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of Ocean Science
for Sustainable Development

TĀWĒRA, TE ARAMAHIITI

THE MORNING STAR GUIDES EASTWARD:

REVIVING TRADITIONAL NAVIGATION KNOWLEDGE IN THE PACIFIC



Knowledge contributed by Master Navigator, Jack Thatcher
Collated and written by Jeff Evans



*Prepared for the New Zealand National Commission for UNESCO and the UNESCO
Local and Indigenous Knowledge Systems (LINKS) section within the Natural Sciences Sector.*

Foreword



It is my great pleasure to write this foreword for the new publication on Mātauranga Māori (Māori indigenous knowledge) commissioned by the New Zealand National Commission for UNESCO and prepared by expert knowledge holders in Aotearoa New Zealand. This exceptional piece of work brings to our attention the great reawakening in the Pacific of ocean knowledge, wayfinding, star charts, and the heritage of long-distance navigation without instruments.

The publication is part of a dialogue between Indigenous knowledge holders of the Pacific region, Member States, regional entities and UNESCO about the critical importance that Indigenous knowledge holds in understanding and addressing the myriad of environmental and social challenges that face our generation and those to come.

As Assistant Director General for the Natural Sciences at UNESCO, I can assure that not all knowledge is found at the end of a microscope. This publication, one in a series on wayfinding and navigation in the Pacific, reminds us that knowledge is born on the open ocean, under the night sky, while trimming the sails and using ancestral knowledge to travel long distances safely. The authors help remind us that such knowledge is transmitted in songs, dances, myths, rituals and whakataukī (proverbs). Since time immemorial, knowledge is passed orally over space and time, uniting people across many generations and across many islands.

One such Māori piece of wisdom says: E kore e ngaro, he takere waka nui – we will never be lost, we are the hull of a great canoe. This speaks to the unity of the Pacific, and the courage of people to use their cultures, languages and knowledge systems to chart their own destiny. In reality, the extraordinary skills of open ocean traditional wayfinding without instruments could have disappeared from the face of the Earth. It was the vision and inspiration of one of the last great traditional

navigators, Master Pwo Mau Piailug from the Micronesian atoll of Satawal that change the destiny of many people, and perhaps ultimately of the planet. He reached out to Polynesians hungry to learn, he brought his knowledge to another generation on islands where people spoke languages that he did not know. Master Piailug ignited not only a reawakening of skills, he touched on a deep well of cultural solidarity, he found a community of practice, and he awakened a new understanding of the ocean and its many life forms.

It is repeated to us many times from the Pacific, the ocean does not divide us, it unites us. As UNESCO takes on the duties and leadership role as the lead agency for the UN Decade of Ocean Science for Sustainable Development (2021 – 2030) and simultaneously the International Decade of Indigenous Languages (2022-2032), this new publication, initiated by the New Zealand National Commission and traditional knowledge holders in New Zealand inspires us, and we trust that it will inspire you too.



The UNESCO 2021 Recommendation on Open Science is an example of the emphasis placed by the UNESCO Member States on inclusivity, respect for Indigenous Peoples and Indigenous knowledge systems, and anchoring scientific cooperation with Indigenous knowledge holders in a rights-based approach that references the 2007 UN Declaration on the Rights of Indigenous Peoples.

UNESCO, through the Local and Indigenous Knowledge Systems (LINKS) programme has a 20-year history of supporting Indigenous led research and dialogue with scientists, which was once seen as unusual and peripheral. A lot has changed, and the time has come to embrace the diversity of our knowledge systems. UNESCO is here to support knowledge holders, scientists, sailors, weavers, herders, honey keepers, protectors of sacred trees and forests, youth and elders, and many others to engage in dialogue and respectful cooperation. Ultimately, there is only one waka (canoe) and only one moana (ocean). We are in this together, and we are here to help build global cooperation for a sustainable world with a vision nourished by knowledge, culture, languages and value systems.



Lidia Brito

Assistant Director General for the Natural Sciences, UNESCO

Tēnā koutou katoa.



Jack Thatcher

Master Navigator

Founder and Chairman of Te Puna I Rangiriri Trust (TPIRT), Jack Thatcher (CNZM) has organised instruction for thousands of young people in traditional Māori knowledge, particularly regarding mau rākau, waka and celestial navigation. Jack has traversed more than 50,000 nautical miles of waka voyaging in his lifetime under the guidance of Hekenukumaingāiwi Busby and on-board waka hourua Te Aurere and Ngahiraka Mai Tawhiti. He is one of those few initiated by Pius Mau Piailug, the traditional Master Navigator from Satawal Island, Micronesia, and has been inducted into Warieng School of traditional navigation. Jack holds a title of Pwo Navigator appointed by Mau Piailug in 2008.

Jack is the kaitiaki of Ngahiraka Mai Tawhiti, alongside his voyaging society, Kura Waka, which is based in Tauranga Moana. Ngahira is the training platform for a new generation of New Zealand Māori Navigators.



Jeff Evans

Author

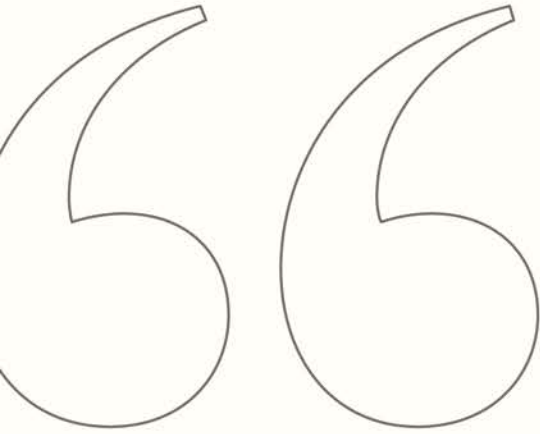
Jeff Evans is the author of seven works of non-fiction relating to Māori and Polynesian culture. A number of his books are waka-related, including Waka Taua: The Māori war canoe, Ngā Waka o Neherā: The first voyaging canoes, and Reawakened: Traditional navigators of Te Moana-nui-a-Kiwa.

He also wrote Not Here By Chance, the biography of the late Sir Heke-nuku-mai-ngā-iwi (Hec) Busby.

Tāwera, Te Aramahiti

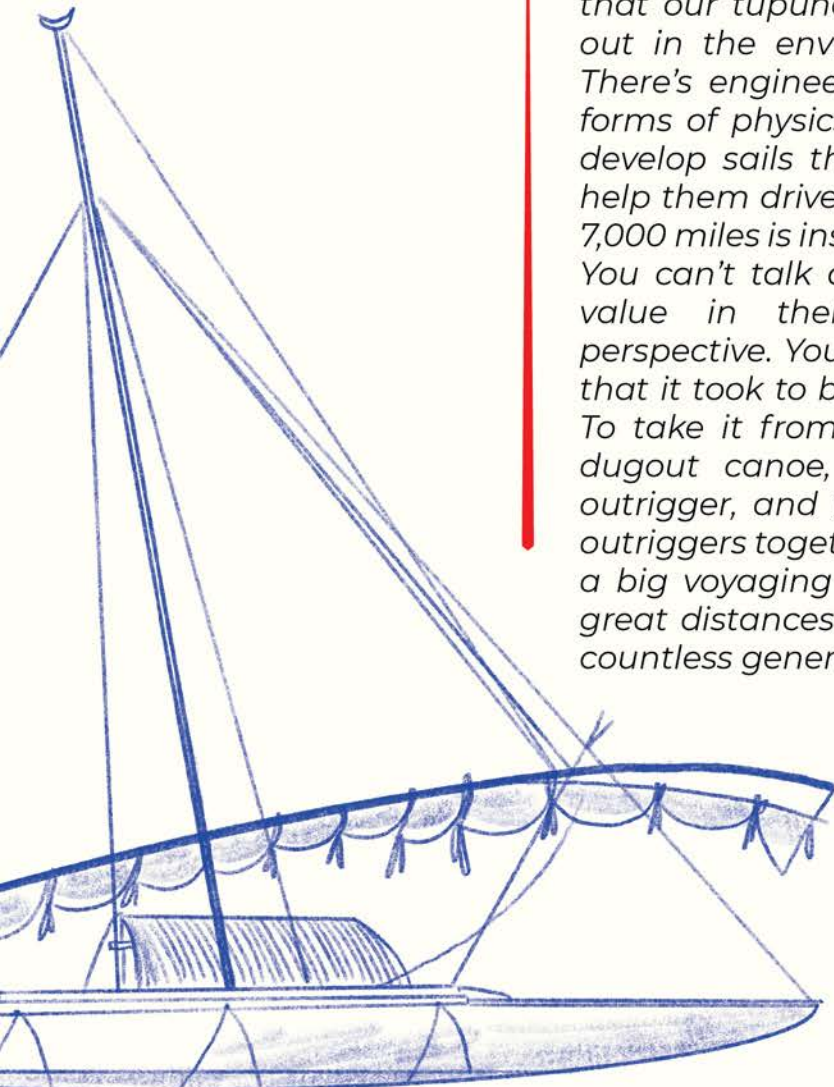
- The Morning Star guides Eastward:

