Harakeke
He huarahi hōu

A new approach, new beginning, new direction, new pathway for the whenua.

Contribution by Mark Ashton Henderson - Biodiversity Business Advisor & Director, Ngāti Ruapani ki Uta ki Tai Co-operative Society Limited

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Foreword

There is of course, no substitute for a kapu tī[1]. But I hope that the information we are presenting here, will be of interest to you and food for thought and action by your whānau, perhaps to your wider hapū and to all New Zealanders.

If so, let's sit down together for a kōrero (discussion) with the hope of developing a strong hononga (relationship), to learn about each other and to discuss ways which might contribute to repairing our whenua and subsequent improvement to our collective wellbeing.

It is important however that we start with a Karakia (a traditional Māori offering, prayer). It prepares us for the journey and conversations to come. This karakia is a waerea; its purpose is to clear the paths before us so we may travel together in unison.

It invokes the clearing of the sky and earth, the shores to the oceans, and our sacred soils. It calls us to elevate and bind ourselves together, so we go forward in unity.[2]

Karakia Timatanga	
Whakataka te hau ki te uru	Cease the winds from the west
Whakataka te hau ki te tonga	Cease the winds from the south
Kia mākinakina ki uta	Let the breeze blow over the land
Kia mātaratara ki tai	Let the red-tipped dawn come with a sharpened air
E hī ake ana te atakura	A touch of frost, a promise of a glorious day
He tio, he huka, he hau hū	
Tīhei mauri ora	

[1] Courtesy of Kapu Tī 101 – acknowledging Cheri Van Schravendijk-Goodman (Te Atihaunui a Papārangi, Ngāti Apa, Ngāti Rangi)

[2] Courtesy of Stephanie Howard, Miriana Stephens (Ngāi Te Rangi, Ngāti Ranginui and Ngāti Rārua), and John Rodwell for the Te Taiao Working Group Primary Sector Council

Acknowledgements

E hiahia ana ahau ki te tuku mihi motuhake.

Ko Mark Henderson (Ngāti Ruapani, Ngāti Pākehā) tēnei e tuku mihi ana ki a koutou i tautoko mai i tēnei kaupapa.

I would like to provide special thanks to the following people for their contribution however small or big, whether it was social, educational, experiential, wisdom, encouragement, insightful, collaborative, relevant, humorous, critical, or simply aroha from my extended Warner whānau. In alphabetical order!

Some of those I thank, I have not even met and hope to one day, but they have been acknowledged through contribution through my research and please accept my sincere apologies for inadvertent omissions:

Alan Haronga (Wi Pere Trust), Andrea Bulleid (Glengordon Farms), Anita Loveriche (Health & Wellbeing Consultant, Ngāti Ruapani ki Waikaremoana, Ngāi Tuhoe, Ngāti Kahungunu), Arapera Paewai (Taiao Ora Contracting), Ataneta Paewai (Kai Raranga Weaver, Rangitāne o Tamaki nui-ā-Rua), BDO, Ben Scales (Co-Founder & CEO, KiwiFibre), Brenda Tahi (Manawa Honey, Te Urewera), Di Lucas (Lucas Associates), Dr Damian Skinner (Hikurangi Botanicals), Dr Garth R. Harmsworth (Manaaki Whenua, Te Arawa, Ngāti Tūwharetoa, Ngāti Raukawa), Dr Nikki Harcourt (Manaaki Whenua, Waikato-Tainui), Dr Rangi Te Kanawa (Master Weaver, Te Papa), Dr Rāpata Wiri (Reo Ora, Kaihautū Mātauranga – Academic Director, Ngāti Ruapani ki Waikaremoana, Ngāi Tuhoe, Te Arawa), Dr Shaun Awatere (Manaaki Whenua, Ngāti Porou), Dr Shirley Cranston (Deputy Principal - Massey High School, Ngāti Ruapani ki Waikaremoana, Ngāi Tuhoe, Ngāti Kahungunu), Dr Travis Badenhorst (Chief Scientist, Snowberry, ADC P&G), Edwin Perry, Ella Lawton (Great South), Gloria Hauiti (Whanau Ora Navigator at Te Kete Hauora o Rangitane), Greg Billington (Supreme wordsmith), Hannah-Mae Pilkington (Whānau Connector, Rangitāne), Haydn Edwards, (Ngātiwai), Henry Murphy (Ngātiwai), Heather Carrigan (Flax Floristry School), Ian Mcgregor (Manager, Snowberry Gardens), Jared Goodman (Matekuare Whanau Trust), Jason Tutara (University of Auckland), Jesse Bythell (QEII Trust), Katarina Tawiri (Manaaki Whenua, Lincoln), Kia Ratima (Kai Whakaaraara / Te Ara Whanau Ora Navigator), Kimberley Alexander-Maaka (Harakeke Specialist, Designer, Ngāti Kahungunu / Ngāi Tahu / Ngāpuhi), Liz McGruddy (Ecologist, Federated Farmers), Marara Van Buren (Ngāti Whātua Ōrākei, Botanist), Maringi Ngata-Campbell (Wairoa Marae), Matt Jackman (Minginui Nurseries), Mavis Mullens (Rangitāne, Te Atihaunui-a-Paparangi and Ngāti Ranginui), Michael Steedman (Ngāti Whātua, University of Auckland), Moritz Maurus (Procter & Gamble Co.), Nicholas Martin (Landcare Research – Manaaki Whenua), Peter Heenan (Manaaki Whenua, Lincoln), Pita Tamiana (Kaiwhakaruruhau / Māori Cultural Advisor - Worksafe), Ray Caird (Author of, Blood of the Flax), Rob McGowan (Tīwaiwaka, Pā Ropata, DOC), Sam Ratima and Whānau, Simon Phillips (Piripi Group, Ngāti Maniapoto me Taranaki), Stephen Cox (Innovation Associates Ltd), Stephen Logie (MPI, Templeton Heritage Flax Museum, Aparima), Hinerangi & Tony Goodman (Matekuare Whānau Trust), Vaughan Templeton (Templeton Heritage Flax Museum, Aparima), William Murrell (Co-Founder & COO KiwiFibre), My Fellow directors of Ngāti Ruapani Ki Uta Ki Tai Co-Op Society Ltd., (https://ruapani.nz/who-we-are/) and to all those not mentioned but referenced.

And of course, Soraya Hendesi (my darling wife and founder of Snowberry, Ngāti Persia)

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Ko wai ra Mark Henderson?

Tēnā koutou katoa

Ko Te Mata te Maunga Ko Tukituki te awa

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Ko Henderson tōku whānau

He uri whāngai tēnei

Ko Ngāti Ruapani iwi

Ngāti Hinekura te hapū

Ko Mark Ashton tōku ingoa

Kāore au i te tino mōhio ki te reo Maori, engari kei te ako ahau.

My father was Ashton Warner Henderson, son of Keith Dawson Henderson, a Pākehā Rangatira of the Huria (Judea), Te Wairoa and Hangarau (Bethlehem) marae, of Tauranga, and of Sylvia Ashton Warner, teacher, author, and artist. Both Keith and Sylvia were honorary members of these marae of Hapū Ngāi Tamarawaho of Ngāti Ranginui.

