

Tauranga Moana, Tauranga Tangata

A Framework for Development of a Coastal Cultural Health Index for Te Awanui, Tauranga Harbour



Manaaki
Taha Moana

Manaaki Taha Moana: Enhancing Coastal Ecosystems for Iwi Report 16, June 2014

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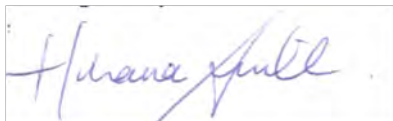
A Framework for Development of a Coastal Cultural Health Index for Te Awanui, Tauranga Harbour

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Mihimihi

Kōrihi te manu
Tākiri mai te ata
Ka ao, ka ao, ka awatea
Tihei mauriora!

Ki a rātau kei tua o te ārai,
Ahakoa, kua moe ngā whatu
Kei te rere tonu ngā kōrero,
Kei te ora tonu ngā kōrero
Nā reira, mihi mai rā

Tātau e pīkau nei i ngā āhuatanga o te ao tūroa
tātau e kawē nei i ngā wawata o rātau mā
Kei te mihi

Ka huri ngā mihi ki ngā hapū e hāpai ana i te kaupapa rangahau nei
Ki ngā mōrehu o Ngāti Taka
Ki Te whānau a Tauwhao ki Otawhiwhi
Ngā puna mātauranga, ngā puna kōrero
Nā koutou kē nga mōhiotanga, ngā māramatanga kua heke iho nō rātua mā
Nā reira ka mihi kau atu ki a koutou katoa

Ka rere tōnu ngā mihi ki te kaupapa
Ko te kaupapa he mea rangatira
He whakapiringa kōrero, he hononga tangata
Nā reira e te kaupapa ka mihi

Executive Summary

This Coastal Cultural Health Index (CCHI) for Te Awanui was developed as part of the Manaaki Taha Moana (MTM) research programme. MTM aims to “restore and enhance coastal ecosystems and their services of importance to iwi, through a better knowledge of these ecosystems and the degradation processes that affect them”.

The CCHI for Te Awanui project builds on previous research to construct an index capable of evaluating the health of Te Awanui or Tauranga Harbour from a tangata whenua perspective. The CCHI project hopes to enable iwi and hapū, to better monitor the health of the harbour from a unique indigenous perspective. Ideally, the CCHI will provide a basis for monitoring changes in the future, with a focus on areas of major degradation or biodiversity hotspots.

This report is the first of two CCHI reports for Te Awanui that will both examine the use of mātauranga Māori as a tool for building integrative environmental monitoring strategies. This report seeks to develop and apply a cultural framework that will guide the design of cultural indicators. Te Kupenga Tairoa is the cultural framework developed for the CCHI for Te Awanui project. This framework outlines the processes and methodologies used to develop relevant and meaningful cultural indicators. The framework acknowledges the value of mātauranga Māori and aims to identify and incorporate mātauranga Māori unique to hapū and iwi. The framework aims to provide a uniform, user-friendly approach to evaluating the cultural environments of Te Awanui.

This report incorporates the first three (of five) sections of the Te Kupenga Tairoa Framework. The first section: Nga Taura Here involved an extensive literature review of documents and traditional accounts with particular relevance to cultural perceptions of Te Awanui. The literature review aimed to identify the major causes and effects of environmental change within the marine environment and more importantly, identify the associated impacts to traditional values. Major themes highlighted from Nga Taura Here included changes within the marine environments, mahinga mataitai and cultural practices. An extensive literature review was also conducted on environmental performance indicators used in New Zealand. This information provided a base line for the synthesis of CCHI indicators.

The second stage: Te Kupenga highlights the uniqueness of hapū relationships within their rohe moana. Two hapū from Te Awanui (Te Whanau a Tauwhao ki Otawhiwhi and Ngāti Taka) participated as case study groups. Both case study groups outlined similar concerns as those raised in the literature review. The major themes were further reinforced by specific examples which were distinct to the case study areas.

Section three of the framework: Ngā Punga revised and integrated sections one and two of the framework. A suite of cultural indicators were identified with reference to previous cultural indicator literature. Indicators developed within this section were finalised under three main sections:

1. **Environmental Evaluation:** identifies cultural indicators that can be used to evaluate environmental issues such as pollution sources, sedimentation, erosion and biological impacts on natural marine ecosystem and taonga species.
2. **Mahinga Mātaaitai Evaluation:** identifies cultural indicators that can be used to evaluate the significance of mahinga mātaaitai and taonga species from a cultural and environmental perspective.
3. **Cultural Evaluation:** identifies cultural indicators that emphasize the unique relationship Tangata Whenua have with Te Awanui. Cultural evaluation includes identification of indicators that can be used to assess the capacity of Tangata Whenua to perform traditional and cultural functions regarding manaaki and kaitiakitanga.

As mentioned earlier this report precedes a second CCHI for Te Awanui report. The second report will further refine CCHI for Te Awanui. From the draft CCHI, numerical indices will be formulated to enable quantification and analysis of CCHI. Methods and framework design will be further refined in order to ensure a user-friendly, transferable monitoring tool kit.

Table of Contents

| | |
|--|-----------|
| Mihimihi..... | i |
| Executive Summary | ii |
| 1 The Manaaki Taha Moana (MTM) Project..... | 1 |
| 1.1 MTM Objectives..... | 1 |
| 1.2 Coastal Cultural Health Index & MTM..... | 2 |
| 2 Introduction | 3 |
| 2.1 Aims and Objectives..... | 3 |
| 2.2 Study Area/ Methods | 4 |
| 2.2.1 Study Area, Tauranga Moana..... | 4 |
| 2.2.2 Methods | 5 |
| 2.3 Ko Te Kupenga Tairoa: Coastal Cultural Health Index (CCHI) Development Framework..... | 6 |
| 2.4 Principles of Mātauranga Māori Research | 8 |
| 2.4.1 Manaaki Taha Moana Principles of Kaupapa Māori Research | 8 |
| 3 TE TAURA HERE: Literature Review | 12 |
| 3.1 Aims and Objectives..... | 12 |
| 3.2 Methods | 12 |
| 3.3 Mātauranga Māori and Te Awanui..... | 13 |
| 3.3.1 Mātauranga Māori | 13 |
| 3.3.2 Mātauranga Māori and the Environment..... | 14 |
| 3.3.3 Te Awanui, Tauranga Harbour | 16 |
| 3.4 Tangata Whenua Concerns | 18 |
| 3.4.1 Lack of Consultation | 18 |
| 3.4.2 Environmental Issues | 19 |
| 3.4.3 Mahinga Mataitai Concerns..... | 23 |
| 3.4.4 Cultural Concerns | 24 |
| 3.5 Environmental Performance Indicators | 26 |
| 3.5.1 Environmental Performance Indicators and Environmental Guidelines in New Zealand | 26 |
| 3.5.2 Environmental Performance Indicators or Tohu | 28 |
| 3.6 Case Studies for Cultural Health Indicators | 30 |
| 3.6.1 Fresh Water Case Studies..... | 31 |
| 3.6.2 Marine and Estuarine Case Studies..... | 35 |
| 3.6.3 Combined Freshwater, Marine and Estuarine Case Studies | 41 |
| 4 TE KUPENGA Tauranga Moana, Tauranga Tangata Customary Case Studies... 44 | 44 |
| 4.1 Aims and Objectives..... | 44 |
| 4.2 Methods and Analysis | 44 |
| 4.2.1 Case Study Areas..... | 44 |
| 4.2.2 Hapū Consultation Protocol | 46 |
| 4.2.3 Hapū Data Management..... | 47 |
| 4.2.4 Analysis | 47 |

| | | |
|----------|--|-----------|
| 4.3 | Tangata Whenua Concerns | 47 |
| 4.3.1 | Environmental Concerns | 47 |
| 4.3.2 | Mahinga Mataitai Concerns | 52 |
| 4.3.3 | Cultural Concerns | 54 |
| 4.3.4 | Summary | 56 |
| 5 | NGA PUNGA Collaborative Analysis/Draft CCHI | 57 |
| 5.1 | Aims and Objectives | 57 |
| 5.2 | Methods | 57 |
| 5.3 | Environmental Evaluation | 57 |
| 5.3.1 | Pollution Source | 57 |
| 5.3.2 | Sedimentation | 60 |
| 5.3.3 | Erosion | 61 |
| 5.3.4 | Biological Influx..... | 62 |
| 5.4 | Mahinga Mataitai Evaluation | 63 |
| 5.5 | Cultural Evaluation | 65 |
| 5.5.1 | Traditional Sites | 65 |
| 5.5.2 | Cultural Practices..... | 66 |
| 5.5.3 | Kaitiakitanga Indicators..... | 67 |
| 5.5.4 | Economic Indicators..... | 68 |
| 5.6 | Summary | 69 |
| 6 | Conclusion | 70 |
| 7 | References | 71 |
| 8 | Glossary | 81 |
| 9 | Appendix | 91 |

List of Figures

| | |
|--|----|
| Figure 1: Map of Tauranga Harbour | 5 |
| Figure 2: Map of the rohe/rohe moana of Te Whanau a Tauwhao ki Otawhiwhi | 45 |
| Figure 3: Geographical map showing the rohe/rohe moana of Ngāti Taka | 46 |

List of Tables

| | |
|---|----|
| Table 1: Overview of Te Kupenga Tairoa | 7 |
| Table 2: Environmental Observations from Hapū and Iwi of Te Awanui | 22 |
| Table 3: Hapū and Iwi observations of Te Awanui Mahinga Mātaaitai | 23 |
| Table 4: Hapū and Iwi observations of Te Awanui Cultural Issues | 25 |
| Table 5: Environmental issues concerning Ngāti Taka and Te Whanau a Tauwhao | 52 |
| Table 6: Ngāti Taka and Te Whanau a Tauwhao concerns regarding Mahinga Mataitai | 54 |
| Table 7: Ngāti Taka and Te Whanau a Tauwhao cultural concerns | 55 |

1 The Manaaki Taha Moana (MTM) Project

Manaaki Taha Moana (MTM) is a six-year programme, running from October 2009 to September 2015, with research being conducted primarily in two areas: Tauranga moana and the Horowhenua coast. This programme builds upon Massey University's previous research with Ngāti Raukawa in the lower North Island: Ecosystem Services Benefits in Terrestrial Ecosystems for iwi.

Professor Murray Patterson of Massey University is the Science Leader of MTM. A number of different organisations are contracted to deliver the research: Te Manaaki Te Awanui Trust in the Tauranga moana case study; Te Reo a Taiao Ngāti Raukawa Environmental Resource Unit (Taiao Raukawa); WakaDigital Ltd; Cawthron Institute; and Massey University. The research team seeks to engage with local communities and end users through a variety of means. Readers are encouraged to visit the MTM programme website (<http://www.mtm.ac.nz>) to read more about this research programme.

1.1 MTM Objectives

MTM's central research question is: — how can we best enhance and restore the value and resilience of coastal ecosystems and their services, so that this makes a positive contribution to iwi identity, survival and welfare in the case study regions? Accordingly, our research aims to restore and enhance coastal ecosystems and their services of importance to iwi/hapū, through a better knowledge of these ecosystems and the degradation processes that affect them.

The MTM teams utilize both western science and mātauranga Māori knowledge, to assist iwi/hapū to evaluate and define preferred options for enhancing/restoring coastal ecosystems. This evaluation of options will also be assisted by the development of innovative Information Technology and decision support tools.

The research team works closely with iwi/hapū in the case study regions to develop tools and approaches which facilitate the uptake of this knowledge and its practical implementation. Mechanisms will also be put in place to facilitate uptake of knowledge amongst other iwi throughout New Zealand. The key features of this research are: that it is cross-cultural, interdisciplinary, incorporates applied problem solving, technologically innovative and integrates the ecological, environmental, cultural and social factors associated with coastal restoration.

Coastal Cultural Health Index and MTM

The following report aims to establish a monitoring tool to enable iwi and hapū to assess the marine and coastal environment of Te Awanui, Tauranga Harbour. This project has been carefully coordinated to incorporate the three outlining objectives of the MTM project:

Objective 1: Develop a knowledge base of coastal ecosystems and their services in the two case study regions.

Objective 2: Determine how to enhance and restore specified coastal ecosystems and their services in the case study regions.

Objective 3: Implementation and benefit transfer to other Iwi.

The CCHI project aims to build a baseline of knowledge for hapū and iwi by intertwining hapū mātauranga, temporal knowledge and cultural links to the marine and coastal environment of Te Awanui.

This knowledge base will provide the foundations for creating an index that will allow iwi and hapū to evaluate the health of their coastal environments. In doing so, this will provide hapū and iwi with the tools to empower and enhance kaitiakitanga and tino rangatiratanga within their own rohe moana. Furthermore, application of the CCHI can be extended to create a network of hapū assessments, which will enable a cultural evaluation of the health of Te Awanui as a whole.

2 Introduction

The estuarine environment of the Tauranga Harbour has undergone rapid ecosystem change. Many changes have resulted from extensive land modification to support population growth and economic expansion of the Tauranga region. Like other coastal areas in similar settings, the need to preserve the environmental integrity of Tauranga Harbour is a high priority for all stakeholders. There is growing awareness regarding the value of integrated environmental management programmes. By recognising a range of perspectives and knowledge sets, the overall health of the harbour can be more accurately portrayed.

Iwi and hapū have a long history and connection with their environment, which is reflected in their cultural values and their affinity to the Tauranga Harbour. The Resource Management Act (RMA 1991) emphasises the unique relationship Māori have with their environment and requires that decision makers show particular regard to concepts such as kaitiakitanga and stewardship. These concepts have been developed through the Ministry for the Environment's Environmental Performance Indicator (EPI) Programme, in the form of cultural indicators. They are used to assess environmental conditions of prioritised environmental areas.

Previous use of cultural indicators have helped to convey cultural values, assess the state of the environment from a kaitiaki perspective, and assist with establishing a role for Māori in environmental monitoring, policy development and decision-making. Further, cultural indicator programmes have helped in management, mitigation and enhancement strategies, aimed at preservation and retention of environmental integrity.

2.1 Aims and Objectives

This report aims to provide hapū and iwi of Te Awanui with a practical guide for developing a Coastal Cultural Health Index (CCHI) that can be used to acknowledge and value mātauranga Māori as an environmental management tool.

The Coastal Cultural Health Index (CCHI) for Te Awanui is primarily designed as a monitoring tool for iwi and hapū use. The objective is to ensure that Tangata Whenua can build robust and justifiable information on the health of Te Awanui using a set of dynamic cultural indicators to assess its environmental integrity.

In addition, the CCHI will be capable of forming baseline information from a cultural perspective. The baseline information will aid hapū and iwi with environmental management roles such as;

- Exercising kaitiakitanga
- Developing iwi/hapū management plans
- Developing iwi/hapū based State of the Environment (SOE) reports
- Identifying environmental trends sensitive to Māori values
- Identifying areas for enhancement and rehabilitation

- Comparing with western forms of science and possibly using the science to validate mātauranga Māori
- To liaise with local and regional government representatives to aid in policy making decisions.

It is intended that the CCHI for Te Awanui will develop a basis for monitoring changes in the future. Monitoring will focus on areas of major degradation or biodiversity hotspots within Tauranga Harbour from a cultural perspective. In addition the CCHI will be used as an analytical monitoring tool, to express environmental issues that Tangata Whenua of Te Awanui have continually dealt with over time.

The aims of the Coastal Cultural Health Index for Te Awanui are to:

1. Value the use of Māori as a viable resource in which to establish effective monitoring initiatives for hapū and iwi,
2. Create an index that can assess the environmental integrity of Te Awanui,
3. Create an index that can portray the spiritual and temporal links hapū and iwi have with Te Awanui,
4. Create an index that has transferable applications both locally and nationally, and
5. Create a framework for developing a Coastal Cultural Health Index.

2.2 Study Area/ Methods

2.2.1 Study Area, Tauranga Moana

Te Awanui is a large estuary (approximately 200 km²) located on the western edge of the Bay of Plenty on New Zealand's North Island (37° 40'S. 176° 10'E) (Inglis *et al*, 2008). The Harbour is protected from the Pacific Ocean by a barrier island (Matakana Island), and two barrier tombolo's, Bowentown at the northern entrance and Mount Maunganui (Mauao) to the south (Park, 2010).

Large intertidal flats in the central area, Matahui, separate the two harbour basins. At mean high water the Katikati (northern) basin has an approximate volume of 178 million m³ and the Tauranga (southern) basin a volume of 278 million m³ (Park, 2009). While the two basins are connected, there is little water exchange between the two (Barnett, 1985; de Lange, 1988). Some reports mention a third smaller basin that includes several bays and sub-estuaries (Park, 2003), this refers to the estuarine area to the south of the Port of Tauranga. Within the harbour are smaller estuarine inlets such as the Waipu, Te Tāhuna o Rangataua, Te Tehe (Welcome Bay) and Waimapu Estuary.

The two entrances to the harbour are located at either end of Matakana Island, the southeastern Tauranga entrance can generate a tidal flow up to four knots and the northwestern Katikati entrance can generate up to seven knots (Ellis *et al.*, 2008). Both harbour entrances are approximately 800 m across, with tidal scour ensuring that deep channels are maintained (Inglis *et al.*, 2008). The remainder of the harbour is shallow, typically less than 10 m deep, with intertidal flats comprising approximately 66% of its total

area (Inglis *et al.*, 2008). Tidal currents and wind-generated waves dominate the hydrodynamics of the harbour (Davies-Colley and Healy, 1978) and tidal flows have a residence time ranging from a few hours up to a month (Heath, 1976).

The Tauranga Harbour catchment covers 1,300 km² and receives discharges from many separate catchments originating in the Kaimai-Mamaku range (Meeuwen-Dijkgraaf; Shaw & Mazzieri, 2010). The northern harbour catchments cover an area of 270 km², while the southern harbour catchments cover 1,030 km² (Sinner *et al.*, 2011).



Figure 1: Map of Tauranga Harbour

2.2.2 Methods

This report outlines the framework used to develop a set of Coastal Cultural Health Index (CCHI) for Te Awanui. Methods involved identifying relevant environmental issues through written and oral resources that have been collated, observed and recorded over a period of time by Tangata Whenua of Te Awanui. A collaborative study of two case study groups: Ngāti Taka (southern basin) and Te Whānau o Tauwhao (northern basin) was conducted to further define hapū specific environmental and cultural issues. From these issues a set of draft CCHI for Te Awanui were developed.

This report provides the foundations for a set of draft CCHI for Te Awanui, which will later on be used in a CCHI pilot study. The pilot study will further consolidate and refine a

customised set of indicators. The final set of CCHI will be presented in a CCHI tool kit for iwi and hapū of Te Awanui. The tool kit will enable individual hapū and iwi to identify, evaluate and monitor their cultural environment. Alternatively, the CCHI tool kit will provide guidelines and processes to further customise or adapt the CCHI to the individual requirements of each hapū or iwi.

2.3 Ko Te Kupenga Tairoa: Coastal Cultural Health Index (CCHI) Development Framework

In order to effectively administrate and manage the projects aims and objectives, the CCHI development is guided by the Te Kupenga Tairoa framework, which is divided into five complementing components (Table 1). Te Kupenga Tairoa will provide Tangata Whenua with a process to exercise tino Rangatiratanga and empower kaitiakitanga within their own rohe moana of Te Awanui.

The objectives of Te Kupenga Tairoa are:

1. To provide a detailed framework to guide and manage the progress of the CCHI for Te Awanui Project.
2. To provide a detailed transferable framework, that can be utilised for different coastal environments or other iwi and hapū groups.

A kupenga is a traditional fishing net used by people of Te Awanui, for gathering species such as kanae (mullet), kahawai, tāmure (snapper) and pātiki (flounder). Traditionally specific rituals and restrictions guided the construction of kupenga. Most nets were made of green flax, and ranged in size depending on the area and target species. The kupenga structure differed depending on the environmental requirements; however the basic components were similar. The CCHI for Te Awanui framework is based on the basic structural components of the traditional kupenga:

1. **Te Taura Here:** The rope that binds and holds the kupenga to its foundations. This signifies the initial information collection, assimilation, and synthesis of traditional and western information both past and present.
2. **Te Kupenga:** The net that captures and holds the fish. This signifies the collaborative assimilation and collection of traditional hapū based mātauranga.
3. **Ngā Punga:** Sinkers attached to the base of the kupenga used as anchors. This signifies the development of a set of founding draft CCHI that will be used as a basis for further refinement.
4. **Ngā Pōito:** Floats used to hold the kupenga in suspension. This signifies the launching of the CCHI trial study.