Reviving Traditional Navigation Knowledge in Pacific



This whole kōrero, or conversation, is to lay out an understanding of where we came from by studying our old stories and by following our own tikanga or protocols. Because of that, one of our priorities is to gather as much experience and knowledge as we can and pass it on to a new generation. To do that we are going back into the domain of Tangaroa¹, onto the ocean, because our greatest lessons have come from being out there. So, we have been giving young people an opportunity to sail on the voyaging waka, Ngā Hiraka-mai-Tawhiti. We sailed around the coast, and we sailed out of sight of land to the Chatham Islands. We do all those things so they can get as much experience as they can.

Being out on the water also allows us to show them that our tūpuna, or ancestors, had a science while out in the environment where it shone brightest. There's engineering, astronomy, mathematics, and forms of physics. Just the thought of being able to develop sails that are aerodynamically efficient to help them drive across an ocean that stretches over 7,000 miles is inspiring. And none of that is anecdotal. You can't talk about a people and say there is no value in their knowledge from a scientific perspective. You just can't say that. The engineering that it took to build a voyaging waka is astonishing. To take it from a log raft to start with, then to a dugout canoe, and then to a dugout with an outrigger, and then to add a sail, then to put two outriggers together with that sail, and eventually into a big voyaging waka capable of relocating people great distances is an incredible sequence spanning countless generations.



Jack Thatcher, 2023

¹ God of the sea and progenitor of fish

Reclaiming knowledge

For many thousands of years indigenous Pacific people have used navigation and voyaging knowledge, paired with the most innovative waka (canoe) and sail technology, to accurately and purposefully traverse the world's largest ocean. From their origins in the far west of Oceania, these ancestors voyaged and settled the many islands of the tropical Pacific, as well as Hawai'i, Aotearoa (New Zealand), and Rapanui (Easter Island). There is also compelling evidence that they voyaged to South America.

The skill they used to do this sits within a wider body of holistic indigenous knowledge that encourages and promotes relationships between people and their environments, emphasising the ecological, cultural and spiritual aspects of those relationships.

The sophisticated navigation systems of the Pacific use the passage of celestial bodies — the sun, moon, and stars — to track the course of a vessel and to mark the passage of time. These are supplemented by other signs, such as swells, currents, winds, clouds, changes in ocean temperature, and the movements of birds and marine life.

Most long-distance voyaging in the Pacific (along with the construction of large voyaging canoes) ceased, however, with the colonisation of the region by European powers. With that cessation in the transmission of voyaging knowledge — that was encoded in story, song, and other forms of cultural expression — the knowledge was almost lost.

Even the history of Pacific navigation was obscured. For much of the 19th and 20th centuries, school curricula in Aotearoa and many other parts of Oceania portrayed these far-voyaging ancestors as unskilled sailors driven by storm-winds and claimed that they encountered new islands by accident when lost at sea. This was simply a fantasy, designed to reinforce assumed Euro-centric superiority, and it has taken decades of robust debate and scientific evidence for academics to finally come to this realisation.

The question of how Polynesians managed to inhabit most of the islands of the Pacific Ocean tropics has long been debated in academic circles. This was heightened after The Polynesian Society published historian Andrew Sharp's monograph, *Ancient Voyagers in the Pacific*, in 1956. His theory was that the Pacific islands had been settled by

'Polynesians swept out to sea, put off-course by storms or exiled either voluntarily or by force. Once they had reached a habitable island, with their primitive vessels and sailing techniques it was well-nigh impossible for them to return. There was no attempt on the Islanders' part at deliberate colonization by special expeditions following sailing directions to a specific island as the New Zealand 'canoe tradition' would suggest. The maximum practicable range for safe two-way voyaging and reliable navigating is 300 miles although generally much less than that. This rules out long exploratory and colonizing expeditions.'

In a response to Sharp, Jack Golson edited a supplement to the *Journal of The Polynesian Society* in 1962 which concluded that 'the weight of argument' was decidedly against Sharp's theory. It was also noted in the supplement, however, that Sharp's argument wasn't exactly ground-breaking; that in fact 'the hypothesis that the more remote regions of the world were discovered and settled by accident [had] a long history in European thought.' One of the contributors, Professor Gordon S. Parsonson, of Otago University, traced this unsubstantiated bias back to at least the 14th century. Spanish navigator Álvaro de Mendaña de Neira, Parsonson pointed out, believed it to be the case as early as 1595, as did Cook and Forster in later years.





Another theory suggesting how the Pacific was populated was put forward by the Norwegian adventurer Thor Heyerdahl. He claimed that Polynesia couldn't have been settled from the west because the prevailing winds came from the east, and Polynesian waka weren't capable of sailing to windward. In trying to provide a possible alternative to the west-to-east migration route, he sailed the Kon-Tiki raft 8,000 kms across the Pacific from South America to the Tuamotu islands in 1947.

What Heyerdahl didn't take into account when dismissing the west-to-east direction of settlement were the seasonal counter-currents and counter-winds that occurred most years in the Pacific. What's more, during an El Niño season, there are consistent winds originating in the west. Furthermore, in a La Niña season, it is considerably easier than usual to sail from central Polynesia down to Aotearoa. This is because the warmer water surrounding Aotearoa attracts strong winds from the north and north-east. The voyaging ancestors of the Pacific, who lived and died by their understanding of their environment, would have been fully cognisant of these fluctuations.

Despite the controversy thrown up by Sharp and Heyerdahl, there were staunch believers who championed the ability of Polynesians to make long distance, purposeful voyages. In 1965, the New Zealand scholar and adventurer David Lewis set out from Tahiti on an experimental voyage in his yacht Rehu Moana. Employing navigation skills he had learned from traditional navigators in Micronesia², he sailed to Rarotonga and then on to Aotearoa

