

Vulnerability & Adaptation Assessment Report for the Island of Penrhyn



Cook Islands



Source: www.wikipedia

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Cover Photo credit: Wharf facilities, Omoka Village, Penrhyn Island. *Source:* www.cookislands.travel/penrhyn

All values are in New Zealand currency.
Metric measures used.

KEY ACRONYMS

ACP	African, Caribbean, Pacific (grouping used by European Union of developing partners)
NGO	Non Government Organisations
NPAC	National Project Advisory Committee
USP/EU/GCCA	University of the South Pacific/European Union Global Climate Change Alliance

Acknowledgement

Tangitangi ana te manu, mei te mea atura e kukupa te manu e tangitangi nei, e karere ki o pokerekere akameitaki io turuturu Matua.

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Taputu and I wish to thank all those who have helped put this report together. It has been an honor serving the people of Penrhyn. The endless hospitality, the warm prayers offered, the exciting meals and stories shared, the personal and family resources used without thought to repay, can never be forgotten. Thank you is such a small word for the love and thoughts and living shared. Thank you, thank you from the bottom of our hearts.

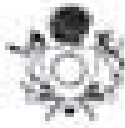
Taputukura Mariri and Vaine Wichman

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PENRHYN ISLAND ADMINISTRATION
GOVERNMENT OF THE COOK ISLANDS

Karere Na Te Konitara Tutara o Tongareva



Kia orana I te aroha poria o to tatou Atu.
Greetings in the great love of our Lord.

Te na roto atu nei iaku, ta matou
akameitakianga, te henua Tangata
Tongareva, ki te Opati o te Apii Reva e te
akatupuanga I te puapinga I te Pa Moana
Pacifica (Pacific Centre for Climate
Environment and Sustainable
Development). E opati teia I roto I te Apii
Tua Toru o te Pa Moana Pacific I Tonga nei
(University of the South Pacific). Kua
turuturu ia teia porokaramu e te

Taokotaiaanga Europa (European Union). *On behalf of the people of Tongareva I wish to thank the Pacific Centre for Climate Science and Sustainable Development; a centre that is part of the University of the South Pacific. I also acknowledge the strong support from the European Union for this program.*

Ta ratou I rave I te henua nei, koia te akakoukou mai anga te au manako e te au
ripoti no runga I te tauiaanga reva I Tongareva nei, ki roto I teia ripoti sumaringa
tei mua ia tatou. *What the Centre has completed on the island through the collating of
the views and findings of the people on climate change on Tongareva and including them
in this beautiful report before us.*

Te inangaro nei au I te akameitaki I te nga vahine tei rave I teia angaanga – Vaine
Wichman (Mata no te Apii Tua Toru) e Taputukura Mariri (mata no te Konitara
Vaine Tini o te Kuki Airani). *I thank Vaine Wichman (In-country Coordinator of the
PACE-SD/USP/EU Project) and Taputukura Mariri (Cook Islands National Council of
Women Local Governance Coordinator) who conducted the various meetings, survey,
field work and report writing for us.*

I teia tuatau nei, ka tapapa te henua tangata no te tuatau ki mua, me akamata I te taangaanga I teia au akaueanga I roto I teia ripoti. *Today, the people are in readiness for the work ahead when implementation of the various recommendations and prioritises from the report begins.*

Ko te au ta'i'i anga o te tauiaanga reva I te henua nei, e puai roa, no reira kia vave teia au angaanga I te akamata, kia paruru I te hiti tangata e to ratou ngutuare e te au mekameka natura o to matou henua. *There are indeed many climate change issues and impacts on the island, so it is important that program work begin as soon as possible, in order to protect the people, their homes and their resource base and island.*

Kia orana e na te Atua tatou e tiaki e Nana e akamanuia mai ia tatou. *Kia orana and may God look after us, and may He bless and keep us all.*

A handwritten signature in blue ink on a light blue background. The signature reads "MAYOR TINI FORD" in a stylized, cursive script. Below the name, there is a small, illegible mark that appears to be a date or initials.

Tini Ford

Executive Summary

Penrhyn, the northern most island in the Cook Islands group comprises two residential *motu*, Moananui Islet (Omoka Village) and Pokerere Islet (Te Tautua Village) that is home to 213 Penrhyn Islanders today, living in 53 occupied households.

Ko Tongareva, ko te enua I te tua tokerau I te Pae Tokerau o te Kuki Airani inara, e rua motu e noo ia nei, ko Moananui ko te Oire ko Omoka e ko Pokerekere ko te Oire ko Tetautua, e te noo nei tetai 213 tangata I roto I te au ngutuare e 53.

This report is drawn up from Census documents, past reports on the environment and resources of Penrhyn, and a field visit mounted in June 2013. The team was able to use a simple and logical methodology for assessing climate vulnerability and adaptation issues of communities, coupled with a practical guideline on preparing an island adaptation plan, tested and documented by the USP/PACE program.

Ko teia ripoti kua kiriti ia mai mei roto I te akapapaanga o te Tareanga Tangata o te Basileia, e pera te au ripoti no runga I te Aorangi e te rekoti rai o Tongareva ma tetai au tangata tei atoro atu ana ia Tongareva I roto ia Tiunu 2013. Kua rauka I te au tangata I te taangaanga marie I te au kite karape no te akatauanga I te au manamanata e tupu mai nei na roto I te tauiana reva e te kimi matatio anga I te au ravenga no te akatanotano anga I te nooanga o te iti tangata kia tau ki te au mea e tupu nei.

Climate change challenges today

Te au Manamanata e tupu nei no te Tauiana Reva I teia ra

Climate change issues are now a significant part of the country's current development program. Severe cyclone formations, receding coastal lines, revised fruiting seasons, loss of endemic species are a handful of examples of the impact of climate changing. Understanding and especially addressing these changes is an important consideration for National and Local Government.

I teia tuatau ko te au manamanata e tupu nei na roto I te tauiana reva, te riro nei teia ei mea puapinga maata I roto I te akatupuanga I te au porokaramu akapuapinga o te Basileia. Ko te au uriia e tupu nei, te akaitianga o te tapa taatai, te tauiana o te tuatau no te ua anga rakau, te ngaroanga o te te au mea natura tetai au akaraanga no te tauiana reva. Kua riro teia au mea e tupu nei ei akarakara anga matatio na te Kavamani

Basileia e pera te au Kavamani Enea no te kimi ravenga anga e ka akapeea te rapakau anga.

Penrhyn is in the front line of these climate change waves and it is urgent that they be involved in understanding, identifying and planning adaptation activities that will extend their islands lifestyle and habitat for future generations.
I mua rava I teia au mea e tupu nei, ko Tongareva, e mea tau kia akao ia mai ratou ki roto I te au akamaramarama anga, e kia kite ratou e, ka akapeea te parani anga I te au angaanga akatanotano anga no ratou mei ta ratou I matou, e no ratou no te tuatau ki mua e no te uki ka aru mai.