5. **Ko Te Kikokiko:** Refers to the flesh of the fish caught by the kupenga, used to sustain the people. This signifies and acknowledges that the CCHI are intended to provide a tool kit for hapū and iwi.

Each of the components is vital to the success of the kupenga. Each therefore determines and dictates the success of the catch. Similarly this report acknowledges that each stage is fundamental to the overall objectives of the project. Each stage supports the co-operative development of a robust and relevant set of CCHI for Te Awanui.

This report is divided into chapters headed and guided by the framework of Te Kupenga Tairoa. The later chapters categorically detail the aims, discussion and outcomes for each stage of the CCHI project.

Table 1: Overview of Te Kupenga Tairoa

| Ngā Wahanga | Ngā Whainga |
|----------------|--|
| Ngā Taura Here | Literature Review <ul style="list-style-type: none"> To conduct a literature review to establish the foundations for the development of CCHI for Te Awanui. |
| Te Kupenga | Tauranga Moana Tauranga Tangata Customary Case Studies <ul style="list-style-type: none"> To acknowledge the value of mātauranga Māori for CCHI development. To customise CCHI for Te Awanui. To develop CCHI unique and specific to Te Awanui and its people. |
| Ngā Punga | Collaborative Analysis/ Draft CCHI for Te Awanui <ul style="list-style-type: none"> To conduct a collaborative and comparative analysis of Tauranga Moana, Tauranga Tangata Customary Case Studies with the literature review findings. To develop draft CCHI for Te Awanui. |
| Ngā Pōito | CCHI Trial Study/ CCHI Refinement <ul style="list-style-type: none"> Design a working plan for trialling the draft CCHI. To test and refine draft set of CCHI for Te Awanui. To conduct trial study of CCHI. |
| Ko Te Kikokiko | Final CCHI for Te Awanui Report <ul style="list-style-type: none"> To produce final CCHI Report. To finalise a set of CCHI for Te Awanui (CCHI tool kit). |

Although the framework suggests a permanence of structure, the Te Kupenga Tairoa Framework acknowledges that theoretical frameworks may in practice change and adapt over time. The framework therefore must be flexible in order to facilitate the overall kaupapa, aims and objectives of the project.

A continuous review process was employed to support the management of the CCHI project. At the end of each stage the framework was subjected to a critical review and refinement process to ensure:

1. Goals were met and each stage of the project met the requirements and outputs outlined in the framework schedules.
2. Principles of the CCHI for Te Awanui were being upheld – ensuring strong methods of tikanga and kawa were maintained.
3. The mana of the CCHI project and its stakeholders was upheld, maintained and protected.

2.4 Principles of Mātauranga Māori Research

All stages of Te Kupenga have been conducted in conjunction with the Manaaki Taha Moana (MTM) Principles of Kaupapa Māori Research. These principles aim to guide the practices and procedures of the CCHI for Te Awanui Report. The principles ensure respect for the participants in the research, whilst upholding and maintaining the integrity of mātauranga.

2.4.1 *Manaaki Taha Moana Principles of Kaupapa Māori Research*

Manaaki Taha Moana (MTM) has developed a set of Principles of Kaupapa Māori Research that will guide and direct our research conduct, methodologies and procedures. These principles are not limited to interaction with Māori, but as Māori, it will guide our interactions with people, kaupapa and environments.

MTM Kaupapa Māori Research Principles have integrated and adapted principles from other studies (Pohatu, 2005; Mane, 2009; Smith, 2000) that are consistent with the aspirations and philosophies of the MTM project. MTM Research Principles are based on eight major strands, all inter-linked and inter-related. It is important to mention that although these listed principles have been categorised into individual principles they do not act in isolation, each principle is linked by multiple connections and relationships.

The key principals of MTM Kaupapa Māori Research are outlined here:

1. Tino Rangatiratanga - The Principle of Self-determination

Tino Rangatiratanga relates to sovereignty, autonomy, control, self-determination independence, acknowledging individuality and distinctiveness. The MTM research project upholds this principle by allowing all participants control of their own cultural aspirations and destiny. Tino Rangatiratanga recognises the reciprocity of mātauranga Māori as a multi-directional transfer of knowledge that provides a basis for empowering self-determination, and capacity building at a project level as well as a whānau, hapū and iwi level.

Tino Rangatiratanga acknowledges that mātauranga Māori belongs to the people. Thus it is the people that determine its use and how its integrity will be upheld. MTM research ensures appropriate processes and procedures regarding information security and ethical practices are maintained.

2. Tikanga/ Kawa - The Principles of Conduct

This principle aims to ensure that MTM research is conducted in consistency with cultural guidelines of conduct. The principle Tikanga/Kawa ensures MTM research respects the cultural significance of traditional customs and acts in accordance with traditional and cultural procedure, lore and practice.

The Tikanga/Kawa principle acknowledges that people/research does not exist in isolation. A network of unlimited layers link and bind us to the past, present and future. MTM research acknowledges that tikanga and kawa are traditional practices that acknowledge and strengthen connections. These connections are not only in Te Ao Kikokiko (physical world) but more importantly respect and acknowledgment is given to Te Ao Wairua (spiritual realm), Te Ao Hinengaro (knowledge), and Te Whatumanawa (emotions).

3. Taonga Tuku Iho - The Principle of Cultural Aspiration

This principle asserts Te Reo Māori, tikanga and mātauranga Māori as central concepts to MTM research. Within a Kaupapa Māori paradigm, Māori ways of knowing, doing and understanding are unique and are valid in their own right. Taonga Tuku Iho recognises the many forms of taonga including, Te Ao Kikokiko (the physical world), Te Ao Wairua (the spiritual realm), Te Ao Hinengaro (knowledge), and Te Whatumanawa (emotions).

Taonga Tuku Iho recognises the significance of trans-generational transfer and acknowledges that taonga passed down have been preserved through generations and have sustained years of change. It is therefore important to acknowledge their origins and pathways, both physical and spiritual.

Taonga Tuku Iho also incorporates Ako Māori. Ako Māori acknowledges the teaching and learning practices inherent and unique to Māori. These practices may not necessarily be traditionally derived but may be preferred by Māori. These practices link to related principles such as, whanaungatanga and kotahitanga which acknowledges that each individual person, whānau, hapū, and iwi have valuable taonga, therefore contribution and co-operation supports and upholds Ako Māori.

4. Kotahitanga - The Principle of Collaboration

Kotahitanga makes links to the principle Tino Rangatiratanga and recognises individuality and uniqueness of the individual person, whānau, hapū, and iwi. It recognises that each has a valuable knowledge, skill and resource base.

Kotahitanga goes further to recognise the limitations of working in individual isolation. Collective co-operation empowers and improves social, cultural and economic capacities. Kotahitanga views the individual as collective members of the larger community, working towards advancing the holistic well-being of the collective. Kotahitanga recognises that the people hold mātauranga Māori and only through a reciprocal collaborative approach will the integrity of the knowledge and all its unseen facets be upheld.

Kotahitanga is also linked to the principle Māramatanga and recognises the importance of kanohi ki te kanohi (face to face communication), and tau utuutu (alternating speakers). Therefore a collaborative approach must maintain and promote respectful lines of communication, both sharing and receiving.

Kotahitanga also embraces the holistic Māori view of the world. Mindful and respectful consideration is always made to Te Ao Kikokiko (the physical world), Te Ao Wairua- (the spiritual realm), Te Ao Hinengaro (knowledge), and Te Whatumanawa (emotions).

5. Whanaungatanga – The Principle of Building Relationships

Whanaungatanga is closely linked to the principle Kotahitanga, which recognises the importance of a collaborative approach. Whanaungatanga however concentrates more specifically on building and enhancing strong relationships to enable effective co-operation.

Whanaungatanga recognises that relationships and interactions within a whānau group are based on respect, understanding and aroha. Whanaungatanga encourages growth, while also attracting and building relationships between tangata, whānau, hapū and iwi.

Whanaungatanga also includes building meaningful relationships with people and Ngā Puna Kōrero (information sources), Te Taiao (the environment), and Ngā Rawa (the resource). Whanaungatanga recognises the importance of not only building new relationships, but also by maintaining and preserving existing relationships.

6. Āta - The Principle of Respect

The principle of Āta was developed by Pohatu (2005) and relates specifically to the building and nurturing of relationships. Āta reminds people of how to behave when engaging in relationships with people, kaupapa and environments. Āta also incorporates the notion of planning, whilst recognising the importance of being prepared holistically in, Te Ao Kikokiko (the physical world), Te Ao Wairua- (the spiritual realm), Te Ao Hinengaro (knowledge), and Te Whatumanawa (emotions).

Āta incorporates māhaki/tūwhakaiti (humility), which is vital at all levels of kaupapa Māori research. The humility approach acknowledges that each person, kaupapa or environment is valued and their mana-integrity is upheld and preserved.

7. Manaakitanga/Kaitiakitanga – The Principle of Care and Guardianship

Manaakitanga/Kaitiakitanga relates to care and protection and is closely linked to the principle Āta. Manaakitanga/Kaitiakitanga guides principles such as whanaungatanga and kotahitanga and incorporates concepts that include building strong relationships.

Manaakitanga/Kaitiakitanga is a holistic approach that recognises the importance of caring for and protecting the cultural realms of Te Ao Kikokiko (the physical world), Te Ao Wairua (the spiritual realm), Te Ao Hinengaro (knowledge), and Te Whatumanawa (emotions).

Manaakitanga/Kaitiakitanga allows for the protection of mātauranga Māori (Māori knowledge) for both the present holders and their future generations.

Manaakitanga/Kaitiakitanga acknowledges mana mātauranga (the integrity of knowledge). This highlights that knowledge is not isolated in time and space but is dynamic. Knowledge has developed, been moulded and adapted throughout time and will continue to do so. Care and respect must be taken to ensure that the present holders direct the knowledge pathways, so that mana mātauranga is maintained.

8. Māramatanga - The Principle of Understanding

Māramatanga relates to transparency of conduct at all levels. Māramatanga highlights the importance of clear management guidelines regarding planning, communications, policies and procedures.

Māramatanga is closely related to the principles of kotahitanga and whanaungatanga. Māramatanga recognises that in order to effectively uphold the principles of collaboration and reciprocity there must be a collective kaupapa, open line of communications, and appropriate information dissemination systems.

Māramatanga incorporates kanohi kitea (the seen face), and kanohi ki te kanohi (face to face), which encourages communication face to face, and the development of meaningful and open relationships.

3 TE TAURA HERE: Literature Review

| 3.1 AIMS AND OBJECTIVES | Literature Review |
|--|-------------------|
| <p>Aim: To conduct a literature review to establish the foundations for the development of Cultural Coastal Health Index (CCHI) for Te Awanui.</p> <p>Objectives:</p> <ul style="list-style-type: none">• To critically evaluate existing CCHI literature• To integrate and synthesize existing CCHI literature for CCHI development• To briefly review the cultural significance of Te Awanui to Tangata Whenua• To understand the cultural affinity between Tangata Whenua and Te Awanui• To identify and evaluate hapū and iwi environmental and cultural concerns in regarding the health of Te Awanui• To evaluate existing literature on western science indicators for marine environmental health | |
| <p>Rationale:</p> <p>Hoki ki te pūtaketanga o to maunga, kia mārama ai koe Return to the base of your sacred mountain, so that you may understand.</p> <p>Without strong foundations the research project may be destabilized, therefore a good literature review will:</p> <ul style="list-style-type: none">• Familiarise the researcher with the scope and information relevant to the development of CCHI for Te Awanui;• Identify any gaps in the current literature; and• Review other research projects to determine good strategies and practices for CCHI development. | |

3.2 Methods

An extensive literature review was conducted to investigate historic cultural values pertaining to Te Awanui. The literature review identified a range of cultural issues that were collated and categorised into environmental, mahinga mātaihai and cultural issues.

1. *Environmental Issues*

Issues associated with temporal changes in the marine ecosystems and their associated environments.

2. *Mahinga Mātaihai Issues*

Issues specifically related to temporal changes in traditional gathering grounds.

3. Cultural Issues

Issues regarding social and economic wellbeing of marae and hapū functions. Issues that affect the capacity of Tangata whenua to assert cultural responsibilities such as kaitiakitanga and manaaki. These categories were displayed in tables to provide a baseline indication of the environmental state of Te Awanui from a cultural perspective.

The second stage of the literature review focused on a review of environmental indicators. The investigation concentrated specifically on environmental performance indicators (EPI), environmental guidelines for New Zealand, and Māori Environmental Performance Indicators. A case study review was also conducted which investigated cultural health indicators for both freshwater and marine systems.

3.3 Mātauranga Māori and Te Awanui

3.3.1 Mātauranga Māori

Mātauranga Māori is an aspect of knowledge that is intricately linked with Māori culture, customs and traditions. Mātauranga Māori is described as “a transfer of knowledge and trans-generational beliefs that is disseminated through oral tradition and first hand observation.” (Harmsworth *et al.*, 2004). Mātauranga Māori is expressed in a variety of forms, through cultural practices such as karakia, kōrero pakiwaitara, waiata, mōteatea, tauparapara, whakataukī and whakapapa (Forster, 2003; Harmsworth, 2002; King *et al.*, 2007; Wallace, 2008 and Williams, 2001). Forster (2003) acknowledges that mātauranga Māori is also transferred through kawa and tikanga.

The value of mātauranga Māori has and continues to shape beliefs, customs and practices of Māori people. In environmental preservation, these values have developed pathways for future generations by nurturing physical and spiritual bonds to the environment, which influence rationale, choice and action for reciprocated research.

Mātauranga Māori in contemporary environmental research can be defined in three forms:

1. The intimate knowledge of ecosystem relationships and the subsequent governance of appropriate behaviours to sustain the resources.
2. The observations and experiences with past and present economic and urban development.
3. The customary social values, cultural practices and spiritual beliefs as well as experiences of emotional and physical wellbeing.

Tangata whenua experience both traditional and non-traditional realities and lifestyles. These experiences have rendered conflicting observations of the two worlds, which have established rationale for argument and revision of environmental concerns. Advantageously these concerns can be incorporated into mainstream monitoring, to provide insight to alternative collaborative environmental assessment strategies.

3.3.2 *Mātauranga Māori and the Environment*

Mātauranga Māori encompasses the Te Ao Māori way of viewing the world, which acknowledges the interconnected holistic worldview. This view requires an all-inclusive understanding of the environment, and recognises the interconnected relationship Tāngata whenua have with their world. The appreciation of this relationship has shaped many forms of bicultural ideologies on resource and environmental management, not only with Mātauranga Māori but also throughout other indigenous cultures.

Failing *et al.* (2007) defines traditional ecological knowledge (TEK) as “a cumulative body of knowledge, practices and beliefs concerning the relationship of living beings and one another with their environment.” Stephens *et al.* (2007) describe indigenous people as “...the guardians of their environment built on observational links and communal views over continuous generations.” Stevenson (1995) illustrates that indigenous cultures have a substantial advantage when assessing their environment as they have lived off the land and harvested its resources. This generates an intimate knowledge of the distribution of resources, the functioning of an ecosystem, and the relationship between the environment and their culture.

Māori share an indigenous connection with their environment. This relationship is preserved by Tauranga Moana iwi and hapū in cultural forms of expression such as waiata, whakataukī and kōrero. A Ngāti Pukenga spokesman encapsulated the uniqueness of the coastal environment in the whakataukī,

“He kiekie ki uta, he tāmure ki te tai”
“Kiekie is found in the bush and snapper at the coast”
(Waitangi Tribunal Report, 2010)

A Ngāti Ranginui whakataukī illustrates how traditionally ancestors had two areas for living according to seasonal use and gathering. This illustrates how the marine and terrestrial environments resourced the people and influenced everyday success,

“He kāinga tahi ka mate, he kāinga rua ka ora”
“One dwelling place may not do very well, but with more than one place to live, the people will flourish”
(Waitangi Tribunal Report, 2004)

A Ngāi Te Rangi spokesman expressed the cultural significance of Te Awanui to his hapū,

“The essence of being Ngāi Te Rangi, our customs, diets and values were all heavily influenced by the harbour, estuary and coastal environment”.
(Waitangi Tribunal Report, 2010)

A Ngāti Pūkenga spokesman described their relationship to the cultural attributes of their marine environment,

“The Rangataua estuary is the life blood of our people, ‘ngā wai koiora’, that course through our veins. Its tributaries the Waitao, Kaitimako, Omatata, Otamarua, te Waiū and Te Awanui are the veins that supply it, and thus us with life giving nutrients – life itself... all living breathing features of our ancestral landscape...”

(Waitangi Tribunal Report, 2010)

When examining these traditional concepts of mātauranga Māori, simple aspects are frequently more complex in definition. This simplicity can often create differing levels of understanding. This is identified by Metge (1978) where the term ‘talking past each other’ is refers to terminological ideologies and thought processes of an indigenous people in one instance, and categorical western science processes of another.

As mentioned previously, mātauranga is formed and nurtured through traditional customs and oration. The recognition and simplistic reference of traditional customs through orated accounts, depicts the relationships and culture that the environment has shaped. Mātauranga Māori is closely tied to social and spiritual aspects of knowledge. This is in contrast to the general scientific practice, where environmental monitoring methods are precise and easily measured in an objective and repeatable manner (Moller *et al.*, 2004). Māori have a rich trans-generational base of knowledge that is not strictly categorised with ecological knowledge, thus it lacks reference or validation. Furthermore, when mātauranga Māori is categorically defined and analysed, it can contradict mātauranga principles. Westernising mātauranga Māori can damage or displace fundamental components that make up mātauranga Māori. When developing integrative cross cultural tools it is vital to apply methodologies that do not damage the cultural essence of mātauranga Māori.

Pihama & Gardiner (2005) relate the development of mātauranga Māori research to the development of research method forms. They stress the importance of recognising the distinction between methodology development and method use. To develop methods based on mātauranga Māori, the driving force must become broad and therefore lacks appeal to scientific researchers. On the other hand, mātauranga Māori encompasses the holistic Māori philosophy and the corresponding methodologies for environmental based research.

When developing mātauranga Māori based methods for environmental research, the first expression is attributed to the Mauri and enhancement of Mauri. Mauri is described by Hauraki Māori Trust Board (1999) as “a form of hapū and iwi kaitiakitanga outlining the responsibilities of maintaining the mauri of an area”. One Ngāti Porou explanation refers to the mauri as the availability to maintain sustenance within a particular place and giving generations the life force to maintain and sustain life (Harmsworth, 2002). Mauri is also described by Tipa & Teirney (2002) as “the life force that ensures the continual life of all living things that reside within it”.

In many cases, when dealing with environmental monitoring and mātauranga Māori, a common objective is to improve the Mauri of an environment through the enhancement of taonga species (Tipa & Teirney, 2002). Harmsworth (2002) uses the number of taonga species to rate the mauri of a wetland. Pauling (2004) developed a toolkit ‘The State of the Takiwā’ for the Iwi of Ngāi Tahu, which focused on generating and implementing available

tools already developed within New Zealand and adapting those methodologies to suit mātauranga based assessment approaches.

Environmental research models that use collaborative methods of mātauranga Māori and western science methodologies are increasing (Wallace, 2008). In the terrestrial landscape, the bicultural approach has been applied with a focus on natural resources such as ecosystem processes and their intricate relationships with tāngata whenua (Cunningham, 2000). Co-management approaches of New Zealand's conservation estate have been developed since the late 1990's. However, the application of such management approaches has been largely reduced by non-Māori organisations. Taiepa *et al.* (1997) has deliberated on the principle philosophies for co-management, and highlighted the importance of recognising Māori concepts such as kaitiakitanga. Taiepa *et al.* (1997) contests that Māori have not been given the opportunities and tools to fully demonstrate their potential to express kaitiakitanga. Additionally, Cunningham (2000) illustrated that traditional Māori operated in ways not dissimilar to western researchers, science and technologists, albeit with indigenous methodologies, philosophies and worldviews. However, mātauranga Māori has not always been catered for in the science, research and technology sector.

The use of mātauranga Māori in environmental management has progressed in the form of cultural indicators that display trends to specific aspects of ecosystem health (see Harmsworth & Tipa, 2006 and Kennedy & Jefferies, 2005 for examples). These cultural indicators depict temporal observations by the tāngata whenua of the area in two forms:

- The environmental integrity of the ecosystem, the loss of key species within the ecosystem and the role of those key species.
- The reciprocated relationship that Tāngata whenua have within the ecosystem.

Within the Tauranga Harbour, iwi and hapū have proactively developed environmental management plans describing concerns from a hapū perspective. These plans outline preferred strategies for management, mitigation and enhancement of the Harbour and its resources. The implementation of hapū and iwi management strategies is limited by the lack of recognition from governing authorities. These limitations marginalise traditional concepts such as rangatiratanga and kaitiakitanga.

