

Historical divisions of time and the Maori Lunar Calendar

Ehara i te mea poka hou mai, nō Hawaiki mai anō

Liliana Clarke

Prehistoric Period

It is useful at the outset of this paper exploring the relationship and influence of the moon on the world of the Māori, to make some brief reference to the earliest purported evidence of humankind's use of the lunar cycle in order to ensure ongoing survival.

The archaeological evidence from Pinnacle Point (or PP13B) at the southern tip of Africa (Marean, 2010), dating back 165,000 years, has revealed that its earliest pre-historic inhabitants engaged in marine foraging as a means of sustaining themselves during a period of severe climatic conditions that had ensued as a result of a glacial age lasting some 70,000 years. This they achieved by staying close to the shoreline as it receded or advanced as the climate cycled through warming and cooling periods and by feasting on the seafood and carbohydrate rich foods that proliferated there. These foods subsequently extending to include limpets and mussels.

What is of particular interest to this paper however, is that, because these species live in treacherous inter-tidal zones, safe harvesting for maximum return is only possible between low spring tides "when the sun and the moon align, exerting their maximum gravitational force on the ebb and flow of the water." Marean surmises, therefore, that

Because the tides are linked to the phases of the moon, advancing by fifty minutes a day, the people who lived at PP13B...scheduled their trips to the shore using a lunar calendar of sorts just as modern coastal people have done for ages.

Marean further asserts, that this evidence of behavioural sophistication also contradicts the longstanding contention of the body preceding the mind. That is,

That cognitive modernity evolved long after anatomical modernity.

It is argued that it is the presence of this cognitive ability that allowed these early ancestors to make mental maps of the locations and seasonal changes of the plants within their environments. Just as importantly, it also provided the capacity to understand the connection between the phases of the moon and the tides and therefore to schedule their food gathering (and other, it is assumed) activities accordingly.

Mercea Eliade (cited in Oliviera, 2008,p.1) posits that

The moon was decisive in the first mental synthesis of mankind...[moreover] It was fundamental to the first perception and measurement of time by early societies and expressed symbolically [for them] the cosmic unity.

Traditional Societies

Traditionally, many indigenous and tribal societies and communities also used the moon (rather than the sun for instance) as their primary timekeeper and basis for an annual calendar. This was/is done for varying reasons including in the first instance it is suggested, out of sheer pragmatism, because as previously noted, the moon's phases, unlike the sun, are readily seen from earth.

In the context of sub-Saharan Africa, Zahan, (2005, p.293-294) posits that one of the "great constants of African astronomy" and the mode of transmission of celestial knowledge, is "the use of a lexicon which is both social and professional". Kinship terms as an example, are often applied to the sun and the moon in order to imply the relationship between them, although these are somewhat more circumscribed than would pertain in ordinary social relations. Generally, direct or first order relations only are used: husband/wife; mother/child; brother/brother; brother/sister; mother's brother/ sister's son.

Given the goals of transmission and retention of knowledge, the model of kinship it is suggested, permits "them to apprehend and analyze a reality which may prove elusive to ordinary scrutiny". With the overlay of human kinship, the stars and the relationships between them are thus more easily understood.

The Lamba people of northeastern Zambia tell the story of the Sun and the Moon striding together over the kingdom. The Moon hurls his darts at the sun and they are seen sticking into him; then the Sun retaliates by hurling mud at the Moon, the dark patches being clearly visible on him.

To fully understand the inferences contained within cosmological accounts such as this, Zahan cautions that we need to consider in the first instance at what latitude the people from whence the story comes are to be found. The sun and the moon appear in quite different manner in those latitudes close to the equator than they do at temperate latitudes. The second phenomenon relates to the declination of the moon which varies according to seasons and its position in relation to the moon. The new moon everywhere and in all seasons follows the declination of the sun; the Full Moon separates itself from it, therefore at a 'high' Sun there is a 'high' New Moon and a 'low' Full Moon; at a 'low' Sun there is a 'low' New Moon and a 'high' Full Moon. Furthermore, in Central Africa the summer (New Moon 'high'- Full Moon 'low') coincides with the 'wet' season and the presence of mud.