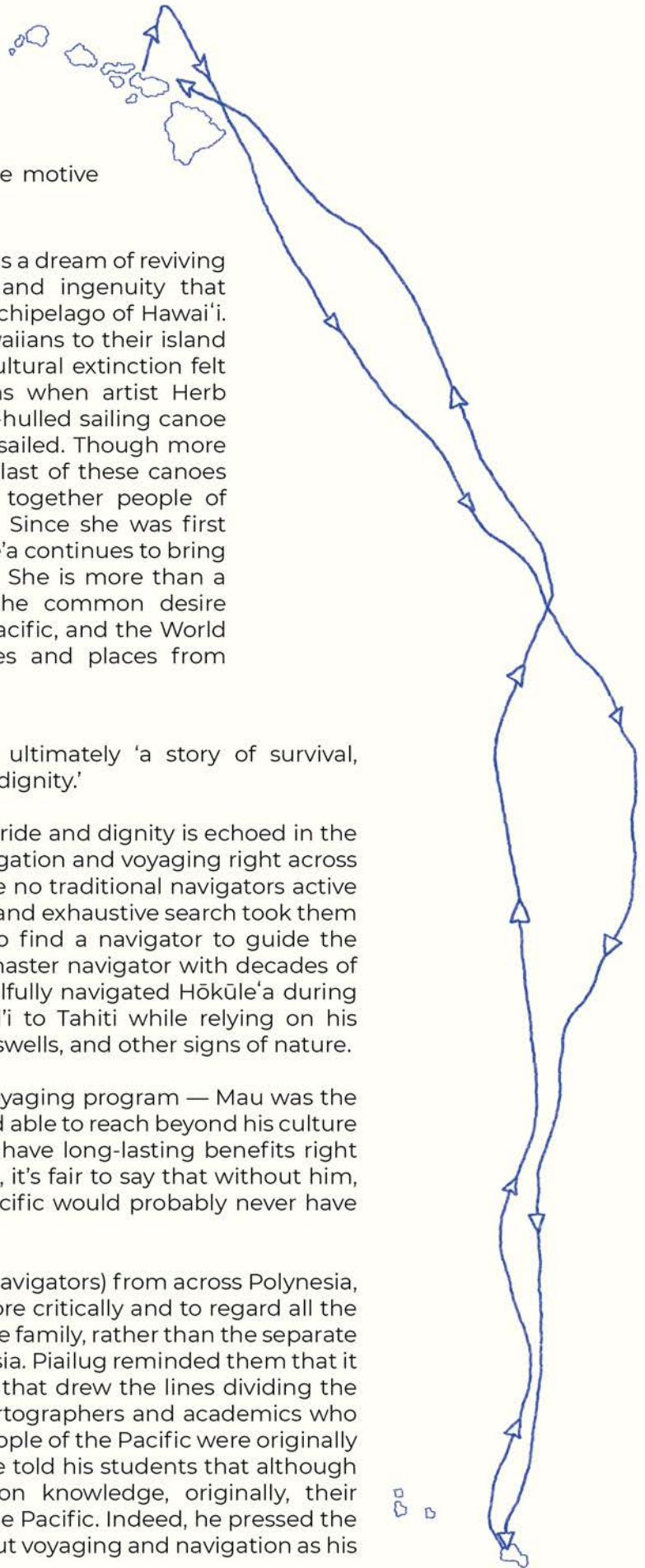
using the stars, sun, and ocean swells to guide him. During a later voyage, on the Isbjorn, he sailed to the Caroline Islands, Santa Cruz Islands and Tonga, interviewing traditional navigators at each stop. His books on the subject, "We, the Navigators and The Voyaging Stars", helped to introduce the concept of traditional navigation to a wider, western audience.

While Lewis was busy sailing the western Pacific, Ben Finney, in Hawai'i, had built and tested a replica of a traditional Hawaiian double-hulled sailing canoe. He wanted to see whether the Hawaiian canoe was capable of sailing both downwind and across the wind, as well as whether it could be tacked to windward. As noted earlier, the supposedly poor performance of ancient waka was often given as the reason why the Polynesians couldn't have successfully sailed their canoes the prodigious distances and directions of their migrations.

Finney's testing demonstrated that the canoe was able to be sailed downwind, across the wind and tack windward, and this positive outcome was enough for him to believe that Polynesian voyagers could have purposefully sailed from Tahiti to Hawai'i. It was another knock to the nay-sayers. The results also encouraged Finney, waterman Tommy Holmes, and artist Herb Kawainui Kane, to form the Polynesian Voyaging Society in 1973, and to build a 62-foot (~19m) double-hulled voyaging canoe Hōkūle'a capable of sailing from Hawai'i to Tahiti and back.

² [https://en.wikipedia.org/wiki/David_Lewis_\(adventurer\)](https://en.wikipedia.org/wiki/David_Lewis_(adventurer))





The Polynesian Voyaging Society explain the motive for the voyage best when they say:

‘Hōkūle‘a, our Star of Gladness, began as a dream of reviving the legacy of exploration, courage, and ingenuity that brought the first Polynesians to the archipelago of Hawai‘i. The canoes that brought the first Hawaiians to their island home had disappeared from earth. Cultural extinction felt dangerously close to many Hawaiians when artist Herb Kane dreamed of rebuilding a double-hulled sailing canoe similar to the ones that his ancestors sailed. Though more than 600 years had passed since the last of these canoes had been seen, this dream brought together people of diverse backgrounds and professions. Since she was first built and launched in the 1970s, Hōkūle‘a continues to bring people together from all walks of life. She is more than a voyaging canoe — she represents the common desire shared by the people of Hawai‘i, the Pacific, and the World to protect our most cherished values and places from disappearing.’³

The story of Hōkūle‘a is, they concluded, ultimately ‘a story of survival, rediscovery, and the restoration of pride and dignity.’

Survival, rediscovery, and the restoration of pride and dignity is echoed in the story of the re-emergence of traditional navigation and voyaging right across Polynesia. As the Hawaiians state, there were no traditional navigators active in Polynesia in the 1970s, and their extensive and exhaustive search took them to the tiny Micronesian island of Satawal to find a navigator to guide the Hōkūle‘a. There they found Mau Piailug. A master navigator with decades of open ocean voyaging experience, Piailug skilfully navigated Hōkūle‘a during the 2,600-mile maiden voyage from Hawai‘i to Tahiti while relying on his observations of the stars, the sun, the ocean swells, and other signs of nature.

His subsequent support of the Hawaiians’ voyaging program — Mau was the only traditional navigator who was willing and able to reach beyond his culture to share his knowledge⁴ — would prove to have long-lasting benefits right across Polynesia, including Aotearoa. Indeed, it’s fair to say that without him, the revival of voyaging in our part of the Pacific would probably never have reached the heights that it has today.

As well as mentoring 10 future Pwo (master navigators) from across Polynesia, he also encouraged his students to think more critically and to regard all the islands of the Pacific as belonging to one large family, rather than the separate regions of Polynesia, Micronesia, and Melanesia. Piailug reminded them that it wasn’t the indigenous people of the Pacific that drew the lines dividing the region — that it was European explorers, cartographers and academics who separated them. According to Piailug, the people of the Pacific were originally all one and they had a shared knowledge. He told his students that although their own people had lost their navigation knowledge, originally, their ancestors knew as much as anyone else in the Pacific. Indeed, he pressed the point that their ancestors knew as much about voyaging and navigation as his own ancestors had.

³ <https://www.hokulea.com/voyages/our-story/>

⁴ <https://www.hokulea.com/voyages/our-story/>

Restoring connection

In the wake of the Hōkūle‘a voyage to Tahiti, key crew-member Nainoa Thompson took it upon himself to learn traditional navigation, and, in 1985, he navigated the Hōkūle‘a on an expedition that circumnavigated much of Polynesia. The voyage was named the Voyage of Rediscovery, in large part because one of the main goals of the voyage was for the Hawaiians to rediscover their ancient connections with other Polynesian nations.

The success of the many voyages of the Hōkūle‘a has been a catalyst for the renaissance in both voyaging and traditional navigation in the region. In the intervening years, men and women from Hawai‘i, Aotearoa, the Cook Islands, Tahiti and beyond, have studied with both Piailug and, more recently, his accomplished student, Nainoa Thompson. Today, voyaging waka capable of blue water sailing are active in Hawai‘i (six), Tahiti, Aotearoa (six), the Cook Islands (two), Samoa, Fiji, and Tonga. Guiding these waka are seven master navigators, two navigators sitting just under them, and a dozen experienced navigators in training. They are supported by many hundreds of dedicated crew members right across Polynesia. An additional fleet of smaller Waka Motu, designed for inter-island sailing within archipelagos, is serving communities of the Western Pacific, in islands groups as diverse as Vanuatu, the Solomon Islands and Federated States of Micronesia. This impressive number of waka are in addition to the many canoes still found in the communities that retained their voyaging practices into the 19th and 20th centuries in, for example, Papua New Guinea, the Solomon Islands, and several others in Micronesia nations.