3.3.3 *Te Awanui, Tauranga Harbour*

The Tauranga area, during pre-European settlement, was described in the Waitangi Tribunal Report (2010) as one of the most densely settled landscapes in New Zealand. The area is known for its natural beauty and its diverse and productive coastal ecosystems; open seas; offshore islands; coastal sandy beaches, and rocky shores. Te Awanui, is a large harbour lagoon and was used as a place of safe anchorage (Tauranga). The Tauranga Harbour consists of many unique geographical features such as estuaries, mudflats, tidal pools, and wetlands (Waitangi Tribunal Report, 2004).

Hapū that occupied Te Awanui were undoubtedly attracted to the diverse, productive ecosystems and the plentiful marine, freshwater and terrestrial resources (Waitangi Tribunal

Report, 2004). Tangata whenua claim rights to their environment through traditional occupation and whakapapa. This inheritance through whakapapa gives rise to perpetual responsibilities of kaitiakitanga, the act of guarding and protecting life sources for the benefit of present and future generations.

Following the arrival of Europeans, hapū of Te Awanui lost a great deal of their ancestral lands (Stokes, 1992). This coincided with changes in natural hapū organisation and utilisation of traditional resources. Resources were traded and as the Tauranga landscape changed so did the traditional methods and legacies of kaitiakitanga, manaakitanga, tikanga and kawa. European settlement saw the introduction of infrastructures and government policies, which made way for rapid development and population influx (Office of Treaty settlements, 2012).

Despite this, the embedded association with Te Awanui and its surrounding environment still remains the basis of cultural identity for tangata whenua. The Waitangi Tribunal Report (2004) emphasises this and states that the significance of the harbour, waterways, forests, fisheries, tīpuna maunga and awa, all mark cultural identity. It goes further to describe these aspects of the natural environment as taonga and the source of economic, cultural, and spiritual wellbeing.

The Waitangi Tribunal Report (2004) states that all resources are ‘taonga’, or something of value, derived from Ngā Atua. Inextricably, Māori were aware that custody of these resources was on behalf of someone else in the future. These traditions supported a holistic view not only of creation, but also for the present and future (Waitangi Tribunal Report, 2010).

Acting as kaitiaki and exercising kaitiakitanga ensured that resources were safeguarded (Waitangi Tribunal Report, 2004). This responsibility was the result of authority and control that rangatira exercised over the environment and its resources in the name of their people (Waitangi Tribunal Report, 2010). This is also reflected in a speech by the Tauranga rangatira Taiaho Hori Ngatai to John Ballance, the Minister of Native Affairs at a Tauranga hui in 1885. He describes the very essence of kaitiakitanga,

“Now, with regard to the land below high water mark immediately in front of where I live, I consider that that is part and parcel of my own land... part of my own garden. From time immemorial I have had this land, and had authority over all the food in the sea. Te Maere was a fishing-ground of mine. Onake, which is a place from which I have from time immemorial obtained pipis. Te Rona is another pipi-bed. Te Karaka is another place. I am now speaking of the fishing-grounds inside the Tauranga harbour. My mana over these places has never been taken away. I have always held authority over these fishing places and preserved them, and no tribe is allowed to come here and fish without my consent being given. But now, in consequence of the word of the Europeans that all the land below high water mark belongs to the Queen, people have trampled upon our ancient Māori customs and are constantly coming here whenever they like to fish. I ask that our Māori custom shall not be set aside in this manner, and that our authority over these fishing-grounds may be upheld. The whole of this inland sea has been subdivided by our ancestors, and each portion belongs to a proper owner, and the whole of the rights within the Tauranga Harbour have been

apportioned among our different people; and so with regard to the fishing-grounds outside the heads: those are only small spots. I am speaking of the fishing-grounds where hāpuku and tarakihi are caught. Those grounds have been handed down to us by our ancestors. This Māori custom of ours is well established, and none of the inland tribes would dare to go and fish on those places without obtaining the consent of the owners. I am not making this complaint out of any selfish desire to keep all the fishing-grounds for myself; I am only striving to regain the authority which I inherited from my ancestors”.

Besides kaitiakitanga, other key cultural values such as whanaungatanga and manaakitanga are encompassed within the concept of rangatiratanga. Together, these notions have established the guiding principles that define appropriate behaviour within the environment, and determine how the environment’s resources should be used and managed.

3.4 Tangata Whenua Concerns

As kaitiaki, tangata whenua have observed and noted changes in the environments and ecosystems of Te Awanui. These observations provide a knowledge base that identify and highlight local issues. This section will discuss issues expressed by Tāngata whenua regarding Te Awanui and its surrounding areas. Lack of consultation, environmental, mahinga mataitai and cultural issues have all been identified as areas of significant concern and will be discussed in detail.

3.4.1 Lack of Consultation

Tāngata whenua of Te Awanui noted that over time the landscape of Tauranga has been transformed by urban development. The rural coastal areas of Te Awanui have been extensively developed by agricultural and horticultural industries. Tāngata whenua have discussed in length their grievances associated with exclusion and lack of consultation regarding environmental management and development decisions within their rohe whenua and rohe moana. Lack of consultation has greatly marginalised tāngata whenua, creating a sense of detachment from their environment and eliminating culturally significant rights and responsibilities to act as kaitiaki for Te Awanui (Waitangi Tribunal Report, 2004)

“It’s not until we are knocking at their door, asking questions to why they have not considered our values do they recognise the need for our input, even then we are still not acknowledged fully.”

(Te Whanau a Tauwhao, 2011)

Tāngata whenua highlight concerns regarding the unnecessary damage to the taonga of Te Awanui by urban and rural development. Particular concern is directed at the decision makers, the Crown and its delegates who have failed to prevent, and have often been complicit in the careless and casual pollution of waterways (Waitangi Tribunal Report, 2010). This is highlighted by a Tauranga kaumatua who stated:

“Some impact on the natural environment is inevitable when development occurs, but what I really object to is the thoughtless and irresponsible development that has taken place. Local

bodies have a habit of putting rubbish dumps and oxidation ponds and sewerage plants by waterways”

(Waitangi Tribunal Report, 2010)

3.4.2 Environmental Issues

Environmental issues identified within the collated data were similar throughout Te Awanui. Tangata Whenua identified specific anthropogenic activities that were caused or produced by humans and their detrimental impacts to Te Awanui. The main areas of environmental concern highlighted were pollution, sedimentation, erosion and biological influxes.

Pollution Sources

Population growth was identified as the main contributor to environmental degradation to coastal ecosystems. With an increase in population comes the need for subsequent infrastructure to accommodate that growth. As mentioned previously, the expansion of the Tauranga District has increased dramatically in the last 60 years. With the increase during this time, Tangata Whenua of Te Awanui have witnessed significant changes in their natural environments.

A summary of the Waitangi Tribunal Report (2006) highlights that water pollution problems have been evident since the early twentieth century. Rubbish from the Sulphur Point Tip was often reported floating in the harbour. There was agricultural discharges and runoff from dairying, abattoirs, piggeries and horticulture, along with run-off from industrial activities and urban development in general. These are all on-going causes of pollution.

Hapū raised concerns regarding the depletion and degradation of traditional resources due to the discharges of sewage, storm water and agricultural run-off into the Waimapu, Wairoa and Mangapapa Rivers as well as the Waikareao and Rangataua estuaries. In addition, storm water discharge and pollution has been linked to the destruction of traditional resources (Tata & Ellis, 2006).

Hapū acknowledge that infrastructure development is a normal response to progressive urban expansion. However, Tangata Whenua raise concerns about the lack of recognition for their cultural and environmental values. In the past, policies relating to infrastructure such as sewerage, wastewater treatment stations, storm-water discharge, landfills and industrial development were established and implemented with little input from Tangata Whenua.

Wastewater management

Wastewater management has changed dramatically with urban growth too. Tangata Whenua spoke openly about the period during the early 1900's and up until the late 1960's when the moana was used as a repository for raw untreated sewage (Waitangi Tribunal Report, 2010). To Māori, human waste is a particularly abhorrent form of pollution and discharge of such effluent into the 'Marae of Tangaroa' is a violation of tapu (Waitangi Tribunal Report, 2010). Narratives from Tangata Whenua describe the violation of tapu:

“Constitutes a fundamental transgression which evokes an instinctive and culturally embedded abhorrence . . . the potential exists for kai moana . . . to be contaminated with human excrement, therefore, threatening to make that which is noa, tapu, and that which is tapu, noa” (Waitangi Tribunal Report, 2010)

Māori have actively expressed their views on the effects wastewater has had on taonga species such as shellfish. In 1928, Māori from five coastal settlements around the harbour jointly petitioned the Minister of Health to reject Tauranga Borough Council’s proposal to discharge excess effluent onto the foreshore at Waikareao estuary. They argued that they were concerned about the pollution of pipi beds and loss of livelihood (Waitangi Tribunal Report, 2004 and 2010).

Other instances of wastewater concerns by Tangata Whenua were highlighted in a Waitangi Tribunal claim (1997) relating to a proposed sewage discharge in Te Tāhuna o Rangataua (Welcome Bay), Tauranga. Tangata Whenua were concerned about sewerage schemes proposed by local and central government agencies to discharge human effluent into waterways. These claims highlighted the widespread concern Māori had about waste water discharge impacting on the health of mahinga kai resources and the people who rely on them for spiritual and physical sustenance (Pauling & Ataria, 2010).

Storm Water Discharge

According to the Waitangi Tribunal Report (2004) during the period from 1886 to 1991, the Tauranga Harbour and its associated tributaries were polluted by numerous discharges including sewage, agricultural run-off and storm-water discharge. Storm-water discharge is also known to accumulate contaminants such as the heavy metals zinc, copper and lead; petroleum based oils, chemical fertilisers, rubbish, sediment and organic waste.

Increased development has resulted in a surge of storm-water run-off from road surfaces and urban areas, which increases pollutant input into the harbour. Storm-water originating from commercial and industrial areas, have the highest concentration of heavy metals, nutrients and turbidity (Burggraaf *et al*, 1997), while residential areas provide the highest annual mass loadings of storm water contaminants. Catchment urbanization has led to accelerated levels of sediment being released to the upper harbour areas, particularly in the Tāhuna o Rangataua, Waikareao and the Waimapu Estuary. Shellfish monitoring in harbour areas exposed to storm-water outfalls show elevated heavy metal concentrations, due mostly to storm-water run-off from roads (Burggraaf *et al*, 1997).

Agricultural and Horticultural impacts

Within the Tauranga Harbour catchment, the agricultural sector contributes to inputs of nitrogen and phosphorous, sediments, and bacteria from faecal matter (Sinner *et al.*, 2012). The use of chemicals in horticulture and rural activities is common practice within the Tauranga District. Chemicals used include fertilisers, insecticides, miticides, fungicides, hormone and growth enhancement additives (Coffin, 2004). These are transported by the water systems and can have detrimental effect on the biological processes within natural marine ecosystems.

Heavy fertiliser and chemical weed control sprays have had a negative effect on shellfish populations. A kuia recalled the effect of the weed eradication spray programme to eliminate spartina grass using the chemical GallantTMUltra, on the local estuary ecosystems. She noted, the spray affected the targeted weeds, however she also linked the spray to the collapse of the local tītiko (estuarine snail) fishery (Waitangi Tribunal Report, 2004).

The development of pastoral areas for farming has been recognised as an environmental stressor since the early 1900's (Stokes, 1980). Wetlands were drained and large sections of forest near and adjacent to running streams were cleared to make way for larger pastoral areas (Waitangi Tribunal Report, 2010). It is common knowledge that coastal wetlands and salt marshes are important and unique areas to Tangata Whenua. Traditionally these areas contained a diverse range of taonga species, both flora and fauna. Presently, wetland areas offer significant habitat for many rare and threatened species (Cromarty and Scott, 1995). Wetlands and estuaries also act as a unique buffer zone between land and sea and are seen by Māori as a vital filtering system. This filtration system aids in protecting the land from erosion, trapping sediment and pollutants from land run off.

“Wetlands are a filtering system, and perform much the same as the liver in a human.”
(Paul Borell, pers. comm 2011).

In the Bay of Plenty, less than one per cent of the natural wetland area remains (Meeuwen-Dijkgraaf; Shaw & Mazzieri, 2010) and the Bay of Plenty Regional Council estimates that some 1000 hectares of wetland have been drained and reclaimed in the Tauranga Harbour area. In addition to the numerous ecological impacts associated with wetland loss, the destruction of these ecosystems has left Tauranga Māori with very few sites from which to harvest their traditional wetland resources (Ellis *et al.*, 2008).

Sedimentation

Within Tauranga Harbour, sedimentation is recognised by hapū and iwi as a main contributor to estuarine ecosystem loss and habitat degradation, with hapū reporting that sedimentation has been observed within sub-estuarine areas. Changes in substrate from sand to mud, a loss of small channels in sub-estuarine areas and a decline in migrating fish such as flounder and Kahawai were all issues that relate to sedimentation. The infilling of sub-estuarine channels is expressed by Anthony Fisher of Ngāi Tukairangi:

“The channels and drains used by whanau of Ngāi Tukairangi in which to store their kaimoana after it had been harvested from mataitai areas have gone”
(Waitangi Tribunal Report, 2010)

Tata and Ellis (2006) described sedimentation as having the most damaging effect to mahinga kai, biodiversity and ecological habitats. This is also emphasised by Morrison *et al* (2009) who directly correlates impacts from sedimentation to elevated estuarine catchments, with the conversion of coarse substrates to muddy sediments. The change in sediment composition can, therefore, modify the morphological and hydrological dynamics of the catchments.

Since the Ruahihi dam collapsed in 1981, Tangata Whenua have observed an influx of sedimentation within the Wairoa River mouth and subsequently the Tauranga Harbour. The collapse of the canal from the Ruahihi Station saw the destruction of natural riverine habitats; the loss of wildlife in the Wairoa River; and the permanent loss of much of the shellfish and fish resources (Office of Treaty settlements, 2012). Although the dam is not recognised as a major contributor to present sedimentation issues, the effects directly following the collapse are being used as indicators to identify sedimentation issues today.

Coastal Erosion

Many hapū have raised concerns regarding the level of impact erosion has on the coastal areas of Te Awanui. Contributing factors include the lack of native vegetation lining the coastline of Te Awanui, which has resulted in many areas becoming prone to constant erosion problems. Culturally significant coastal lands are more susceptible to gradual land loss leading to degradation of culturally significant sites. Erosion has affected traditional and culturally significant areas such as marae, urupā, and wāhi nohonga.

Biological Influxes

Influxes in flora and fauna have been observed by hapū and iwi of Te Awanui. Thick mats of the invasive Asian Date Mussel have reportedly displaced shellfish beds such as pipi, kukuroa and tupa (Rameka & Taiapa, 2006). The influx in mangroves and sea lettuce has also raised concerns for the health of Te Awanui. Some hapū acknowledge that, although mangroves and sea lettuce have detrimental effects to particular shellfish communities, the extensive growth is merely a response to the increase in anthropogenic stressors such as sedimentation, pollutants and eutrophication (Waitangi Tribunal Report, 2010).

Table 2: Environmental Observations from Hapū and Iwi of Te Awanui.

| Types | Causes Examples | Effects Examples |
|------------------|--|---|
| Pollution Source | Farming, Orchards, Industrialization, Urbanization, Port of TGA workings, sewage treatment plants, sewage discharge from septic tanks, storm water runoff, rubbish tip runoff through wetlands | Loss of ecosystems and habitats Depletion and pollution of kaimoana Wetland loss, Nutrient accumulation, Cumulative sea lettuce and mangrove growth, Water quality |
| Sedimentation | Land development, Adjacent coastal land use, Poor management of upper catchments, Coastal erosion, Urbanization | Elevation of estuarine areas, Increase in mangroves, Change in substrates within Tauranga Harbour (sand to mud), Loss of ecosystems and habitats (i.e. sea grass and shellfish beds) |
| Erosion | Lack of riparian vegetation, Increased dredging of the port channels, Increase height in tides, Adjacent coastal land use | Loss of coastal land, Loss or degradation of cultural significant sites, and water quality |
| Biological | Invasive marine species, Increased growth of sea lettuce and mangrove habitats, algal blooms | Displacement of shellfish beds, Smothering of shellfish beds, unable to consume shellfish, Areas of no bathing |

3.4.3 Mahinga Mātaitai Concerns

The significance of Mahinga Mātaitai to Tangata Whenua is all about the ability to provide for and sustain present and future generations. A common concern throughout the researched literature is the breakdown of important cultural relationships with the Te Awanui. Tangata Whenua comment on feeling detached from Mahinga Mātaitai due to harvesting limitations and displacement of traditional beds, along with the inaccessibility, poor quality and low populations of these beds.

Tangata Whenua recognise that the loss of shellfish habitat indicates that the moana is responding to an increase in anthropogenic stressors and pressures. Tangata Whenua understand the holistic concepts of ecosystems and describe the susceptibility of the fragile coastal systems to the flow-on effects of human impacts. These flow-on effects highlight loss of shellfish and finfish resources. Pawley (2010) noted a decline in recreational fisheries, attributing this to an increased susceptibility to exploitation, due to over harvesting.

Concerns have been raised regarding the quality of shellfish. Although in some areas shellfish are still relatively abundant, they tend to be poor quality and have potential health risks associated with them (Ellis *et al.*, 2008). The health risks greatly impact the cultural harvest capacities in local gathering grounds, which sometimes lead to temporary abandonment of the beds. Tangata Whenua in these instances are forced to source kai from alternative shellfish beds in distant areas (Green, 2008).

Kaumātua of some hapū, recall harvesting pipi from expansive beds within the harbour and bringing them back in large kete. They would empty the pipi into small intertidal channels adjacent to the marae or kāinga sites where they would remain fresh for collection when needed, days or even months later (Waitangi Tribunal Report, 2010). Tangata Whenua can no longer observe these cultural practices. In some areas sedimentation and pollution, has lead to the complete abandonment cultural storage practices.

Tangata Whenua have emphasised issues surrounding the displacement of shellfish species (Rameka & Taiapa, 2006). The decline in Tītiko populations in some estuarine areas has been associated with the influx of mangroves. Pipi and horse mussel beds have been displaced by the introduction of exotic species such as Asian Date Mussel (Taiapa, 2007). Many hapū, who have witnessed this occurrence, also recognised that exotic species competition leads to poor shellfish condition and disruptions in juvenile recruitment. It was also noted that mangrove habitats change the ecosystem structure within the high intertidal environment, which can leave localised areas uninhabitable environments for tītiko (Parks, 2003)

Table 3: Hapū and Iwi observations of Te Awanui Mahinga Mātaitai

| Types | Causes | Effects |
|--|--|--|
| Loss of traditional shellfish habitats | <ul style="list-style-type: none">• Sedimentation,• Invasive species displacing shellfish beds• Point and non-point source pollution | <ul style="list-style-type: none">• Loss of shellfish has led to a decline in seasonal migratory finfish.• Decline in shellfish quality and quantity. |

| | | |
|---|--|--|
| | <ul style="list-style-type: none"> • Overharvesting of shellfish, and limited size restriction • New technologies to obtain shellfish and/or finfish (i.e. boats and scuba) | <ul style="list-style-type: none"> • Shellfish unable to receive quality food uptake. • Loss in traditional fishing grounds. |
| Contamination of shellfish beds | <ul style="list-style-type: none"> • Point and non-point source pollution • Algal blooms | <ul style="list-style-type: none"> • Poor quality shellfish |
| Decline in shellfish and finfish quality and quantity | <ul style="list-style-type: none"> • Sedimentation • Invasive species displacing shellfish beds • Point and non-point source pollution • Overharvesting of shellfish and limited size restriction • past commercial fishing | <ul style="list-style-type: none"> • Lack of recruitment of juvenile shellfish • Loss in traditional fishing grounds |

3.4.4 Cultural Concerns

Young *et al* (2008) stated that cultural value is the connection to a place, which establishes responsibilities to a geographic area or resource. Cultural value can also be described as the physical and spiritual relationship that Tangata Whenua have with Te Awanui. The main cultural and traditional values arising from the collated data relate to the cultural significance of kaimoana. One hapū could recite how their tīpuna spoke of abundant stocks of kaimoana and unrestricted access to Mahinga Mātaitai (Whakamarama Māori Land Court Minutes, 1901). However, the availability and abundance of taonga species has declined significantly. As a consequence the functioning capabilities of hapū and their marae have diminished.