In such a way at this time of the year marked by agricultural chores from which one gets dirty, one may speak of a 'clean' Sun and a 'dirty' Moon. The first shines with all its brilliance while the second – relegated to a fairly low place above the horizon – possesses its lowest level of luminescence, as if it had been both "chased away" and "besmirched" by its "brother" the Sun.

Zahan asserts that the knowledge contained within these enduring myths does not need “high scientific culture nor learned observations”; naked-eye or “empirical observations” are sufficient in keeping them alive.

Remaining in the southern hemisphere, the Paraiba people of northeast Brazil demonstrate an intimate understanding of the lunar cycle's influence upon the tidal ebb and flow of their estuarine and coastal environs. This understanding is especially pertinent to their crustacean and mollusc gathering subsistence activities which are outlined in (Nishida, A., Nordi, N., & Alves, R. (2006, 1-12). As a result of their fieldwork, the authors in this study conclude that the gatherers have an “accurate comprehension of tidal phenomenon [as influenced by lunar phases], based on their exploitation of natural resources.” This crucial local knowledge is then in turn handed down and thus “perpetuates through generations.” In recent years, Western research has begun to commonly refer to this longstanding traditional knowledge as indigenous ecological knowledge or in abbreviated form. Berkes (1998), describes IEK as:

...a cumulative body of knowledge and beliefs handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with their environment. (Cited in Woodward, E., Jackson, S., Finn, M., & McTaggart, P; 2012, p.58)

It should be noted that the use of the term IEK or TEK (traditional ecological knowledge) can be problematic for traditional/indigenous peoples who may view it as simply naming and then misappropriating such knowledge often for commercial gain.

The Woodward et al study examines the use of traditional indigenous ecological knowledge in understanding aquatic resource use and management in the Daly River region of Northern Australia. The researchers maintain that IEK is widely understood to be integral to the management of many indigenous customary land and water systems, including subsistence resource use strategies. In addition, and as is also illustrated in the Paraiba example, they further argue that whilst surveys of the literature indicate that knowledge transmission and its **longevity** is [justifiably] emphasised, increasingly many authors (Berkes, 1993; Goodall 2008) are also concerned to stress its **dynamism** [my emphasis]. This assertion of pragmatic and evolving indigenous modification and adaptation is made “in response to populist images of traditional knowledge as static or unchanging.” (Woodward et al, op.cit 58) As Mondragon states:

Calendars are based on experience. They are not unchanging, but are rooted in cultural landscapes and on living, changing forms of local practice. (Mondragon)

This observation does not pertain solely to traditional and Indigenous societies however, but is also true of Western science, as Kuhn (1977) cited in Turnbull (1991, p.30) has argued

The necessity on the one hand to ensure that a body of knowledge is maintained and transmitted intact, and on the other hand, the necessity that it be capable of innovation

produces what Kuhn has called 'the essential tension'. Arguably there is greater requirement for conservatism in an oral tradition, in order to ensure effective transmission, but that conservatism or 'closedness' does not automatically preclude change any more than it does in Western science.

Te Moana Nui a Kiwa - Oceanic Calendars

Traditional calendars in the Pacific provide reference frames within which communities are able to organise their localised knowledge and experience in relation to the surrounding environs of land, sea and sky along with the accompanying seasonal changes and cycles. Oceanic peoples' calendars are mostly based on the lunar cycles - the lunar months - and predominant wind and wave patterns and ocean currents. By means of their traditional calendars and other environmental indicators, communities are able to recognise the appropriate times in which to begin preparing and organising for the various stages, primarily of food production – from planting to harvesting of crops, such as yam, taro and manioc – but as well, shellfish gathering, fishing and hunting (Mondragon, 2013). These are the activities that Pacific peoples' subsistence economies are largely based upon. It is important to note also that these specific activities have their own respective associated rituals and celebrations.

