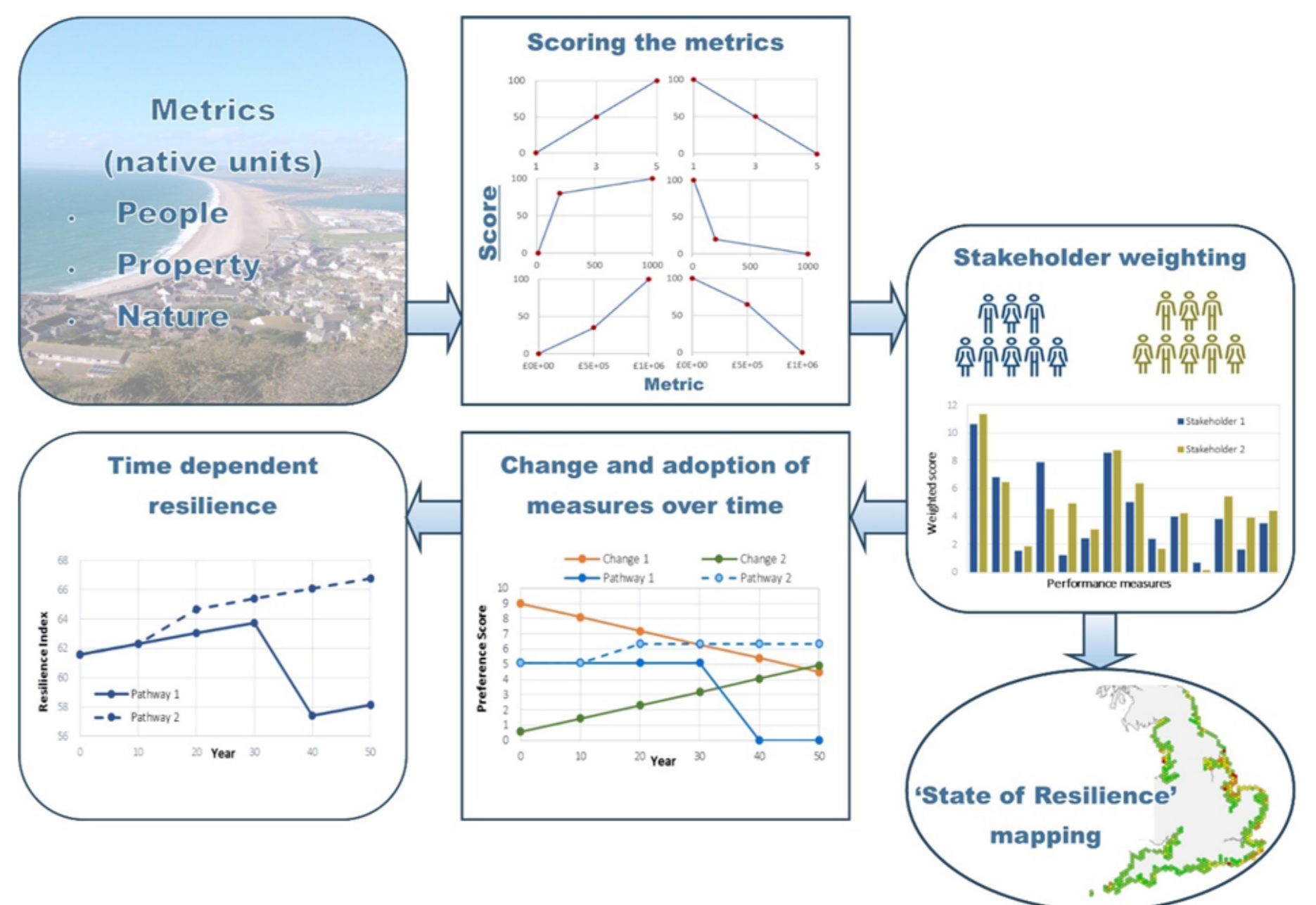


Figure 1: Summary of method to quantify Coastal Resilience

Study Outputs

Detailed background documentation is available on-line:

- Reports on the development of the Coastal Resilience Model can be found at: <https://coastalmonitoring.org/ccoresources/coastalres/>
- A summary of the concepts being used and some preliminary results is given in: <https://doi.org/10.1016/j.scitotenv.2021.146880>
- The demonstration model (Excel spreadsheets) is available at: <https://doi.org/10.5255/UKDA-SN-854523>
- Issues related to the data available and future data requirements are discussed in: <https://doi.org/10.1139/anc-2020-0023>