Hapū sustained themselves through the reliance on Te Awanui resources. Hapū entities are defined by their ability to act and provide for specific functions as Tangata Whenua. Many functions still rely greatly on the capacity of the environment to provide resources. Stokes (1993) described this as:

“The mana of the tribes of Tauranga Moana has traditionally been associated with their control of kaimoana... the mana of the tribes today is still measured by their ability to provide a wide variety of seafood at marae gatherings...”

Economic and social concerns are frequently mentioned in the resources collated for this report. Today, more commonly there is a greater need to buy kaimoana for hui and tangi due to limitations associated with gathering kaimoana. Not being able to uphold the cultural functions of a coastal people is considered embarrassing and demeaning to the mana of the iwi and hapū.

The impacts to the marine environment have adversely affected the traditional practice of gathering kaimoana. Resources from the sea are not as abundant, nor as effortless to obtain as they were historically. Tangata Whenua are required to adapt to new technologies such as boats and scuba gear, which are now almost necessary to collect some species of kaimoana.

The high costs associated with new gathering methods and increased distances to gathering grounds, greatly limit the ability of Tangata Whenua to carry out customary functions.

Concern has also been expressed regarding the restricted and limited access to many culturally significant sites around the coastal areas of Te Awanui, many of which are now in private ownership. These cultural sites include kainga, burial and pā sites. Tata and Ellis (2006) described cultural sites as areas that include kai gathering areas, mahinga mātaaitai, wāhi tapu, wāhi taonga and wāhi tīpuna. Love *et al.* (1993) describes culturally significant sites as areas where hapū build the integrity and identity to a landscape. One hapū mentioned that they were bound and connected to the landscapes of Tauranga through whakapapa. Their ancestral landscapes are those places made sacred by the lives and deaths of their ancestors (Waitangi Tribunal Report, 2010). This definition of ancestral landscape emphasises the relationship between Tangata Whenua and the natural environment. The state of their ancestral landscape is therefore inextricably linked to spiritual, emotional, physical and social well-being, which is expressed through the tradition of kaitiakitanga. Tangata Whenua frequently mentioned the inability to exercise kaitiakitanga. They raised concerns regarding the lack of consideration for tikanga Māori in the management of Te Awanui.

Table 4: Hapū and Iwi observations of Te Awanui Cultural Issues

| Types | Causes | Effects |
|-----------------|---|---|
| Economic | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas | <ul style="list-style-type: none"> • The need to buy kaimoana from other sources • New technologies to obtain shellfish and/or finfish (i.e. boat and scuba) • Unable to access coastal areas of cultural importance • Unable to protect areas of cultural importance |
| Social | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of culturally significant sites | <ul style="list-style-type: none"> • Losing a sense of mana due to not being able to uphold the cultural, social, spiritual economic and ecological functions of a coastal hapū/marae • Unable to express the significance of natural resources and the traditional functions of a hapū/marae • Loss of a stable food source |
| Cultural | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of culturally significant sites | <ul style="list-style-type: none"> • Losing a sense of mana due to not being able to uphold the cultural, social, spiritual economic and ecological functions of a coastal hapū/marae • Unable to uphold kaitiakitanga practices • Loss of a stable food source and a change in diet |

| Types | Causes | Effects |
|--------------------|---|--|
| Traditional | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of culturally significant sites | <ul style="list-style-type: none"> • Loss of traditional values such as whakapapa and mahinga kai mātaihai methods • Unable to portray the significance of natural resources and the traditional functions of a hapū/marae • Loss of a stable food source • Unable to uphold kaitiakitanga practices |

3.5 Environmental Performance Indicators

3.5.1 *Environmental Performance Indicators and Environmental Guidelines in New Zealand*

Environmental monitoring in New Zealand (and the use of indicators) is a concept that follows international approaches to monitoring and reporting on the State of the Environment (SOE) (Harmsworth & Tipa, 2006). The Environment 2010 Strategy (E2010) was the first comprehensive statement of environmental priorities and strategies, which was developed by the New Zealand government in 1995 (Taylor *et al.*, 1997). Its aim was to guide the development of environmental policies and priorities of Government, local authorities, resource users and community groups up to the year 2010 (Taylor *et al.*, 1997). The priorities included:

- land (soil) management
- water quality management
- air quality management
- biodiversity
- pest management and biosecurity
- sustainable fisheries
- energy
- transport
- pollution, waste and hazardous substances
- climate change (Taylor *et al.*, 1997)

Additionally, part of E2010's agenda required developing the means to monitor and assess decisions on resource use (Taylor *et al.*, 1997). To meet this requirement, the Ministry for the Environment's National Environmental Performance Indicators (EPI) programme was initiated and ran from 1997- 2001 (Jollands & Harmsworth, 2007). The EPI programme was developed in accordance with international best practise (specifically the Organisation for Economic Co-operation and Development, or OECD), its objective was to simplify, quantify and communicate complex environmental data, and in doing so track trends and inform the public on the state or quality of the environment (Ministry for the Environment, 2009a). These indicators also assess whether policies, laws and other legislation are having the desired effect (Ministry for the Environment, 2009a).

From a wider set of 160 indicators developed under the EPI programme, a core set of national environmental indicators was assembled. These comprised of 66 variables which report on 22 indicators across ten key environmental domains (air, atmosphere, biodiversity, consumption, energy, fresh water, land, oceans, transport and waste) (Ministry for the Environment, 2009a). There are three national environmental indicators for oceans; marine areas with legal protection, fishing activity, and recreational water quality (Ministry for the Environment, 2009a).

A set of six standard criteria were used to select all indicators, which related to:

- national significance
- relevance
- ability to be measurable and statistically sound
- simplicity and ability to be easily understood
- cost effectiveness
- ability to be internationally comparable (Ministry for the Environment, 2009a).

Supporting national environmental indicators, are non-binding national guidelines and standards. These are intended for agencies such as local and regional governments, environmental consultants, and sometimes community groups to use in the collection and management of their environmental information (Ministry for the Environment, 2009b). In relevance to water quality, there are several key guidelines listed below (Ministry for the Environment, 2009b). Specifically, the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas and the ANZECC Water Quality Guidelines 2000 which include trigger limit values for four indicators – nitrate nitrogen, ammoniacal nitrogen, dissolved (soluble) reactive phosphorus, and visual clarity (Ministry for the Environment, 2009c). The New Zealand Periphyton Guidelines (Biggs, 2000) also report nitrate and dissolved reactive phosphorus concentrations in the context of these nutrients produces algal growth (Ministry for the Environment, 2009c).

- Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry for the Environment & Ministry of Health, 2003).
- ANZECC Water Quality Guidelines 2000 (Australian and New Zealand Environment and Conservation Council (ANZECC), 2000).
- New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment of Streams (Biggs, 2000).
- The Kaimoana Survey Guidelines for Hapū and Iwi (Otaraua Hapū et al., 2003).
- The Cultural Health Index (and user guide) for Streams and Waterways (Tipa & Teirney, 2006a) (Tipa & Teirney, 2006b).

Additionally, there are several environmental monitoring tool kits that have been specifically developed for community groups. These are usually based on both qualitative and quantitative approaches but use simpler assessment methods compared with specialist scientific monitoring methods, making them more user friendly (Young *et al.*, 2008), but are still robust. Some examples of community monitoring kits are:

- Stream Health Monitoring & Assessment Kit (SHMAK), NIWA, 1998 (Version 1). Updated version 2002 (Version 2) (Biggs *et al.*, 2002).
- Water Self-Assessment Form (Polglase & Death, 1998).
- Wetland Restoration: A Handbook for New Zealand Freshwater Systems (Robertson & Peters, 2010).
- Freshwater Invertebrate Guide - online resource (Landcare Research (Manaaki Whenua), no date).
- NIWA freshwater fish database and atlas (National Institute of Water & Atmospheric Research Ltd (NIWA), 2012c).
- NIWA management tools – useful methods, guidelines and modelling tools developed to assist with management of freshwaters and estuaries. These are sub-categorised into:
 - Restoration tools
 - Sediment tools
 - Estuarine tools
 - Water quality tools
 - Ecological monitoring tools
 - Freshwater ID guides, factsheets and models

These tools can be found on the NIWA website (National Institute of Water & Atmospheric Research Ltd (NIWA), 2012c).

- Estuary monitoring by communities: Mangrove habitats as a case study (Schwarz *et al.*, 2005).
- Turning the Tide: An estuaries toolkit for New Zealand communities (Robertson & Peters, 2006).
- Inventory and Monitoring Toolbox, (Greene *et al.*, 2008)
- FORMAK: A forest monitoring and assessment kit for community groups (PA Handford & Associates Ltd 2004).
- WETMAK: A wetland monitoring and assessment kit for community groups (Denyer & Peters, 2012).

However, the majority of these community-targeted kits do not include any cultural indicators, perhaps because, like specialist scientific indicators, one needs to have specialist mātauranga Māori to use cultural indicators. Later on we also review culturally based environmental reporting tools targeted at Tangata Whenua (including Tipa & Teirney (2006a and 2006b) above).

3.5.2 Environmental Performance Indicators or Tohu

Under the Resource Management Act 1991 and the Principles of the Treaty of Waitangi 1840, cultural significance must be accounted for in environmental resource management alongside the empowerment of Tangata Whenua to recognise Tino rangātiratanga. The EPI programme therefore, attempted to fulfil this by asking Māori to give input in regards to developing Māori Environmental Performance Indicators (Jollands & Harmsworth, 2007).

This was initiated by the formation of the Māori Environmental Monitoring Group (MEMG) who proceeded to write the following two reports in the late 1990's; Māori Environmental Monitoring (Royal, 1998) and Māori Input into the Environmental Performance Indicators programme (Ministry for the Environment, 1999), both of which were published by the Ministry for the Environment. Kennedy and Jefferies (2005) have reviewed and summarised these reports (amongst others) succinctly. Additionally, Jollands and Harmsworth (2007) review the EPI programme and, as one of their chosen examples, the involvement of Māori as an example of participation of indigenous groups in sustainable development.

The overall conclusion from the above reports is that Māori indicators and/or concepts should be assessed within their own framework rather than trying to assess them within a Western science framework. For example, Māori indicators tend to be derived from a bottom up/community level approach whereas Western science indicators are specifically selected to be generic and thus from a top down approach. Māori indicators generally take a wider holistic systems approach whereas Western science likes to compartmentalise. Māori indicators are often qualitative, whereas Western science indicators are quantitative. Secondly, a lack of guiding principles has been highlighted when attempting to integrate, or at least view in parallel, western science and mātauranga Māori environmental performance indicators (Kennedy & Jefferies, 2005).

Royal proposes two frameworks to combat this: the Mana Whenua framework and the Integrating framework (Royal 1998, Kennedy & Jefferies, 2005). Harmsworth and Tipa (2006) reiterate this, by listing factors that help guide the development of indicators under the right social and cultural framework. Royal (1998) describes a Māori EPI as:

“a tohu created and configured by Māori to gauge, measure or indicate change in an environmental locality. A Māori EPI leads a Māori community towards and sustains a vision and set environmental goals defined by that community”

Two broad groups of Māori EPI's were developed and illustrated by Royal (1998) in Kennedy and Jefferies, (2005) and Harmsworth and Tipa (2006):

1. Eco-centric EPIs (environment-centred): e.g. mahinga kai based EPIs (i.e. information and knowledge from Māori customary use of flora and fauna for traditional purposes) and/or local observation-based EPIs (i.e. information from local Māori observations over time of the environment).
2. Anthropocentric (people centred): e.g. human ecology based cultural indicators (i.e. knowledge from traditional Māori phenomena that define environmental relationships) these include kaitiakitanga, the mauri of a particular object or ecosystem, whakapapa, whanaungatanga, rāhui, tapu and wahi tapu.

From these two main broad groups of Māori EPI's a range of (Māori) indicators were developed for use in different habitats. Two water quality related Māori EPI case studies were commissioned as part of the EPI programme, one for freshwater and the other for marine. Firstly, the Taieri River Case Study was later developed into the Cultural Health Index for Streams and Waterways (Tipa & Teirney, 2006a) and accompanying User Guide

(Tipa & Teirney, 2006b). Secondly, the Hauraki Customary Indicators Report (Hauraki Māori Trust Board 1999).

Although MfE's EPI's programme came to an end in the late 90's, the Ngāti Kere and Ngāti Konohi Methods and Indicators for Marine Protection followed on from the theme of developing Māori EPI's or *tohu* (Gibson, 2005; Ngāti Konohi *et al.*, 2005 and Wakefield & Walker, 2005).

The range and quantity of EPIs emphasised the strong relationships Māori have with taonga species. These taonga indicators were measured by quantity (presence/absence as well as actual numbers), quality or condition, and the cultural relationship that hapū and iwi have with those specific taonga indicators (Harmsworth & Tipa, 2006).

Harmsworth (1999, 2002) developed these concepts further by incorporating taonga species as Māori EPI's for monitoring wetland condition for environmental trends. His work, along with the Cultural Health Index (CHI) (Tipa & Teirney, 2006a), resulted in five main groups of indicators:

1. Taonga species (presence/absence).
2. Unwanted flora and fauna (presence/absence).
3. Mauri.
4. Water quality.
5. Cultural heritage indicators.

As with Western science EPI's, criteria were also developed for selecting effective Māori indicators. Some of these were similar to the Western science EPI criteria, while others were unique, e.g. based on Tikanga. Kennedy and Jefferies (2005), point out that some of these indicators could be argued to reflect Western scientific values more than Māori values (e.g. cost effectiveness, quantitative indicators). On the contrary, it can be argued that all criteria listed for selecting effective Māori indicators (in Harmsworth & Tipa, 2006) not only maximise environmental monitoring from an indigenous perspective, but also produce robust indicators than can be monitored cost effectively (Harmsworth & Tipa, 2006).

3.6 Case Studies for Cultural Health Indicators

Below, numerous New Zealand case study cultural indicator reports are reviewed. Specifically, we are looking at the methods others have used to develop Māori or cultural indicators for assessing the health of water (within the wider context of the environment) as well as the specific cultural indicators used. These have been categorised into freshwater (streams, rivers and lakes), estuarine and marine, and lastly those that can be applied to freshwater, estuarine and marine environs.

3.6.1 *Fresh Water Case Studies*

a.) *A Cultural Health Index for Streams and Waterways (Tipa & Teirney, 2003)*

The purpose of the development of the Cultural Health Index (CHI) was to build a tool which would facilitate the input and participation of iwi into land and water management processes and decision making (Tipa & Teirney, 2003). The final nationwide tool published in 2006, was the outcome of several years work by Tipa and Tierney on developing the CHI for streams and waterways (freshwater), initiated under the MfE's EPI programme.

The first stage of development was a case study on the Taieri River, Ōtago, and was based on observation of the river over 12 months and completed in association with Ngāi Tahu (Kennedy & Jefferies, 2005). The indicators described in this report are focused on sensory perception – sight, sound, smell, touch and taste, as well as traditional place names (Kennedy & Jefferies, 2005). Kennedy and Jefferies give a critical overview of this initial case study.

The next published report of the programme was *A Cultural Health Index for Streams and Waterways: Indicators for Recognising and Expressing Māori Values, 2003* (Tipa & Teirney 2003). This expanded on the first case study (the Taieri River) with both the Taieri catchment and the Kakaunui River being studied (Tipa & Teirney 2003). Both these catchments are in the Ngāi Tahu rohe and both are hill country rain-fed rivers, with a variety of land uses in their catchments. It followed from this that the same cultural and ecological information collated within the first report, would be applicable to this report.

The outcome of the 2003 report was the development of the Cultural Health Index, comprising of three distinct scores for each site to be viewed in parallel:

1. Site Status: traditional vs. non-traditional. Would Tangata Whenua return to this site in future?
2. Mahinga Kai: evaluates the mahinga kai value of sites. How many mahinga kai species are present? Are mahinga kai sites that were gathered in the past still there? Accessibility?
3. Cultural Stream Health: from the original set of 21 indicators identified by local Tangata Whenua, five were chosen. They were narrowed down using statistics, specifically correlation and step-wise multiple regression and include:
 - Catchment scale: catchment land use
 - Riparian river-margin scale: use of riparian margin
 - In-stream physical characteristics: use of river – modification
 - In-stream flow: river flow – visible
 - In-stream water quality: water quality – pollution (Tipa & Teirney, 2003).

The third component was then tested against Western science measures of stream health, namely the Macro invertebrate Index (MCI) and the Stream Health Monitoring and Assessment Kit (SHMAK) (Tipa & Teirney, 2003). The cultural stream health measure was significantly correlated with both the MCI (0.58) and SHMAK (0.49), indicating that the cultural stream health measure successfully captures aspects of stream health (Tipa & Teirney, 2003).

The overall three-part index is expressed as shown in the following example:

A-0 / 2.5/3.9 Where:

- A identifies the site as traditional (vs. B for non-traditional)
- 0 identifies the site will not be used in future (vs. 1 for will be used)
- is the mahinga kai score (four factors are scored on a 1-5 scale, then averaged)
- is the stream health score (five factors are scored on a 1-5 scale , then averaged) (Tipa & Teirney, 2003).

In 2006, the '*Cultural Health Index for Streams and Waterways: A tool for nationwide use*' and '*Using the Cultural Health Index: How to assess the health of streams and waterways*' were published. The former built on and broadened the 2003 CHI, enabling it to be applied to all streams and rivers across New Zealand. This meant enabling it to be used on all (ecological) river types, and across different rohe (different iwi may incorporate varying values, meaning different indicators may be used) (Tipa & Teirney, 2006a). The two most noted changes were:

- The mahinga kai measure broadened its definition, and refined the methods for assessing the number of species present so that this measure can be comparable between sites.
- The cultural health measure was also refined (again using statistics) to come up with a group of indicators that could be applied to all NZ streams and rivers. This means they are less site specific, but still highly robust. The final list of indicators includes:
 - Water quality
 - Variety of habitats
 - Catchment land use
 - Riparian vegetation
 - Use of the riparian margin
 - Riverbed condition/sediment
 - Water clarity
 - Channel modification (Tipa & Teirney, 2006a)

This refined CHI was trialled in two more case study areas – the braided Hakatere (Ashburton) River (different ecological river type but still in the Ngāi Tahu rohe), and the Tukituki River, in the Hawke's Bay (similar river type to the first case studies but in a different rohe, that of Ngāti Kahungunu). The later 2006 report, '*Using the Cultural Health Index: How to assess the health of streams and waterways*' is a user guide, taking one through the processes step by step and includes field data collection sheets.

Since 2006, numerous hapū and iwi have applied the CHI to streams and waterways within their rohe, or they have at least used CHI as a baseline to measure water health from a cultural perspective. For example, in Young *et al* (2008) they adapted the CHI and applied it to sites in the Motueka and Riwaka catchments in Tasman, as part of a wider Integrated Catchment Management Programme. Additionally, it is suggested, in the Waikato River Independent Scoping Study by NIWA, that river based iwi could use the CHI framework to develop a

Cultural Recreational Index to monitor progress of proposed restoration actions (Rutherford *et al.*, 2010).

b.) Coordinated Monitoring of New Zealand Wetlands, Phase 2, Goal 2: Māori environmental performance indicators for wetland condition and trend (Harmsworth, 2002)

c.) Linkages between cultural and scientific indicators of river and stream health. Motueka Integrated Catchment Management (ICM) Programme Report (Young *et al.*, 2008)

The aim of Harmsworth (2002) monitoring of NZ's wetland project was to provide nationally consistent indicators as tools for coordinated monitoring of wetland condition and trend, including a set of mātauranga Māori based indicators (Harmsworth, 2002). As mentioned above, Harmsworth's work, along with CHI resulted in five main groups of indicators:

1. Taonga species (presence/absence).
2. Unwanted flora and fauna (presence/absence).
3. Mauri.
4. Water quality.
5. Cultural heritage indicators.

A large number of examples of indicators within the above groups are given (Table 6 in Harmsworth 2002, pg. 31).

The aim of the Motueka Cultural Indicators for River and Stream Health Project, by Young *et al.* (2008), was to also help articulate cultural values, determine the state of the environment from a cultural perspective and establish a role for Māori in environmental monitoring. This cultural indicator framework is based on Tipa and Tierney's CHI for streams and waterways. The most noticeable difference, however, is that they categorise the mahinga kai component and the cultural stream health indicators component according to atua domains, namely Tangaroa, Tāne Mahuta, Haumia/Rongo, Tūmataurangi, Tāwhirimātea, with an overall ora/wairua/mauri score too. This work is part of a wider Integrated Catchment Management (ICM) project and is to be viewed in parallel with scientific monitoring data (Young *et al.*, 2008).