Key concerns for them were:

Te au manamanata no ratou:

- Keeping their homes and immediate food sources safe (coastal protection and water reservoir requests);

Akonoanga I to ratou ngutuare e pera ta ratou vairanga kai (paruruanga mei te tai e pera kia rava te au tura vai)

- Coastal protection around key island assets that assist in alleviating remoteness (airport, harbour, hospital, telecommunication);

Paruruanga anga I te au tuanga puapinga I runga I te enua kia kore ratou e rokoia e te tumatetenga(toanga pairere, uapu, aremaki, e te ngai o te teleponi)

- Uninhabited homes and depopulation (maximizing their water reserves and sources and the issue of less people being responsible for the same amount of resources).

Te au ngutuare kare e noo ia ana e te iti tangata (akamatutuanga I te au vairanga vai e te vai atura e na taua iti tangata rai oki e akono nei I teia au mea.

Their proposals to address these issues

Te au tamanako anga no te akatano I teia au manamanata

Adaptation Options (solutions)(Te au Ravenga)	Estimate Costing Only Moni Tamanako
Developing gender equality and representation in decision making places <i>Akatupuanga I te turanga aiteite o te tane/vaine na roto I te mata anga I runga I te au turanga tukuanga tika</i>	Part of an existing CINCW/CLGF project, to hook into <i>Ko tetai tuanga angaanga teia e rave kapiti nei te Konitara Vainetini e te akateretereanga tau o te Pa Enea</i>
Survey: water tanks, active and inactive, including repairing community (ferro	Propose for MOIP engineers to conduct survey and assessment

<p>cement) water tanks to become reservoirs for each village <i>Vaitoanga/Tare: tura vai, te mea meitaki e te kare e meitaki ana, e pera te akaouanga o te au tura oire (timeni/ngaika)kia riro mai ei vairanga vai no te au oire.</i> Supply of additional spouting for water catching (an outcome of the survey) <i>Oronga anga I tetai au taeanga vai (no roto mai I te tuatau o te vaitoanga/tareanga)</i> Increase more home programs that encourage food production near homes <i>Akamaatanga I te au porokaramu ngutuare no te akamaroiroi atu I te tanu kai ki te pae ngutuare</i> Using traditional knowledge and modern materials to sustain lake reserves for fish <i>Akonokono anga na roto I te au kite tei matauia e pera te au kite ou I te au punavai e noo anga te ika</i> Increase the varieties of atoll fruit and vegetables to accompany health programs to address NCDs <i>Akamaataanga I te au tu ua rakau e te manga raurau ei tauturu I te au porokaramu a te Pae Rapakau maki no te paruru atu I te au maki naau rai I kimi, mei te toto vene, toto kake e te vai atura</i> Bring forward the renewable energy project for Penrhyn <i>Apai vave mai anga I te akakoroanga o te Uko Natura ki Tongareva</i></p>	<p>(expected visit in July 13) <i>Tamanakoanga I te au initinia o te Tuanga Angaanga o te Kavamani kia tare mate akapapu mai I te turanga o te au tura vai</i> (part of MOIP engineers TOR) <i>(tetai tuanga angaanga a teia au initinia</i> Two practical workshops using Min of Agriculture Secretary and Research Officer (airfare, training etc) \$15,000 <i>Kia raveia e rua iriirikapua e te Tekeretere e te Opita Kimikimi o te Pae Tanutanu(moni patete, terenianga e te vai atura) \$15,000</i> MMR and MOIP collaboration and scoping Scoping - \$5000 Lake reserves - \$25000 <i>Angaanga kapitiana o te Pae o te Moana e te Angaanga</i> <i>Vaitoanga e te akatika - \$5,000</i> <i>Punavai - \$25,000</i> Part of Min of Agri/Island Council activity above <i>Tetai tuanga o tei angaanga na te Pae Tanu e te Konitara Enua</i> \$100,000</p>
<p>Build up family boat landing units (about 1.5 km on Omoka side) <i>Akatu'anga I te au ngai vairanga poti o te au ngutuare tangata(mei te 1.5 kilometera I Omoka)</i></p>	<p>\$150,000</p>
<p>Deploy coastal protection units at sites</p>	<p>\$100,000</p>

<p>to be determined with island support <i>Maani anga I tetai au paruru tapatai ki runga I tetai au ngai tei turuturuia e te enua tangata</i></p> <p>Revisit the harbour plan and develop proposal in line with the request for coastal protection and use of any dredged materials for fill and coastal upgrade</p> <p><i>Akarakara akaouanga I te parani o te uapu e te akatupu I te patianganga kia aru I te patianganga no te paruru I te pae tai ma te taangaanga atu I te au one te ka kiriti ia mai no roto I teia ngai no te akakiki atu e te akameitaki I te I te pae tai.</i></p> <p>Climate proofing Omoka wharf, and airport.</p> <p><i>Akameitakianga I te uapu o Omoka e pera te Toanga Pairere</i></p> <p>Developing a production and marketing plan and strategy to revive handicraft industry</p> <p><i>'Anga I tetai parani e te ravenga no te akaoraanga I te au kimi puapinga na roto ite rangaranga e te tuitui</i></p>	<p>\$250,000</p> <p>\$1,000,000 (estimate only pending above revisiting exercise)</p> <p><i>\$1,000,000 (e tamanako ua teia, tei runga ua I te akarakara akaou anga o te parani)</i></p> <p>\$50,000 (supported by CINCW and CLGF, and USP/EU GCCA)</p> <p><i>\$50,000(turuturu ia e te Konitara Vainetini e te Akateretereanga tau, e pera te USP/EU GCCA)</i></p>
<p>Estimated Cost of Prioritised Activities for CC and DRM</p> <p><i>Moni tamanakoanga o teia au akakoroanga puapinga no te Tauiana Reva e te DRM</i></p>	<p>\$1,695,000</p> <p>\$1,695,000</p>

Looking ahead...what may be forgotten

Akaraanga ki mua.... Eaa te au mea kare I taiku ia ake

Depopulation on the islands was discussed in passing, but perhaps as the implementation of the present set of requests and activities takes off, may be an issue to return to in twelve months time.

Kua uriuri ia ana te iti o te tangata I runga I te au enua, inara penei me tupu teia au patiangā e tuku ia atu nei, ka riro teia ei tumu manako na tatou I roto I te taingauru ma rua marama.

Nowhere during discussions did the people consider a relocation plan or policy. Yet by default their families have been relocating over the last 10 years to Australia and especially to the township of Cairns. The population drift confirmed in this report is the highest island of people that have moved off shore for the many reasons of isolation, opportunities, medical, education, and an easier life.

I roto I te au uriuri anga manako, kare roa e atiangā I manako mai ana te iti tangata e kia 'anga ia tetai parani me kare akanoonooanga no te tau i to ratou ngai nooanga. Ua atu ra teia, kua aere atu tetai au ngutuare tangata I nga mataiti e taingauru I topa ake nei ki Autireria, e ko te maatanga tei te oire I Keini. Kua akapapu mai teia nekeanga no te iti tangata Tongareva e ko te enua tangata maata roa atu teia tei akaruke I to ratou enua no te au tumu mei te mamao, kimi puapinga, te tuanga o te rapakau maki, te apii e pera te maru o te nooanga.