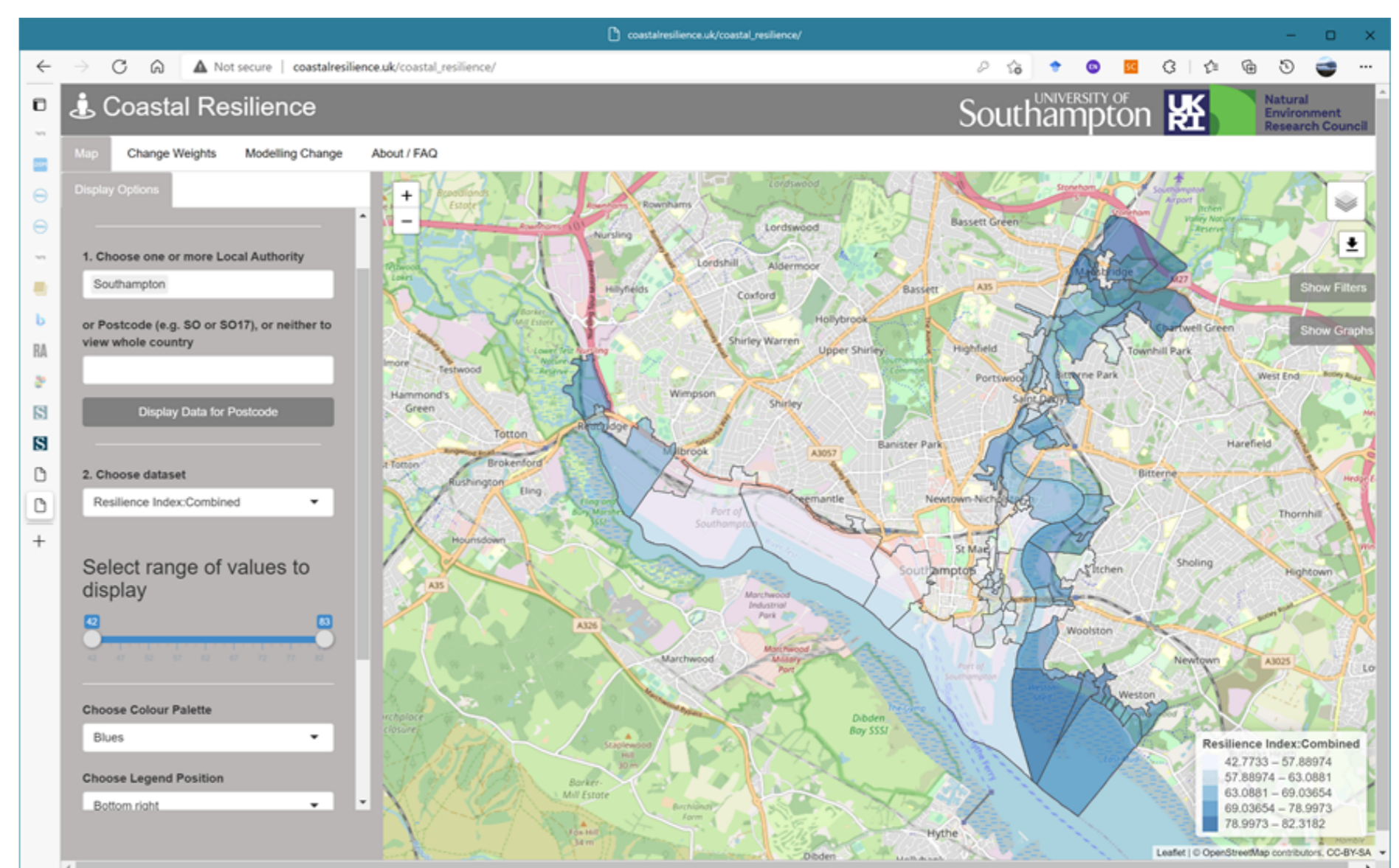


Figure 3: Coastal Resilience Portal

http://coastalresilience.uk/coastal_resilience/ - developed by Ian Waldock at GeoData

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