

CASM FILLS A GAP IN CATCHMENT WATER QUALITY MODELLING

CASM Contaminant Allocation & Simulation Model



The NPS for Freshwater Management sets out the policy framework for the management of NZ's freshwater into the future. Regional councils are required to manage contaminants by establishing a freshwater quality accounting system when setting or reviewing objectives and limits, and setting enforceable load limits for contaminants entering water bodies. Limits need to be set using the best available scientific and socio-economic information.

To meet these requirements, regional councils and other stakeholders need effective modelling tools. Existing tools are generally either highly simplistic, customized spreadsheet applications that lack in predictive power or transferability; or they are overly complex mechanistic catchment water quality models, lacking in spatial resolution and usability.

CASM – A MODELLING SOLUTION

Streamlined Environmental's Contaminant Allocation & Simulation Model (CASM) is designed to overcome the above limitations.

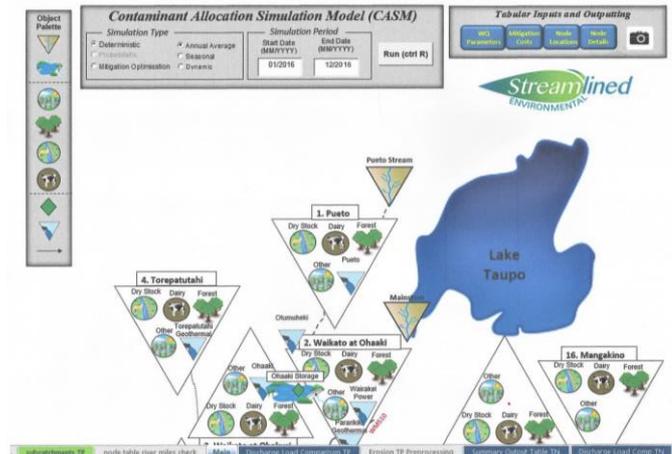
CASM is a catchment modelling tool for simulating both diffuse and point-source pollution at a catchment scale. CASM:

- can simulate a wide range of contaminants;
 - allows for easy investigation of mitigations;
 - has a graphical interface that is easy to navigate;
 - offers 3 different modes of simulation: deterministic, stochastic, and optimisation;
- can be implemented at multiple scales from large catchments to individual properties;
 - is spatially and temporally variable at differing levels of resolution (e.g. lumped vs. node-based; annual average vs. seasonal), as required;
 - is highly portable and requires only standard MS Office installation;
 - is based on the Excel platform, which will be familiar to most end users;
 - is great for stakeholder engagement – the graphical interface allows stakeholders to “see” where they are within a catchment and how reducing contaminant loads from their property will contribute to meeting catchment objectives;
 - can be used to fulfil the contaminant accounting requirements of the NPS-FM;
 - allows contaminant allocations and trade-offs between users to be explored.

MITIGATION AND OPTIMISATION

An objective of any limit-setting process usually involves reducing contaminant loads to meet water quality objectives at various locations in the catchment.

CASM translates estimates of on-farm, edge-of-field and instream load reductions associated with specific mitigation options into cumulative impacts, in the form of both total load and average contaminant concentrations, at key downstream locations. Model simulations can be performed to investigate the extent to which any given mitigation strategy will achieve water quality targets throughout the catchment. CASM's optimisation module can identify the best way (types and placements of mitigations) to achieve receiving-environment objectives while minimising mitigation costs.



STOCHASTIC MODE OF SIMULATION

CASM's stochastic mode of simulation can provide valuable information regarding the levels of uncertainty associated with load and concentration projections, as well as the range of variability around modelled water quality objectives. Rather than single value outputs, stochastic simulations present output in terms of exceedance probabilities (or "risk"). Simple probability distributions can be defined for both load and attenuation input parameters. Internally, the model randomly samples the prescribed input distributions for a user-defined number of iterations, storing calculated outputs for each iteration and fitting percentile distributions to the final output sets. This form of output can be extremely useful for decision-making.

AUTO-CALIBRATION

CASM offers a one-click "auto-calibration" option for easy model setup. The software applies a rigorous fitting algorithm to fit modelled output with measured data at specified locations by systematically adjusting assumed model attenuation coefficients (the primary calibration parameters in the model). This feature may be especially appealing for non-expert users.

CLIENTS GET A FULLY OPERATIONAL MODEL

We don't just provide a report – we also provide the implemented model as fully functioning software together with a user's manual. Training can also be provided. This enables clients to run their own scenarios without needing to pay additional consulting fees.

A PROVEN EFFECTIVE PLANNING TOOL

CASM's maiden application was in support of Waikato Regional Council's Healthy Rivers Plan Change 1 (PC1) process. CASM was implemented for the entire Waikato River catchment and used to simulate the generation, fate, and transport of nitrogen and phosphorus through a dendritic network of the catchment's major tributaries. CASM gained general acceptance as a supporting tool in the planning process and was used to investigate, among other things, current load contributions by industry (landuse) sector and spatial sub-catchment, uncertainty in model projections, and the feasibility of achieving stated PC1 targets.

CONTACT US FOR A DEMONSTRATION OR FOR MORE INFORMATION

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