This phenomenon in itself will be an important factor in future climate change plans for the Northern Cook Islands if the current listing of immediate concerns above are not seriously implemented in their island plans.

Ko teia tikai e tupu nei, te akapapu mai nei e, e aka manamanata teia me kare e akao ia teia au akapapaanga no runga I te tauiangā reva ki roto i te au parani enua o te Pae Tokerau o te Kuki Airani.

Introduction

Penrhyn is the largest atoll in the Cook Islands, with a 77 km long reef rim enclosing a deep lagoon of 233 km². Penrhyn's numerous *motu* (53) have a combined land area of 10 km². The lagoon, which has many patch reefs, is connected to the open sea by three passes. Takuua Pass is located on the northeast side of the atoll, Siki Rangi Pass is on the northwest, and Taruia Pass is located on the west side.

Inter-island and international cargo/passenger ships access the lagoon via the Takuua and Taruia passes.

Climate Change Context

Meteorological Information

Projections under the Pacific Climate Change Science Program (Australian AID, CSIRO, Cook Islands Meteorological Services) advise that in the next 50 to 100 years the climate in the country will tend towards:

- More rainfall and wet periods
- Lesser cyclones and storm occurrence, although when they do hit they will be very severe
- Sea levels around the coasts rising by a metre.

(ref. *Pacific Climate Change Science Program, 2011*)



Frigate birds in flight (Photo credit: Vaine Wichman)

For Penrhyn, logged climate indicators over the period 1981- 1993 are used to correlate with the climate science results. During this period drought conditions experienced in the early eighties in the country corresponded to El Nino registered in the same period.

Table 1: Average annual climate values¹

Year	T	TM	Tm	PP	V	RA
1981	28.0	-	-	1119.18	26.0	221
1982	28.5	30.2	26.2	2272.06	24.0	198
1983	28.1	30.3	25.9	3458.47	25.9	253
1984	27.9	29.8	25.6	3527.54	25.0	246
1985	27.8	29.5	25.3	3639.65	26.1	249
1986	28.1	29.8	25.7	3126.01	25.3	207
1987	28.6	30.6	25.7	4385.57	23.6	237
1988	27.8	29.5	25.7	3269.17	25.8	253
1989	-	-	-	-	-	-
1990	28.1	29.8	25.9	2960.66	26.1	219
1991	28.4	30.3	26.0	3233.66	23.7	222
1992	-	-	-	-	-	-
1993	28.3	30.1	25.6	3487.16	21.0	237

Source: www.tutiempo.net/Climate/Oceania/Cook

The total rainfall value 0 (zero) may indicate that there has been no such measurement and/or the weather station did not broadcast then.

¹ Interpretation average annual climate values

T Annual average temperature (°C)

TM Annual average maximum temperature (°C)

Tm Annual average minimum temperature (°C)

PP Total annual precipitation of rain (mm)

V Annual average wind speed (Km/h)

RA Total days with rain during the year

Field Observation Notes

Geology

Penrhyn's geology reflects the atoll feature of a circular reef that encloses a lagoon and extends from a very great depth to the sea surface. The atoll was formed when the oceanic island which was once ringed by a barrier reef sank below sea level.

Geography

Penrhyn sits atop the highest submarine volcano in the Cook Islands at 4878 m above the ocean floor. Distance from Rarotonga is over 1360 km north-north-east and 9 degrees south of the equator, which includes the island in the non-cyclone belt.

Drainage patterns

For the Northern Cooks, the low-lying sand cays and *motu*² provide porous cover features for storm, sea surge and water runoff.

Clay sand and sand are found throughout the *motu* and there are swamp pits and freshwater reserves on some of the *motu*.

Vegetation cover

Compared to the high islands of the south, coconut and pandanus trees dominate the island cover, with *au*³, *tamanu*⁴ and *ngangie*⁵ and sea resistant shrubs dotting the coastal landscape.

Soil types

The atoll is predominantly sand and there are patches of fertile reserves of land throughout the *motu*, and the people have developed their surrounding and *motu* food gardens to be able to grow various types of vegetables and fruit trees.

Land use types & patterns

The residential *motu* are Moananui Islet (Omoka Village) and Pokerere Islet (Te Tautua Village). Traditionally islanders lived on the *motu* towards the south eastern and western side of the atoll. According to island knowledge, these *motu*

² Islets

³ Pacific hibiscus tree

⁴ Pacific mahogany tree

⁵ Coastal hardy shrub, sea water resistant

were ideal for the people to observe the arrival of visitors from the ocean and to prepare for any invasion or peaceful visit. Christianity brought the islanders into the two main settlements located today.

Originally each *motu* encircling the Penrhyn lagoon, comprises high settlement areas, low water filled plots that have become useful for planting *puraka* (a sturdy atoll rootcrop) that provides carbohydrate and energy food alongside fish, sea and shellfood and chicken and pigs.

Today, most inhabited homes host a stand or two of plantain (*rokua*⁶ variety), some homes host introduced fruit trees and the common observed being the *tava*⁷ fruit tree. Pawpaw trees are interspersed around some of the homes, and pumpkin and *rukau viti*⁸ adds to the nutritional variety of vegetables available. A few stands of mango trees provide fruit options for the villagers in Omoka. Guava is available throughout some parts of the *motu*.

Generally each extended family unit (from the grandparents to their children and children's children) maintain homes on one or both villages, as well as their foraging and food collecting grounds on several of the *motu* circling the lagoon. The Island Council provides oversight on the larger *motu* to encourage conservation and harvesting practices.

Population distribution

In 1864, Penrhyn was almost depopulated by Peruvian expeditions. An estimated 1,000 men, women and children were taken to South America. Native pastors of the London Missionary Society had introduced Christianity from Rarotonga in 1854. The new religion had been accepted enthusiastically, and the villagers immediately started to build churches. Promises from the slavers of good pay and safe return offered a way to obtain money for churches, but most who accepted died in exile, virtually slaves.

Another recorded story tells how in 1863, 410 inhabitants of the total population of about 500 were kidnapped by Peruvian black birders who were assisted by four native missionary teachers, who sold their people for 5 dollars per head. The missionaries accompanied the slaves to Peru as their interpreters. None returned.

⁶ A starchy banana variety that grows in the atolls.

⁷ A small round date tasting fruit.

⁸ Fijian rukau/bele, a green leafed plante that is eaten cooked.

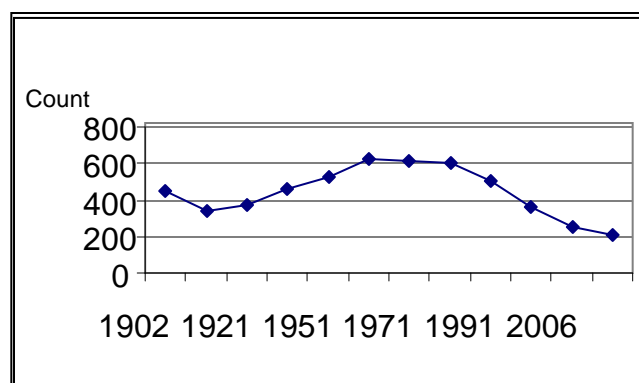


Figure 1 Penrhyn Population 1902 2011

From a 1961 high of 628 people, the tide of outmigration has continued unabated over the last forty years, with strong outmigration experienced in the 2001 Census with a drop in count from 503 in 1991 to 357 in 2001. This drop ties in with the impact economic and public sector reforms in the late nineties wrought on the Northern islands of the Cook Islands who in that period were heavily reliant on government intervention in employment and growth. Many left for New Zealand and Australia.