Harmsworth (2002) and Young *et al.* (2008), also discuss EPI's in general, and suggest they be organised into 3 main categories:

1. **Māori/culturally based indicators** – based on mātauranga Māori and requires in-depth specialist knowledge and skill as well as cultural understanding, which can be time consuming.
2. **Community-scientific based indicators** – requires low to moderate levels of technical input and skill, but are still scientifically robust, enabling community groups (which can include Māori) to use these indicators.

3. **Professionally scientific based indicators** – requires a high level of technical input and skill, very robust sampling methods, analysis and interpretation. However, can be expensive and time consuming.

Harmsworth (2002) included in the results, the following indicators that could be used to monitor positive and negative environmental changes as determined by Māori communities' values and aspirations. Numbers 4-8 were found to be the most critical for assessing environmental change from a Māori perspective:

1. Percentage area of land uses/riparian factors affecting cultural values
2. Number of point (sites) sources of pollution degrading te mauri
3. Degree of modification (draining, water table, in-flows, out-flows) degrading te mauri
4. Number of (and change of) unwanted (e.g., exotic, introduced, foreign) plants, algae, animals, fish, birds (pest types) that affect cultural values
5. Number of (and change of) taonga species within wetland
6. Percentage area of (and change in area of) taonga plants within total wetland
7. Percentage area of (and change in area of) unwanted plants covering total wetland (e.g. exotic, introduced, foreign)
8. Assessment of, and change in te mauri (scale)
9. Number of cultural sites protected within or adjacent to wetland.

The conclusions of Young *et al.* (2008) were:

- It is important that scientific monitoring approaches and indicators are not compared to cultural approaches and indicators just to show weaknesses and fallacies, but instead used side by side to illustrate the differing perspectives and articulate different sets of values and desires (Young *et al.*, 2008).
- Scientific indicators were more objective and directly measured at each site, while the cultural indicators were chiefly qualitative and relied on consistent iwi training and sharing of cultural knowledge (Young *et al.*, 2008).

d.) Ngā Mahi: A Kaupapa Māori Outcomes and Indicators Kete

The Mauri of Waterways kete is part of the report Ngā Mahi: A Kaupapa Māori Outcomes and Indicators kete, which in turn is part of a broader Planning Under Cooperative Mandates (PUCM) Māori research project. This work aimed to develop a Kaupapa Māori Environmental Outcomes and Indicators Framework and Methodology. The Kaupapa Māori Outcomes and indicators kete outlines 3 tikanga-specific tool kits and methods for evaluating Māori value-based methods and indicators. These are Mana Whenua, Mauri of Water, and Wāhi Tapu. The relevant tool kit to our literature review is the Mauri of Waterways kete.

The aim of the kete is to enable iwi to assess the quality of statutory plans and the environmental performance of councils in their rohe (Jefferies & Kennedy, 2009b). Thus, a primary focus of the Mauri of Waterways tool kit is on the perceived extent to which the local authorities, Tangata Whenua, other agencies and the wider community protect mauri (four of the five indices of this tool kit are related to this). The final index examines the physical evidence that mauri is healthy. This index has five indicators:

1. Whether the respondent agrees that the mauri is protected (1 to 5 scale)
2. Characteristics of the water:
 - Is the water safe to drink?
 - Water clarity – can you see the bottom of the stream bed?
 - Absence/presence of visible foam on the water surface
 - Taste of the water – natural or unnatural?
 - Smell of the water – natural or unnatural?
 - Does the water feel oily when rubbed between the fingers?
 - Presences/absence of sediment and slime on the riverbed?
3. Characteristics of the waterway and its immediate environment:
 - Presence/absence of stock on the riparian margins and waterway
 - The extent of riparian vegetation, including presence/absence of overhang
 - Natural range of plant species within riparian margins
 - River flow characteristics
4. Characteristics of waterway inhabitants:
 - Number of indigenous fish species present
 - Number of specimens of each species
 - Health of fish present
5. Presence of potential human threats:
 - Withdrawal of water from waterway for other uses
 - Incidence of point or non-point discharge to waterway (Jefferies & Kennedy, 2009a)

3.6.2 Marine and Estuarine Case Studies

a.) Hauraki Customary Indicators Report (Hauraki Māori Trust Board, 1999)

This report was the MfE's marine and estuarine case study as part of the EPI programme. The area examined took place in extensively modified lowland catchments and adjacent waters, specifically in three case study regions: Waihou River, Manaia Harbour and the Firth of Thames (Hauraki Māori Trust Board 1999, Kennedy & Jefferies 2005). The case study chapters discuss the historical and customary resources of these areas. This includes the change in habitat/environment over time and the influence this has had on the customary resources, alongside the shift in harvest ethic/tikanga by all New Zealanders; commercial and recreational.

In this report, customary indicators are encapsulated by an analysis of the following themes: definitions, resource abundance; habitat extent; fisheries use; tikanga Māori; seasonal calendars; observation and inherited knowledge.

Customary indicators identified are further described as being one of five types, defined as; celestial phenomena, seasons, weather, stages in the life cycle of plants or animals, and

observed changes in fish behaviour or shellfish location (Hauraki Māori Trust Board, 1999. Kennedy & Jefferies, 2005). The Hauraki Customary Indicators report discussed differences between Western science indicators and customary indicators, with the main conclusion being that resource management from a Western science perspective is all about maintaining/recognising and providing for, the physical dimensions of a resource. Resource management from a mātauranga Māori perspective, however, encompasses the physical *and* metaphysical dimensions of a resource. It is also observed that some traditional customary indicators may not be applicable today, because of environmental change.

b.) Kaimoana Survey Guidelines for Hapū and Iwi (Otaraua Hapū et al., 2003)

These guidelines aim to provide hapū and iwi with information and a suggested process for undertaking a survey of kaimoana. The guidelines also aim to provide a template and guidance on how to build a partnership with other organisations that have mutual interests (Otaraua Hapū et al., 2003).

The guideline package is structured into six phases:

1. Making a start
2. Steering the project
3. Reviewing previous surveys
4. Designing the survey
5. Undertaking the survey
6. Presenting and reviewing the data

(Otaraua Hapū et al., 2003).

The guidelines take the reader step by step through each of the above phases, going over what to do by using suggestions and general examples. Overall, these guidelines offer information on the types of indicators or tohu one can monitor and how to proceed, but do not give specific indicators/tohu. The methods described are mainly based on western science methods with suggestions on how to utilise sensory information.

c.) Māori methods and indicators for marine protection: Ngāti Kere interests and expectations for the rohe moana (Wakefield & Walker, 2005)

This report is one part of a three-year Foundation of Research, Science and Technology (FORST) - funded research study with support from the Ministry for the Environment and the Department of Conservation entitled 'Māori methods and indicators for marine protection'. The study took place at two sites in partnership with Ngāti Kere of Porangahau (in the Hawke's Bay) and Ngāti Konohi of Whangara (in the East Coast area) (Wakefield & Walker, 2005). The objectives of the overall project were to:

- identify specific iwi-hapū visions, values and expectations for marine management;
- define a process to identify Māori indicators to measure the health of the environment across a range of trophic levels;
- and to test a range of management methods – e.g. marine reserves, taiāpure and mātaimai (Wakefield & Walker, 2005)

Through identifying species of importance, their values, and management systems, Ngāti Kere wished to see the principles of manaakitanga and whanaungatanga applied to marine management (Makey, 2010). The report gives tohu or indicators for both the health of the rohe moana and mahinga kai/harvest. These are then categorised into traditional tohu and contemporary tohu. The traditional tohu are mainly observations of seasonal patterns – alignments between terrestrial and or celestial events with marine events. The contemporary tohu are more similar to Western science ecological indicators, for example, a decrease in biodiversity; changes in populations of certain species across the food web (Wakefield & Walker, 2005). For a table summarising these tohu, please see Appendix 1.

d.) Māori Methods and Indicators for Marine Protection: A process to identify tohu (marine indicators) to measure the health of the rohe moana of Ngāti Kere (Wakefield et al., 2007)

This report is Stage Two in the Ngāti Kere case study rohe and describes the process that was applied for identifying and developing tohu to measure the health of the Ngāti Kere rohe moana. The report discusses the objectives, the project plan, roles and responsibilities of individuals/groups, the manner in which the project was carried out and how the project fits in with Ngāti Kere's vision statement and goals.

The report identifies a total of nine tohu:

1. Number and size of koura (and/or paua) in shallow water;
2. Number and size of hapūka/groper close (within 50m) to the coast;
3. The level of Ohinemuhu rock above the sand and the correlation with abundance of pipi;
4. The level of Ngāti Kere involvement in marine management – e.g. measure the number of management plans that Ngāti Kere have developed or contributed to; number of submissions made by Ngāti Kere on rules and plans;
5. The availability of native plant (dune) resources e.g. pingao;
6. Number and type of customary take permits issued;
7. Number, size and distribution of 'no-take' areas;
8. The number and type of prosecutions for illegal catches and takes; and
9. The level of rohe moana knowledge within the hapū and community.

However, while monitoring methods were discussed and one trial day was performed, more detail was required for on-going measurement to ensure robustness (Wakefield *et al.*, 2007).

The key conclusion of the report was that while the monitoring trial component of the project was not completed, there was still value in the tohu kete resource created, in that it successfully captured the knowledge and aspirations of Ngāti Kere and could serve as a reference tool for the hapu, when planning and making decisions related to the rohe moana (Wakefield *et al.*, 2007).

e.) Māori methods and indicators for marine protection: Ngāti Konohi interests and expectations for the rohe moana (Ngāti Konohi et al., 2005)

This reports on the second case study of the Māori methods for marine protection project – with Ngāti Konohi (in the East Coast area). Accordingly, the report had the same objectives as the Ngāti Kere case study. This case study area includes the Te Tapuwae o Rongokako marine reserve (Ngāti Konohi *et al.*, 2005).

The future goals and aspirations of the people involved were divided into seven key areas:

1. Tino rangātiratanga
2. Kaitiakitanga/sharing guardianship responsibility
3. Education
4. More kaimoana/seafood
5. Clean and safe rohe moana
6. Mahi/work
7. Environmental enhancement (Ngāti Konohi *et al.*, 2005).

Ngāti Konohi participants identified two types of environmental markers; harvesting and planting indications, which were signs of environmental health (Ngāti Konohi *et al.*, 2005). Another indicator communicated cultural practice in the marine environment. For example, reference was made to placing a rāhui over the moana in the event of death as a sign that it was not good to go in the sea (Ngāti Konohi *et al.*, 2005).

Additionally, there were a number of suggestions for contemporary indicators used by Ngāti Konohi to monitor the health of the rohe moana. Again, these were all based on sensory feedback –taste, touch, sight and smell, as well as colour, size, abundance and variety.

f.) Māori methods and indicators for marine protection: A process to identify tohu (marine indicators) to measure the health of the rohe moana of Ngāti Kanohi (Gibson, 2005)

The aim of this report was to provide environmental tohu that could be used in conjunction with western science methods (for example in State of the Environment reports) to give a more holistic view of the health of the environment, as well as providing specific focus for outlining possible future directions for marine management for the Ngāti Konohi rohe (Gibson, 2005). Overall, the participants in the interview process stated that the main objective was for ‘the prime responsibility for the management of the rohe moana to be back in the hands of Ngāti Konohi’ (Gibson, 2005).

This report focused on the environmental tohu that were identified by Ngāti Konohi as indicators of the health of the marine environment within their rohe. These tohu could be used as an indication of the effectiveness of marine management practices (Gibson, 2005). This report built on the tohu identified in the previous report, including listing additional tohu mentioned in interviews, and discussing potential monitoring methods for using these tohu (see Appendix 3). Tohu are then categorised into primary and secondary tohu, with primary tohu being further categorised into species tohu and process tohu.

Primary tohu are described as observations of the state of the health of the kaimoana and of the natural processes that denote the state of the health of the marine environment, whereas secondary tohu are scientific measurements of kaimoana present, and of other things that denote the state of the health of the environment (Gibson, 2005).

Of the primary tohu, species tohu are those that measure the availability, accessibility, abundance and quality of key species identified that reflect mana and manaakitanga of Ngāti Konohi, these being species that are for ‘putting food on the table’ (Gibson, 2005). These were:

- Kina
- Koura
- Paua
- Pupū (cats eye’s/univalves) (ataata, maehe)
- Parengo (edible seaweed)
- Ika (fish) – kahawai, snapper, mullet, shark including dogfish and rig, maomao and spotty

On the other hand, process tohu monitor the condition and presence of processes that are indicative of a healthy marine environment from a holistic point of view of the moana (Gibson, 2005). These included:

- A series of land based signs that can be used to indicate the ‘ripeness’ of some of the primary tohu identified above.
- The presence of a natural and diverse range of marine species.
- The presence of a natural diversity of marine species in intertidal areas including seashore bird life.
- The seasonal observation of feeding aggregations of ‘bait fish’ (kahawai, trevally, tarakihi) together with predators, such as tuna, marine mammals, sea birds.
- Harvesting success is positively linked to the lunar phases (maramataka) (Gibson, 2005).

Secondary tohu are there to give baseline measurements that can be re-measured over time when required (Gibson, 2005). Monitoring methods mentioned that are used to obtain data measurements include those often used in western science ecological monitoring – for example plot surveys and water quality testing (Gibson, 2005).

g.) Iwi Estuarine Indicators for Nelson, (Walker, 2009)

The Walker (2009) report expanded on Young *et al.* (2008) (freshwater) cultural and scientific indicators report, and is also part of the Manaaki Whenua FRST funded Motueka ICM science programme. It too used Tipa & Tierney’s CHI as a framework for measuring cultural environmental health, but like Young *et al.* (2008), it did this based on the atua domains. The point of difference is that this CHI has been developed for estuarine health as opposed to freshwater.

The purpose of this report was to provide technical advice and professional expertise on cultural monitoring tools for estuarine areas within the Nelson City Council (NCC) administrative area, ultimately providing cultural input into future state of the environment (SOE) reporting, and for council decision-making, management plans and assessments in relation to estuaries (Walker, 2009).

Of the four estuaries within the administrative area of NCC, Wakapuka (Delaware) Inlet was chosen to be the case study site in which to trial and establish monitoring sites (Walker, 2009). Monitoring sites were selected based on diversity across the following criteria:

1. Cultural significance – must have
2. Adjacent landowner – includes a description of land owners adjacent to site
3. Mahinga kai value – using an initial estimate based on biological productivity, ‘gut feeling’, anecdotal evidence and vegetation patterns
4. Human influences – sites with immediate adjacent housing or with high recreational use were rated high compared with less modified sites
5. Science site – whether or not Cawthron had an established monitoring site at or near by (Walker, 2009).

This report provides two key results:

- A set of tools - monitoring form and guidelines - for the monitoring of estuaries from a cultural perspective within the NCC area (Walker, 2009).
- A monitoring programme and set of protocols. (Walker, 2009).

The report concludes with a list of recommendations, including a two year trial period to test and refine these estuarine monitoring tools and to seek funding for this, as well as future monitoring (Walker, 2009)

h.) Ngā Waihotanga Iho: The Estuary Monitoring Toolkit for Iwi (Rickard & Swales, 2009)

The main objectives of the Nga Waihotanga Iho, the estuary monitoring tool kit for iwi, is to empower Tangata Whenua in the resource management decision-making process; provide easy-to-use inexpensive and robust tools for Tangata Whenua and community groups, to monitor environmental changes in their estuaries; and provide an educational resource for high-school students (Rickard & Swales, 2009; Makey, 2010).

The first phase of the toolkit development was consultation with Tangata Whenua to prioritise their values in the case study areas of Mania estuary, located on the west coast of the Coromandel Peninsula, and at Kaiwha on the west coast of the North Island (Rickard & Swales, 2009). This was achieved via detailed interviews, hui, a survey questionnaire, as well as field trips to the case study areas, which were attended by hapū members and NIWA scientists (Rickard & Swales, 2009). Based on this consultation, the NIWA scientists

designed and developed the toolkit based on western science tools and methods (Rickard & Swales, 2009).

The toolkit is based on seven modules, which have been designed to be used either ‘stand-alone’ or together (Rickard & Swales, 2009). The modules are as follows:

- **Habitat mapping** – maps of estuarine habitats and how they change composition overtime.
- **Sediments** – description of sediment types, rates and estuary morphology.
- **Water and sediment quality** – tools to measure water quality and sediments and how these change over time, including a tool to measure concentrations of *E. coli* in water samples.
- **Plants** – tool for describing plant community biodiversity and changes over time.
- **Tidal flat ecology** – tools to measure changes in area and density of shellfish beds, shellfish size and community composition.
- **Fish** – tools to measure size and abundance of fish species, as well as monitoring recreational and customary fisheries within the estuary.
- **Coastal management** – a guide to legislation relating to the management of the coastal environment and its resources, including the roles of the various management stakeholders, information on planning documents (e.g. regional policy statements), a review of the resource consent process and how Tangata Whenua can become involved (Rickard & Swales, 2009).

Following the development of the toolkit, NIWA scientists tested it in the first of the case study regions – Mania estuary, with participation and feedback from local Tangata Whenua (from Ngāti Whanaunga and Ngāti Pukenga) (Rickard & Swales, 2009).

3.6.3 Combined Freshwater, Marine and Estuarine Case Studies

a.) State of the Takiwā -Te Rūnanga o Ngāi Tahu. (Te Rūnanga o Ngāi Tahu 1996, Pauling & Arnold, 2009)

State of the Takiwā (SoT) is an environmental monitoring approach developed by Te Rūnanga o Ngāi Tahu as part of their *Ki Uta Ki Tai – Mountains to Sea Natural Resource Management Framework* (Te Rūnanga o Ngāi Tahu 1996, Pauling & Arnold, 2009).

State of the Takiwā has been defined as:

“An environmental monitoring and reporting approach that integrates mātauranga Māori and western science to gather information about the environment to establish a baseline for the creation of policy and improvement of environmental health. A programme developed as an alternative to conventional state of the environment reporting used by MfE, that takes into account Tangata Whenua values”

(Kaupapa Taiao, 2004).

The SoT was developed under the following themes:

1. **Mahinga Kai – (and whakapapa)** – for Tangata Whenua to be able to undertake food gathering/access rivers, beaches, oceans and forests – these environs must be in pristine condition – “good enough to eat from”.
2. **Mauri, mana, Manaaki (hospitality)** - Ngāi Tahu’s vision to “continue to provide for our people and our manuhiri, now and in the future, for us and our children after us”.
3. **Mātauranga** – This traditional knowledge adds another dimension to current (western) state of the environment monitoring, especially relating to the health and wellbeing of the mauri (Kaupapa Taiao, 2004).

The SoT database is a specially developed Microsoft Access 2002 runtime application, linked to a physically separate database which can be run on any PC by uploading it from an installation CD-ROM (Pauling *et al.*, 2007). Furthermore, it has an easy to use Helpfile and a bi-lingual interface (Pauling *et al.*, 2007).

The SoT database includes a Site Assessment Module for storing, analysing and reporting data collected from sites, and a print centre where monitoring forms for data collection and standard reports can be produced (Pauling *et al.*, 2007). The forms were developed through discussion with both tāngata whenua groups and monitoring experts and by reviewing previously developed monitoring tools (Pauling *et al.*, 2007). The Site Assessment Module can identify environmental monitoring sites and record and display historic and current information (Pauling *et al.*, 2007). Data gathered is a combination of reasoned multi-choice evaluation criteria (e.g. access for harvesting: 1 = very poor- 5 = very good), and general comments about the site (Pauling *et al.*, 2007).

Moreover, additional data can be recorded and stored in the database. This can include, but is not be limited to: past interviews, manuscripts, literature; photographs, results provided from councils’ monitoring and Crown research departments, Tapa & Teirney’s freshwater CHI assessments, NIWA’s Stream Health Monitoring and Assessment Kit (SHMAK) (freshwater) results, Geographic Information Systems (GIS) data/maps, *E. coli* water quality testing results, and electronic fishing survey results (Pauling *et al.*, 2007, Prepared by Makey 2010). The Takiwā tool therefore provides a diagnostic tool for identifying issues (and sites) of concern to iwi and allows for remedial action to be prioritised, implemented and monitored for performance over time (Pauling & Arnold, 2009).

However, because the Takiwā database has been driven by concerns primarily around water quality of streams and rivers, it is limited in its application for monitoring species health and in assessing the health of other ecosystems including lakes and estuaries (Pauling & Arnold, 2009). That is why Ngāi Tahu and research partners are developing specific tools that can be added to the overall system (Pauling & Arnold, 2009). For example:

- The joint Ngāi Tahu/NIWA Te Waihora (Lake Ellesmere) Cultural Health Study
- The joint Ngāi Tahu/Te Tiaki Mahinga Kai Marine Health Index

The Te Waihora Cultural Health Study was performed as a condition of the Te Waihora Lake Opening Consent obtained by Environment Canterbury in 2007 (Pauling & Arnold, 2009). The work plan, people involved, the processes and the results are summarised in Pauling and Arnold (2009).