Over the past fifty years, the renaissance launched by the Hōkūle‘a has evolved from a desire to sail and navigate traditional waka, into a desire to re-connect the many severed communities of the Pacific. There was a point in time when the Māori of Aotearoa were separated from the rest of the Pacific people, not only by distance, but also, eventually, by the termination of voyages back to the ancestral homeland. That is no longer the case. Master navigator Jack Thatcher reiterates that today the renaissance is progressively more focused on the connections that continue to be established, rather than the voyaging and navigation itself. The latter two skills are, of course, important elements of the revival, but in reality, they are the tools being used to re-establish and then keep the connections alive. And it is the maintaining of these connections, through the traditional practice of waka voyaging, that is the central and indispensable element of the renaissance and passing on of knowledge. As Thatcher so eloquently states,

‘We are talking about pathways and connections and relationships, and they are what is important. So this whole thing is really about us linking back to our connections in Hawaiki, and to do that we have turned to our waka, because it is the waka that connects the people of this ocean. The waka also connects the people of the ocean with their ancestors: Herenga waka, Herenga tangata, Herenga moana, Herenga tūpuna.’

The importance of waka goes even further than that and is the central element that allows Pacific voyaging knowledge to live and breathe.

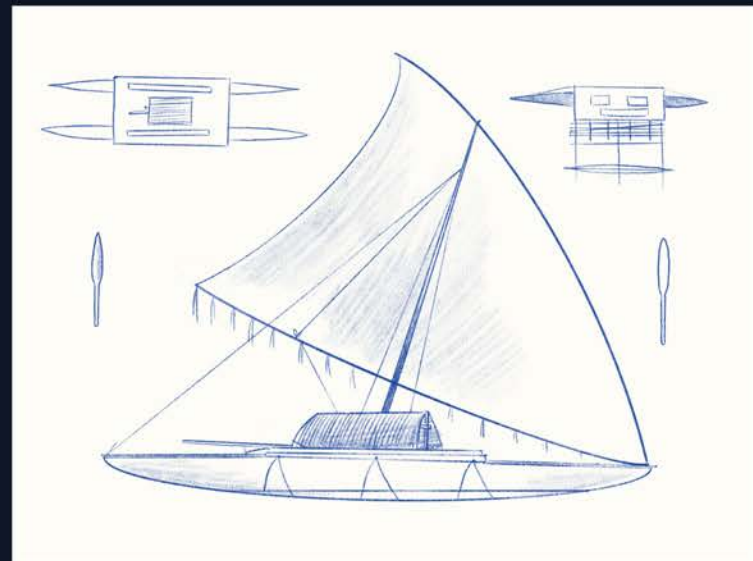


It is unquestionable that the renaissance for Aotearoa started largely with the arrival of the Hōkūle‘a in 1985. That visit inspired Tā (Sir) Heemi Henare to adopt the Hawaiians as the sixth tribe of Te Tai Tokerau (northern region of Aotearoa). He named them Ngāti Ruawahia – the Māori name for the star Hōkūle‘a. That gesture created a strong connection between the Māori and Hawaiians, which was further strengthened through Tā Heke-nuku-mai-ngā-iwi (Hec) Busby’s relationship with Nainoa Thompson, which in turn led to a relationship between Busby and Pailug – and a connection back to Micronesia.

As a result of the relationship, the first Māori voyaging canoe of modern times, Te Aurere, was constructed in 1991 by Hec Busby. Since then, the renaissance of traditional navigation and voyaging has continued unabated in Aotearoa, as well as across large parts of the Pacific, and long-distance voyages are once again taking place along ancient sea paths that have not been sailed for hundreds of years.

There are a number of ancient ara-moana, or sea paths, remembered in tradition. Two of the most significant are Ke-ala-i-kahiki (the pathway to Tahiti), and Ara-i-te-uru (the pathway to the west). Referred to in Hawai‘i as a heritage pathway, Ke-ala-i-kahiki is the name of an ancestral sea road that connects Hawai‘i to Tahiti, one of the acknowledged homelands of the Hawaiian people. As was traditional, the memory of the sea road was safeguarded in the Hawaiian narrative by naming landmarks connected to the pathway with the route’s name. Both the westernmost point of Kaho‘olawe Island, and the 17-mile (27-km) wide channel between Kaho‘olawe and its nearby island neighbour, Lāna‘i,⁵ were named Ke-ala-i-kahiki. When the Polynesian Voyaging Society decided to re-trace the route used by their Hawaiian ancestors for their maiden voyage, they followed this pathway. The outcome of the voyage saw the Hawaiians re-connected with the descendants of the Tahitian navigator and explorer, Hiro.

From the ancient traditions of Aotearoa, we learn that the name given to the pathway that Kupe followed to discover Aotearoa was Ara-i-te-uru (the pathway to the south-west).



The route has forever been memorialised in the instructions Kupe gave to his grandson (some say his nephew), Nukutawhiti. Those directions, as given to Nukutawhiti, instructed him to keep the sun and Venus to the right of his prow until he sighted Te Ika a Māui (the Milky Way) lying across the horizon. When he saw that, he knew he was at the latitude of Aotearoa. Once there, Nukutawhiti was to seek out the tu kapua, the stationary clouds that stand over land. Because Nukutawhiti would have been heading towards the south-west during his voyage, he would have been coming down at an angle roughly perpendicular to land and have been able to see the clouds sitting right across the horizon, stretching to the south.

We also know the migration pathways followed by other entities, such as whales, helped the ancestors arrive in Aotearoa. There are stories about mōkaī tohorā – pet whales – that the migration waka sailed alongside (the double-hulled waka are believed to have travelled at about the same speed as migrating whales). At some point, one particular bull whale was given the name Tūtarakauika, after the eldest of the children of Tangaroa. After that, it seems likely that for generations every bull whale seen became Tūtarakauika in memory of the first.

⁵ <https://kaiwakiloumoku.ksbe.edu/kealaikahiki>



While not a voyaging path, there is a place in Hawaiki called Ta Wa Wawau remembered in a haka, which contemporary thinking says may be Vava'u in the Tongan group. Vava'u is a locale well known for the birthing of whales, and the context of the haka suggests that the tūpuna were there following whales.

But back to the peopling of the Pacific. It was a three-thousand-year-long period of journeying from the time the first ancestors departed South-East Asia on their voyages of discovery until they arrived in Samoa, Tonga and Fiji. Along the way they inhabited many islands, built homes and created new civilisations, as they island-hopped and gradually populated the Western Pacific.

During the 1,000 years after settling Samoa, Tonga, and Fiji, when large scale migration voyages seemed to stop, skilled navigators and their crews continued to set out on voyages of exploration. They sailed into the wind, in one direction after another, and not turning for

home until their resources were beginning to run out. As they explored, their navigation and sailing skills were constantly being challenged, and they realised that their technology needed to change, as did their capability. How did they do that? They did it by refining what they knew. They built better waka and they improved their understanding of the natural world around them.

Once they got to the point where longer voyages were able to be made consistently and safely, they discovered the rest of the islands in the tropics over a short period of time. Hawai'i, Rapa-nui and Aotearoa were populated within a matter of a few hundred years rather than the 1,000 years the previous jump had taken.

That final expansion, dated to approximately 1200-1250 AD,⁶ was a direct result of the depth of knowledge that they had accrued as they moved across the Pacific from the west to the east.



⁶ <https://nzhistory.govt.nz/culture/encounters/polynesian-voyaging>

Revitalising kōrero

Tāwhaki

The search for the knowledge that would allow them to cross vast ocean distances is recalled in the tradition of Tāwhaki.

Tāwhaki, an ancestor who became a demi-God, was visited each night by Tangotango, a woman from the heavens. When she became pregnant, she told Tāwhaki that if their child was male she would wash him, but if it was female, that he was to wash her. After their daughter, Arahuta, was born, Tāwhaki proceeded to wash her as instructed, but while doing so he expressed disgust at the smell emanating from the infant. Upset and offended, Tangotango took the child, climbed onto the roof of their whare (house) and disappeared up into the sky.

Soon afterward Tāwhaki and his young brother, Karihi, set off to find Tangotango and his daughter. Along the way they found their grandmother, Whaitiri, who is the guardian of the vines that form the pathway into the sky. After acknowledging her grandsons, Whaitiri advised them how best to ascend to the heavens.