In the last twenty years decline in population from Penrhyn has registered one of the more serious in the country at an average of 34% annually.

Table 2: Penrhyn Population 1991 - 2011

1991	2001	2006	2011
503	357	255	213
%	-41	-40	-20
change			

(Source: Cook Islands Census, 2011)

Sex ratios are also in warning zones with only 78 females to every 100 males. The country ratio is 119 male to 94 females.

Dependency ratio is expected to be higher than the national average of 75%, especially with the void in economically active population.

The distribution of the population between the two villages averages at 25% in Tetautua and 75% in Omoka

Condition of water sources

All 53 occupied households advise that they draw their supply of water from their own water tanks. A handful of homes maintain their ground water holes for

cleaning and emergency. Form of water collection is from the roof, and all homes have roofing iron roofs.

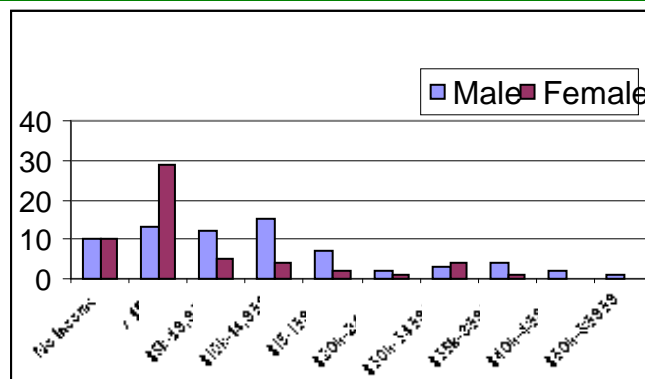
A random survey of the conditions of water tanks advises that over 90% of inhabited homes maintain excellent water storage management protocols⁹.

Income sources

Of the islanders over the age of 15, those with income sources show that:

- 20 do not receive any form of income
- 42 receive an income of less than \$5000 a year
- 36 receive incomes from \$5000 to \$14,999

Figure 3: Aged over 15 years: Income levels 2011



Source: Census 2011

In terms of occupation, more men featured in the professional (20) the technical (11) and the labour (18) grouping compared to women with 7 as professionals, 4 in the services sector, and 2 in the formal labour services.

The public sector provides the main employment for over 46 employees (37 men, 9 women), The private sector (Air Raro, Telecom, BCI, retailers, farmers, accommodators) provide the remaining employment opportunities (12 male, and 4 female)

Conditions and use of resources

○ Terrestrial

Terrestrial resources are more commonly known as natural resources and refer to that body of naturally occurring substances used in production. Such resources include water, fresh air and soil minerals. Discerning how these deplete and or

⁹ Regular inspection and cleaning of interior of tanks and attention to fittings and taps to avoid leaks and wastage.

rejuvenate can assist the island decision makers in prioritizing adaptation and mitigation activities.

During the visit, vegetation cover over the surrounding *motu* and the two main settlements was lush and healthy. Omoka hosts a stand of mangoes (5 bearing trees¹⁰ were observed and another 3 growing ones). Home plantains were fruiting and watermelons were observed at 2 in every 10 household throughout the villages. Pumpkin was also observed at a few homes. Pawpaw trees dotted through home back yard gardens and pig feeding areas. Compared to an earlier visit 17 years ago (1996), the diversifying of fruit and vegetables is observed and is encouraging.

*Ngangie*¹¹ vegetation is prolific throughout the *motu* and fairly established on the sandy cay ones prone to seawater intrusion during king tides and sea surges.

Coconuts are prolific throughout all the *motu*, and the undergrowth advises the natural replacement plan these *motu* ecosystems have been accustomed to over the last few centuries.

- Marine

The island residents rely on fish as the main protein source. A Passfield report (1997), calculated the annual per capita consumption of fish in Tongareva Island as being about 219.0 kg. The Rarotonga average is 25kg per capita. Though the report is dated it does confirm that the people have a very strong reliance on the lagoon and surrounding ocean for food.

- Fresh water

The island residents have always relied on their own efforts to catch water for personal use.

In the sixties communal water tanks established under the New Zealand Administration saw all islands installed with community water tanks for household access to complement the earlier water source systems of water wells in established places on the island and individual efforts to catch their own drinking water.

In the eighties under an Australian aided program, ferrous cement water tanks for each inhabited household was implemented throughout the Northern Cook

¹⁰ Over 15 metres in height. Planted in ex-puraka planting sites (hence water tables in the vicinity).

¹¹ Suriana

Islands. Only a handful of maintained tanks from that period are in operation today. A few have sustained cracks and symptoms of neglect mainly due to the inhabitants migrating.

Most of the occupied dwellings have existing water tanks (cement or/and PVC). In 2011 these were complemented by a disbursement of 57 PVC tanks (39 x 6,000ltr, and 18 x 3,000ltr) under the Northern Group Water Tank and Catchment Project. During field assessment it was observed that most inhabited homes had 2 or more water tanks.

- Signs of land degradation, coastal erosion

The communities of Omoka and Te Tautua confirm the claims that two islets in the uninhabited south east zone of the atoll are being inundated with seas now covering these sandy cays that once was home to bird nesting activities with scrubs and *ngangie* dotting the islets.

In the lagoon side of Omoka, there is obvious coastal erosion due to lack of maintenance of sheltered landing passages, the effects of the sea surges over the years and more recently in 2010 that damaged about 30% of front lagoon property on the Omoka bay side extending from the site of the Cook Islands Christian Church properties, to the Government Representatives home to the Catholic Church and towards the school and wharf area. Onwards the resident's claim that high seas and king tides spilling over 20 metres onto the road on segments leading to the airport have become common.

The University of the South Pacific/Pacific Centre for Climate Science and Sustainable Development/European Union Global Climate Change Alliance Project – Community Engagement Component

The USP-EU GCCA project is a 4 year regional project being implemented in the 15 Pacific ACP countries (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, East Timor (Timor Leste), Tonga, Tuvalu, Vanuatu) through Capacity Building, Community Engagement, and Applied Research. The objective of this project is to develop and strengthen the Pacific ACP countries' capacity to adapt to the impacts of climate change. This objective will be achieved through the training of local, national and regional experts on climate change and adaptation and the development and implementation of sustainable strategies for community adaptation to climate change, based on improved understanding of impacts of climate change and variability in the Pacific region. It is also expected that the project will contribute to the establishment of a

network of local, national and regional specialists on climate change who will support communities, governments within Pacific Island countries, NGOs, and regional organizations in their efforts to address the effects of climate change through a long-term, sustainable approach.