Western Oceanic Longitudes

The indigenous agricultural calendar still in use on the island of Futuna in the Western Pacific is discussed in Kirch(1994). While the Gregorian calendar may have largely supplanted the indigenous Futunan lunar calendar in a wider sense, the enduring use of an alternative indigenous temporal classification – that of yam planting periods – remains extant. The crucial relationship between ecological seasonality and agricultural activity – the wet/dry cycle of rainfall, the period of cyclones and the integration of these latter with the swidden cycle - is well noted. Of added interest in relation to this yam-oriented calendar is, Kirch (ibid) observes, that the Futunan ritual cycle also appears to have been keyed to this wet-dry seasonality:

What I shall term the main 'ritual season' (in which first fruit offerings were pivotal) started with the onset of the wet season, and the beginning of the first yam harvests. (those yams planted in the ta'u mua).

Analysis of the journal of the French catholic missionary priest Pere Pierre Chanel (Father Peter Chanel), who was stationed on Futuna for three years in the early 1800s, provides some early contact insight into the specific ritual behaviours associated with key seasonal phenomena and the agricultural system.

Of major concern to traditional as well as contemporary Futunan people is the potential threat of either cyclones or drought and subsequent damage to crops or resultant famine (*oge*). According to Kirch, "Oge is no abstract concept; it is always a threat, lurking in the wings, subject to the vagaries of rain and wind." Indeed, as we have seen elsewhere in the Pacific in recent times increasingly recurring cyclones, typhoons, and other extreme weather patterns.

The priest's journal entries, beginning at the end of December 1837 towards the end of the monsoon season, describe various supplicatory rituals "addressed to the gods to forestall just such devastating natural events." The priest refers to a feast at which all the paramount chiefs of the Island appear to be in attendance. Subsequently, on the 5th of January he was invited to dine on bananas at Niuliki "the king of Singave's" house, possibly Kirch suggests, as part of a first-fruits ritual. Two weeks later:

...after a night of thunder and strong wind, with rain in the morning, the grand priest made kava and announced that the day would be tabu, "to kill the evil wind". The following day, three young men from Sigave brought a "superb turtle" to Niuliki as an offering...On the 20th the turtle was cooked and eaten in an elaborate ceremony ...without taro or other starch, after which kava was drunk.

Journal references continue intermittently throughout the following months until the end of May and the onset of the trade-wind ritual season and the concurrent appearance of Mataliki (Pleiades) on the eastern horizon just before sunrise. At this point frequent references are made in the journal to early morning kava ceremonies. The journal entry for 5th May 1838 states:

Sacred mass a bit late because of the kava.

Similarly, with particular reference to the rising of the Matariki constellation, brief mention can be made here of Tikopia, also located in Western Polynesia. The Tikopia cycle falls into the two main ritual periods of the "work of the monsoon" and the "work of the trade winds". Here too, the timing of the *nuanga* [turmeric manufacture], an important substance throughout Polynesia, is signaled by the appearance of the Matariki constellation. Turmeric is highly valued for its medicinal qualities and its use in the performance of certain rituals. Following the extraction and concentration process the resultant orange reddish "precious paint" is used to besmear the bodies of participants in formal ceremonial activities. Firth (cited in Kirch) quotes his Tikopian informant:

The Ariki Tafua said that when he saw it [Matariki] stand up directly over the shoulder of the mountain from his village of Matautu he knew that the turmeric was fit to dig.
(1967a: 29-30, 418)

The calendars, as we can see therefore, are not simply about food production or environmental resource management. Traditional Oceanic calendars are established upon the relationships that inhere between the people and their environment and all things contained within. Thus, they have;

important spiritual and cultural values attached to them...spiritual and ethical values, which relate to ancestral land, correct behaviour and non-Western forms of land use and appreciation. Local calendars are grounded in cultural land [sea and sky] scapes that

are often full of place-names, histories and presences – human and non-human, gods, etc. (Mondragon, op.cit p. 5)