My mother is Margaret Anne (Powdrell) Henderson, artist, teacher, daughter of Earnest Frank Powdrell and Ethel Alice Powdrell.

I am honoured to hold the position of Biodiversity Business Advisor and Director of Ngāti Ruapani ki Uta ki Tai Co-operative Society Limited where I am responsible for the development of concepts to revitalise the Harakeke economy with an emphasis on sustainable environmental planting initiatives including taonga species such as Harakeke (*phormium tenax*). I have the greatest respect for Mātauranga Māori, Tikanga Māori and Kaitiakitanga taiao.

Over the past 35years, I have developed four successful businesses in Aotearoa New Zealand and the Middle East. Now that I am retired from corporate life, I seek to help the people of our land to restore and regenerate their whenua in a way that heals and provides for social and community wellbeing.

He hono tangata e kore e motu;
ka pa he taura waka e motu

Unlike a canoe rope,
a human bond cannot be severed

He Pōwhiri mo te Kōrero
An Invitation to Talk

This is an invitation to a discussion about how the development of a harakeke industry can improve the wellbeing of all of Aotearoa and its people.

History of the Whenua

We can only imagine the extraordinary vibrancy of the whenua when Kupe lay foot here about 1,000 years ago or prior. When they arrived the mythical people of Patupaiarehe, Ngāti Kura, Ngāti Korakorako and Ngāti Turehu, all hapū of the people Tangata Māori could hear but not see were intrinsically linked to the whenua (A mystical beings of the whenua). Ngāti Whātua traditions tell of the Tuputupu-whenua, who grew from the ground and Ngāi Tūhoe, of the Urewera, trace descent from Hine-pūkohu-rangi, the 'mist maiden' known today as the 'the children of the mist'.

The Patupaiarehe and Tūrehu – living in secluded mountains, they are said to be the first tangata whenua (people of the land).

Kupe and Toitehuatahi, explorers, important pre-canoe ancestors, must have arrived at a truly exquisite land and seascape from mountains to the coast. Today only about 7-10% of the indigenous rainforest cover of Aotearoa New Zealand remains.

Before European reached Aotearoa, more than 80% of the land was covered in lush, dense native forest and shrublands. According to DOC[3] about 10–15% of the total land area of New Zealand is covered with native flora, from tall kauri and kohekohe forests to rainforest dominated by Rimu, Beech, Tawa, Matai and Rata; Ferns and Flax; Dunelands with their Spinifex and Pingao; alpine and subalpine herb fields; and scrub and tussock.

Over 80% of our land-based birds, bats, reptiles and frogs are in trouble[4]

One species, most prevalent in our wetlands; Harakeke, *phormium tenax* (also referred to by European as New Zealand Flax), has over the past 200 years succumbed to large-scale destruction of native ecosystems, including wetland drainage, and weed invasion. This has dramatically changed both the structure of natural ecosystems, and the geographical distribution of Harakeke besides being moved around the whenua by early Māori. A revival of traditional techniques since the mid-20th century, and the burgeoning use of Harakeke in ecological restoration plantings, has encouraged increased research activity into its ecology, genetics, morphology, and uses, but lack of a reliable pollen record has hampered understanding of historical ecology and indigenous management.

Harakeke - He huarahi hou methods might in some way assist in any recovery if not enhance it, while providing a sustainable harvest resource.

Parapara waerea ā ururua kia tupu whakaritorito te tupu o te harakeke

Clear away the overgrowth so that the flax will put forth many young shoots

[3] New Zealand Department of Conservation: https://www.doc.govt.nz/nature/native-plants/
[4] Forest and Bird: https://www.forestandbird.org.nz/campaigns/forgotten-places

State of affairs

Over recent decades, restoration of natural habitats, riparian planting and revegetation planting in Aotearoa by likeminded private landowners, farmers, councils, charitable trusts and iwi groups, have been undertaken in many forms, some of which include:

- Wetland restoration
- Ecological enhancement planting
- Waterway/river riparian planting to restore health of the awa while reducing nutrient runoff
- Highway and motorway berm and stabilisation planting
- Parks and greenspace recreational areas
- Development of 'inland islands' for bird migration corridors
- Replacement of invasive, exotic and deciduous planting both introduced and wilding
- In some cases, biodiscovery plantation (Snowberry Gardens for example)[5]
- Community developments where improvements in stormwater runoff is a focus (Ngāi Tahu's Te Whāriki for example: https://tewhariki.co.nz/live-here/your-environment/)

In essence however, the speed with which such planting is undertaken, while growing in frequency, suggests that much more is needed to be done in conjunction with other environmental changes we are to act on, to limit the impacts of climate change; improve our wellbeing, environment and biodiversity; as well as repair our whenua for our future, and by future, we expect to be looking not 10-20 years ahead (a common European societal construct), but 100-300 years ahead.

The state of our whenua and taiao can be, and we should expect it to be, healed by all of us in our lifetimes with a continued mahi through Kaitiakitanga.

Ka ora te Whenua
Ka ora te Tangata

When the land is well,
The people will be well[6]

[5] Courtesy of Snowberry Gardens: https://www.snowberry.co.nz/about-snowberry/snowberry-gardens/
[6] Tīwaiwaka from Pa Ropata (the 'wise' Rob McGowan) https://www.tiwaiwaka.nz/

Harakeke - He huarahi hōu
A new beginning

To aspire to change for the good of us all is a good start.
A call to action and you're already on the way.

Harakeke – He haerenga
The Journey

Background

Harakeke *phormium tenax* is a taonga species of tangata whenua. Harakeke has for centuries and still does form an intrinsic importance to Māori connection with the whenua.

The common name "flax" was given by early European traders because of the similarity between Harakeke fibre and that of the true flax plant, Linen Flax *Linum usitatissimum.* Harakeke fibre however has twice the tensile strength of Flax (and even Hemp, Sisal and Steel!)[7]

Harakeke lives strong across the whenua today and within the lives of our master raranga weavers producing kete and tukutuku but in particular the extraordinary craft of muka derived works.

There is much in the way of historical account and documentation of 'New Zealand Flax' (https://www.nzgeo.com/stories/flax-the-enduring-fibre/) as an example, however for the purposes of our written material, we will refer to Harakeke alone.

Harakeke Resource

New Harakeke planted every year is currently biased towards both:

- Roadway berm stabilisation (mixed to some extent with other companion native planting), and
- Riparian or wetland restoration planting (most often with mixed biodiversity in line with regional ecology)

Harakeke is most prevalent today as planted cultivar rather than through natural propagation such as in national park wetlands. To this extent, and while planted cultivars would suggest easy access to such a resource, there are several factors that limit viability of resource and access to resource, explained later in the ***Access & Benefit*** section.

Of all planting, and we can assume that wild harvest is not really an option in a practicable sense, it is estimated that planted Harakeke resource is spread over the following geographic areas:

Naku te rourou nau te rourou ka ora ai te iwi

With your basket and my basket the people will live

[7] Reference to multiple studies highlighted by KiwiFibre Innovations Ltd.

