Te Hunga Takutai o Aotearoa
NEW ZEALAND
COASTAL SOCIETY

Abstract Submission Form

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Coastal Receiving Environment Scenario Tool (CREST)

DHI has developed the Coastal Receiving Environment Scenario Tool (CREST) to visualise and scenario-test changes in coastal health linked to contaminants, revealing the link between catchment sources and contaminant sinks, across estuary/harbour environments. CREST enables variation in coastal health to be interactively mapped, transparently demonstrating the impacts of local (catchment) activities on local (sub-basin), albeit integrated across the broader coastal receiving environment.

CREST extends from coupled catchment-coastal hydrodynamic modelling. Typically, continuous time series of discharges and pollutant loads from surrounding sub-catchments are input into a wave and tide-forced hydrodynamic model to simulate transport and fate of terrestrial contaminants (through advection and dispersion processes). From this, a catchment-to-coast connectivity matrix is developed across the integrated coastal model domain.

CREST facilitates collaboration and stakeholder decision-making, allowing users to quickly process complex information about coastal health, including:

- "Sensitivity" to catchment resource use – contribution catchments make to sub-basin received loads of contaminant (e.g., transport of contaminants)
- "Health" under catchment resource use – variation in water and sediment-column based concentrations within sub-basin (e.g., fate of contaminants)

CREST is well suited to decision-making for catchment remediation, integrated resource management and consenting decision-making. In collaboration with Auckland Council (Healthy Waters), DHI coupled CREST with the novel Freshwater Management Tool (FWMT) to provide an integrated (mountains-to-sea), resolute (process-based, continuous) digital twin of the Manukau and Waitematā harbours (for hydrodynamic responses to sediment, nutrient and heavy metal inputs from land).

This presentation will provide an overview of the systems design and visible power of an integrated, coastal health digital twin approach in Auckland Council (CREST-FWMT).

Combining DHI's hydrodynamic toolbox and Auckland Council's FWMT dynamic tools, has created a novel solution able to model baseline and broader scenario changes (e.g., under alternate land management and use, network investment and/or altered climate futures).

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