The Marine Health Index (MHI), or Marine Cultural Health Index, has been defined as a set of indicators, observations and measures that help a scientist, fisher or manager record and track changes in the health of a particular coastal area in an independent, inexpensive and robust manner (Te Tiaki Mahinga Kai, 2012). The purpose of the MHI is to provide a protocol where the Tangata Taiki/kaitiaki can rapidly assess the health of their mātaihai, taiāpure or area where a temporary closure has been imposed (Te Tiaki Mahinga Kai, 2012).

This MHI has been modelled on Tipa & Tierney's CHI for streams and waterways. Indicators may include: the continuation of traditional harvest practices, changes in the taste, smell and size of kai, and visually noticeable water pollution and litter (Te Tiaki Mahinga Kai, 2012). It is envisioned that once developed, the MHI can be adapted and applied to coastlines around the country (Te Tiaki Mahinga Kai, 2012).

4 TE KUPENGA Tauranga Moana, Tauranga Tangata Customary Case Studies

| 4.1 AIMS AND OBJECTIVES | Tauranga Moana, Tauranga Tangata Customary Case Studies |
|---|--|
| <p>Aims:</p> <ul style="list-style-type: none"> To acknowledge the value of mātauranga Māori within the development of CCHI To customise CCHI for Te Awanui To develop CCHI unique and specific to Te Awanui and its people. <p>Objectives:</p> <ul style="list-style-type: none"> To develop and build relationships with Tangata Whenua and cultural stakeholders of Te Awanui. To acknowledge the unique relationship Tangata Whenua have with Te Awanui To acknowledge the wealth of meaningful information obtained through occupation, observation and oral transfer of mātauranga Māori. To identify environmental and cultural issues specific to each case study group. | <p>Rational:</p> <p>He tangata, he mātauranga Everyone has knowledge.</p> <p>Mātauranga is passed down through generations, and is developed further through physical interaction and observation. Mātauranga Māori has ensured the survival of generations; it connects Tangata Whenua to the land, resources and people. Mātauranga Māori guides interactions with the environment and resources, and must be acknowledged as a valuable resource for the management of environmental systems.</p> |

4.2 Methods and Analysis

4.2.1 Case Study Areas

In order to identify a broad spectrum of environmental and cultural issues, two case study areas were selected to include a range of environments and ecosystems within the Tauranga Harbour. The two case study groups are situated within two sections of the Tauranga Harbour:

1. Te Whānau a Tauwhao ki Otawhiwhi /Otawhiwhi Marae: are situated in the upper northern harbour. Geographical features of the area include the Tauranga Harbour's northern entrance, and the Waiau and Tuapiro catchments (Rowson, 2011). The Waiau River catchment area is 33.1 km² with the river extending 103 km from foothills beyond the Kaimai Ranges, to the very north of Tauranga Harbour where it emerges through an extensive saltmarsh wetland. Vegetation consists of mainly forestry (34%) and indigenous vegetation

(10%) (Rowson, 2011). Large tracts of pasture also occur to the north and west of the upper catchment and extend into the lower catchment to make up around 47% of the land cover (Scholes and McIntosh, 2009).



Figure 2: Map of the rohe/rohe moana of Te Whanau a Tauwhao ki Otawhiwhi

2. Ngāti Taka / Te Puna: are located within the Tauranga Harbour's Southern basin. Geographical features include areas of the Wairoa River and the Te Puna/Waipapa Catchment (Watchmen, 2011). The Te Puna Waipapa catchment stretches 18 km in the upper reaches of the Kaimai ranges and is 7 km long, from the Wairoa to the Waipapa River and is in total an area of 7375 ha (Watchmen, 2011). The catchment incorporates significant river and streams such as the Oturu, which flows into the Waikaraka Estuary; the Te Puna River; Mangawhai Bay; the Waipapa River; Wainui and Aongatete River.

Once the two areas were identified as potential case study candidates, initial contact was made with hapū representatives who agreed to a presentation of the CCHI for Te Awanui project at a hui-a-hapū (hapū meeting). At this meeting the hapū collective formally agreed to be part of the CCHI study and an overview of the consultation plan was outlined.

Following the initial consultation, a series of marae-based wānanga were held. Marae-based consultation encouraged hapū participation and ensured that Tangata Whenua maintained authority over the consultation process. Marae-based consultation provided a safe and comfortable space for all participants, encouraging open sharing and communication. Marae-

based consultation ensured all members of the hapū had equal opportunity to participate and promoted intergenerational communication.



Figure 3: Geographical map showing the rohe/rohe moana of Ngāti Taka.

Marae-based consultations followed the principles of an open wānanga. Wānanga is an ancient process of learning that encompasses Te Reo Māori and mātauranga Māori. Wānanga makes use of mātauranga Māori in all its forms in order to teach and learn. Wānanga is “given life by taonga such as mātauranga Māori and Te Reo Māori and in the reciprocal nature of the Māori world, wānanga also serves to give life to Te Reo and mātauranga. Each is dependent on the others to nurture, sustain, and develop” (Waitangi Tribunal Report, 2010).

Wānanga based consultation nurtures open conversation and sharing of mātauranga Māori and Taonga. Hapū wānanga conducted during the project were guided by the researcher, however because participants were allowed to express their stories and views openly, their contribution dictated the major discussion pathways. In allowing open wānanga, major concepts and themes were identified and developed effortlessly.

4.2.2 Hapū Consultation Protocol

It is essential to understand that mātauranga Māori does not exist in isolation. Mātauranga Māori involves a matrix of interconnected concepts, which have existed from the time of creation. Traditionally mātauranga Māori was transferred orally. This transfer of words,

knowledge or mātauranga is regarded as a transfer of energy, which joins the physical world to the spiritual. It is this connection that gives emphasis to the intergenerational transfer of knowledge through whakapapa. When mātauranga Māori is transferred it is not alone, it is instead a collection of mātauranga from generations past. Mātauranga Māori is a taonga and therefore the mana, mauri and wairua must be respected.

It is essential that when engaging with tāngata whenua and collecting mātauranga Māori, strict ethical procedures and principles are adhered to. MTM Kaupapa Māori Research Principles guided the case study consultation process for the CCHI for Te Awanui project (See Introduction for details). This guaranteed that the mana of the people and their knowledge was always upheld and hapū participants were comfortable and secure with the research practices and procedures.

4.2.3 Hapū Data Management

The CCHI for Te Awanui project acknowledges the significance of mātauranga Māori and the responsibility Tangata Whenua have, as kaitiaki of their hapū knowledge. As kaitiaki, hapū ensure the mana, and mauri of their knowledge, people and hapū is always upheld and preserved.

Hapū information management followed the MTM Mātauranga Māori Kaitiakitanga - MTM Mātauranga Māori Data Management Protocol (see appendix 6), which outlines the key considerations regarding the management and security of mātauranga Māori.

4.2.4 Analysis

All hapū consultation wānanga were voice recorded. The recordings were later transcribed for further analysis and reference. The main themes were identified and categorised into three broad groupings:

1. Environmental Issues:
Issues associated with temporal changes in the marine ecosystems and their surrounding environments.
2. Mahinga Mātaitai Issues:
Issues specifically related to temporal changes in traditional gathering grounds.
3. Cultural Issues:
Issues regarding the social and economic wellbeing of marae and hapū functions.
Issues that affect the capacity of Tangata Whenua to assert cultural responsibilities such as kaitiakitanga and manaaki.

4.3 Tangata Whenua Concerns

4.3.1 Environmental Concerns

Major environmental issues were identified regarding point source pollution types, sediment inputs, erosion control, presence of introduced species and the displacement, decline and/or unavailability to harvest shellfish.

Pollution Source

Both Ngāti Taka and Te Whānau a Tauwhao have observed temporal change in the lands surrounding their rohe moana. Within the semi-rural settings, both acknowledge the extensive rural growth in both agriculture and horticulture. Forestry work, orchards and stock farming are recognized by both hapū as major contributors to marine ecosystem degradation, increased nutrient loading and contamination input into the moana.

Ngāti Taka has identified poor land management as a contributor to the increase of nutrients and contaminants into the marine environment. They made particular reference to three main areas where poor land management practices, have led to environmental neglect, such as:

- Lack of and/or removal of riparian belts
- Lack of coastal margins
- Poor stock fencing

The lack of and/or removal of riparian belts along rivers and coastal banks has caused not only extensive erosion but has also been associated with the deterioration of natural nutrient removal capacities,

“...vegetation along the banks are not there just to look pretty, they have a purpose. They have an interconnected relationship between land and water, they hold the land and act as a filter from land to sea, without them there is little control on what enters the waterway”

(Ngāti Taka, 2011).

Ngāti Taka also identified the removal of natural coastal/river margins as poor land management. Natural buffers provide an appropriate area of land between farm and river/coast. These areas allow the establishment of adequate riparian margin growth, and provide a larger distance of filtration, which increases the filtration capacities and assists in nutrient and pollution removal. Without these areas, the risk of potential nutrient leakage into the waterway increases substantially (Ngāti Taka, 2011).

Ngāti Taka recognised the lack of effective stock fencing as a major concern. They highlighted that the lack of adequate stock fencing compromises the stability and structure of the river/coastal banks, which allows stock access to the waterways. Defecation directly into the river systems has obvious impacts on the nutrient inputs into the waterways (Ngāti Taka, 2011).

The historical loss of wetland areas adjacent to the harbour to make way for farming was identified as a major contributor to ecosystem loss and function. Both Ngāti Taka and Te Whānau a Tauwhao acknowledged the importance of wetland and riparian areas as filters for nutrient runoff. Removal or modification of these culturally significant areas greatly impacts on the effective functioning of the natural vegetation systems, which then have cascading effects into other marine systems. Both hapū associate the loss of wetland to contamination of shellfish areas. For this reason caution is taken when harvesting seafood in areas known

for high nutrient loading or potential nutrient contamination (Ngāti Taka, 2011, Te Whanau a Tauwhao, 2011)

One hapū member from Ngāti Taka explained how the influx in sea lettuce within the harbour was simply a response to the changing environmental state, and more specifically the increase of nutrients into both fresh water and marine systems. It was mentioned that sea lettuce was a method of nutrient removal in coastal environments. Sea lettuce uses nutrients for growth, the algae is carried by the currents and dumped on the shores, removing nutrient from the main water system. It was also acknowledged that the build-up of sea lettuce can be detrimental to the culturally significant areas, due to smothering and other impacts related to seaweed breakdown (Ngāti Taka, 2011).

Hapū identified issues regarding the expansion of mangroves in estuaries. Both hapū acknowledged that mangroves are natural cultural features of the estuarine system, and their presence has been recorded in traditional accounts. There are references to mangroves in stories from the arrival of Te Arawa waka. In this account, mangrove was confused for kumara vine. Because of this mistake the people of Te Arawa waka ate their precious kao (dried kumara) stores and kumara seeds. When the incoming tide covered the kumara vines the people realised their error, it was too late. The majority of the kumara stores had been eaten (Te Whānau a Tauwhao ki Otawhiwhi, 2011; Stokes, 1980).

Hapū also recognise mangroves as important biological features of estuaries. Mangroves have a vital role in ecosystem functions such as sediment storage, nutrient removal and contaminant storage. The influx of mangrove distribution has therefore also been attributed to the environments natural response to increased nutrients. These natural environmental responses were highlighted in a statement made by a spokesperson of Te Whanau a Tauwhao:

“...when you cut down the trees next to the moana, the moana replies by establishing trees next to the land. The presence of mangroves is a tohu to display a way of the ecosystem adapting to the environments - this is the same with sea lettuce”
(Te Whanau a Tauwhao, 2011)

The effects of storm water run-off and recurring seepage from septic tanks into the storm water drains was and still is, a major concern to the hapū of Otawhiwhi. The hapū gave dated accounts of when heavy rains combined with large tides, leading to septic tank overflows within the subdivision adjacent to the area of the Otawhiwhi Marae. The permanent storm water drain that runs from the main road through the marae land area has been susceptible to these septic tank overflows, and the drain runs directly into the outer reaches of the Waiau Estuary where traditional shellfish beds are still harvested. The dispersal of untreated wastewater directly into the culturally significant estuary has been linked with tipping the natural balance of the ecosystems and damaging the mauri (life essence), therefore affecting the stable state, and recovery processes of the ecosystem,

“The change in ecosystems related to the change or the changing effect of the mauri of an area... in that the balance of that ecosystem was maintained. That meant in a traditional

sense to maintain the mauri of that ecosystem was achieved by recognising the functional attributes of that ecosystem”

(Te Whānau a Tauwhao, 2011).

Sedimentation

Sedimentation has also been associated with land use and management. Te Whānau a Tauwhao gave detailed examples of poor land management in the lands surrounding their moana and highlighted issues such as the lack of riparian margins along river ways and deforestation impacts on the Waiau River (Te Whānau o Tauwhao, 2011).

Sedimentation has been identified by Te Whānau o Tauwhao as a major contributor to declines in shellfish quantities and marine ecosystem change. Along with this, both Ngāti Taka and Te Whānau a Tauwhao explained that the gradual influx of sediments into the estuaries has led to the elevation of intertidal areas. As a result hapū have observed associated impacts to the biological communities within the estuaries.

Within the Te Puna area, Ngāti Taka highlights an increase in sediments within the Waikaraka, Te Puna, Mangawhai, Waipapa and Pahoia estuaries, which is observed by an infilling of the major estuarine channel systems. As a result of infilling, Tangata Whenua have witnessed a loss of traditional harvesting and gathering areas for flounder, mullet, kahawai, tītiko (mud snail) and pāpaka (Paddle crab) (Ngāti Taka, 2011).

Temporal observations within shellfish harvesting areas indicate issues associated with sediment load. Changes in the sediment composition have been linked to gradual declines in tuangi size and the disappearance of pipi beds.

“...the tāhuna (sand banks) are still there... however the kaimoana is not the same. A presence of sediments within shellfish beds were not noticed before, but they are there now”
(Te Whānau a Tauwhao, 2011)

Erosion

It is acknowledged by Ngāti Taka that coastal erosion is a natural process that has been documented in traditional accounts of the area. The natural process of coastal erosion has however been greatly accelerated by anthropogenic activities.

Erosion shows parallel themes to pollution and sedimentation and has been associated with land use, dredging, the construction of causeways and poor land management practices. Erosion can also be linked to issues surrounding riparian vegetation, coastal buffer zones, and inadequate stock fencing. The lack of and/or removal of riparian belts along rivers and coastal banks were identified by Ngāti Taka and Te Whānau a Tauwhao as causing extensive river/coastal erosion.

Native vegetation aids in stabilising the river/coastal margins. Some coastal/river species are better adapted to the land-water interface environment and soil types. These types of vegetation therefore have more effective stabilising capacities. Both hapū acknowledge the

importance of vegetation as a natural solution for mitigating and managing erosion. Ngāti Taka has observed that the:

“...planting of non-indigenous vegetation such as pine trees which have different root systems to native, don’t retain the land as well as native trees in other areas. That coupled with constant high tides leads to significant erosion. This is commonly seen in areas such as Motuhua, Waipa, and Raropua.”

(Ngāti Taka, 2011)

The effects of coastal creep and urbanisation of natural coastal margins were identified as major contributors to coastal/river erosion. Coastal and river buffers provide an area of land between farm and river or coast. This area allows the establishment of adequate riparian margin growth, which provides structure and stability. Without these buffer margins the coastal and river banks are highly susceptible to erosion.

The lack of effective stock fencing was identified as a major concern. Ngāti Taka highlighted that the lack of effective fencing structure in some areas compromised the stability and structure of the river/coastal banks as it allowed stock to access the fragile river/coastal margins. The physical trampling causes destabilisation of sediment and creates greater susceptibility to erosion.

It has been observed by Ngāti Taka and Te Whānau a Tauwhao that over the years the high tide range has changed. Hapū have observed an increase in extreme high tide frequencies. It was highlighted that in the past an extreme high tide would be expected once every six months. However now it is not uncommon to get an extreme high tide once or twice a month. These high tides have been linked to an increase of erosion in coastal margins (Ngāti Taka, 2011). Both hapū have identified coastal erosion as a major concern regarding preservation of areas of cultural importance such as urupā and traditional wahi-nohonga. Ngāti Taka made reference to cultural areas that have been affected by coastal erosion,

“...Ongarahu, Raropua and Motuhua have culturally significant areas which have been affected by coastal erosion. An urupā has been exposed due to cliff failure caused by erosion. Pā sites have become smaller in size because the land around has eroded for example Ongarahu and Raropua”

(Ngāti Taka, 2011)

Te Whānau o Tauwhao discussed issues regarding the management and mitigation of erosion in the local area. It was indicated that a sea wall was constructed on the estuarine side of the Otawhiwhi Marae in response to the compounding impacts of erosion.

Biological Influx

Ngāti Taka and Te Whānau a Tauwhao express major concerns regarding the introduction and proliferation of non-indigenous species within their rohe moana. Te Whānau o Tauwhao identified the influx of Black Swans within the northern Tauranga Harbour as having detrimental effects to sea-grass beds. It is thought that their feeding habits affect the root systems, destabilising the sea grass beds. Black swans were also reported as having an effect

on traditionally significant species such as flounder, whose juvenile shelter in sea grass beds and experience the secondary effects of grazing.

Ngāti Taka identified the Asian date mussel as a major concern to local ecosystems and shellfish beds. The Asian date mussel establishes quickly, and therefore rapidly displaces traditional shellfish populations and alters the substrate of traditional shellfish beds.

“There have been two traditional harvesting areas for pipi that are now gone because of the Asian date mussel. One pipi bed was named Kotaroa has been overtaken by date mussel. The second pipi bed was where we collected pipi for the special gatherings”
(Ngāti Taka, 2011)

Table 5: Environmental issues concerning Ngāti Taka and Te Whanau a Tauwhao

| Issues | Causes | Effects |
|---------------------------|--|--|
| Pollution source | <ul style="list-style-type: none"> • Farming (runoff) • Orchards (pesticides) • urbanisation • Sewage discharge from septic tanks • Storm water runoff | <ul style="list-style-type: none"> • Loss of ecosystems and habitats • Depletion and pollution of kaimoana • Wetland loss • Nutrient build up • Cumulative sea lettuce and mangrove growth • Water quality |
| Sedimentation | <ul style="list-style-type: none"> • Land development • Adjacent coastal land use • Poor management of upper catchments • Coastal erosion • Urbanisation • Lack of riparian vegetation | <ul style="list-style-type: none"> • Elevation of estuarine areas • Loss of wetlands • Increase in mangroves • Change in substrates within Tauranga Harbour (sand to mud) • Loss of ecosystems and habitats (i.e. sea grass and shellfish beds) |
| Erosion | <ul style="list-style-type: none"> • Lack of riparian vegetation • Increase height in tides • Adjacent coastal land use • Widening of channel adjacent to the marae | <ul style="list-style-type: none"> • Loss of coastal land • Loss or degradation of cultural significant sites • water quality |
| Introduced species | <ul style="list-style-type: none"> • Invasive marine species • Increased growth of sea lettuce and mangrove habitats • Black swans | <ul style="list-style-type: none"> • Displacement of shellfish beds • Smothering of shellfish beds • Unable to consume shellfish • Competing with fish • Predation on juvenile fish |

4.3.2 Mahinga Mataitai Concerns

Environmental changes within the rohe moana of Ngāti Taka and Te Whanau a Tauwhao have contributed to a decline in quality and quantity of taonga species such as shellfish and finfish. Both hapū made mention of the once plentiful stocks of mahinga mātaaitai species within their rohe. Te Whanau a Tauwhao ki Otawhiwhi has a significant area for collecting the green-lipped mussel. Mussels were collected at certain times of the year based on their ripeness. Indicators that signalled harvesting of mussels occurred during late-spring and early

summer, for example the bloom of the pohutukawa tree. These indicators also coincided with other kaimoana species such as kina and hururoa (horse mussel). The harvesting of mussels still takes place today, however Te Whanau a Tauwhao have raised serious concerns regarding depletion of remaining mussel stocks due to over harvesting. Hapū members also mentioned that recruitment stocks of several kaimoana species are waning due to the absence of size limit restrictions for various shellfish species such as mussel and hururoa (horse mussel).

Tuangi is a culturally significant shellfish of the Ngāi Tauwhao hapū. The following whakataukī illustrates how the visual presence of shellfish shells within middens depicts the past diet of their ancestors.