Resource Table [Anecdotal information only]

Harakeke (Planted) resource throughout Aotearoa New Zealand (Excluding above 1300m ASL)

Name	Māori name	Phormium bias*	Tenax Profligacy	Access	Reason/Comment	New planting opportunities
Northland	Te Tai Tokerau	Harakeke *(tenax)*	High	Low	Mixed riparian/ Roadside/ Private	High
Auckland	Tāmaki-makau-rau	Harakeke *(tenax)*	Low	Low	Urban sprawl	Low
Waikato	Waikato	Harakeke *(tenax)*	High	Med	Mixed riparian/ Roadside/Private/ Council***	High
Bay of Plenty	Te Moana-a-Toi	Harakeke *(tenax)*	Med	Low	Wetland/Roadside/ Private	High
Gisborne**	Te Tai Rāwhiti	Harakeke *(tenax)*	Med	Low	Mixed riparian/ Roadside/ Private	High
Hawke's Bay	Te Matau-a-Māui	Wharariki (cookianum)	Low	Low	Roadside/Private/ Limited tenax	High
Taranaki	Taranaki	Harakeke *(tenax)*	Med	Med	Mixed riparian/ Roadside/ Private/ Council***	High
Manawatū-Whanganui	Manawatū-Whanganui	Harakeke *(tenax)*	Med	Med	Wetland/Roadside/ Private	High
Wellington	Te Whanga-nui-a-Tara	Harakeke *(tenax)*	Low	Med	Urban sprawl/But some coastal access	High
Tasman	Te Tai-o-Aorere	Harakeke *(tenax)*	Med	Low	Wetland/Roadside/ Private	High
Nelson	Whakatū	Harakeke *(tenax)*	Low	Low	Wetland/Roadside/ Private	Medium
Marlborough	Te Tauihu-o-te-waka	Harakeke *(tenax)*	Low	Low	Wetland/Roadside/ Private	Medium
West Coast	Te Tai Poutini	Harakeke *(tenax)*	High	High	Mixed riparian/Coastal access/Private/ Council***	High
Canterbury	Waitaha	Harakeke *(tenax)*	Low	Low	Mixed Riparian/ Roadside/ Private	High
Otago	Ōtākou	Wharariki (cookianum)	Med	Low	Wetland/Roadside/ Private	High
Southland	Murihiku	Harakeke *(tenax)*	High	Low	Wetland/Roadside/ Private (Fencing)****	High

* Rare to not find either cultivar anywhere
** Including te Urewera/Waikaremoana
*** Council generally provision for Māori access
**** Serious infestation of Notch Caterpillar and Gal Fly

Key Points:

- Roadsides not practical due to safety and pollutants (non-sealed rural generally OK)
- Wetlands will tend to be unharvestable for obvious reasons
- Common riparian or restoration planting is not likely harvestable due to disbursement amongst biodiversity
- Private land is not harvestable without consent
- Natural ecology is not likely harvestable due to disbursement amongst biodiversity
- CONCLUSION: Of all Harakeke throughout Aotearoa, 85% not accessible in first instance. Of balance only 15-20% accessible due to right of way, permission and/or density of resource = **~3% of resource is truly harvestable.**

Ki te kahore he whakakitenga ka ngaro te iwi

Without foresight or vision the people will be lost [10]

Access & Benefit to Whānau

While New Zealand as a country is achieving success in some areas of biodiversity repair, there is still the question around where we at in terms of involvement of Māori in the effort.

New Zealand is not a signatory to the Nagoya Protocol on Access to genetic resources and the Fair and Equitable Sharing of Benefits arising from their Utilisation to the Convention on Biological Diversity of 2014. This is an international agreement which aims at sharing the benefits arising from the utilisation of genetic resources in a fair and equitable way. New Zealand's status points to some strategic measures to date including New Zealand's Biodiversity Strategy 2020 which was received by the convention on 24 September 2020 and provides strategic direction for biodiversity up to 2050.[8]

To this extent, the writer tables the suggestion that while such access is a given, or should be, the benefit is not necessarily visable.

Therefore, and in conjunction with Mātauranga Māori (*Māori knowledge - the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices*), it is proposed that a model of development is adopted to provide multi-faceted utilisation of the resource.

The Resource of Land & People

- te whenua (The land)
- te taiao (The environment)
- te whānau (Our Families) *

** All of us!*

Te Whakaaro / *The thinking*

It is proposed that on the back of an already funded drive and effort by numerous bodies, individuals and organisations to plant native biodiversity throughout Aotearoa, we might consider that Access and Benefit combined are driving the Architecture[9] of such planting.

As explained, outside monoculture in a horticultural sense, much of our planted resource results in important restoration benefits to te taiao, te whenua, te awa.

To truly enact the of Principles of Tīwaiwaka - Ka ora te Whenua, ka ora te tangata, *when we heal the land, we will heal the people*, then Access and Benefit for the people to thrive is paramount.

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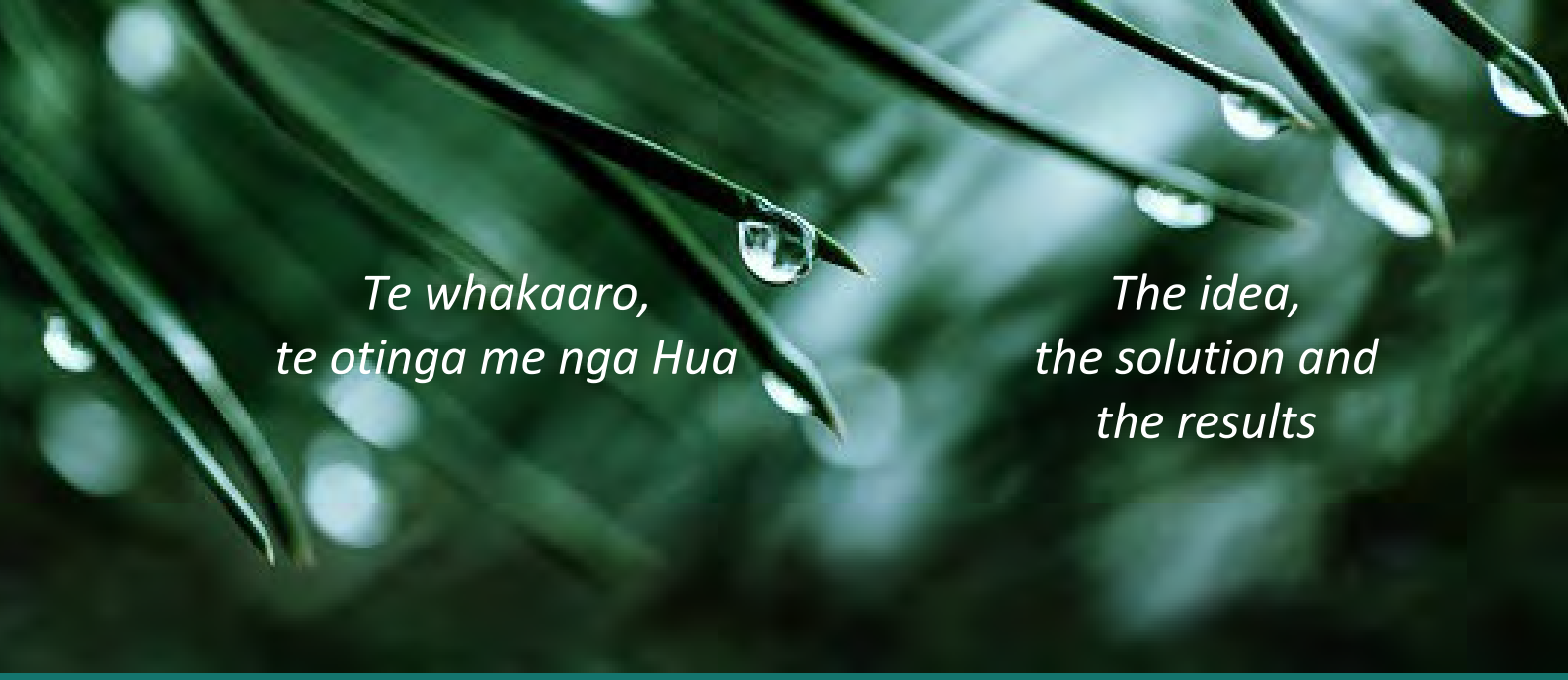
[8] Nagoya Protocol reference: https://www.cbd.int/nbsap/about/latest/#nz
[9] Referenced proposal by Mark Henderson, on Harakeke fibre resurgent development
[10] Said by Kingi Tāwhiao Pōtatau te Wherowhero, to show the urgency of unification and strong Māori leadership.