Karihi attempted first by climbing the aka taepa, or hanging vine, but when the winds of heaven begin to blow, he lost his grip and fell to his death. Tāwhaki then stepped forward, and instead of climbing the aka taepa, he climbed the aka matua, or parent vine. As he climbed the vine, he recited the correct incantations and eventually arrived at the highest of the 12 heavens. There he was met by Tama-i-waho, who taught him many karakia, or ritual chants. He was also reunited with Tangotango and his daughter.⁷

In times past, the seekers, vessels and teachers of knowledge –

tohunga – were those that held to the tradition of Tāwhaki by climbing (metaphorically) ki runga o maunga nui (up the largest of mountains) using te aka a rangi – those vines that dangled down from the heavens. They climbed the vines until they reached Te Toi o Ngā Rangi – the upper most heaven where the baskets of knowledge resided – and in doing so, they nurtured their strength and perseverance for the kaupapa (task) that they were invested in.

It is no different for today's tohunga. Voyagers from across the Pacific are actively trying to re-establish those old connections by referring back to the knowledge of their ancestors who saved the details of ara moana (ocean paths) and the constellations used to guide their waka in the stories that they told – and those stories became myths and legends over time. The intentional codification of reliable information in those stories was how they kept the knowledge alive for the next generation.

The sad fact is, however, that over the generations, the teachers have forgotten the absolute meaning of many of those legends, and a significant component of the resurgence of voyaging in Aotearoa over recent years has involved sifting through traditional narratives for clues to help us understand how the ancestors of Māori navigated the routes they sailed. This has often involved forensic-level analysis of well-known narratives – narratives that have been found to be rich with symbolism, as well as reliable, dependable information. The narratives have then been tested and confirmed through the many voyages undertaken in the past few decades.



⁷ <https://en.wikipedia.org/wiki/T%C4%81whaki>



Tāne Ascends to the Heavens

Another tradition that sheds a light on how stories were used to convey knowledge is that of Tāne. Like the story of Tāwhaki, Tāne ascends to the heavens, but this time his quest is to find order in the stars above.

According to Ngāti Awa and Tūhoe tribes, Tangotango was the first born of the children of Rangī and Papa. He became the guardian of the whānau-mārama (the Family of Light) after marrying Wainui (the ocean). Tangotango descended from the heavens to the horizon [where sky and ocean meet] and lay with Wainui. In time, the sun, the moon and the stars were born of their union.

Tāne asked Tangotango for the knowledge of the heavens so that he could bring light into the world by dressing his father in a cloak of stars. When he separated his parents, Rangī-nui and Papatuanuku, after having been in a close embrace for eons, there was no light between them.

Initially, Tāne was given the hīnātoke, which is the glow of the heavens – not the stars as such – and he pressed that to the chest of his father, and it was the first light brought into the world.

But it wasn't yet bright enough. So he went back, and asked for the whetu (stars), which he wove into a korowai (cloak) using the brightest of the stars. Once that was ready, he loaded the remaining stars into the hold of his waka and sailed to the horizon. He then took the korowai and threw it across the shoulders of his father, and in doing so, all the brightest stars were placed into the heavens, before causing his waka to tilt so the remaining stars were tipped across the night sky.

That brought more light into the world, but it still wasn't enough for him, so he went back to Tangotango and was given the whetu rere (planets), te marama (the moon) and Tama-nui-te-rā (the sun). He set the whetu rere on their own paths through the heavens. Then he set the moon to travel across the chest of his father, and finally, he set the sun to travel across his tuarā, his back. So that is all the part of Tāne arranging the heavens.

This whole story tells us that our tūpuna understood the movement of the stars and planets, and from that knowledge they were able to create their maramataka, their fishing and planting calendar.



Māui

Often theories relating to the true meaning of these stories are tested while sailing on the ocean. That is where navigators can best hope to understand, for example, what was being referred to when their ancestors spoke of Te Matau ā Māui (the hook of Māui) catching Te Ika a Māui (the fish of Māui) or when they said that someone migrated to Aotearoa on the back of a whale.

Indeed, the traditions of Māui are a rich source of knowledge relating directly to voyaging. Māui was the great trickster hero of Polynesian mythology, and his exploits are well known right across Polynesia; so much so, that in time he was considered a demi-God.

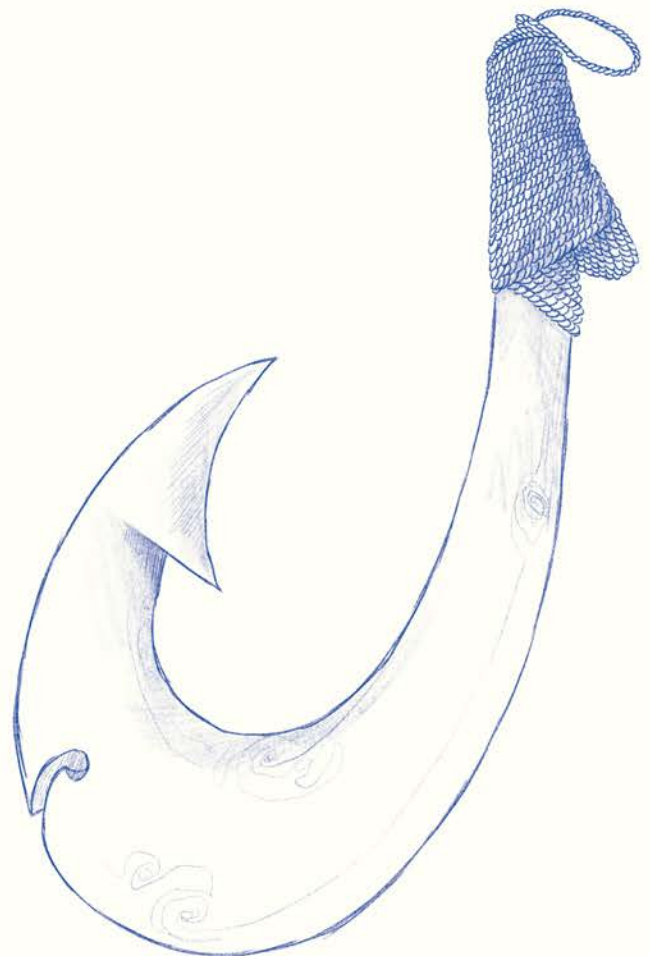
The position of Māui as otherworldly is underlined by the narrative of his birth. It is said that he arrived into the world stillborn, and that, as was the custom, his mother Taranga wrapped him in her tikitiki (topknot) before placing him into the sea. From this Māui became known as Māui-tikitiki-a-Taranga. When he was eventually washed ashore by the tide, Māui was rescued by his grandfather, Tama-nui-ki-te-rangi, who raised him.

The first of the stories relating to Māui (in Aotearoa) recalls how he fished up Te Ika a Māui (the North Island). It is a well-known storyline that is shared as the founding narrative on many islands across Polynesia. The story plays on the visual experience that a voyager would experience as they approach an island. The first sight of land may have been the summit of a tall mountain, or if approaching a low-lying atoll, it might have been the top of coconut trees peaking up from beyond the horizon. Then, as the vessel gets closer to land, the island appeared to rise out of the sea, just as a fish does when it is pulled up from the depths.

To catch his fish, Māui used the jawbone of his grandmother as his hook. This excerpt from the story, found in *Te Ara The Encyclopaedia of New Zealand*, was written by Mohi Ruatapu, a tohunga of Ngāti Porou. His version begins with Māui out fishing with his brothers.

'...his bait was his nose; he punched it, the blood ran down, and he smeared it on the jawbone of his grandparent Muri-ranga-whenua. By the time the jawbone reached the bottom, his fish had bitten on it. Then the canoe was lifted up and its bow was pushed down. His elder brothers cried out in fear ... Then his fish came to the surface ... That fish continues to lie here as land. It is still inhabited by Māui, his elder brothers and their children. This is the origin of the presence of the Māori ancestors in this island.'⁸

The hook Māui used (Te Matau ā Māui / Scorpio) can still be seen in the southern heavens, embedded in Te Ika a Māui (the Milky Way).