The Community Engagement component will help establish a demonstration site in the selected vulnerable island to adapt to climate change. The adaptation projects realised in the communities will cover the vulnerable sectors identified in each country by the country's National Communication.

Once accepted, the adaptation plan will be implemented by the communities, with the help of the in-country coordinator and of technical experts if needed, and with the support of the project management team. The progress of each community, or demonstration site, will be continuously monitored by the in-country coordinator and the project management team. A National Project Advisory Committee established in every Pacific country will help to prevent duplication. This component also encompasses the creation of an information network (the Locally Managed Climate Change Adaptation or LMCCA network) within these communities that will be later expanded to disseminate lessons learned at the demonstration sites to other communities in the country and region.

All information and data collected during the project, especially from the Community Engagement and Applied Research components will be stored at the USP Knowledge Centre. The goal of this is to ensure that the data, information and lessons learned during this project are stored and made accessible to the people in the region.

The Selection Process

The National Project Advisory Committee (NPAC) for the Cook Islands, recommended that all final sites be in the Northern Group of the Cook Islands as these islands and communities are more vulnerable, largely as a result of isolation.

The NPAC also recommended for the Cook Islands ICC to utilize the findings of the Strengthening Resilience in Communities (SRIC) Inception Workshop where all the Island Mayors targeted specific islands for future climate change adaptation activities. Table 4 below shows a summary of the results from this Inception Workshop.

**Table 3: Summary from the SRIC
Inception Workshop**

Cook Islands

Targets	Water capture, storage and management capacities are enhanced	Coastal protection enhanced	Climate resilient agricultural and fisheries practices implemented	Health support and vector-borne disease control technique introduced	Resilience of tourism enterprises to climate change
Islands					
Pukapuka	X			X	
Nassau	X				
Rakahanga					
Rakahanga		X	X		
Manihiki			X		X
Penrhyn	X		X	X	

Source: Office of the Prime Minister: Climate Change Division, 2012

Comparing Manihiki, Rakahanga and Penrhyn, this latter island was targeted the most for future climate change adaptation activities, across sectors including water, agriculture and health. These are all critical livelihood resource areas, making **Penrhyn**, made up of **two villages**, the **recommended site for the EU-GCCA project**.

NPAC duly confirmed the island of Penrhyn with the villages of Omoka and Te Tautua as the identified sites in country to conduct the V & A assessment and adaptation initiatives of the project in.

Vulnerable Aspects of Socio-Economic, Cultural, Governance and Climate Changes

Climate Change Knowledge & Attitudes Survey & Field Observations and Discussions and Assessment¹²

Governance and Socio-economic resources

The Island Council under the Local Governance Act (2013) presides over the direction and development activities of the island. An Executive Officer under

¹² Including commentary from focus group meetings in both villages

this new regime will provide the financial reporting and management support to the Island Mayor and Councilors and support management and information channels with Rarotonga.

The Churches play a significant support to the daily living of the residents. There are two main denominations, Cook Islands Christian Church, and Cook Islands Roman Catholic Church. Particularly on Te Tautua, the community activities revolve around the Church activities and the church provides community assets and facilities for the community to use and work from.

Feedback from the villagers advise their content with the work of the Island Council and the Island Administration. Over recent years, Council workers have had to provide labour supply to private work besides public projects. The shuffling of work effort follows the supply of public equipment for public projects and activities and when these are in short supply, increased support to community and private jobs.

There are no women on the Island Council and there has never been. The Island Administration employs a Women's Development Officer who is involved in supporting training in home improvement and living to women's groups and young women in the schools. She is also involved in managing rito hat orders and production levels on the island, mainly from orders from Rarotonga. However there is not much support to the transporting and marketing side of her and the women's' efforts and so this important productive activity has basically survived all these years from sheer determination by those who seek orders of hats and the women who are keen to make money from supplying them.

Although there is no overt sign of women being involved in any community and island council decision making process, a observant remark by a woman leader advised that though the men make decisions in public, it is the woman that rules the activities and decisions in the home. How useful this is to the development of island and community plans is unclear. The evening exercise conducted to raise awareness to the community on the differences in decision making and planning by men, women and councils of mixed numbers of men and women provided some sharing platform to help them draw their own conclusions on what forms and scope of leadership they may wish to develop and adopt in the future.

Pursuing the lack of women participation in island council leadership provided some socio-cultural understanding of the role of women in Penrhyn. There is a general agreement by the men that they do not want their women to do the physical work. They believe women's work is made out for them in the confines of the home, and with the children and the lesser mobile in the home.

Disaster Risk Management

There is a fairly extensive understanding of the disaster risk features that could affect the island and the people. Under the Disaster Risk Management Act, the island has a disaster risk management plan overseen by the Island Council. The community is aware of the role the Mayor and Councilors with the Island Administration have in implementing activities relating to this plan, particularly



Motu Vaiari

Photo Credit: Vaine Wichman

in times of impending disaster and the after-impacts.

Of the 53 occupied dwellings in the two villages, 29 were built before 1979. Only 17 were built in the period 1980 to 1999. In the last 12 years only 7 new houses have been constructed. Over 46 of these homes have concrete floors, and 41 homes had cement walls as well. To be expected all homes have iron roofing, which is an ideal material for water catching. Although there is no custom built cyclone shelter, the island hosts some fairly sizeable homes and halls that could act as

cyclone evacuation centres for the villagers. The trouble with most of the Church halls is they are located in vulnerable parts of the island. The Catholic Church hall is located on the lagoon coastal side on Omoka and was subjected to sea surge damage in 2010. The CICC Church and Hall are located at the Northern end of the Moananui Atoll and villagers have advised the vulnerability of this area to sea flooding and inundation during exceptionally high tides and sea surges.

Water Resources and Security

According to the survey results, the residents' responded they have a fairly reliable supply of water based on their private water tank catchment system. Most inhabited homes have one or two large water tanks holding water caught from their roof.

In the focus group discussions they collectively advised that more tanks per household as well as the repair and reactivating of the communal water tanks would go a long way to increasing their water security.

The two climate sensitive sectors to any drought conditions are water and agriculture. Discussions on how vulnerable the villagers would be during dry periods, advised that their island water conservation and practices come into action. Less water usage on toilet and washing activities and the conservation of drinking water is practiced. Those homes that also maintain and tidy family vacant homes are conscious of the need to ensure the water tanks in these homes are maintained as backup sources. There is a water hole in Omoka (residence of the Government Resident officer) but this is mainly used for washing and hygiene.

In 2011, under a Government Northern Group Water Tank Project, Penrhyn residents' received over 50 water tanks which were distributed by a project management team working in line with Island Council and installed (in some cases new roofing and spouting installed) to ensure quality water catchment to the homes.