“E kei te kai para tuangi, ka mahue ki era kai”
Tuangi middens, left behind by ancestors.

Over the years hapū have noticed the significant decline tuangi. Ngāi Tauwhao have observed a reduction in tuangi sizes, with very few accounts of harvestable sized tuangi. A hapū member told stories of visitor’s admiration for the size and abundance of tuangi available to the hapū. These accounts however cannot be replicated in the marae functions today, due to the dwindling stocks.

Historically pipi beds were extensively found throughout Te Awanui, each bed was recognised as “he pātaka kai” or food storage. A Ngāi Tauwhao hapū member spoke of pipi management within their rohe. Pipi were able to be harvested from a number of different beds, which ensured that each bed was never over-harvested. This practice is no longer applied by Ngāi Tauwhao as pipi stocks have declined to such an extent that only one prominent pipi bed remains actively harvested.

Both hapū similarly identified species of fish that were once abundant in the area but are no longer caught. Ngāti Taka spoke of a once plentiful supply of Sand Shark, which was considered a staple diet. The shark was hung on lines to dry and preserve for later consumption. These practices are no longer applied due to an absence of sand shark in their rohe. A Ngāti Taka (2012) hapū member told how sand sharks were attracted to intertidal shellfish beds.

“We would know when to set the net, by examining the fish diggings in the pipi and tuangi beds during low tide, indicating that fish were feeding in this area; types of fish we would catch would be sand shark, mullet, kahawai, snapper and pātiki”

The pātiki is a fish species of particular cultural significance to the hapū of Ngāi Tauwhao. One member identified a traditional site that was used to catch and cook the once abundant fish resource. At this site, hapū would recall a prominent whakataukī which illustrated the inseparable relationship the people have with their cultural taonga:

“Ko au te pātiki, ko te pātiki ko au”
“I am the flounder, the flounder is me”

Historically juvenile pātiki could be seen within the small channels at low tide. A hapū member from Te Whanau a Tauwhao spoke of their abundance and accessibility:

“...right outside the marae you could catch flounder. Baby flounder could be seen in the shallows at low tide during winter and spring. You cannot see this now.”

Table 6: Ngāti Taka and Te Whanau a Tauwhao concerns regarding Mahinga Mataitai

| Types | Causes | Effects |
|---|--|---|
| Loss of traditional shellfish habitats | <ul style="list-style-type: none"> • Sedimentation • Invasive species displacing shellfish beds • Point source pollution • Overharvesting of shellfish and limited size restrictions | <ul style="list-style-type: none"> • Loss of shellfish has led to a decline in seasonal migratory finfish • Decline in shellfish quality and quantity, shellfish unable to receive quality food uptake • Loss in traditional fishing grounds • New technologies to obtain shellfish and/or finfish (i.e. boats and scuba) |
| Contamination of shellfish beds | <ul style="list-style-type: none"> • Point source pollution • Algal blooms | Non consumption of shellfish |
| Decline in shellfish and finfish quality and quantity | <ul style="list-style-type: none"> • Sedimentation • Invasive species displacing shellfish beds • Point source pollution • Overharvesting of shellfish and limited size restriction • Past commercial fishing • Predation from swans | <ul style="list-style-type: none"> • Lack of recruitment of juvenile shellfish • Loss in traditional fishing grounds |

4.3.3 Cultural Concerns

It is clear that the harbour and its foreshores were and still remain a crucial aspect of hapū economic, cultural, and spiritual wellbeing. Tauranga Moana is clearly and indisputably a taonga of all of the hapū of Tauranga Moana. The significance of Te Awanui’s resources, relationships and traditions are all evident in the accounts of each individual hapū.

The hapū claimed that the decline in and loss of taonga resources as well as the inability to manage those resources through roles and responsibilities of kaitiakitanga have altered cultural traditions. The inability to manaaki manuhiri, due to the sharp decline in Kaimoana, was described as,

“...affecting our mana. Manaakitanga for our manuhiri that come on to our marae; we were known for providing the sweetest tuangi of Aotearoa and the manuhiri come from far and wide for hundreds of years specifically for the tuangi. For the last three years we’ve seen those tuangi disappearing from our tables, it effects the way people perceive us and effects our mana”

(Te Whanau a Tauwhao, 2011)

Ngāti Taka identified specific taonga species such as the ureroa (horse mussel) and the tuangi, as having cultural links to their people. These shellfish were once prolific, but are now scarce and at most times un-harvestable due to their small size. One member highlighted the significance of the ureroa:

“some people/hapū use paua, some use mussel but traditionally we used the shell of the ureroa within our carvings, the ureroa represented the kaimoana within our area, these were a much sought after shellfish.”

(Ngāti Taka, 2012)

The loss of taonga species has also resulted in changes to traditional teachings. The health of many traditional kaimoana habitats have declined or disappeared altogether, in some cases this has resulted in complete abandonment of customary practices in those areas. In such instances, although the connection to the place remains, important knowledge systems regarding kaimoana gathering and kaitiakitanga are lost. Hapū recognised that rangatahi do not have the same opportunities to experience and learn about traditional gathering practices or traditional gathering areas, thus limiting the natural transfer of this cultural knowledge.

Table 7: Ngāti Taka and Te Whanau a Tauwhao cultural concerns

| Types | Causes | Effects |
|----------|---|--|
| Economic | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas | <ul style="list-style-type: none"> • The need to buy kaimoana from other sources • New technologies to obtain shellfish and/or finfish (i.e. boat and scuba) • Unable to access coastal areas of cultural importance • Unable to protect areas of cultural importance |
| Social | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of culturally significant sites | <ul style="list-style-type: none"> • Losing a sense of mana while not being able to uphold the cultural, social, spiritual economic and ecological functions of a coastal hapū/marae • Unable to portray the significance of natural resources and the traditional functions of a hapū/marae • Loss of a stable food source |
| Cultural | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of | <ul style="list-style-type: none"> • Losing a sense of mana while not being able to uphold the cultural, social, spiritual economic and ecological functions of a coastal hapū/marae • Unable to uphold kaitiakitanga practices • Loss of a stable food source and a change in diet |

| | culturally significant sites | |
|-------------|---|--|
| Traditional | <ul style="list-style-type: none"> • Loss of traditional shellfish habitats • Decline in shellfish and finfish quality and quantity • Contamination of shellfish beds • Loss of cultural land • Loss of wetland areas • Loss or degradation of cultural significant sites | <ul style="list-style-type: none"> • Loss of traditional values such as whakapapa and mahinga kai mātaihai methods • Unable to portray the significance of natural resources and the traditional functions of a hapū/marae • Loss of a stable food source, unable to uphold kaitiakitanga practices |

4.3.4 *Summary*

During the case study consultations, Tangata Whenua expressed numerous concerns regarding their temporal observations and assessments of their rohe moana (area of sea). Many of these accounts provided a time line of events and identified positive feed-back loops observed over time that has led to the degradation of coastal estuarine environments.

Both case study groups are located in a semi-rural setting which has resulted in a similar expression of major concerns. Although the major themes were similar, both case study groups discussed unique examples of issues specific to their area and hapū. Major themes included issues surrounding environmental change, degradation of mahinga mataitai and loss of cultural practices.

5 NGA PUNGA Collaborative Analysis/Draft CCHI

| 5.1 AIMS AND OBJECTIVES | Collaborative Analysis Draft CCHI |
|---|--------------------------------------|
| Aim: | |
| <ul style="list-style-type: none">To conduct a collaborative and comparative analysis of Tauranga Moana, Tauranga Tangata Customary Case Studies with the literature review findings.To develop draft CCHI for Te Awanui | |
| Objectives: | |
| To Identify major cultural themes | |
| To develop a set of draft indicators | |
| To further refine and customise CCHI for Te Awanui | |
| Output: | |
| Draft CCHI for Te Awanui | |

5.2 Methods

The major concerns outlined in Chapter 2: Literature Review and Chapter 3: Customary Case Studies have been amalgamated and used as the basis for developing appropriate cultural health indicators. The major issues have been categorised into the following:

1. Environmental Evaluation
2. Mahinga Mataitai Evaluation
3. Cultural Evaluation

An extensive review of cultural environmental indicators was conducted to identify relevant indicators that have been formulated and utilised in other studies. The objective of this project was not to re-create cultural health indicators but to acknowledge those that are already in successful operation and utilise them to further synthesis and customise indicators specific to the Te Awanui.

From the various studies, indicators that could be applied to the major cultural issues were extracted. These indicators were further refined to produce a set of concise coastal cultural health indicators, specifically relevant to the major cultural concerns of Te Awanui.

5.3 Environmental Evaluation

5.3.1 Pollution Source

Pollution was identified as a major environmental issue in both the literature review and case studies. The causes and effects of nutrient and contaminant influx into the harbour have been observed since the early 1900's. Tangata Whenua refer to population growth in the region as one of the main causes of pollution. The development of infrastructure, such as wastewater

management, and storm water systems, were highlighted as major contributors to the nutrient and contaminant input into the waterways.

Agriculture and horticulture were identified as having a significant effect on the nutrient and chemical inputs into the harbour. Tangata Whenua made specific mention of poor land management practices, which they view as being responsible for inhibiting nutrient removal functions of riparian margins and wetlands.

Pollution and nutrient influx were linked to a change in local ecosystem processes and function. A common observation emphasised that the influx of sea lettuce and mangroves was having a significant impact on estuarine ecosystems. These types of biological influxes are described as natural indicators for the effects of pollution.

Pollution Source Indicators

Pollution sources can be used as indicators for ecosystem degradation and/or health. From the issues outlined regarding pollution source, a collection of potential indicators were identified from other studies, these indicators are listed below:

- Health of Taonga species (skin ailments, as a result of consumption, soft shell in adult shellfish, polluted taste) (Ministry for the Environment, 1999)
- Changes in the presence of customary/traditional target species (Ministry for the Environment, 1999; Walker, 2009)
- Presence or absence of stock in riparian margin or waterway (Tipa & Teirney 1999; Tipa & Teirney, 2003)
- Presence/absence of activities (that cause adverse effects) in the headwaters of the catchments
- Presence/absence of foams, oils and other anthropogenic pollutants in waterway (Young *et al*, 2008)
- Number Of Point (sites) sources that pollute and degrade *te Mauri* (Harmsworth, 2002)
- Degree of modification degrading *te Mauri* (Harmsworth, 2002)
- Wetland extent (Harmsworth, 2002; Hauraki Gulf Forum, 2005)
- Extent of fencing protection (Hauraki Gulf Forum, 2005)
- Extent of development impact (Walker, 2009)
- Land use pressure (Hauraki Gulf Forum, 2005 and Walker, 2009)
- Adjacent land use pressure (Walker, 2009)
- Evidence of modification of the estuary edge (Walker, 2009)
- Evidence of pollution entering estuary (e.g., Effluent, road run-off or storm water is observed directly entering estuary) (Walker, 2009)
 - Water quality (Tipa & Teirney 1999; Tipa & Teirney, 2003 and Walker, 2009)

Pollution Source Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of pollution source indicators specific to Te Awanui. These indicators aim to identify pollution sources that have potential impact to the site. Pollution source indicators are detailed below:

Land Use Indicators

Land use types and impacts: Identifying related types of pollution sources adjacent to a study site can define the potential impacts of those activities on an area, this can include both land adjacent to the site or land not visible from the site but that may have significant impact to the site.

Pollution evaluation

Point source pollution: aims to track the effect of pollution by identifying and locating a visual source of pollutants entering a site. The source can further distinguish potential pollution types and the impacts they may have within the area.

Non-point source pollution: aims to identify pollution within the site that does not have an obvious visual source but evidence of input is present. Evidence of non-point source can include unusual smell, or unusual appearance of water.

Number of pollution sources: aims to give an indication of the collective impact of pollution in one area. Numerous pollution sources in one area may indicate a large cumulative impact.

Riparian margin indicators:

Riparian vegetation extent: aims to give an indication of the bio-filtration capacities of the land-water interface. An extensive established riparian margin can provide a buffer zone supporting nutrient and contaminant removal.

Riparian margin condition: aims to determine the efficacy of the riparian margin. A well-established extensive coverage of riparian margin can support the functions of nutrient and contaminant removal.

Wetland indicators:

Wetland extent: aims to give an indication of the bio-filtration capacities of the land-water interface. An extensive established wet land will provide a bio-filtration zone buffer supporting nutrient and contaminant removal.

Wetland condition: aims to determine the efficacy of the wetland. A well-established native wetland can more effectively support nutrient and contaminant removal.

Algal indicators

Extent of algal cover: aims to give an indication of nutrient input into the area. Nutrient input is a major determinant in algal growth, extensive algal cover therefore may indicate a high level of nutrient input.

Taonga Species indicators

Taonga species condition: aims to detect unusual qualities in taonga species such as taste, smell, colour, or form to determine the possible effect of pollution on the area. Abnormal features can indicate impact from pollutants or contaminants.

5.3.2 Sedimentation

In recent times the effects of sedimentation in the Tauranga Harbour have become more noticeable. Sedimentation has been attributed to poor land management causing erosion in both the upper freshwater catchments and the coastal margins. Tangata Whenua have related the deposition of these eroded areas and the accumulation of sediments to the modification of culturally significant estuarine ecosystems. Tangata Whenua observed a decline in quality, quantity and size of shellfish, which has coincided with elevated levels of sedimentation in estuarine catchments.

Sedimentation Indicators

From the issues regarding sedimentation, a collection of potential indicators were identified from other studies, these indicators are listed below:

- Presence/absence of sediment at sites (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Colour of the water/ level of turbidity (Tipa & Teirney 1999; Tipa & Tierney, 2003)
- Unnatural sedimentation build ups in channels or catchments (Young *et al.*, 2008)
- Extent of fencing protection (Hauraki Gulf Forum, 2005; Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Extent of development impact (Hauraki Gulf Forum, 2005)
- Land use pressure (Hauraki Gulf Forum, 2005 and Walker, 2009)
- Adjacent land use pressure (Hauraki Gulf Forum, 2005 and Walker, 2009)
 - Modification to estuary channels (natural or anthropogenic) (Walker, 2009)

Sedimentation Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of sediment indicators specific to Te Awanui. These indicators aim to identify the extent of sedimentation at the site and provide an indication of potential impacts. Sedimentation indicators are detailed below:

Land Use Indicators:

Land use types and impacts: Identifying related types of sedimentation sources adjacent to a study site can define the potential impacts of those activities on an area. This can include both land adjacent to the site and land not visible from the site but that may still have significant impact in an area.

Sedimentation Indicators

Substrate composition: aims to identify changes in substrate composition to determine sediment input and accretion. Substrate composition can also assist in assessing the impact of fine sediment to the area.

Estuarine geomorphology: aims to identify the impact of sedimentation in the area by examining the accretion and deposition of sediment. It specifically looks at the extent of channel infilling and elevation of intertidal mud flats.

Turbidity: aims to determine the presence of suspended fine sediment in the area by examining the colour and transparency of water. Fine sediment can be associated with fine mud deposition in estuarine catchments.

5.3.3 Erosion

Erosion has become a major focus of hapū and iwi due to the effects of land loss and degradation to culturally significant sites. Tangata Whenua highlight poor land management practices as significantly compromising both upper and lower catchment margin stability. The removal of native vegetation from coastal and freshwater margins has been related to destabilizing fragile bank systems. In many cases lack of native vegetation has left coastal edges more exposed and susceptible to the impacts of tidal currents and wave action.

Erosion Indicators

From the issues regarding erosion, a collection of potential indicators were identified from other studies, these indicators are listed below:

- Presence/absence of stock in riparian margin or waterway (Tipa & Teirney 1999; Tipa & Teirney, 2003 and Walker, 2009)
- Presence/absence of activities (that cause adverse effects) in the headwaters of the catchments (Tipa & Teirney 1999; Tipa & Teirney, 2003)
- Riparian vegetation extent around catchments (Tipa & Teirney 1999; Tipa & Teirney, 2003)
- Degree of modification degrading *te Mauri* (Harmsworth, 2002)
- Wetland extent (Harmsworth, 2002)
- Extent of fencing protection (Tipa & Teirney 1999; Tipa & Teirney, 2003 and Young *et al.*, 2008)
- Extent of erosion impact (Young *et al.*, 2008)
- Evidence of erosion (Human or naturally occurring) (Harmsworth, 2002; Hauraki Gulf Forum, 2005 and Walker, 2009)
 - Estuary margin use (Walker, 2009)

Erosion Indicators for Te Awanui

From the list of possible indicators, further refinement was been made to define and produce a concise set of erosion indicators specific to Te Awanui. The indicators aim to identify the extent of erosion at the site and provide an indication of potential impacts. Erosion indicators are detailed below:

Land Use Indicators

Land use types and backgrounds: Identifying related types of erosion sources adjacent to a study site can define the potential impacts of those activities on an area. This can include both land adjacent to the site and land not visible from the site but that may still have significant impact in an area.

Riparian margin indicators:

Riparian vegetation extent: aims to give an indication of the stabilising capacities of the land water interface. An extensive established riparian margin can reinforce

coastal margins and provide a sufficient buffer from land use that may compromise the stability.

Riparian margin condition: aims to determine the efficacy and functionality of the riparian margin. A thick belt of established native vegetation can indicate a riparian margin in good condition.

Erosion Indicators

Extent of coastal bank/cliff: aims to identify areas susceptible to erosion, and the extent of potential impact in the future.

Coastal bank/cliff exposure: aims to identify areas exposed to wind and wave action, in order to demonstrate the effect of weathering as a contributing factor to the erosion of coastal margins.

Coastal erosion: aims to identify visual evidence of coastal erosion in the area. This will assist in identifying the source of erosion and can aid in tracking the effect of erosion on the marine environment and cultural sites of significance.

Erosion management structures: aims to identify man-made structures erected as erosion mitigation and management strategies. These structures can identify areas that have had considerable erosion impact in the past.

5.3.4 Biological Influx

Biological influx was highlighted as major concern in both the literature review and case studies. The influx of both native and exotic flora and fauna has had a considerable impact to estuarine ecosystems. Biological fluxes have been associated with shellfish displacement, benthic habitat modification, competition and destabilising the population structure of taonga species.

Biological Influx Indicators

From the issues regarding biological fluxes a collection of potential indicators were identified from other studies, these indicators are listed below:

- Presence/absence and diversity of bird life (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Presence/absence and diversity of fish life (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Riparian vegetation extent (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Loss of aquatic vegetation (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- Number of (and change of) unwanted (e.g., exotic, introduced, foreign) plants, animals, fish, birds (pest types) affecting cultural values (Tipa & Teirney 1999; Tipa & Tierney, 2003 and Young *et al.*, 2008)
- % area (change in area) of taonga plants within total wetland (Harmsworth, 2002 and Walker, 2009)

- % area (change in area) of unwanted (e.g., exotic, introduced, foreign) plants covering total wetland (Harmsworth, 2002 and Walker, 2009)
- Presence/absence of estuarine vegetation (e.g., algae, eel grass, salt marsh vegetation, sea lettuce, prolific mangrove growth) (Walker, 2009)
- Presence/absence of native vegetation (Harmsworth, 2002)

Biological Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of biological indicators specific to Te Awanui. The indicators aim to identify exotic species that may have an impact on habitats and taonga species. Biological indicators are detailed below:

Estuarine Flora Indicators

Algal type and impact: aims to identify different algal species within a site, to determine the degree of impact both to the area and the habitats within the area. Algal type can identify both native and exotic species. Algal impact further aims to emphasise the effect of algal growth, competition and modification to natural estuarine habitats.

Estuarine vegetation type and impact: aims to identify different estuarine vegetation within a site, to determine the degree of impact both to the area and the habitats within the area. Vegetation type can identify both native and exotic species. Vegetation impact further aims to emphasise the effect of vegetation growth, competition and modification to natural estuarine habitats.

Estuarine Fauna Indicators

Fauna type and impact: aims to identify different faunal species within a site, to determine the degree of impact both to the area and the habitats within the area. Faunal type can identify species both native and exotic. Faunal impact further aims to emphasise effect of faunal growth, competition and modification to natural estuarine habitats.

Taonga Species indicators

Taonga species presence: aims to identify species of significant cultural significance to the area. Presence and absence of taonga species can indicate the effect of displacement and competition by other native or exotic species.

5.4 Mahinga Mataitai Evaluation

There is considerable concern regarding the state of mahinga mataitai in Te Awanui. Major issues highlighted in the literature review and case studies include: the loss of traditional shellfish habitats, contamination of shellfish beds and decline in shellfish and fish quality and quantity. These issues have been related to over harvesting, poor management strategies and environmental change.

