UNIVERSITY of OTAGO

Te Whare Wānanga o Otāgo

TE TIAKI MAHINGA KAI: APPLICATION OF TRADITIONAL KNOWLEDGE AND SOCIAL-ECOLOGICAL RESEARCH TO ENSURE SUSTAINABLE CUSTOMARY FISHING AND ENHANCED COASTAL, ESTUARINE AND RIVER HEALTH

Overall vision: The vision of TMK is of sustained enhancement of the cultural, economic, social and environmental wellbeing of Māori through the application of mātauranga associated with mahinga kai to modern customary fisheries practices.

Mission: The mission of the project is to provide opportunities for Māori to participate fully in the management of their own customary fisheries assets, through the acquisition of enhanced science research capacity, and more recognition and utilisation of appropriate traditional methods alongside contemporary practices.

Brief description and purpose of the project:
Mātaitai and taiāpure are Māori-styled community-led conservation initiatives for managing customary fisheries on coasts and rivers throughout New Zealand. There are currently 8 taiāpure and 6 mātaitai gazetted around New Zealand, but another 12 applications are being processed by Ministry of Fisheries (MFish). Informal inquiries suggest that at least 10 more applications are about to be lodged. The rapid escalation of the number of mātaitai applications in the past two years suggests that this community-led, local-level devolved governance institution is emerging as the main vehicle for Māori to exercise kaitiakitanga throughout New Zealand. Expectations are that mātaitai and taiāpure provide improved environmental and cultural outcomes.

Te Tiaki Mahinga Kai (TMK) is a nation-wide collective of researchers, Māori environmental managers, and Māori community leaders from throughout Aotearoa who have come together to support environmental management and kaitiaki of mātaitai, taiāpure and rahui reserves (local community-led fishing reserves on coasts, estuaries and rivers). Work will begin on 5 intensive case studies (including NZ's only freshwater mātaitai) and less intensive study of another 6 mātaitai and taiāpure.

A Participatory Action Research approach will be used to develop tools for enhanced management by the kaitiaki, and to discover opportunities and constraints to improved cultural, economic, and environmental resilience of Māori through application of kaitiakitanga to reserve management. The subsequent creation of a network of kaitiaki from all mātaitai and taiāpure management groups will maximise uptake of the results from the research which is likely to be long term (funding has been secured from FoRST for 4 years, but a 10-20 year project is envisioned). Complementary ecological studies of changes in population abundance and structure of taonga species will determine whether mātaitai and taiāpure deliver improved gains in ecological resilience and customary harvesting.

The overall project will be directed by Tangata Whenua. A hui (planned for Puketeraki marae in late July 2007) will decide on the exact governance structure of *Te Tiaki Mahinga Kai.*

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We will be nudging the contributors into building in a transdisciplinary approach to their own work so that they can test and nurture their scholarship over several areas (a necessity in sustainability research and management for the future). We will use a Resilience Theory framework for the project (take a look at "*Navigating Social-Ecological Systems*", by Fikret Berkes, Johan Colding and Carl Folke, Cambridge University Press, 2003, ISN 0 521 81592 4; also you could consult the Resilience Alliance network at www.resalliance.org). Our research on environmental subjects and how their attitudes and actions for environmental care are generated and nurtured is informed by Arun Agrawal's concept of '*Environmentality*' (see Agrawal, A. 2005. Environmentality: Technologies of Government and the Making of Subjects. Duke UP, Durham and London.)

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What type of students could contribute?

BSc Honours, Postgraduate Diploma, MSc and PhD students would all be welcome. Practice placements of Wildlife Management and Environmental Science students would also be welcomed if you want to take a closer look and assess options. It may be possible to obtain a Vacation Bursary for a few students to support summer work that can then lead on to their own MSc or PhD thesis.

Currently there is scope for at least another 5 postgraduate students to research aspects of Te Tiaki Mahinga Kai.

Students completing a papers year (MSc or Postgraduate Diploma in Wildlife Management) or prospective BSc Honours students may wish to get started very early to catch the early summer weather.

TMK is trying to secure some Vacation Bursaries and studentships to support 10 – 20 week placements in the team, i.e. this would provide work experience rather than necessarily leading on to further study. However it is quite possible that the data gathered during the student internship for the wider team can be incorporated into, or create a platform for subsequent MSc thesis research.