Te whakaaro, te otinga me nga Hua

The idea, the solution and the results

Harakeke - He huarahi hou, a new approach, new beginning, new direction, new pathway for whānau, by whānau, for whānau is one-way tangata whenua can develop a sustainable and fulfilling existence as one with the whenua in unison with all New Zealanders, Māori, Pākehā, Pacifica and all other kiwis who call Aotearoa home.

TE WHAKAARO / *The Ideas*

The ideas focus on a 10-Point framework that draws on some fundamental valuable considerations as follows:

1. EXISTING MAHI - Existing riparian and wetland restoration efforts
2. LAND UTILISATION - Underutilisation of land and/or poor-quality land utilisation and subsequent low cost of this
3. MĀORI LAND SETTLEMENTS - Diversity of use over newly returned land assets to Hapū
4. CO-OPS: Value in the Co-operative model
5. MĀTAURANGA MĀORI - Resurgence in focus on Mātauranga Māori
6. CLIMATE CHANGE - Sequestration, carbon farming science & technology
7. FUTURE GENERATION - Labour resource within Whānau, strength engagement with our tamariki
8. FUNDING - Government, NGO funding support availability
9. SMART PRODUCTION - Transitional pressure and subsequent action to produce a low carbon output, replace high carbon goods and services
10. HARAKEKE MARKET - Finally, the growing interest and value proposition in Harakeke fibre and extracts derived products.

TE OTINGA / *The Solution*

The solution is presented in a 10-Point strategy that provides fundamental valuable and cost-effective solutions to getting there, as follows:

1. NEW MAHI - Development and implementation of a considerable adjustment in our Common Riparian, or Revegetation, or Restoration Planting Model [*let's call this **CRPM***]. This new architecture [*let's call this **NRPM***] will essentially provide for the following:
    - Will ensure all existing biodiversity efforts and expectations are met and will most likely exceed in a 'closer to natural' biodiversity bias (e.g. Harakeke thrives and exists naturally as a 'Pa'. Kanuka, Manuka, Totara, Kahikatea for example congregate in stands).
    - Will provide for Access and Benefit needs in a sustainable, biodiverse and vibrant way by simulating what might be expected from monoculture (excuse the irony) but maintain a superb environment for our Manu and Ngārara.
    - NRPM will require no additional cost of establishment beyond that already allocated for the CRPM in the first place.
    - Will provide a return on investment [ROI] on the CRPM not otherwise expected if a NRPM was not adopted (other than an environmental health return).

Next: **HOAHOANGA O TE HUARAHI HOU – Architecture of a New Way for Riparian Planting**, we are keen to present ideas that are based on experience, study, observation and discussion with numerous learned people around Aotearoa New Zealand. The architecture is intended to provide for not only all the objectives above but:

- Embrace the principals of TIWAIWAKA: Heal the Mauri of the Whenua, we can then heal the Tangata[11]
- Adopt the principals of Te Taiao Framework and Pathways[12]

2. LAND UTILISATION - Underutilised and/or poor horticultural/agricultural land is easily transitioned when an ROI is still in sight. Riparian planting often borders on such areas such as wetlands, that need to be restored.
3. MĀORI LAND SETTLEMENTS - Diversity of use over newly returned land assets to Hapū will result in the possibilities of shared resources over multiple business and community projects.
4. CO-OPS: Value in the Co-operative model will be realised through likeminded inter-iwi collective of production efforts and resulting supply chain and/or processing.
5. MĀTAURANGA MĀORI - Resurgence in focus on Mātauranga Māori without which, tino rangatiratanga and kaitiakitanga can thrive socially and culturally.
6. CLIMATE CHANGE - Sequestration, carbon farming will come from Revegetation efforts resulting long term monetary gains for hapū through a mature emissions trading scheme. Selection of existing post 1990 planting of native flora can also be incorporated through an audit process. Passive income is always a nice to have.
7. FUTURE GENERATION - Pākehā social, environmental and business planning and implementation time frames tend to fall short of benefit to future generations with a 5-30year eyeglass. Māori have a unique advantage in that Tikanga Māori suggests (among some of our Kaumatua a Rangatira) planning time frames are accepted as primarily for future generations.
8. FUNDING - Beyond NRPM, there will be a need for funding/investment to develop the infrastructure or in fact grass-root funding applications for RPM in the first place. Many channels exist and strong strategic and business planning can enhance successful funding applications.

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[11] Tīwaiwaka from Pa Ropata (Rob McGowan) https://organicmechanic.co.nz/products/tiwaiwaka
[12] Te Taiao Working Group Primary Sector Council: https://fitforabetterworld.org.nz/assets/TE_TAIAO_REPORT_WEB.pdf

9. SMART PRODUCTION - Production of low carbon food, fibre, extracts and even services from within the Hapū catchment is a prudent measure and will result in cost benefit. Home grown energy will also result in wise investment and reduce dependency. Even Grid-tied electricity and water storage can pay for themselves in an ever-shorter timeframe.

10. HARAKEKE MARKET - There is much in the way of history and accounts relating to the 'New Zealand Flax Industry, while predominantly Pākehā lead, which stemmed from the early 1820's to the mid 1960's when synthetics took over.[13] Interestingly this industry fed a somewhat narrow course fibre industry for yarn and twine type products.
Today, Harakeke Fibre is sold to artisan weavers, raranga weavers and passionate users of the fibre from the Templeton mill in Aparima, Riverton, Southland[14]
Revival of the industry discussion either from the fibre industry or the farming sector has been reported on for the last 3 decades.