The Sphere Project (www.spherehandbook.org/.../water-supply-standard-1-access-and-water-) advises that:

Survival needs: water intake (drinking and food)	2.5–3 litres per day	Depends on the climate and individual physiology
Basic hygiene practices	2–6 litres per day	Depends on social and cultural norms
Basic cooking needs	3–6 litres per day	Depends on food type and social and cultural norms
Total basic water needs	7.5–15 litres per day	

Water Carrying Capacity (Estimate)

Each occupied household hosts at least two (and in some cases three or four) water tanks in use and storing rainwater. Most tanks stand at about 6,000 litres. Using this holding capacity estimate per household suggests that most homes store 12000 litres of water at any one time, year round (the assumption for this is

that rainfall is adequate and predictable monthly). Most homes live 5 members at any one time (although some households look after two or three homes where the water holding capacity is the same as the caretaker home). This being the case an average size family (5 members – 3 adults and two kids) would be accessing above the minimum water requirements each day for a month. In a month this household (5) would use up about 2250 litres. With water storage being over 12,000 litres (and given the assumption of adequate rainfall year round), Penrhyn is indeed already well into the higher quadrant of Pacific Islands aiming for water resource and reservoir security by the year 2015.

It appears therefore that the request for additional water tank storage is presented to encourage further water supply for personal and household use. The use of pumps on water tanks also advises that living levels and expectations in some homes has improved and their vision to have inside showers and flush toilets mirrors the national strategy to ensure that everyone has the opportunity to a basic lifestyle that they choose as relevant.

Health & Sanitation

The hospital in Omoka services the two villages. There are community waste dumps located outside of village boundaries with regular collection and dumping performed by the Island Council's infrastructure team.

At the household level, 42 homes (80%) have flush toilets, while the remaining have access to pourflush/pit or lagoon toilets. Te Tautua village general cleanliness and attention to clearing rubbish and disposal of papaa¹³ rubbish was highlighted in their village operations as well as observed during the field visit. Both villages host 6 monthly village health inspections with Health officials help. At the time of the visit the Nurse Practitioner advised that a *tutaka*¹⁴ is scheduled for July. Her reports advise that the villagers do pay attention to correct disposal of waste, and to the health, hygiene and safety of their home environment. Most homes have bath/shower units (49) and kitchen sinks. Water pumps are becoming available, 21 homes advised they had these units for helping to pump water to their toilet and shower units. This home improvement activity confirms the homeowners' interest to move away from carting water into showers and toilets. However it was relayed that this effort does waste water and hence the reason they are interested in larger storage tanks or water storage units.

¹³ European

¹⁴ Inspection.

Energy Resources

There is a power station in each village that provides electricity to the homes from 6 am in the morning to 11 pm at night.

The power station in Omoka hosts a 72KVA generator, and Te Tautua's has a 35 KVA generator.

A few homes have also added solar lighting to be able to continue their lighting after the generators are turned off.



Brown Shark at Te Tautua

Photo Credit: Kaye Lynch

Although 52 homes own gas cooking facilities, at least 47 homes also use the fire for cooking their food. Most of the firewood used is collected from the reef side bushes and the motu, and also collected from the household's use of coconut (dry coconut husks and shells).

A 100 pound gas tank for cooking from Rarotonga lands on the island for about \$450 and when conservatively used can last almost 6 months. The bakery in Omoka can cook up to 8 loaves one batch. The baker oven used is a ground one, lined with baker bricks, and fueled by dried coconut shell and hardwood. When flour stocks are plentiful, production levels can range from 20 to 30 loaves produced twice a week for sale and for island functions.

In terms of home appliances, power and safety tools and entertainment (and the few that have solar) the main equipment are:

- Clothes Iron – 53
- Sewing machines – 58
- Electric drill -49
- Torch – 93
- TV screens – 60
- Laptops – 29

At least 47 homes advised they have freezers (2/3 energy rating), 9 owned fridge/freezers (with 2 & 3 energy rating) and 31 homes had washing machines (mainly ringer machines).

Source: Census 2011

Information, Communication & Technology

Over 60% of the homes have internet in their homes. All homes have access to a phone and all homes have access to a radio (*ref: Visit Survey*).

Telecom Cook Islands is currently installing mobile servers so that mobile phone coverage can reach the island. However observing the amount of mobile phones already in use to capture meetings (footage) and photos (to capture events) and how these are quickly uploaded to the Tongareva Facebook community page site from the island suggests the technology savvy of the people.

Food Resources & Security

The villagers consulted advised that food sources were plentiful and secure. While 40 of the homes were involved in many forms of subsistence food production, 13 homes were not, a few of these latter homes housed the elderly and young ones. At least 38 households planted vegetables and fruit trees, and 10 homes were keen flower garden planters.

In fishing, 43 homes fished while the remaining 10 did not fish. Most of the fishing was done in the lagoon and in the surrounding ocean area. Fishing equipment available ranged as follows:

- Spear guns – 80
- Fishing rods – 63
- Nets – 50
- Scuba – 14
- Boats – 68
- Outboard motors – 62

Cook Islands Census; 2011

Natural Resources

The feedback from survey and discussions advise that the residents' do not consider their natural resources under threat. Although there are considerations of *hapuku*¹⁵ behaviour and the disappearance of sand cays in the chain of islets,

¹⁵ *Epinephelus polyphekadion*

generally they responded favorably to their environment and natural resources being in good condition.

The system of food foraging and fishing generally follows a subsistence one where food is taken enough for home and living. When large catches are experienced a system of distribution throughout the two villages ensures that all homes eat the excess or exotic fish available at the time without too much wastage and spoiling of catch. For instance when the mangoes in the stand to the north of Moananui Motu are fruiting, the fruit is shared to most homes in Omoka.

When large fish drives or collection of food on the motu are announced this has mainly been to support delegations and dignitaries from outside the island (tere parties, government and donor delegations or when the island teams have to travel to attend national meetings and events). These large food collection expeditions are timed around the transporting of the excess by air or sea to their final destinations.

Discussion on Key Problems

Based on focus group outcomes in both villages the following were issues discussed relating to their understanding and a concern with the effects climate change is having on their lives.

- Keeping their homes and their immediate food sources safe
- The observed high seas encroaching on a regular basis onto the neighbouring lands and roads towards the southern side of the Omoka island, the area after the village and before the airport (about a kilometer stretch of land)
- The need to improve and maintain all their island assets (wharf, airport, schools, churches)
- The sea insurgence threat to all homes by the lagoon side coast
- Uninhabited homes and depopulation
- Water supply storage

Table 4 Priorities and Measures Going Forward

<i>Sector/Resource Area</i>	<i>Issues</i>	<i>Causes</i>	<i>Proposed Solutions</i>
Governance & Socio-economic	No woman on the island	Not thought of as an important issue	Developing gender equality and

resources	council	until awareness activities illustrate the rationale of having good representation in decision making	representation in decision making places
Disaster Risk Management (Climate induced disasters)	Family boat landings eroded Securing all island assets that facilitate socio-economic activities	Wave movement and tide movements Threat from sea surges, severe storms, weed out of control	Build up family boat landing units to longer time frames
<i>Sector/Resource Area</i>	<i>Issues</i>	<i>Causes</i>	<i>Proposed Solutions</i>
Water Resources & Security	Confirm storage relevancy in times of drought	The climate predictions for the future though conducive to more rainfall in the north should still be treated with caution	<p>Survey the active water tanks, the inactive, and the water tanks in vacant homes that can form the basis for a water security program for Omoka and Te Tautua</p> <p>Based on the survey to develop a program that provides adequate water storage to all inhabited homes.</p> <p>Repair all community (ferro cement) water tanks to become reservoirs for each village</p>