Personal qualities of the students we would be looking for

The community-led and Participatory Action Research framework used in the study means that all our contributors have to be good in dealing with people! So we are looking for team players with good communication skills and a respectful and humble approach to their collaborators from both the public and research teams. Your own ethnicity is irrelevant to us (Māori and non Māori are given equal support and encouragement), but it is very important that our students and Postdoctoral Fellows are open to and interested in Māori approaches to environmental management, and to the interplay of Mātauranga Māori (Traditional Ecological Knowledge) and science. There is no place for 'Political Correctness' in the team – critical and rigorous scholarship of all world views is expected. TMK offers both Pākehā and Māori students with an excellent opportunity to learn Kaupapa Māori research methods, but projects applying science in other cultural contexts would be extremely welcome also. What matters most is that prospective students want to empower community-led sustainable fisheries and associated healthy environments.

General scope of topics available

Student research projects could cover a wide variety of ecological, social, cultural, environmental history and environmental philosophy issues that broadly might fit under the Socio-ecological Resilience Theory rubric. Please suggest your own topics, but a few general examples include.

- Population ecology of paua, kina, cockles, other shellfish, fish, kelp, other seaweeds, birds
- Reserve design and management
- Ecological restoration, reseeding, habitat enhancement
- Reproductive development and growth
- Harvest management
- Community-based monitoring methods
- Environmental education
- Mātauranga mahinga kai and science interface
- Emergence of environmentality and community empowerment from environmental co-management
- Environmental management
- Relationship between land, people and wellbeing
- Social dynamics

Community reserve managers have already requested research on:

1. Development of community-led monitoring tools
2. Stock, recruitment and growth studies for erecting sustainable harvest management bylaws
3. Spatial modelling of habitats and species distributions for managing sustainable harvests
4. Design of active adaptive management strategies to identify optimum sustainable harvesting regimes
5. Assessment of efficacy of traditional Māori teachings about paua harvesting tikanga
6. Population dynamics of kanakana (Lamprey) in the Mataura River

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7. Design and calibration of a 'Cultural health Index' for coastal and estuarine areas. See Townsend et al. 2004[1]

We are particularly interested in fostering some transdisciplinary research projects to support kaitiakitanga. There would be scope for input from Māori Studies, Reo specialists, environmental history, economics, management studies, Film Making, Communication studies, Chemistry, Surveying, Information science, etc. Many of these areas are particularly relevant to our project as Te Tiaki Mahinga Kai incorporates research aimed at investigating social and cultural wellbeing associated with the relationship of people with the land.

Some more specific suggestions for research topics

a. *Optimum design of a robust population monitoring regimes and fish sampling for measuring long-term trends in kanakana (lampreys), tuna (eels) and giant kokopu population health in the Mataura mātaitai and river system*: Part of the scheme will be associated with the design and construction of a fish passage at Mataura Falls (in the middle of the Mataura mātaitai). Baseline studies of kanakana passage before the pass is built will allow better interpretation of the long term monitoring figures.
b. *Calibration of catch statistics against fish and marine invertebrate abundance measures:* MFish monitor mātaitai on the basis of rudimentary data records of catch per authorisation. Our research will calibrate (i) this measure and (ii) more sophisticated catch per unit effort data and (iii) relative population monitoring indices (traditional indicators and new science protocols done by the reserve managers e.g. Wakefield & Walker 2005[2]) against full scale quantitative stock assessments. The crucial question is whether the relative and traditional methods give a linear relative index of stock abundance or, as expected for many traditional knowledge indicators, a curvilinear measure (see Fig 1 of Moller et al. 2004[3]). If the index saturates at low fish/pāua/kina abundance, severe depletion of the resource will occur long before the kaitiaki and MFish managers can register much change in the catch statistics. Our goal is to suggest and test a moderately more sophisticated but more informative set of population monitoring statistics for shellfish, pāua, kina and some taonga fish species.
c. *Evaluation of traditional and simple new techniques for reseeding karengo (seaweed), pāua and kina in depleted areas of mātaitai*: Rongomaiwahine have trialled traditional methods of placement of karengo in freshwater streams to flush seed onto coastal areas near stream mouths; and placement of mature pāua in plastic crates in strategic locations and times to facilitate reseeding. We will do complementary research of practical reseeding strategies using more structured experiments to discover optimum selection of growth stages, currents and locations for 'soft-release' strategies like those being trialled less formally by Rongomaiwahine.
d. *Traditional strategies for spacing pāua harvesting*: The Waitutu whānau were taught to always leave 3 large pāua in each rock pool or large crevice to help stimulate resettlement. A randomised experimental block design, replicated between at least two mātaitai/taiāpure, will simulate four harvest methods: i) traditional optimum strategy; ii) random harvest; iii) 'over harvest' and iv) 'under harvest'. Recruitment will be monitored over the following years to determine whether the traditional teaching still applies. Controlled experiments in