Bales of dressed Flax late 1800's

Bales of dressed Flax late 2021[15]

Some of these and other historical references are as follows: [Sites provide reference in the public domain. No rights reserved]

- https://www.scoop.co.nz/stories/ED0412/S00081/the-benefits-of-a-revived-flax-industry.htm
- https://projects.sare.org/sare_project/fnc99-249/
- https://www.royalsociety.org.nz/assets/127-Alpha-Series-Harakeke-Flax.pdf
- https://livingheritage.lincoln.ac.nz/nodes/view/6496
- https://teara.govt.nz/en/flax-and-flax-working/page-5
- https://core.ac.uk/download/pdf/288353076.pdf
- https://www.youtube.com/watch?v=x55pssmuVCU

[13] Reference: https://www.environmentalhistory-au-nz.org/2016/09/the-history-of-the-phormium-flax-industry-in-canterbury/
[14] Templeton Flax Mill Heritage Museum: https://www.nzmuseums.co.nz/collections/4412/templeton-flax-mill-heritage-museum
[15] Courtesy of Vaughan Templeton – Templeton Flax Mill, Riverton Aparima, Murihiku

HOAHOANGA O TE HUARAHI HOU – Architecture of a New Way for Riparian Planting

We are delighted to present ideas that are based on experience, study, observation and discussion with numerous learned people around Aotearoa New Zealand. The architecture is intended to provide for not only all the objectives above but:

- Embrace the principals of TIWAIWAKA: Heal the Mauri of the Whenua, we can then heal the Tangata[16]

  https://organicmechanic.co.nz/products/tiwaiwaka

- Adopt the principals of Te Taiao Framework and Pathways:

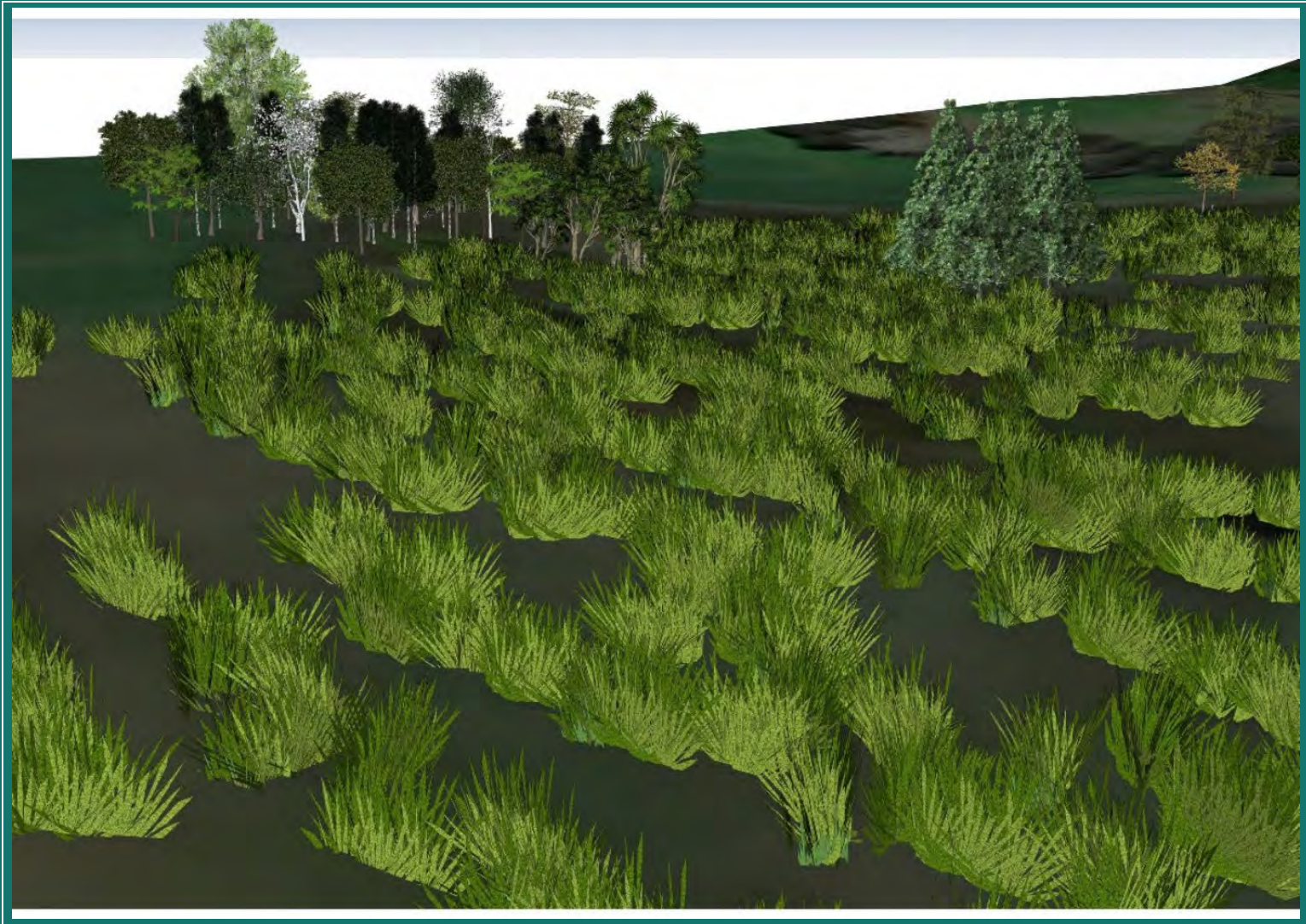
  https://fitforabetterworld.org.nz/assets/TE_TAIAO_REPORT_WEB.pdf [17]

[16] Tiwaiwaka from Pa Ropata (Rob McGowan) https://organicmechanic.co.nz/products/tiwaiwaka

[17] Te Taiao Working Group Primary Sector Council: https://fitforabetterworld.org.nz/assets/TE_TAIAO_REPORT_WEB.pdf

Large clusters of stand trees such as Totara, Tawa, Kanuka, Manuka, Kahikatea and even Cabbage Trees