			Supply of additional spouting for water catching (an outcome of the survey)
Health & Sanitation	Level of NCD on island	Growing taste for imported food	Increase more home programs that encourage food production near homes
Energy Resources & ICT	High cost of electricity generation Long periods of stocking fuel for generators (locks up cashflow and dictates conservation)	With transport links irregular it is important to develop alternative sources of energy to support domestic and community living and development activities	Bring forward the renewable energy project for Penrhyn
<i>Sector/Resource Area</i>	<i>Issues</i>	<i>Causes</i>	<i>Proposed Solutions</i>
Food Resources & Security	Level of NCD on island Protecting the motu lakes that are home to ava and other fish varieties Food supply	Growing taste for imported food Wave and sea surge breakdown sand and coconut tree protectors By default, diversifying food supply is happening, with various crops once never seen on the	During health inspection days reward homes with fruit and vege garden Increase programs that encourage food production near homes Using traditional knowledge and modern materials to sustain lake reserves

			economy
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Table 5. A Proposed Costed Matrix of Adaptation and Mitigation Plan Outline

Sectors/Resource Area	Adaptation Options (solutions)	Priorities ¹⁶
A. Governance and Socio Economic Resources	Developing gender equality and representation in decision making places	Priority (1)
B. Livelihood Sectors		
i) Water Resources and Security	<p>Survey the active water tanks, the inactive, and the water tanks in vacant homes that can form the basis for a water security program for Omoka and Te Tautua</p> <p>Based on the survey to develop a program that provides adequate water storage to all inhabited homes.</p> <p>Repair all community (ferro cement) water tanks to become reservoirs for each village</p> <p>Supply of additional spouting for water catching (an outcome of the survey)</p>	Priority 1a)
ii) Health and	Increase more home	Priority 1b)

¹⁶ As guided by the PACE-SD Strategic Adaptation Framework

iii)	Sanitation	programs that encourage food production near homes	Priority 1b)
	Food Resources and Security	Using traditional knowledge and modern materials to sustain lake reserves for fish Increase the varieties of atoll fruit and vegetables to accompany health programs to address NCDs	
iv)	Energy Resources and ICT	Bring forward the renewable energy project for Penrhyn	Priority 1d)
C. Disaster Risk Management (Climate Induced Disaster)		Build up family boat landing units to longer time frames	Priority 2
D. Natural Resources (Terrestrial, Marine, Freshwater)		Deploy coastal protection units at sites to be determined with island support Revisit the harbour plan and development proposal in line with the request for coastal protection and use of any dredged materials for fill and coastal upgrade Climate proofing Omoka wharf, and airport.	Priority 3

	Developing a production and marketing plan and strategy to revive this industry which is an important input into the national (tourism)	
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Table 5 (a). A Proposed Costed Matrix of Adaptation and Mitigation Plan Outline

Adaptation Options (solutions)	Priorities¹⁷	Estimate Costing Only
Developing gender equality and representation in decision making places	Priority (1)	Part of an existing CINCW/CLGF project
Survey: water tanks, active and inactive, including repairing community (ferro cement) water tanks to become reservoirs for each village	Priority 1a)	Propose for MOIP engineers to conduct survey and assessment (expected visit in July 13)
Supply of additional spouting for water catching (an outcome of the survey)		(part of MOIP engineers TOR)
Increase more home programs that encourage food production near homes	Priority 1b)	Two practical workshops using Min of Agriculture Secretary and Research Officer (airfare, training etc) \$15,000
Using traditional knowledge and modern materials to sustain lake reserves for fish	Priority 1b)	MMR and MOIP collaboration and scoping Scoping - \$5000 Lake reserves - \$25000
Increase the varieties of atoll fruit and vegetables to accompany health programs to address NCDs		Part of Min of Agri/Island Council activity above

¹⁷ As guided by the PACE-SD Strategic Adaptation Framework

Bring forward the renewable energy project for Penrhyn	Priority 1d)	\$100,000
Build up family boat landing units (about 1.5 km on Omoka side)	Priority 2	\$150,000
Deploy coastal protection units at sites to be determined with island support	Priority 3	\$100,000
Revisit the harbour plan and develop proposal in line with the request for coastal protection and use of any dredged materials for fill and coastal upgrade		\$250,000
Climate proofing Omoka wharf, and airport.		\$1,000,000
Developing a production and marketing plan and strategy to revive handicraft industry		\$50,000 (supported by CINCW and CLGF, and USP/EU GCCA)
Estimated Cost of Prioritised Activities for CC and DRM		\$1,695,000



Coastal Protection at Te Tautua (Photo Credit: Vaine Wichman)

Annexe 1

(Vaine and Taputu field notes, survey results and focus group conclusions)

Omoka	Focus Group Outcomes	
Governance - Economic		
Tangata I te oire		187
Ngutuare nooia		37
akatere	meitaki te nga tu'anga e rua - evangelia e te henua, paruparu te ture (kare e akava, justice)	
manamanata	na te kopu tangata e te taeake	
Tanu kai	nu, puraka, maika, mereni, pawpaw, mango, pumpkin	
te tautai	tavere, taviri, takiri, kupenga, patia,	
akatupu puapinga	rangaranga (craft production all sorts)	
angaanga tane	tautai, handicraft, pearl diving and production, village and coastal cleaning	
angaanga vaine	rangaranga (craft production all sorts)	
parani oire	ae, e cyclone centre, tapataatai, mataara, tura vai, airport, uapu (henua e te kopu tangata)	
disaster plan	ae, e kumiti rai tetai na roto I te akatereanga a te konitara tutara e te konitara e te red cross e au arataki o te oire	
tetai au mea ka inangaro ia	ae, e cyclone centre, tapataatai, mataara, tura vai, airport, uapu (henua e te kopu tangata)	

Health, renewable energy, ICT

Cooking	gas, power, charcoal, fire	
internet	over 50% homes	
phone		100%
radio		100%
Maki putuputu	flu, eke, asthma, toto kake, toto vene, stroke	
Maki vaine	lung cancer, period, vairanga topa	
maki tane	maki tane, hua topa, tui kairoro	
waste papaa	village dump and burning and scraps to pigs	
issues	kare rava te tura vai	
local treatments	vai rakau maori, akaeke	
conservation		

Te Au kai e te au mekameka natura

	uto, kaveu, varevare, rukau, maika, ninita, kuru, hara, to, puraka, kumara, mereni, tomati, pinapi, oporo, tiporo, remene, mautini, komuko, niuta, moa, puaka, manu, vi, raparapa, vikavakava (tei te oire nei te maataanga o teia kai) - te kai tei te motu - uto,
ea te au kai	nimata, puraka,...
angai manu	
traditional food conservation	
kai vahine te tiki	pasua, ariri, pipi
kai na te tane e tiki	te au kai I roto I te moana
invasive	whitefly

fishing boats	
lagoon fish	
ocean fish	ruhi, sau , kakasi
conservation practises	rahui e te avarianga
management	Na te konitara e te Marine
Moni ou	te angaanga rangaranga, te apinga I roto I te moana