[1] Townsend, C.R., Teirney, G.T., Niyogi, D.K. 2004. Development of a tool to facilitate participation of Maori in the management of stream and river health. *Ecohealth* 1(2): 184-195
[2] Wakefield, A.T., Walker, L. 2005. Maori methods and indicators for marine protection. Department of Conservation, Wellington. 66 pp.
[3] Moller, H., Berkes, F., Lyver, P.O., Kislalioglu, M. 2004. Combining science and traditional ecological knowledge: monitoring populations for co-management. *Ecology and Society* 9(3):2. Online at: ww.ecologyandsociety.org/vol9/iss3/art2

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captivity will test our hypothesised potential mechanisms behind the strategy i.e. chemical cues or physical alteration of substrates by adults, heated water in infrequently flushed intertidal pools triggering fertilisation and subsequent locally enhanced recruitment, retention of fertile males and females in close proximity enhancing fertilisation/recruitment).

e. *Development of an effective native fish pass at Mataura Falls*: Plans to facilitate fish passage at Mataura Falls requires careful consideration of options, impacts, design and the establishment of an associated monitoring protocol.

Where might student research studies be based?

A nested design allows research of a small number of intensive case studies, complemented by inclusion of several community reserves in less intensive ways. This allows considerable flexibility on where the student study could be based. If you wish to study an aspect of ecological or community reserve management, it may be best to focus your work on the existing reserves below. If you are more interested in reserve planning and changes in peoples' behaviour as they become active reserve managers, you might choose to work with groups struggling to establish the reserves in the coming 5 years. We have contacts with many such groups (Northland to Southland). In general we would like to spread the students and postdoctoral Fellows right round the country, but travel to/from distant sites would be quite expensive. But if your home community is in deepest darkest North Island and you want to work there, we'll find a way!

Established Taiāpure-Local Fisheries

There are currently eight taiāpure-local fisheries in New Zealand. The taiāpure-local fisheries came into existence as follows:

1. Palliser Bay Taiāpure-local Fishery (Southern Wairarapa) 13 July 1995
2. Maketu Taiāpure-local Fishery (Bay of Plenty) 19 September 1996
3. Porangahau Taiāpure-local Fishery (Southern Hawkes Bay) 5 December 1996
4. Waikare Inlet Taiāpure-local Fishery (Northland) 18 December 1997
5. East Otago Taiāpure-local Fishery 1 July 1999
6. Kawhia Aotea Taiāpure-local Fishery (Waikato) 11 May 2000
7. Whakapuaka Delaware Bay Taiāpure-local Fishery (Nelson) 21 February 2002
8. Akaroa Harbour Taiāpure-Local Fishery (Banks Peninsula) 31 March 2006

Established Mātaitai Reserves

There are currently six mātaitai reserves in New Zealand. The mātaitai reserves came into existence as follows:

1. Rapaki Bay Mātaitai Reserve (Lyttelton Harbour) 18 December 1998
2. Koukourarata Mātaitai Reserve (Lyttelton Harbour) 14 December 2000
3. Te Whaka a Wera Mātaitai Reserve (Stewart Island) 1 January 2004
4. Moremore Mātaitai Reserve (Hawkes Bay) 12 August 2005
5. Mataura River Mātaitai Reserve (Southland) 12 August 2005
6. Raukokore Mātaitai Reserve (East Cape) 12 August 2005

Student research supervision

Several of the Postdoctoral Fellows in TMK and the researchers above could contribute as co-supervisors, but we need not be directly involved in supervision (we are happy to just give general support in the background if you have another supervisor in mind). Otherwise other supervisors in Zoology, Botany, Ecology, Geography, Surveying, Anthropology & Sociology, Environmental History, Food Science etc. may be willing to support your thesis research in the project. Co-supervisors in CRIs (e.g. Landcare Research, NIWA) may also be available. We are open to having students associated with Canterbury University (e.g. Dr John Pirker from the Biological Sciences Department at Canterbury is keen to be involved), or jointly between Canterbury and Otago where a TMK team member is supervisor, but also happy to consider having students entirely supervised

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from other universities also. The only proviso here is the need to negotiate some issues about access to sites and databases to ensure that the core TMK work is not disrupted – if we know the supervisors in other universities there will not be a problem. If you are keen and your project fits, we will find a way to support you!

More information?

For more information, contact Henrik Moller, Centre for the Study of Agriculture, Food and Environment, University of Otago. (03) 479 9244 henrik.moller@otago.ac.nz. Information on CSAFE, the main University of Otago unit that is promulgating TMK, can be found at their website www.csafe.org.nz. A project website (www.mahingakai.org.nz) is currently under construction.

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