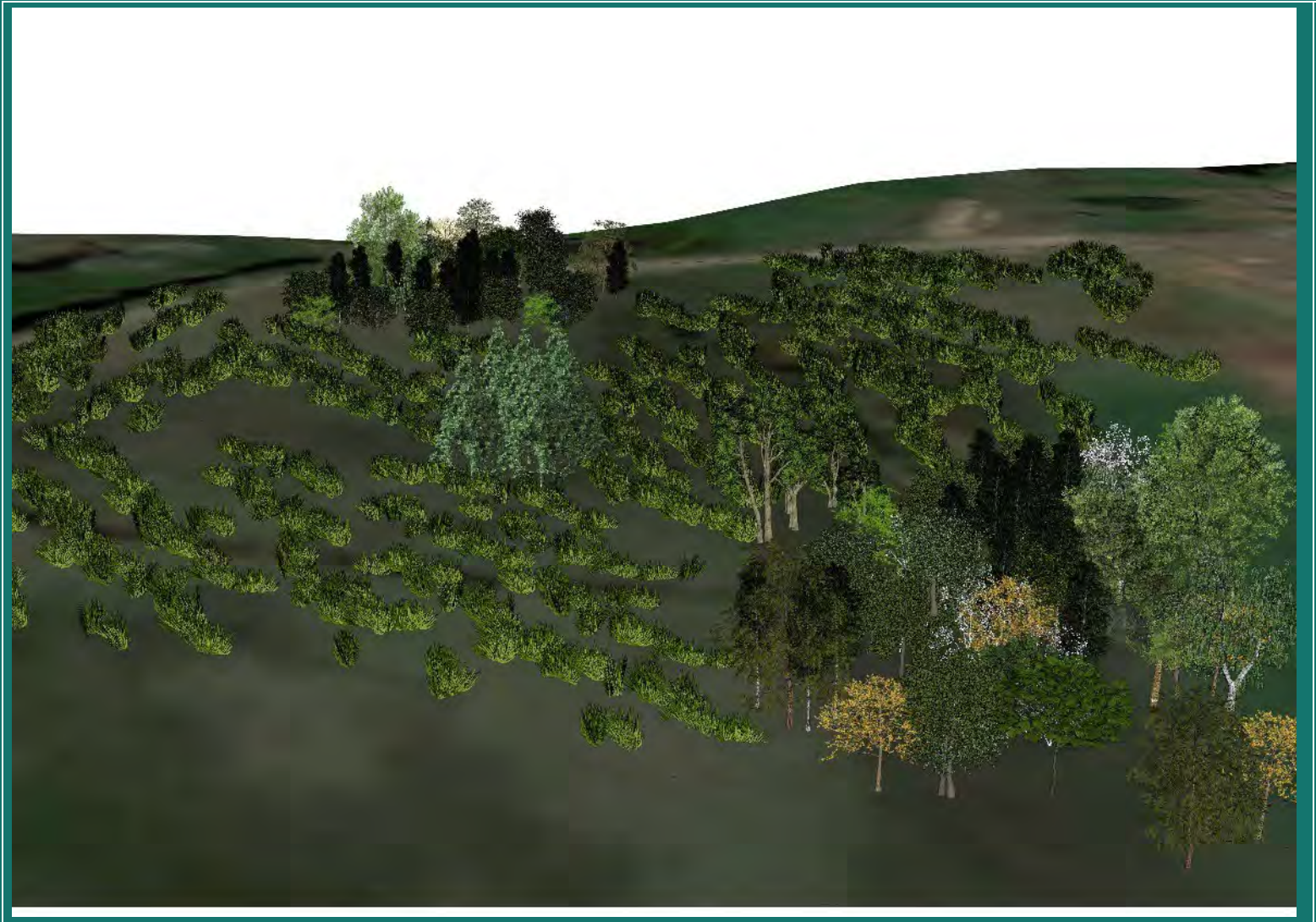
Biodiversity planting creates the food sources for Tīwaiwaka (Fantail), Tauhou (Wax eyes), Riroriro (Grey Warbler) etc. to balance the invertebrate population.



Rows or clusters can be orientated to satisfy stormwater-flow, egress, terrain or even aesthetics.

The format of cluster versus mixed planting is going to be dependent on terrain, objectives and biases.

An indicative model can easily be developed based on budget, expectations, sustainable food and fibre type etc.



Bodies that we hope will provide such NRPMs will be those that already support revegetation, restoration and riparian planting efforts.

Contemporary revegetation planting, restoration or riparian planting tends to result in biodiverse ground cover that satisfies the environmental and ecological benefits but with limitations to ACCESS for harvest viability.

Versus a more clustered approach for the likes of Harakeke (to name one harvestable spiecies)

[18]

[18] Courtesy of Snowberry Gardens: https://www.snowberry.co.nz/about-snowberry/snowberry-gardens/

HOAHOANGA O TE HUARAHI HOU – Architecture of a New Way for Riparian Planting – NRPM Example

[19]

[19] Courtesy of Wi Pere Trust

CRPM Example – Common Riparian Planting Model

[20]

[20] Courtesy of Wi Pere Trust

NRPM Example – New Riparian Planting Model

[21]

[21] Courtesy of Wi Pere Trust

ME NGA HUĀ / *The Results*

The Results present 10-Point fundamental expectations after establishing the HOAHOANGA O TE HUARAHI HOU initiative as follows:

1. NEW MAHI - Resulting in several social, environmental and commercial benefits:
    - Employment
    - Biodiversity more aligned to pre-destruction ecology
    - Access for sustainable harvesting of biomass, seed, honey etc.
    - Cultural and spiritual connection
    - Sustainable multi-faceted business outputs
2. LAND UTILISATION - Healed whenua of Māori and Non-Māori land catchments alike.
3. MĀORI LAND SETTLEMENTS - Successful transition of collective ownership and self-governance and guardianship that might prompt enhanced confidence for all stakeholders.
4. CO-OPS: Realise the success in working together, sharing the load and resources. Join the ranks of other successful Co-operative companies like Fonterra.
5. MĀTAURANGA MĀORI - Becomes the backbone of everyday lives for our Whānau and forms but of our everyday education.
6. CLIMATE CHANGE - Passive revenue from carbon sequestration as well as establishing environmental change commitment to our tamariki and mokopuna that they can see themselves in their lifetimes.
7. FUTURE GENERATION - The establishment of a framework, platform and a resource that could see the viable replacement of Pinus radiata with native timber planting (such as Totara, Tawa) with the expectation that fruits of these initiatives are going to be of constant benefit to future generations in the next 60-75years and each 3-4 years thereafter forever, instead of short term 22-25 year cycles such as pine.
8. FUNDING - Seeding Investment to enterprise has without a doubt been a challenge even though channels have existed. The returns on that investment have resulted in a medium to long term gain secure in the knowledge that infrastructure, resources (which are also enhanced through the Co-op business model) and the original environmental outcomes are already being realised.
9. SMART PRODUCTION - Production of low carbon food, fibre, extracts and even services from within the Hapū catchment has been realised in different phases. Home grown energy is already having a cost reduction impact on overheads. A facility on Whānau land has already attracted multiple business ventures to establish there and not just related to the NRPM resource.
10. HARAKEKE MARKET - The initial resource from NRPM planting has not provided for any resource to harvest or feed into the emissions trading scheme for the first few years. However much has been achieved in infrastructural development, eco-sourcing of seed, propagation, planting and seeking out existing planted and natural resource that can supply biomass in the shortfall such as:
    - HARAKEKE SEED - For seed oil production (possibly inhouse), supply customers such as Snowberry New Zealand Ltd (subsidiary of Procter and Gamble Co) and other P&G companies offshore.
    - HARAKEKE LEAF PRODUCTS - For Te Raranga, extracts (Gels and juices), Rongoā Māori medicine (as well as other harvest from other resource), Fibre, Green matter derivatives [Refer HARAKEKE USES in this document for more detail].

Harakeke in the long term, could be harvested in other countries which treat Harakeke as an invasive weed: It has proved seriously invasive on the three remote islands of the Tristan da Cunha archipelago in the central South Atlantic Ocean (Ryan et al., 2012), and on the equally isolated island of St. Helena (ISSG, 2016). Shepherd (2013) says it is also invasive on the Juan Fernandez Islands near Chile, and on Molokai Island in Hawaii.[22]

Don't take my word for it…

This is from a truly gifted individual, Kimberley Alexander-Maaka (Ngāti Kahungunu / Ngāi Tahu / Ngāpuhi) from her Master of Design thesis, AUT[23]

The following are a few creative ways how harakeke can support diverse ventures in the development in new ways to increase economic output and indigenous development.