The decline in quality and quantity of shellfish and fish species concerns hapū and iwi of Te Awanui. Concerns have been raised regarding the sustainability of Mahinga Mataitai, as the

lack of shellfish recruitment in customary shellfish beds limits the effective replenishment of population stocks.

Possible Mahinga Mataitai Indicators

From the issues regarding mahinga mataitai a collection of potential indicators were identified from other studies, these indicators are listed below:

- Presence/absence of mahinga kai species (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Presence/absence of exotic species (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Presence and absence of recruitment (e.g., nurseries for fish, juvenile recruitment areas), (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Evidence of pollution entering estuary (e.g., Effluent, road run-off or storm water is observed directly entering estuary), (Walker, 2009)
- Level of contaminants and food safety (NIWA, 2009)
- Water quality (NIWA, 2009)
- Quality and condition of mahinga kai species (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Presence/absence of mahinga kai species (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Presence and absence of mahinga kai species habitats (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)
- Changes in the presence of customary/traditional target species (and associated species) observed by whanau/ hapū members (NIWA, 2009)
- Changes in fish behaviour shellfish location (Ministry for the Environment, 1998; Tipa & Tierney 1999; Harmsworth, 2002; Tipa & Tierney, 2003; Young *et al.*, 2008 and NIWA, 2009)

Mahinga Mataitai Indicators for Te Awanui

From the list of possible indicators further refinement was made to define and produce a concise set of mahinga mataitai indicators specific to Te Awanui, the indicators aim to determine the past and present harvest capacities of mahinga mataitai and build background knowledge for taonga species harvested at the site. Mahinga Mataitai indicators are detailed below:

Significance of Mahinga Mataitai

Ngā Kōrero o Neherā: aims to acknowledge the mātauranga of Tangata Whenua from the past and present. It further aims to identify culturally significant kōrero that have specific reference to the relationship Tangata Whenua have with the area, mahinga

mataitai or taonga species. These kōrero may include whakataukī, pakiwaitara, waiata, mōteatea and kōrero tuku iho.

Type of Mahinga Mataitai: aims to identify the species harvested at the site. Species type can identify culturally significant relationships between Tangata Whenua and taonga species. Species type can also indicate the type of ecosystems present within the site and can identify relationships between other mahinga mataitai (of the same or different species) in the same site or other nearby sites.

Harvest capacities: aims to identify the abundance of taonga species and the extent to which the mahinga mataitai sustains the people. This may indicate a traditional mahinga mataitai that was historically harvested but, due to depleted stocks or poor quality of taonga species, is no longer a sustainable mahinga mataitai site.

Condition of Mahinga Mataitai

Environmental evaluation: aims to evaluate the state of the mahinga mataitai by highlighting impacts such as pollution, sedimentation and biological influx.

Taonga species presence: aims to identify species of cultural significance to the area. Presence and absence of taonga species can indicate environmental impacts such as pollution, sedimentation and the effect of displacement and competition by native or exotic species.

Taonga species condition: aims to determine the consumption quality of taonga species. This can include observations regarding the size, ripeness and taste of taonga species. Poor condition can indicate detrimental environmental impacts. Taonga species condition also aims to detect unusual qualities in taonga species such as taste, smell, colour, or form, to determine the possible effect of pollution on the area. Abnormal features can indicate impact from pollutants or contaminants.

5.5 Cultural Evaluation

5.5.1 Traditional Sites

Cultural sites demonstrate hapū affiliations and connections to the environment. The naming of an area emphasises its significance to the people and establishes links to significant historic events, resources and people. Sites of traditional significance have been identified as including coastal features, harvesting grounds, rivers, streams, mountains, and all their natural features. Tangata Whenua are marginalised by the loss of traditional lands surrounding Te Awanui. Both the literature review and cases studies emphasise the loss of traditional lands as being responsible for restricted access to traditional sites and limited management authority.

Traditional Sites Indicators

From the issues regarding traditional sites, a collection of potential indicators were identified from other studies and these indicators are listed below:

- Traditional or non-traditional site (site has/has not been used for traditional activities), (Ministry for the Environment, 1998; Tipa, 1999; Tipa & Tierney, 2003, Young *et al.*, 2008; Walker, 2009 and Kennedy and Jefferies, 2005)
- Return to a site in the future (Ministry for the Environment, 1998; Tipa, 1999; Tipa & Tierney, 2003, Young *et al.*, 2008; Walker, 2009 and Kennedy and Jefferies, 2005)
- The use of traditionally used names for site areas (records previous environments and features), (Kennedy and Jefferies, 2005)
- Number of cultural sites adjacent or within estuarine area (Walker, 2008)

Traditional Sites Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of traditional site indicators specific to Te Awanui. The indicators aim to identify traditional sites and highlight their significance to Tangata Whenua. Traditional sites as indicators are detailed below:

Significance of Traditional Sites

Ngā Kōrero o Neherā: aims to acknowledge the mātauranga of Tangata Whenua both past and present. It further aims to identify culturally significant kōrero that have specific reference to the relationship Tangata Whenua have with the area. These kōrero may include whakataukī, pakiwaitara, waiata, mōteatea, kōrero tuku iho.

Ingoa Tawhito: aims to identify coastal areas or features that have Māori names. The indicator further aims to acknowledge the people, acts and events that resulted in the naming.

Sites of significance: aims to identify sites of cultural significance. The type of site can indicate its significance to Tangata Whenua. The type of site may include wahi tapu, wahi kainga, wahi mataitai, wahi nohonga.

Accessibility to Traditional sites

Land ownership: aims to identify the owner ship status of bordering lands. It aims to determine the accessibility to cultural areas and highlight the influence Tangata Whenua have regarding management of cultural areas and resources, now and in the future.

5.5.2 Cultural Practices

Concern was raised in both the literature review and the case studies regarding the transfer of customary and traditional knowledge. It was noted that because customary kaimoana supplies are diminishing; rangatahi do not have the same opportunities to experience and learn important cultural practices and traditions.

It was highlighted that cultural practices such as manaaki and tiaki are limited due to dwindling kaimoana resources. Tangata Whenua raise concerns about the inability to provide traditional kai at marae gatherings, which reflects badly upon the mana of the hapū. Manaaki and tiaki are not restricted to just marae gatherings but they can also be considered at a

whanau and kaumatua level. Being able to care for and provide for the requirements of whanau is a principle concept in Māori culture.

Cultural Practices Indicators

From the issues regarding cultural practices a collection of potential indicators were identified from other studies, these indicators are listed below:

- Percentage of hapū members practicing mahinga mataitai at the site (Te Ao Turoa, date unknown)
- Hapū able to obtain taonga species for marae functions (NIWA, 2009)

Cultural Practices Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of cultural practice indicators specific to Te Awanui. The indicators aim to identify cultural practices and determine the ability of Tangata Whenua to uphold, maintain and preserve their unique cultural practices.

Cultural Practices Indicators

Manaaki/ Tiaki: aims to determine the capacity of Tangata Whenua, to uphold cultural customs surrounding hospitality and care. These concepts can be viewed at a hapū level (concerning marae functions) or at a whanau level (in regards to caring for families).

Taonga tuku iho: aims to identify cultural customs and traditions surrounding knowledge transfer and determine the capacity of Tangata Whenua to uphold taonga tuku iho.

Gathering practices: aims to identify the cultural customs and traditions surrounding gathering and harvesting of taonga species. This indicator hopes to further investigate the application of culturally significant gathering practices.

5.5.3 Kaitiakitanga Indicators

Lack of consultation and limited management influence were emphasized as major issues in both the literature review and case studies. Tangata Whenua highlighted examples of decision-making that disregarded cultural knowledge and views. As a consequence culturally significant areas and resources were negatively impacted.

Tangata Whenua raised concerns regarding the difficulties of maintaining and upholding traditional responsibilities of kaitiaki. Tangata Whenua mentioned that current legislative management approaches left them feeling detached and disempowered.

Kaitiakitanga Indicators

From the issues regarding kaitiakitanga a collection of potential indicators were identified from other studies, these indicators are listed below:

- Number of cultural sites protected within or adjacent to a wetland (Harmsworth, 2002)
- Number of customary fisheries management areas established (mātaitai, taiāpure or other instrument), (Hauraki Gulf Forum, 2002)
- Number of tangata kaitiaki appointed (mandated through the MoF), (Hauraki Gulf Forum, 2002 and Kennedy & Jefferies, 2005)
- Development of hapū environmental management plans (Hauraki Gulf Forum, 2002 and Kennedy & Jefferies, 2005)

Kaitiakitanga Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of cultural practices indicators specific to Te Awanui, the indicators aim to identify traditional and contemporary practices of kaitiakitanga. The indicators also aim to evaluate the current state of kaitiakitanga from a Tangata Whenua perspective.

Kaitiakitanga Indicators

Traditional management practices: aims to identify traditional management practices regarding taonga species and the estuarine environment. This indicator further aims to determine the application of traditional management practices today.

Protection status of sites: aims to identify the management status of sites. This may include land features, marine areas or taonga species.

Taonga tuku iho: aims to determine extent to which kaitiakitanga is preserved. This indicator more specifically evaluates the capacity of Tangata Whenua to transfer knowledge surrounding the roles and responsibilities of kaitiaki.

5.5.4 Economic Indicators

The decline in traditional taonga species and degradation of traditional mahinga mataitai has had significant effect on economic state of Tangata Whenua, at both a hapū and whanau level. Tangata Whenua emphasise the economic impact associated with the costs of kaimoana gathering equipment and resources. These additional costs greatly impact the economic welfare of the hapū and whanau.

Economic Indicators

From the concerns regarding economic issues, a collection of potential indicators were identified from other studies, these indicators are listed below:

- Having to purchase customary kai species (renowned species) for marae (Niwa, 2009)
- Area of land in Māori ownership (Kennedy & Jefferies, 2005)

Economic Indicators for Te Awanui

From the list of possible indicators, further refinement was made to define and produce a concise set of economic indicators specific to Te Awanui. The indicators aim to evaluate the economic impacts on the hapū in regards to loss of taonga species and mahinga mataitai.

Economic Indicators

Mahinga mataitai harvest capacities: aims to identify the capacity of mahinga mataitai to provide for customary functions. The indicator more specifically aims to determine whether Tangata Whenua buy taonga species in order to meet the requirements of hapū or whanau functions.

Mahinga mataitai harvest capacities: aims to identify the capacity of mahinga mataitai to provide for customary functions. The indicator more specifically aims to determine whether Tangata Whenua harvest taonga species outside of the traditional area in order to meet the requirements of hapū or whanau events.

5.6 Summary

From the major cultural concerns outlined in chapters 1 and 2, a comprehensive set of coastal cultural health indicators were developed. The cultural indicators were organised into three main areas of evaluation:

1. **Environmental Evaluation:** outlines indicators that can be used to evaluate environmental issues. Environmental indicators concentrate on issues relating to pollution, sedimentation, erosion, and biological fluxes.
2. **Mahinga Mataitai Evaluation:** outlines cultural indicators that can be used to evaluate the state of a mahinga mataitai. These indicators concentrate on the significance of mahinga mataitai to Tangata Whenua and the condition of mahinga mataitai as a means of providing for the people.
3. **Cultural Evaluation:** outlines cultural indicators that can be used to assess cultural issues, by emphasising the unique relationship Tangata Whenua have with Te Awanui. These indicators concentrate on traditional sites, kaitiakitanga, cultural practices and economic impacts.

6 Conclusion

The Te Kupenga Tairoa Framework was effective in facilitating the development of CCHI for Te Awanui. The framework provided simple well-defined guidelines and review processes, for ensuring the aims and objectives of the CCHI for Te Awanui project were met and that the principles and philosophies of Manaaki Taha Moana were upheld.

The draft set of indicators outlined in this report incorporate and reflect the major issues and concerns outlined in the literature review and case studies. The common environmental themes included pollution sources, sedimentation, coastal erosion and biological influxes. These variables identified issues regarding displacement and/or loss of mahinga mataitai as well as loss and/or change in localised habitats. Issues were also raised regarding the diminishing ability to uphold practices that govern hapū function such as manaakitanga, whanaungatanga and kaitiakitanga.

The second CCHI report for Te Awanui aims to further refine and finalise the draft indicators. Refinement will include the development of quantitative indices that will provide the means to measure and analyse environmental integrity within areas of Te Awanui. The report will also develop the methodology for application of CCHI in the field. These methods will assist in successive evaluations and monitoring over time.

Stage 4: Ngā Poito, will involve a pilot study which will work in conjunction with the case study groups to strengthen relationships with the people and the moana. The pilot study will also support the refinement of CCHI and aims to identify specific areas that require further consolidation. These areas may include but are not exclusive to indicators, indices and methodology. Stage 5: Ko te Kikokiko aims to evaluate specific areas identified by the case study groups using the completed set of coastal cultural health indicators.

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8 Glossary

| | |
|---------------------------|--|
| akoako | to consult together, give or take counsel |
| āo | world, realm, domain |
| ara | to rise up, awake, arise |
| aroha | affection, sympathy, charity, compassion, love, empathy |
| Ataata | common cat's eye <i>Turbo smaragdus</i> |
| atua | ancestor with continuing influence; god |
| hapū | sub-tribe |
| Haumia-tiketike | an offspring of Rangi and Papa and atua of fernroot and uncultivated food |
| hinengaro | mind, thought, intellect, consciousness, awareness. |
| hui | meeting; gathering |
| hururoa/ureroa/ | Horse mussel <i>Atrina pectinata zelandica</i> |
| kukuroa | |
| ika | fish, marine mammal – any creature that swims in fresh or saltwater |
| ingoa tawhito | old/ancient name |
| iwi | tribe |
| kahawai | Australasian salmon <i>Arripis trutta</i> |
| kai | food, meal; to eat |
| kaimoana | seafood, shellfish |
| kāinga | home, residence |
| kaitiaki | guardian, custodian |
| kaitiakitanga | guardianship, stewardship |
| kanohi kitea | see in person |
| kapowai | dragonfly |
| karakia | incantation, ritual chant, prayer |
| kaumātua | elderly, aged man |
| kaupapa | matter for discussion, proposal, subject, programme, theme, topic, policy |
| kaupapa Māori | Māori ideology incorporating the knowledge, skills, attitudes of Māori society |
| kawa | marae protocol - customs of the marae and wharenui, particularly those related to formal activities |
| kete | basket, kit |
| kikokiko | flesh, can be used in reference to the physical world |
| kina | sea urchin <i>Evechinus chloroticus</i> |
| kīngitanga | King movement - movement which developed in the 1850s, culminating in the anointing of Pōtatau Te Wherowhero as King. Established to stop the loss of land to the colonists, to maintain law and order, and to promote traditional values and culture. |
| kōrero pakiwaitara | to tell of legends, folklore |
| kotahitanga | unity |
| koura | crayfish – both freshwater and saltwater |

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| kuia | elderly, aged woman |
| kupenga | traditional fishing net |
| marae | the complex of buildings where Māori live/meet for formal meetings and discussions. |
| māhaki | humility, humbleness, modesty |
| mahere mahi | work plan |
| mahi | work, job, employment, practice, occupation, activity, exercise, operation. |
| mahinga kai | food gathering places; garden |
| mahinga mātaítai | traditional seafood gathering place |
| mana | prestige, authority, control, power, influence, status, spiritual power, charisma - mana is a supernatural force in a person, place or object |
| manaaki | support, hospitality |
| manaakitanga | the nurturing of relationships; protection, blessings, show respect or kindness to |
| manuhiri | visitor, guest |
| maomao | (blue) <i>Scorpiis violacea</i> . N.B. Māori refer to pink maomao (<i>Caprodon longimanus</i>) as mātā |
| maramataka | Māori planting and fishing calendar based on the phases of the moon |
| mātaítai | (reserve) a fisheries management tool under the Fisheries Act 1996, recognising and providing for customary management practises and food gathering. A mātaítai reserve excludes commercial fishing, but allows customary and recreational fishing, as well as bylaws for fishing to be made. |
| mātauranga Māori | Māori ancestral knowledge, including the Māori world view and perspectives, Māori creativity and cultural practises. |
| mauri | life force/ life principle that ensures the continual life and quality all living things that reside within it |
| moana | sea, ocean, or large lake |
| mōteatea | traditional chant, lament, sung poetry, or songs sung in the traditional mode. |
| ora | health, vitality |
| pāpaka | paddle crab <i>Ovalipes catharus</i> |
| Papatuanuku | Earth mother and wife of Rangi-nui. All living things originate from them. |
| parengo | an edible seaweed (purple laver) – a greenish-purple seaweed with a tough, silky texture. Also referred to as karengo. <i>Porphyra columbina</i> |
| pātiki | flounder, flatfish <i>Rhombosolea spp.</i> |
| paua | abalone <i>Haliotis iris</i> , <i>Haliotis australis</i> , <i>Haliotis virginea</i> |
| pepeha | tribal saying, proverb |
| pipi | type of edible bivalve <i>Paphies australis</i> |
| pōhutukawa | New Zealand Christmas tree <i>Metrosideros excels</i> |
| poito | a float used to hold fishing nets, or fishing lines. |
| poukai | King Movement gathering |
| punga | anchor, sinker |

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| pūpū | univalve mollusc – usually a second name identifies a particular species, e.g. pūpū rore is the Arabic volute or <i>Alcithoe arabica</i> |
| pūrongo | report, article |
| rāhui | a temporary ritual prohibition, closed season, ban or reserve. Traditionally a rāhui was placed on an area, resource, or stretch of water as a conservation measure or means of social and political control. |
| rohe | territory, region, boundary, district, area |
| rangatahi | younger generation, youth |
| rangatira | chief (male or female) |
| rangatiratanga | sovereignty, chieftainship, right to exercise authority |
| Ranginui | atua of the sky and husband of Papa-tū-ā-nuku, from which union originate all living things |
| raupō | bulrush, green swamp plant <i>Typha orientalis</i> |
| Rongo-mā-Tāne | atua of the kūmara and cultivated food and one of the offspring of Rangi-nui and Papa-tū-ā-nuku; he is also known as Rongo-hīrea and Rongo-marae-roa-a-Rangi. |
| tāhuna | sandbank, shoal |
| taiāpure | a management tool (generally fisheries) established in an area that has customarily been of special significance to an iwi or hapū as a mahinga kai or for spiritual or cultural reasons. All fishing (including commercial fishing) can continue in a taiāpure, but tangata whena are involved in the management of all fishing in the area. |
| takiwā | district, area territory, region, vicinity |
| Tane Mahuta | atua of the forests and birds and one of the children of Rangi-nui and Papa-tū-ā-nuku. |
| Tangaroa | atua of the sea and fish, he was one of the offspring of Rangi-nui and Papa-tū-ā-nuku and fled to the sea when his parents were separated. |
| tāngata whenua | indigenous people of the land |
| tangihanga | funeral, weeping, crying, rites for the dead |
| taonga | treasure, anything prized or considered to be of value |
| tapu | be sacred, prohibited, restricted, set apart, forbidden, under atua protection |
| tauparapara | incantation to begin a speech. Each iwi has a unique, aiding the identification of them when formal introductions are made |
| taura here | the binding rope |
| Tawhirimatea | atua of the winds, clouds, rain, hail, snow and storms, he was also known as Tāwhiri-rangi and Tāwhiri-mate-a-Rangi and was one of the offspring of Rangi-nui and Papa-tū-ā-nuku who did not want his parents separated. |
| Te Ao Māori | the Māori world |
| tikanga | custom, correct procedure, method, practice |
| tīmata | start, beginning |
| tino rangatiratanga | absolute chieftainship; self-determination (referred to in Article Two of the Treaty of Waitangi). |
| tio | rock oyster <i>Saccostrea cucullata</i> |

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| tipuna/tupuna | ancestor, grandparent |
| titiko | mud snail <i>Amphibola crenata</i> |
| tohu | indicator, sign, |
| tuangi | cockle <i>Austrovenus stutchburyi</i> |
| tukutuku | ornamental lattice-work - used particularly between carvings around the walls of meeting houses |
| Tūmatauenga | the <i>atua</i> of war, an offspring of Rangi-nui and Papa-tū-ā-nuku |
| tupa | scallop, queen scallop, <i>Pecten novaezelandiae</i> |
| tuwhakaiti | humility |
| urupā | burial ground, cemetery, graveyard |
| wāhi | place, location |
| wāhi tapu | sacred, restricted place |
| waiata | song, chant, psalm |
| wairua | spirit, soul, quintessence - spirit of a person which exists beyond death |
| whakataukī | proverb, saying |
| whakapapa | genealogy, lineage, descent |
| whakatuwheratanga | opening; opening ceremony |
| whakawhanaungatanga | process of establishing relationships, relating well to others |
| whakawhiti | kōrero exchange words; open lines of communication |
| whānau | (extended) family, family group |