What is MTM?

Manaaki Taha Moana (MTM) is a research programme to restore and enhance coastal ecosystems and their services of importance to iwi/hapu, through a better knowledge of these ecosystems and the degradation processes that affect them.

We utilise Western Science and Mātauranga Maori knowledge and participatory modelling tools and processes to assist iwi/hapu to evaluate and define preferred options for enhancing/restoring coastal ecosystems. This evaluation of options is assisted by innovative IT and decision support tools (e.g. digital libraries, simulation modelling, interactive mapping, 3D depiction, real-time monitoring).

Action plans are being produced for improving coastal ecosystems in each rohe.

The research team works closely with iwi/hapu in the case study regions to develop tools and approaches to facilitate the uptake of this knowledge and its practical implementation.

Mechanisms will also be put in place to facilitate uptake amongst other iwi throughout NZ.

Research Providers:

School of People Environment and Planning, Massey University

Taiao Raukawa Trust

Manaaki Te Awanui Trust

Waka Digital Ltd

Cawthron Institute

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MANAAKI TAHA MOANA: ENHANCING COASTAL ECOSYSTEMS FOR IWI

MTM Report No. 4

Mediated Modelling of Coastal Ecosystem Services:

A case study of Te Awanui Tauranga Harbour

The Mediated Modelling (MM) component of the Manaaki Taha Moana (MTM) project brought together about 20 key stakeholders for a series of five workshops between November 2010 and May 2011. These workshops were organised around the facilitated construction of a system dynamics model (using STELLA software) to support a complex dialogue about the Tauranga Harbour and its Ecosystem Services.

The goal of the MM process was two-fold:

• A scoping exercise to identify the major research gaps about the state of Tauranga Harbour, thereby helping inform the selection of ongoing case studies in the MTM research programme;

• To provide a neutral space for a broader dialogue among a network of diverse stakeholders, who often meet in contentious processes, through which they could learn from each other, and use the ongoing fact-based dialogue to develop an initial model of the social, cultural, economic, and ecological aspects of Tauranga Harbour, and the interactions of these different aspects.

The majority of participants at the first two workshops agreed that the model should answer the following key questions:

1. What are the three processes or factors that most threaten the health of the Harbour (i.e., what are the causes of the three most worrying symptoms?

2. What are the desired outcomes and indicators of a sustainable Harbour with respect to four aspects of well-being?

3. What are the solutions for ecosystem restoration (what, when, who, and how?) to the identified processes or factors that most threaten the health of the Harbour that can make an impact, and how much of an impact can they make?

4. What social values can we modify to help implement the solutions in Q3?

These questions are very broad and merely provided the context for the model building and subsequent scenarios development.
The answers to the above questions (with minor edits) were:

1. The three major issues (symptoms) that emerge are: 1) sedimentation; 2) eutrofication; 3) loss of taonga species such as kaimoana, habitat. The three driving processes/factors that cause these issues are: 1) increased industrial/economic activity; 2) coastal development and urban pressures and associated pollution; 3) system not "counting" ecosystem services.

2. *Ecological:* Water in the Harbour must be of the same quality as that at the uppermost part of catchment, i.e. clear, drinkable, sustains life.
Social: Valued uses of the Harbour can still occur, e.g., fishing. Managing social systems reliant on the Harbour, such as the ability to collect kaimoana, are intact.
Cultural: Mauri of the Harbour is sustained through kaitiakitanga
Economic: The value of ecosystem services is accounted for in the economic system, with appropriate incentives and regulations, so that use of ecosystems is sustainable and does not erode the natural capital on which the economy depends, thus enabling ongoing but sustainable "economic" activity in the region.

3. Future research is recommended to better understand the role of wetlands, mangroves and salt flats as intertidal habitats with potential to accumulate sediments and filter nutrients, acknowledging that such areas may also release sediments and nutrients to the Harbour through cutting or storm events. "Users" of ecosystems or groups/industries that benefit from ecosystem services provided by the Harbour contribute to the maintenance/restoration of those ecosystems, for example, through funds set up specifically for ecosystem services, via taxation or levies on ecosystem goods and services. The system is adapted via incentives/taxes either to encourage individuals/groups to engage in restoration efforts, or to limit unsustainable use of ecosystems.

4. Better integration, so people can see the "whole picture" and how different parts of the system influence other parts; for example, how economic/social/cultural activities impact on the environment, and vice versa. Society needs to become aware that the services they get from ecosystems have values that they will need to support to ensure sustainable natural capital levels. People need to understand the system more clearly, including interactions between parts of the system, how economic/social activities impact on ecosystems, and how ecosystems provide "services".

The workshops were therefore structured to address these questions, to provide more detail of the primary pressures driving ecosystem decline, and to identify actions that currently are or could be implemented, to restore important Harbour ecosystems. The focus was on identifying 'indicators'. As such indicators reflect the most important factors through which their change over time could be represented in a model that would link various indicators in order to assess the overall functioning of the Harbour. The goal was to understand better how Tauranga Harbour behaves as an integrated system that changes over time.

A summary of the workshop discussions, and the contributions offered from participants about the Harbour, was made publicly available on the MTM website and was used as the basis for ongoing development of the model itself between workshops. Thus, participant contributions at the workshops enhanced the stocktake of existing knowledge about the state of Tauranga Harbour.

Much of the value of the MM process is in the dialogue between participants about what is really going on in the Harbour and the associated co-learning among participants as they hear each other's points of view and experiences. The model-building process aims both to help structure such complex dialogue, and to interlink issues that are otherwise often discussed in a fragmented manner. At a highly aggregated level, the model describes some land-use changes and the ecosystem services affected by such changes. The model aims to connect a growing GDP with a loss in ecosystem service values, which raises the question of whether or not "real" value is being added to the region by current 'economic activities being undertaken in this interdependent system of Tauranga Harbour. A detailed description of the model can be found in Appendix 1.

Participants were surveyed before and after the MM workshops, and a comparison of pre- and post- survey responses was used to help evaluate the perceived value of the MM process. At the final workshop 8 findings, 19 recommendations, and 5 actions were developed. Among the more significant outcomes is that the participant group unanimously scheduled a follow-up workshop to take place in the middle of the year to arrange a self-organising ongoing group (without requiring leadership from the MTM programme) to maintain the momentum created through the MM process, and to enable ongoing input into decision making about the Harbour.