1. Iwi, hapū, rohe, local community groups, and whanau lifestyle blocks provides opportunities to re-establish Pa harakeke throughout the regions for sustainable economic return. Productivity will see a restoration of polluted waterways, soil management and crop protection of the sacredness and sustainability of the plant.
2. New employment across a diverse range of sectors such as the arts, design, agriculture, science, commercial business and education but not limited to.
3. Remote communities, residents, businesses and visitors to the regions will benefit from improved technological infrastructures put in place within and between regions that focus on a new build.
4. Development of new roads or the improvement of existing between production processes within regions will support transport infrastructure with a focus on efficient transport methods.
5. Natural assets benefit, contributing to reducing energy demand by increasing energy efficiency.
6. A circular design framework supports the sustainable use of soil management, crop production, and using scarce water resources more efficiently.
7. Māori development through collaborative partnerships and sustained local employment, creating community unity.
8. Preservation of traditions and renewal of Te Whare Pora (The Ancient House of the Art of Weaving). Providing support and teaching correct tikanga and protocols when harvesting etc.
9. Personal well-being. Connecting youth to issues of identity, place, spiritual relationships and community pride. Guidance towards how their skills and talent can be applied through the transition of knowledge into the real world around us.

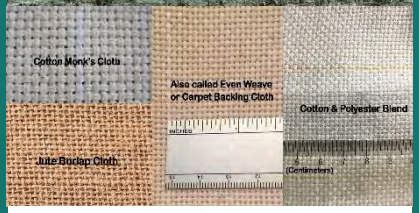
[22] Reference: Invasive Species Compendium: https://www.cabi.org/isc/datasheet/40302#tosummaryOfInvasiveness
[23] Te Kāuru Hou—a new leaf: Processing Harakeke (Phormium Tenax) for WholeGarment® Knitting Technology - Shima Seiki, Kimberley Alexander-Maaka (Ngāti Kahungunu / Ngāi Tahu / Ngāpuhi): https://openrepository.aut.ac.nz/bitstream/handle/10292/14624/AlexanderMaakaK.pdf?sequence=3

HARAKEKE USES

Without repeating accounts of the long and tumultuous history of the Harakeke industry in Aotearoa New Zealand, it is important to note that some historical uses will be revisited. Manaaki Whenua Landcare Research reference many historical uses for reference in their excerpt on Ngā Rauropi Whakaoranga providing access to information on how Māori used plants and other organisms to survive in Aotearoa, particularly before the arrival of Europeans.24

The writer has identified numerous applications of Harakeke however the following provides a small overview of what is possible in the next 5 years to a point where a viable industry can be established with Co-operative involvement and may substantially enhance the Māori economy, in partnership or otherwise.

Tikanga - When harvesting harakeke, tikanga in the form of a karakia to communicate our respect for the taonga of this wonderful plant and to show gratitude and reverence before our ancestors is a fulfilling experience.

Contemporary potentials (not limited to)	Feasibility	Comment/remark
Te raranga me te whatu: Kākahu, Korowai, Tāniko, Tukutuku, Whāriki, Raranga, Whiri, Kete, Floristry	Customary	
Sacking/Bailing yarn/Rope	Historical	
Carpet backing	Real	Collaboration with resurgent Wool Carpet producers (Bremworth as example). Alliance with New Zealand Farm Assurance Programme (NZFAP) 
Reusable Shopping Bags	Real	If the coarse fibre is a bi-product of extraction then there is no reason why we should not be replacing high-carbon imported natural fibre bags from India, Vietnam, China etc. Alliance opportunities with Farro Supermarkets 

[24] Manaaki Whenua Landcare Research historical use of Harakeke: https://rauropiwhakaoranga.landcareresearch.co.nz/names/f7dbd5a8-9779-451f-ad75-72f1866c6e1b

Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Fibre Glass Alternative - Woven	Real	Already in development by KiwiFibre Innovations Limited, a small New Zealand start-up in the form of Various composite manufacturing methods to produce new products out of Harakeke tube. The key benefits? Radio transparent and more than twice the tensile strength as Hemp, Sisal, Linen Flax and even Steel.	 [25]
Fibre Glass Alternative - Non-woven	Real	Already in development are various composite manufacturing methods including composite panelling with macerated Harakeke Fibre composite with PLA technology. In future collaboration with a major water tank manufacturer to replace existing PU panels with Harakeke PLA composites. The key benefits? Reduction of plastic import, high strength to thickness ratio, reduced carbon footprint, circular economy with farmers.	 [26]
Weed suppression for planting	Real	Jute or Coir Blanket could be replaced with a Harakeke mesh as a good growing median, with appropriate fertiliser, special batter seed blend, along with more organic matter. 100% Biodegradable erosion blanket. Ideal for vegetation growth, Slope Protection, Drainage Swales, Mulch Protection, Dune Protection, Grass spillways & embankments.	
Card co-fibre	Possible	Investigation required	
Board fibre	Possible	Investigation required	
Fibre reinforced board	Real	Natural Fibre Reinforced Concrete already uses wood, horsehair, straw, other plant fibres but non-offer the tensile strength of Harakeke. Collaboration with cement board producers would be a prudent first step.	

[25] Courtesy of KiwiFibre
[26] Courtesy of Kliptank

Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Coffee cups	Real	Disposable coffee cups typically have a plastic resin, or polyethylene, lining. Polyethylene is a petroleum-based plastic, requiring more than 231,000 barrels of oil to line our paper cups every single year. Provided these can be lined with Poly Lactic Acid (plant-based plastic) this is a viable opportunity. Collaboration with a tertiary body or CRI would be advantageous.	
Insulation bats Alt.	Real	Collaboration with the insulation industry would be advantageous however options may exist in sound insulation also.	
Planter pots	Real	Currently Zealandia recycle 5mil plastic pots from Mitre 10 per annum. Opportunities exist into the composable space also. Equipment already exists in NZ for production of these.	
Upholstery	Real	Provided appropriate equipment is available	
Fire suppression	Possible	Investigation required. Research and development at tertiary level may be required.	
Kitchen bench tops	Real	Technology already in development in the form of composite panelling with macerated Harakeke Fibre composite with PLA technology.	

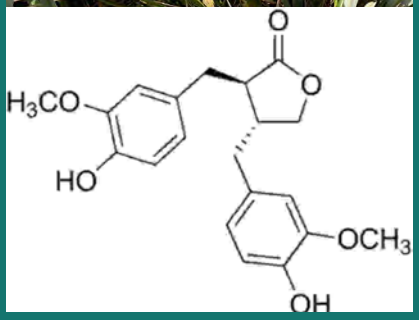
Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Skateboards and Surfboards	Current	A few companies including KiwiFibre have successfully prototyped such items. Tony Reid Harakeke and Wood surfboard manufactured in 1994 Laminated flax and wood covered in fibreglass	 27
Cladding and Decking	Possible	Already in development are various composite manufacturing methods. Same process exists. CLADDING AND DECKING COMPOSITES High-cost wood composite products, which are low maintenance, environmentally and climate friendly perform superbly as an alternative to wood. These can be made of a blend of Harakeke fibre and recycled plastics.	
Furniture	Possible	Already in development are various composite manufacturing methods. Or simply woven componentry.	
Industrial structural components	Possible	Already in development by KiwiFibre Innovations Limited, a small New Zealand start-up in the form of Various composite manufacturing methods.	
Door mats	Real	If the right technology exists for mass production of Muka or a woven format, then as supplementary homegrown product rather than imported Jute or Coir might find a niche.	