⁸ <https://teara.govt.nz/en/first-peoples-in-maori-tradition/page-3>



Another tradition that many New Zealand children grow up with is the story of Māui slowing down the sun – Tama-nui-te-rā. Frustrated that the days are too short to allow him to eat his dinner during daylight hours, Māui weaves a noose from flax leaves and with the help of his brothers captures the sun. Beaten relentlessly with the jawbone of his grandparent and unable to break free from the noose, Tama-nui-te-rā eventually promises Māui to slow his movements through the sky.

It is a memorable story, but what it tells us is that the ancestors of the Māori understood that the sun's path is cyclical, and that when a navigator looked towards the sun during the solstice period in mid-summer, he recognised that the sun's setting place remained in almost the same place on the horizon for upwards of a month and a half. And what that consistency meant was that the sun became a good marker of direction to use when travelling from one destination to another, say for example, from Rarotonga to Aotearoa.

Te Waka ā Māui is another important Māui constellation. It was identified because of its appearance being relevant to the Māui

narratives, and it is visible just after the sun sets during summer. It is also a latitudinal marker for Aotearoa. There is an associated constellation called Te Waka ā Tama Rereti, which uses many of the same stars as Te Waka ā Māui, but it is visible during winter. Both constellations also have strong links to Venus. When Venus rises with Te Waka ā Tama Rereti, it is known as Tāwera and referred to as the morning star. When Venus sets just after the sun rises in summer, with Te Waka ā Māui in the sky, it is known as Meremere, and referred to as the evening star. It sets to the south of the sternpost of Te Waka ā Māui.

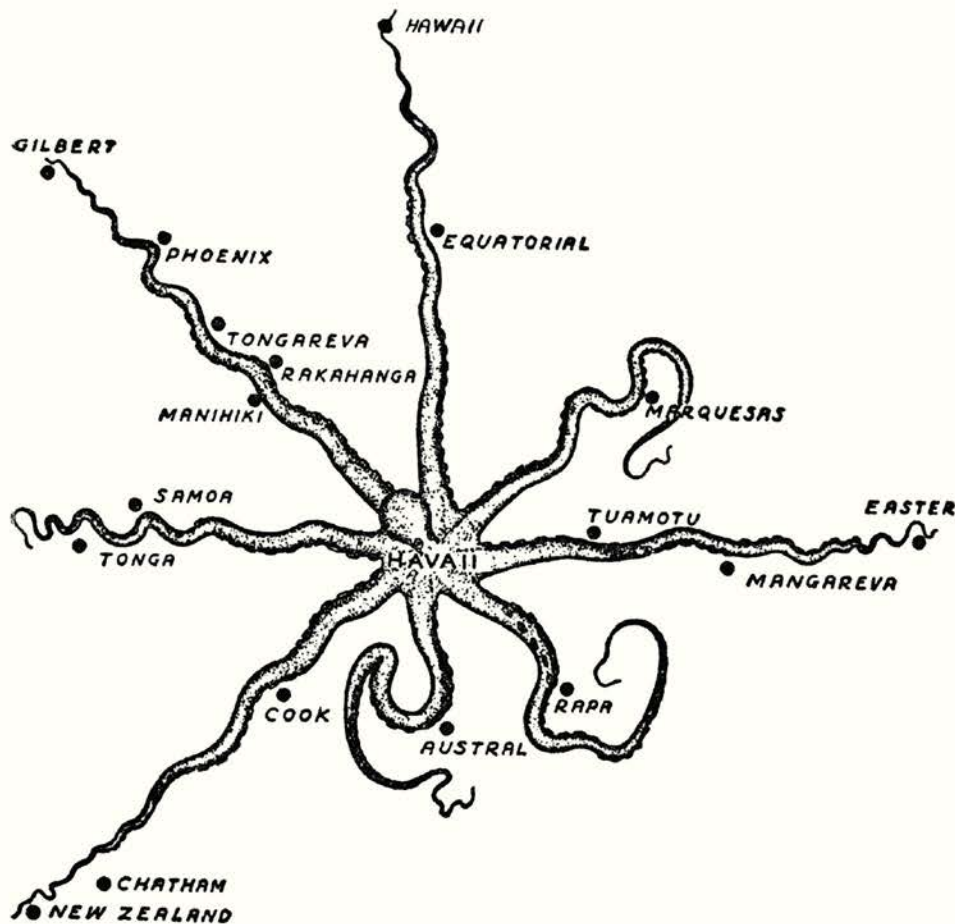
The tohunga of the migration period recognised that they were one and the same celestial object, but gave it two names for symbolic reasons: Tāwera is the male and Meremere is the female – so you have that balance. When Kupe's wife, Kuramarotini, is talked about later, her time of triumph was during the summer months, when Meremere is in the heavens – so there is a strong female essence at that time when she sees the first signs of Aotearoa – the stationary clouds hovering above land – and calls out, 'He ao! He ao tea!'

Kupe

To bring this story to the realm of mankind, its relevance is clear when we look at the traditions of the explorer, Kupe.

At its most basic level, the story sees Kupe and Ngahue chasing Te Wheke a Maturangi (the octopus of Maturangi) in their canoes Matahourua and Tāwhirirangi respectively, from their tropical homes into ever colder waters. After, perhaps, four weeks of voyaging, Kupe's wife, Kuramarotini, sights land and calls out, 'He ao! He ao tea!' - and Aotearoa is discovered. From there, the story progresses to the eventual dispatching of Te Wheke, Kupe stays at Hokianga for a period, and then eventually returns to his homeland.

At first glance, the inclusion of a wheke to chase and fight might merely be seen as a technique to keep the attention of listeners, but it is much more than that. According to knowledge holders in central Polynesia, Ra'iatea, whose ancient name was Hawai'i (Hawaiki), was the centre of a cultural alliance between many island groups in Polynesia, and the wheke (he'e/fe'e /octopus) was used as a metaphor to show the connections between the members of the alliance.⁹ With the octopus's head at the centre (Ra'iatea), its tentacles highlight the links to other islands in the alliance.



Hawai'i-Ra'iatea Centered Map with Octopus Motif: "Vikings of the Sunrise," 1938 by Dr. Peter H. Buck, aka, Te Rangi Hiroa

⁹ It was no accident that Ra'iatea was situated at the centre of the alliance. That is where Taputapuātea Marae is found on Ra'iatea. A highly sacred site, the marae is associated with voyaging, and it remains a significant site to many people from across Polynesia.

One interpretation of the story is that it confirms that Kupe achieved his goal of finding the lands that Māui first brought out of the ocean, and that chasing the wheke to Aotearoa acknowledges that he travelled the pathway to the south-west and arrived at the great fish of Māui.

The involvement of Ngahue, it must be said, also had a long-term impact on the newly discovered island. The consequence of Ngahue finding pounamu (greenstone), would help cement the new islands as a destination worth visiting, if only for its resources. Ngahue found greenstone, stronger and more resilient than the stone they were using for their adzes. He took it back to Hawaiki and, as it was highly desirable, created a need. And so part of the reason for the migration to Aotearoa would have been for the greenstone trade.

The story of the discovery of Aotearoa by Kupe has proven instrumental in terms of the development of the contemporary voyaging culture within Aotearoa, largely because it includes his sailing instructions for the voyage to Aotearoa. As discussed earlier, the instructions Kupe gave to Nukutawhiti were to keep the sun and Venus to the right of his prow and to look to the south for the stationary clouds – tu kapua – standing above the horizon after he saw the celestial Te Ika ā Māui (The Milky Way) lying on the horizon.

These instructions have been tested by contemporary voyagers who found that a waka departing Rarotonga for Aotearoa in mid-October would be sailing as the sun's daily setting position on the western horizon was dropping further south night after night. The sun's evening position would, in effect, be a moving target, meaning that over the length of the voyage, a navigator keeping his prow to the left of the sun would be following a curved path and end up near the top of Aotearoa.