Gender, Governance and Climate Change

Tane Konisara	Medicine, solar power, water, centre, power, airport maintain
Vaine Konisara	centre, solar power, tangika vai, vairakau no te haremaki, uapu tura vai, tanutanu, te au uapu ia akasumaringa ia, sora, rangaranga,
tane vaine konisara	simeni, cyclone centre

Omoka Participants

Maurea, Papa Tata Tonitara, Arumai, Kahua, Taupoiri William, Piina Viniki, Akata Maretapu, Papa Orometua Bosini, Davida Teaurere Jnr, Turoto William, Ru Taime, Tahiri Matara, Pangaa Tekena, Mere Taime, Taime Tekena, Kirikava, Abela William, Heva Viniki, Tererua Maretapu, Hati Manata, Metuakore Marsters, Jacob Ivirangi, Natua Viniki, Mamaruaki Tapairu, Andrew Vaeau, Manata Akatapuria, Alex Maretapu, Matangi Maretapu, Turoa Tuaine

Tetautua Focus Group Outcomes

	Akatereanga I roto I te oire, socio-economic aspects	
Tangata I te oire		57
Ngutuare nooia		15
akatere	meitaki nga tu'anga e toru I te rave I ta ratou angaanga	
manamanata	na te akava e tamaru e te evangelia	
Tanu kai	nu, puraka, maika,	
te tautai	tavere, taviri, takiri, kupenga, patia	
angaanga akatupu		
puapinga	pare, tahiri, mini, sei, tapea, purumu,	
angaanga tane	oro parau, tautai, rukū poe, pua kakau, angai puaka	
angaanga vaine	puroku tangata, tunu kai, akono kainga	
parani oire	yes, uapu kia meitaki te oraanga o te iti tangata	
disaster plan	te akono nei te konitara	
tetai au mea ka inangaro ia	cyclone shelter, VHF radio	

Health, renewable energy, ICT

Cooking	gas, power, charcoal, fire	
internet	over 50% homes	
phone		100%
radio		100%
Maki putuputu	flu (maremare), uneune, stroke	
Maki vaine	cancer, maki mimi, stress	
maki tane	heart attack, ulcer, cancer	
waste papaa	village dump	
issues	kare rava te tura vai	

local treatments
conservation

vai rakau maori, maoro, akaeke
people look after the tura vai, tuku ki te ngai marumaru

Tetautua	age	M/F	Y	School level	do u know cc	are u concerned cc	is cc natural or manmade	Y/N ¹⁸	
	1	40	f	no Y	junior secondary	y		coastal erosion	
	2	62	m	salary	primary	y		coastal erosion	
	3	79	f	pension	primary	n		nothing	
	4	67	m	pension	junior secondary	n		nothing	
	5	34	f	weaving	junior secondary	y		imported food	
Omoka1		61	m	supa	secondary	yes high	yes	human	not good, very well, v well, not enough, not really, before never work together today yes, sustaining - leaders need to show example especially in the places where our fish source spawn
									not good, water good, water source not enough, food enough, village sometimes works together sometimes doesn't, sustain resources sometimes
	2	51	f	child benefit	primary	yes	no	human	sometimes not not good, drought not good, h2o not enough, kai rava, village and sustain yes
	3	38	f	weaving, even tho public servant	junior secondary	ok	no	natura	not good, drought know what to do, sea rise know what to do, water still need more, kai enough, village works and sustains resources
							no because no way to stop it	human but from outside where it is happening and affecting us	
	4	54	m	salary	secondary	yes ok, understand today that the winds have changed and move to the south and north often compared to the old days			

¹⁸ to Medical Services, Drought knowledge, sea inundation, water levels, food supply, local environment conditions, village cooperation, managing resources

7	15	m	allowance	junior secondary	no	no	natura	working together and sustaining meitaki, kare, kare, water good, kai good, village working and sustaining yes not good, yes akono I te vai, ae kite I te paruru, water rava, kai rava, taokotai e te sustain yes meitaki, ka kite, ka kite, rava te vai, kai good, kare rauka ia taua I te irinaki ki tetai ke tuke te vaerua o te tangata, irinaki taua I te Atua meitaki, akono I te vai, akaruru, rava te vai, rava te kai, taokotai e te sustain te oire tangata not good kare vairakau, kite te akono I te tuatau kare vai, akaki tai, need more water storage, rava te kai, toilets use a lot of water, only lately village working together and sustaining resources mako te health, know what to do drought and seasurge, water rava, kai rava, ae te taokotai e te sustain nei kare mako te health, ae ka kite, ae ka kite, rava te vai, rava te kai, taokotai ma te taporoporo
8	49	m	salary	secondary	yes	yes	natura	
9	89	m	nz pension	primary	a bit	yes	na te atua te au mea katoatoa, na te tangata e rave e takinokino	
10	40	f	weaving	secondary	no	no	natura	
11	48	f	baking	junior secondary	yes	yes	tangata	
12	20	f	no Y	tertiary, extension	yes	yes	tangata	
13	48	m	salary	secondary	yes	yes	tangata	

Te Au kai e te au mekameka natura

ea te au kai	uto, kuru, nikau, nimata, nita, mautini, tiporo, maika, taro, puraka, niu,
angai manu	komuo, rau puka 9tei te oire e tei te motu teia kai)
traditional food	puaka e te moa
conservation	there are methods, umu cooking fish and leaving in a raurau, drying, salting
kai vahine te tiki	nu mangaro, pasua, etuke, ariri, pipi, korori, ika I roto I te roto
kai na te tane e tiki	te au kai I roto I te moana
invasive	whitefly I runga I te tiare e te rau ote te tipani

fishing boats	18 in te tautua
lagoon fish	ava, nato, sau, ruhi, vere, marau
ocean fish	kakasi, ruhi, paara,....
conservation practises	rahui
management	konisara e te iti tangata
	angaanga rangaranga - rito, parau, poreo pupu, ika maro, pasua, koura,
Moni ou	poe pipi, poke mangaro

Gender, Governance and Climate Change

	Cyclone shelter, water tanks, vhf radio, sat phone, first aid kit, solar
Tane Konisara	project/battery/panels, emergency food supply
Vaine Konisara	Cyclone shelter, water tanks, uapu, cement tango e te akateitei
tane vaine	
konisara	water tanks and add ons and properly installing with roofing support etc

Te Tautua Participants

Torohata Joe Marsters, Tapaitau Joe Marsters, Mamaroriki Saitu, Akamau Tapaitau, Rakoroa Tapaitau, Tuakana Riki, Kura Teika, Rio Teika, Rose Teika, Masoi Taia, Rite Tapaitau, Williams Marsters, Kaihui Kaihui, Tom Marsters, Teina Taia, Veronica William, Tiarere Taka, Tamu Tapaitau, Taia Tere, Penui Taia, Small Rongo, Ben William, Solomona Tapu

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