[27] Courtesy of KiwiFibre

Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Indoor matting and carpets [Sisal, Jute Alt.]	Real	Ideally from a course, non-woven system. High value.	
Beauty accessories, scarves, bags, hats	Possible	If the right technology exists for mass production of Muka, then there exists an enormous opportunity for all types of apparel and accessories.[28]	
Apparel co-fibre [Wool]	Real	Provided appropriate equipment is available	
Microgreen substrate	Real	Natural fibre substrates are for Micro-greens is being fed into huge nutrition industry.	
Nappies/Pampers material Alt.	Possible	Natural fibres commonly used for cloth diapers include cotton, hemp (or a cotton/hemp blend), and bamboo. The natural fibre used for cloth diaper covers is wool. Harakeke muka could form a blend of these.	

[28] Te Kāuru Hou—a new leaf: Processing Harakeke (Phormium Tenax) for WholeGarment® Knitting Technology - Shima Seiki, Kimberley Alexander-Maaka (Ngāti Kahungunu / Ngāi Tahu / Ngāpuhi): https://openrepository.aut.ac.nz/bitstream/handle/10292/14624/AlexanderMaakaK.pdf?sequence=3

Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Outdoor event mattings	Real	Like tukutuku or this could be a simpler weave or something that applies to the high-end floor coverings industry (competition to Sisal carpets for instance)	
Automotive finishing	Possible	Technology already in development by KiwiFibre Innovations Limited, a small New Zealand start-up in the form of composite panelling with macerated Harakeke Fibre composite with PLA technology. In future collaboration with a major automaker.	
Wall treatments, Drapery	Real	Harakeke paper for roman blind scenarios or literally all forms of woven fibre derivatives. Co blending with other natural fibres also extensive.	
Sound insulation	Real	Collaboration with the insulation industry would be advantageous however options may exist in sound insulation also.	

Contemporary potentials (not limited to)	Feasibility	Comment/remark	
Tubes/Various composite manufacturing methods components	Real	Already in development by KiwiFibre Innovations Limited, a small New Zealand start-up in the form of Various composite manufacturing methods. In collaboration with others, composite products out of Harakeke tube. The key benefits? More than twice the tensile strength as Hemp, Sisal, Linen Flax and even Steel.	
Non-fibre Product: Harakeke Green Matter	Real	Either the fibre becomes a bi-product of this or the other way around. Green Matter is rich in chlorophyll with huge health benefits but also exception stock feed.	
Non-fibre Product: Lignan	Possible	Lignan-rich foods are part of a healthy diet, but the roles of lignans in the prevention of hormone-associated cancers, osteoporosis, and cardiovascular disease are not yet clear. In any event Lignans play an important part in our diet in an intestinal health perspective.	

Contemporary potentials (not limited to)	Feasibility	Comment/remark
Non-fibre Product: Harakeke Seed Oil	Current	Harakeke Seed Oil is unique and not to be confused with Flax Seed Oil! Rich in Linoleic Acid (about 75% of the acid profile) this oil is produced only by Snowberry New Zealand at present however with limited resource, needing to engage with seed suppliers across the country.[29]

[29] Courtesy of Snowberry New Zealand Ltd: https://www.snowberry.co.nz/about-snowberry/snowberry-gardens/

Contemporary potentials (not limited to)	Feasibility	Comment/remark
Non-fibre Product: Harakeke Leaf Extract/Gel	Current	Either the fibre becomes a biproduct of this or the other way around.
Non-fibre Product: Rongoā Māori extracts	Current	Mainly from the root of Harakeke
Non-fibre Product: Harakeke Honey	Current	While Snowberry produces Kanuka Honey extracts, Harakeke honey after the Kanuka and Manuka flowering in Dec/Jan offers a superb and quite unique golden culinary honey. While bees do not pollinate Harakeke, (the Tui and Bellbird look after this) they do produce a nice honey given half the chance.

PLANT SELECTION

This document is not intended to advise on what plants should be selected in planting for riparian, wetland restorative or revegetation planting beyond suggested architecture for access and benefit from a harvest resource.

What we can suggest is that:

1. There are many resources from within tangata whenua, local government, non-government, tertiary, research institutes and of course planting groups that provide guidance on plant selection and placement (https://www.landcare.org.nz/file/kakanui-riparian-planting-guide-2015/open for example specific to the Kakanui region) specific to the ecology of the region.

2. Harakeke will virtually always play a significant part in such selections. The writer suggests focus on appropriate cultivars may be an important consideration in respect of fibre quality, biomass quality, disease resistance, sustainability outcomes avian food sources and invertebrate support to name a few. For example as highlighted in Te Kāuru Hou—a new leaf: Processing Harakeke (Phormium Tenax) for WholeGarment® Knitting Technology - Shima Seiki: https://openrepository.aut.ac.nz/bitstream/handle/10292/14624/AlexanderMaakaK.pdf?sequence=3[30]

   > *'These varieties are; Arawa, Makaweroa, Ngaro, Opiki, Parekoritawa, Ruapani, Ruawai, Tapamangu, Taumataua, Takirikau, Tapoto and Whareongaonga. Three cultivars; Arawa, Tapamangu, and Makaweroa are commonly revered to be of highest quality for its 'silk-like' fibre content that is found amongst them all. However, the varieties nurtured by Diggeress Te Kanawa and her whanau include Kōhunga and Taeore.'*
   >
   > *'Black-edged varieties are regarded by some weavers as having the best muka. The well-known varieties 'Kōhunga', 'Taeore' and 'Tapamangu' fall into this category. However, having a black edge and/or keel is not necessarily indicative of good fibre. There are excellent varieties with orange keels and margins, such as 'Arawa' and 'Makaweroa'.'*

   As a result, such a focus might be driven by the need for specific cultivars with due consideration of endemic biodiversity of course.

3. Any selections would not upset the environmental outcomes expected of the type of planting in a CRPM initiative.

[30] Kimberley Alexander-Maaka (Ngāti Kahungunu / Ngāi Tahu / Ngāpuhi): Te Kāuru Hou—a new leaf: Processing Harakeke (Phormium Tenax) for WholeGarment® Knitting Technology - Shima Seiki: https://openrepository.aut.ac.nz/bitstream/handle/10292/14624/AlexanderMaakaK.pdf?sequence=3

Nō reira me kōrero tātou

so lets talk

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Tāwharautia a Ruapani, mai uta ki tai

Uniting the Descendants of Ruapani from Forest to Coast

Ngā mihi nui

Whakataukī (proverbs) represent the wisdom guiding Māori culture.

They are commonly used as inspirations in speeches and as gentle reminders, spoken to each other in everyday life.

They are poetic expressions of wise sayings which allude to symbols native to Aotearoa

'Whatungarongaro te tangata toitū te whenua'

'As man disappears from sight, the land remains'

'Ka pū te rūhā ka hao te rangatahi'

'Out with the old and in with the new'