Kupe probably sailed to Aotearoa in October or November and would have seen the constellation of Te Matau ā Māui high in the sky, seemingly pulling Te Ika ā Māui down with it as it slid towards the horizon below. Night after night as his waka voyaged to the south-west, Kupe would have seen Te Ika ā Māui go through its heavenly rotation, only for it to disappear completely under the horizon; until one night it came down, and part of it remained visible above the horizon. The next night a bit more of the constellation would have been showing, until, by the time he arrived at the latitude of Aotearoa, he would have been able to see all of Te Ika ā Māui as it lay horizontally above the horizon. When it was in that position, Kupe would have noted Te Matau ā Māui standing upright, almost perpendicular to the horizon. Contemporary voyagers have been able to confirm that the prone constellation is an easily identified latitude marker for Aotearoa.

A return voyage to Aotearoa never eventuated for Kupe, but he did gift his waka, Matahourua, to his grandson Nukutawhiti, so that the young man could take his family and escape the constant warfare in Hawaiki. Before Nukutawhiti departed for Aotearoa, however, he famously re-adzed the waka and named it Ngātokimatawhaorua.¹⁰



¹⁰ One seemingly improbable detail from Nukutawhiti's voyage is that he surfed the waka to Aotearoa on a massive wave named Ngaru-nui, which meant that the trip only took a matter of days. It is possible that this is a reference to the waka being on the edge of a strong weather front. When Jack Thatcher sailed from Rarotonga to Aotearoa in 2013, his waka was hit by an aggressive storm, and they started surfing down the swells, much as Nukutawhiti did. It is estimated that the waka was travelling at 15-18 knots, rather than the 4-5 knots the vessel would normally achieve.

Kuramārōtini

The tradition of the discovery of Aotearoa by Kupe is also important because it re-affirms the importance of women in the Polynesian narrative. It has only been since the arrival of Europeans in the Pacific that the role of women has diminished. Up until that time, women provided an important balance to the work of men.

What we know is that our voyaging ancestors were both men and women, and to put it bluntly, no one was taken on a voyage if they didn't have an important role to play. When Kupe departed his homeland, he was on a voyage of exploration, which is inherently dangerous, so there would have been no reason to take his wife Kuramārōtini if she wasn't going to play a significant role.

In some versions she is named Hine Te Apārangi, in others she is Kuramārōtini, which leads some to say Kupe had two wives. Current thinking suggests, however, that he only had one wife, named Kuramārōtini, but she had a title: Hine Te Apārangi. She was said to be a beautiful woman, and Kupe stole her from his cousin, Hoturapa, but the belief is that Kuramārōtini must have had a purpose beyond her looks, and that there is a clue to that purpose in the name, or title, that was bestowed upon her.

She was a woman born of the apākura, those beings that look after Io (supreme deity) and all of the things that he has created. Apā is the connection to apākura, and rangi is that word that links it to the heavens, so when we talk about Hine te Apārangi, we are talking about Hine being an apākura, or having the knowledge of the heavens.

So when you think about that, Hine Te Apārangi is a woman born with the skills of the apākura that come from the heavens. So her being the first one to see the signs of land places higher emphasis on why she is there – to locate the land. Remember it was her that famously called, 'He ao! He ao tea!' So Kuramārōtini calling out like she did is an indication of her knowledge. It is believed by some that Kupe had one wife that he stole from his cousin – not just because she was beautiful, but because she had skills he needed.

Following on from the Kuramārōtini example, women have played an important part in the renaissance of voyaging. From the beginning of the renaissance of voyaging in Aotearoa, Hec Busby's wife, Ngā Hiraka (Hilda) Busby, created the support for the maiden voyage of Te Aurere and for those voyages that followed. Indeed, it had been her strength that allowed Hec to complete the building of Te Aurere and then to focus on preparing the crew for the voyage. It was Hilda's complementary skills that ensured the voyages success.

Today wāhine are threaded right through the voyaging tapestry. They are captains, watch-captains, and trainee navigators and hold positions right through the leadership group. They are part of the education delivery teams, and among the teachers that are coming out of the schools to deliver programmes to their students in our primary schools and high schools. Once again, wāhine are taking their rightful place alongside their voyaging tāne.



Rata

Over the past two to three decades several master navigators have founded schools of learning, such as Jack Thatcher's Te Kura o Ngā Kuri a Tarawhata School of Traditional Celestial Navigation, in Aotearoa. Ancestral navigation and voyaging knowledge is being taught in these schools and practiced by a new generation of voyagers from throughout the Pacific. As well as teaching students how to sail and navigate the voyaging waka, another important aspect of training is to understand how we should act in this environment. In this case, we can look to the tradition of Rata.

Rata's story is about the importance of tikanga (protocols), and about creating a doctrine or at least refining one. It is also about understanding your responsibility when you are part of the natural cycle of things: that you can't just take and take. That you have to be prepared to give – and in that instance, what Rata was supposed to give was his love and respect for the forest.

Some say Rata decided to build a voyaging waka so he could seek revenge for the murder of his father on a distant land. Others say that he wanted to help his people to migrate to Aotearoa because their village was constantly battered by storms. Whatever the motive, he found a tall, straight tree in the forest and cut it down in preparation of shaping a large waka.

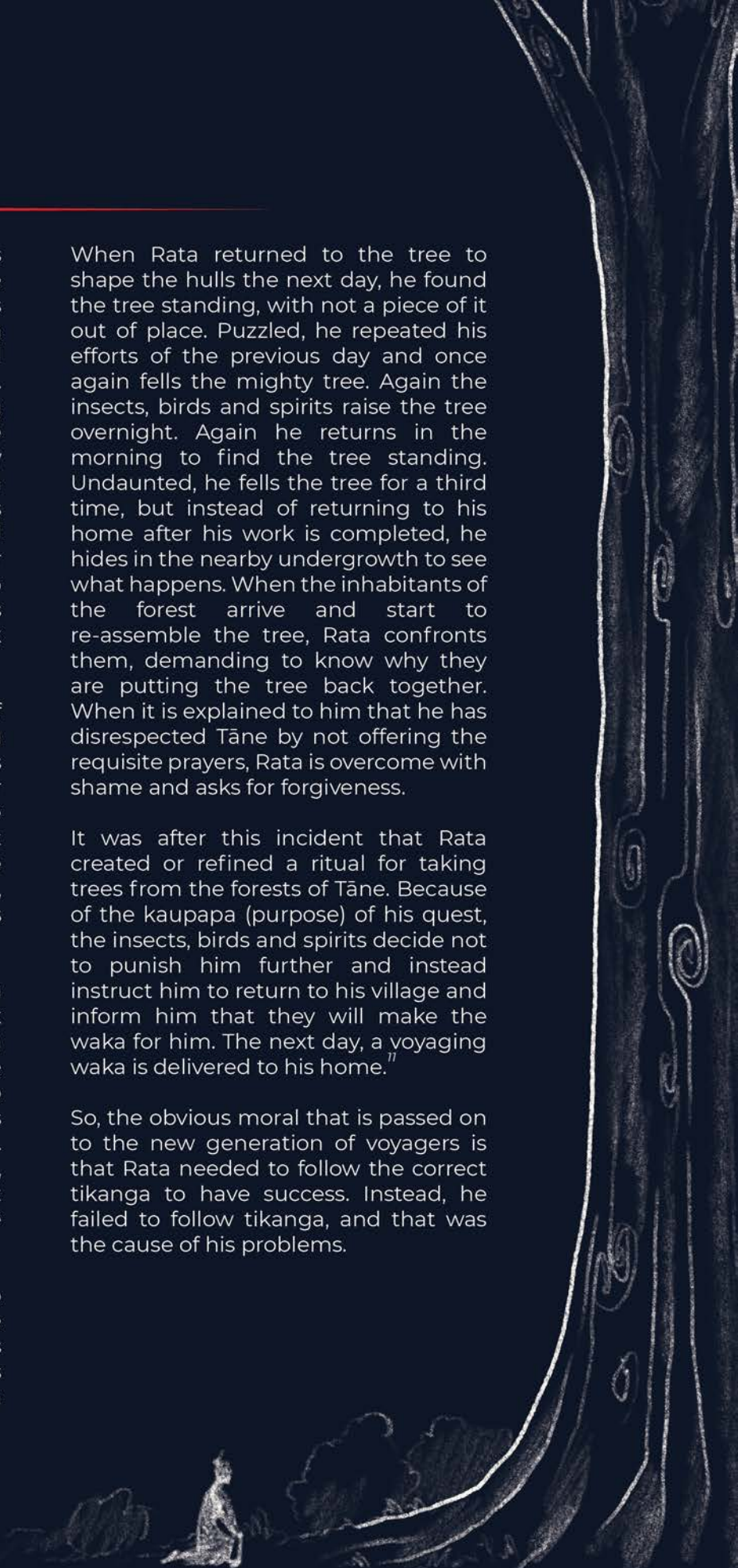
Outraged that he didn't offer prayers to Tāne, the god of the forest, before he cut the tree down, the insects and birds inhabiting the trees and all of the spirits who lived in the forest decided to teach him a lesson.

When Rata returned to the tree to shape the hulls the next day, he found the tree standing, with not a piece of it out of place. Puzzled, he repeated his efforts of the previous day and once again fells the mighty tree. Again the insects, birds and spirits raise the tree overnight. Again he returns in the morning to find the tree standing. Undaunted, he fells the tree for a third time, but instead of returning to his home after his work is completed, he hides in the nearby undergrowth to see what happens. When the inhabitants of the forest arrive and start to re-assemble the tree, Rata confronts them, demanding to know why they are putting the tree back together. When it is explained to him that he has disrespected Tāne by not offering the requisite prayers, Rata is overcome with shame and asks for forgiveness.

It was after this incident that Rata created or refined a ritual for taking trees from the forests of Tāne. Because of the kaupapa (purpose) of his quest, the insects, birds and spirits decide not to punish him further and instead instruct him to return to his village and inform him that they will make the waka for him. The next day, a voyaging waka is delivered to his home.¹⁷

So, the obvious moral that is passed on to the new generation of voyagers is that Rata needed to follow the correct tikanga to have success. Instead, he failed to follow tikanga, and that was the cause of his problems.

¹⁷ <https://www.careers.govt.nz/resources/tools-and-activities/the-magic-of-myths/rata-and-the-treerata-me-te-rakau/> and <https://nzetc.victoria.ac.nz/tm/scholarly/tei-GrePoly-c1-7.html>



Tailoring to context

In addition to sifting through traditions, master navigators have been able to adapt knowledge received from Hawai'i and Satawal by substituting in Māori names and understanding. For example, Māori have infused their names into the framework of the Hawaiian star compass, so now when they are teaching, they are teaching Takurua and Atutahi (instead of Sirius and Canopus respectively), and that makes a difference, particularly for students seeking to reconnect with their ancestors.

Another strong connection to the Hawaiians was found in the night sky. The Southern Cross is an important latitude marker when voyaging to both the Hawaiian Islands and Aotearoa. The ancestor Hiro was the first navigator to use the Southern Cross as a way of being able to return to Hawai'i. He recognised that when the Southern Cross is at its highest point in the sky, and sitting at its own height above the horizon, then you have arrived at Hawai'i's latitude and you can turn towards the west and sail directly to the Hawaiian Islands.

In Aotearoa, we use the Southern Cross when it is at its lowest point in the heavens.

If, for example, you are sailing from Tahiti in October, then the Southern Cross will disappear below the horizon each night, but as you come down closer to Aotearoa, you see that the Southern Cross becomes circum-polar, so you can see it throughout the night, rotating around a point in the sky. Once you get to the point where the Southern Cross sits just above horizon – and the whole of the Milky Way is arrayed along that horizon – then you know you are close to Aotearoa's latitude.



Closing remarks

Written by Dan Hikuroa (Culture Commissioner) and Linda Faulkner (Natural Sciences Commissioner) of the New Zealand National Commission for UNESCO

The Aotearoa New Zealand National Commission for UNESCO in collaboration with the UNESCO Local and Indigenous Knowledge Systems (LINKS) programme is humbled and grateful to partner with Master Navigator Jack Thatcher and writer Jeff Evans to provide a glimpse of the context to indigenous navigation from a Māori knowledge perspective. The extremely generous sharing of a small piece of Jack's extensive knowledge and experience, contributes indigenous voices and narratives to the ocean voyaging discourse. This paper prioritises and centres the voices and vast knowledge of those who know and understand voyaging waka best - the navigators. It is only through their unique lens and experience that we can truly hope to gain some insight into the historical, cultural and holistic context through which voyaging waka exist and have evolved.

Indigenous voyagers, have for thousands of years, been multi-disciplinary scientists with a unique and profound knowledge of the currents, life, and moods of the Moana (ocean), ngā tohu o te taiao (environmental observations and signs), and ngā whetu (the stars). Addressed across three sections, this paper has examined the reclamation of indigenous voyaging knowledge and mana by the voyagers themselves. It has looked at the critical importance of voyaging waka as a vehicle for restoring the ancient pathways that re-connect the many people of Te Moana-nui-ā-Kiwa (The Great Ocean of Kiwa or the Pacific Ocean). It has then explored the value in revitalising the wisdom of ancient narratives that have shared careful and purposeful instruction down through countless generations. As noted in the paper, this is a story of survival, rediscovery and the restoration of pride and dignity echoed in the re-emergence of traditional navigation and voyaging right across Polynesia and beyond. It is through this reclamation, restoration and revitalisation of indigenous knowledge that we are provided with a vital opportunity to better understand our relationship and connection with each other and our environment.


Our heartfelt mihi (greetings) to Jack Thatcher for his generosity and wisdom, and to Jeff Evans, whose long-term relationship with such navigators has enabled the preparation of this document.





The paper, its genesis, co-creation and co-development are an exemplar of how the Aotearoa New Zealand National Commission for UNESCO is approaching the International Decades of Ocean Science for Sustainable Development, and Indigenous Languages. It recognises that indigenous knowledge, and its ongoing practice, contributes significantly to human endeavours, and the aims of UNESCO globally.

The paper also contributes valuable and unique perspectives and lived experience of direct relevance to the 2024 UN Ocean Decade Conference. It provides a glimpse into the vast set of knowledge and expertise of the navigators and ocean voyagers that can inform many of the 10 Challenges for which a set of white papers will be published identifying future priorities. The information herein has enormous relevance for and could provide guidance to, the crafting of those future priorities and examples of relevant Challenges include:



Challenge 1:
Understand and beat marine pollution;

Challenge 2:
Protect and restore ecosystems and biodiversity;

Challenge 7:
Expand the Global Ocean Observing System.

Waka navigators and voyagers have seen and experienced first-hand, pollutants and contaminants in the Ocean and the effects of multiple stressors on ocean ecosystems. They are well placed to co-develop solutions to remove or mitigate the former and manage and restore the latter, as well as having the ability to captivate and engage diverse audiences using voyages and storytelling as literal vehicles. The collective knowledge of the entire waka navigator and voyager communities is one of the most rich untapped ocean observing systems.

Challenge 9:
Skills, knowledge, and technology for all;

Challenge 10:
Change humanity's relationship with the ocean.

The collective work of the waka navigator and voyager communities has already added significant capacity and capability development, largely in areas under-served and in cultures under-represented in Ocean science. For the New Zealand waka navigators and voyagers, Wainui is the personification of the Ocean – to whom they have a kinship relationship and a familial responsibility of care. Wainui, the Ocean, cannot be owned or sold, and while humans have ‘user-privilege’ access to the bounties of Wainui, they come with responsibilities to not exceed her regenerative capacities.

‘Be a good ancestor’ is a framing consistent with a Māori worldview, and perhaps many indigenous worldviews that could play a role in exploring humanity’s relationship with the ocean, and its relationship with humanity. ‘Be a good ancestor’ is of relevance to both the International Decades of Ocean Science for Sustainable Development, and Indigenous Languages.

This paper is a koha, a gift, to add to the kete-o-mātauranga – baskets of knowledge, in our collective efforts to realise the aspirations of this conference and associated Decade of Ocean Science for Sustainable Development.



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