Northern Oceanic latitudes

In her scholarly work on the traditional Hawaiian uses of plants, Professor Emerita - kupuna Isabella Abbott (op cit, p.19) discusses the religious dimensions of Hawaiian agriculture. She unambiguously states that “Hawaiian use and understanding of plants was thoroughly and profoundly religious.” Again, as with the Western Polynesians, the people of the Hawaiian Islands, located in the Northern hemisphere at the tip of the Polynesian triangle, also lived according to the lunar calendar, where the timing of many events including planting and fishing was underscored by Hawaiian religion and its associated rituals. Illustration of this relationship between religion and calendar is outlined:

The Hawaiian lunar, or synodic, month started and ended with the new moon...Each day had a specific name, often linking it to a particular god. Nine of the days, comprising four periods within each lunar month, were dedicated to worship of the four principal gods – Ku, Kane, Lono, and Kanaloa. During these periods, planting and certain kinds of fishing were disallowed, as were some other forms of work such as beating kapu

Traditionally, Hawaiian society viewed the *ali'i*, the high ranking chiefs, as the embodiment of the gods with principal responsibility for caring for the land (*malama 'aina*) on behalf of the *maka'ainana* (commoners – literally, eyes [people] that attend the land). Tasked with providing succour and protection as might be manifested in naturally occurring disasters, the chiefs and priests engaged, as we have seen elsewhere in Polynesia, in much ceremonial ritual activity, both celebratory and supplicatory. The former, in thanks for a bountiful harvest. The latter, in hope of protection from devastation of crops and shelter by seasonal cyclones.

The *Makahiki na o Lono* was a large religious occasion attended by much ceremonial activity. It was marked by the advent of the season of wind and rain, sometimes of cyclonic proportions. *Makahiki* began with the appearance of the first new moon after the rising of the star constellation *Makali'i* (Matariki, Pleiades) in the eastern sky at sunset. For the chiefs and priests, elaborate ceremonies involved in the *Makahiki* continued for some four months. While Kupuna Isabella is concerned to provide some detailed account of the *Makahiki*, she makes no apology for doing so, averring that what it reveals about Hawaiian society is too important to gloss over or lightly dismiss. She states:

Makahiki was much more than a gesture of thanksgiving and a break from routine; it gave form to the belief that maintaining a right relationship with the gods and the earth is humanity's basic spiritual challenge. It is also important not to ignore Makahiki's biological significance; a two-month period when the land could rest, plants could grow without being harvested, and the ocean could replenish itself.

Renowned Maori waka builder and member of the illustrious group of pwo navigators - kaumatua Hekenukumai Busby from Te Tai Tokerau, in the Far North region of Aotearoa, recounts his experience of seeing the rising of Matariki in the mid-1990s while voyaging on the waka Te Aurere. In spite of the countless thousands of nautical miles he has sailed over the decades, the sense of wonder and delight on this occasion is almost palpable in his kōrero

We don't use Matariki because it is often too high in the sky at the time of the year that we are crossing oceans. But in 1995 I saw it rise and I will never forget it. We were sailing from Hawaii to Rarotonga and had left on the first of June. Matariki rose on the morning of the eleventh of June that year and it was right there beside us. We were in the northern hemisphere and the stars were up on their side and when they came up that morning they were beautiful and so bright...I like to see it myself and I feel happy if it is a good year for sailing...and we did have a very good year...That is the connection now with Matariki and voyaging. (Hakaraia, L. 2004 p. 38)

Nga Huihui o Matariki – The Māori New Year

As we have seen with other societies across time and space, indicators such as the flowering times of plants, the presence (or absence) of stars, and the phases of the moon, were (and still are) also used by Maori to signal the seasons of the year.

Matariki is the star cluster that heralds the start of the Aotearoa Pacific new year and is important to Maori and Pacific people as well as other cultures around the world.

In Aotearoa the rising of Nga Huihui o Matariki (the cluster of Matariki) takes place in Takurua (winter) just above the eastern horizon in the early pre-dawn hours of the morning before the first light. Its appearance in the winter sky heralds the coming of the Māori new year for many of the iwi groups in Aotearoa. Celebration of its reappearance, however, may differ from group to group according to the particular phase of the moon. For some, feasting and festivities are held when the Matariki is first seen. For others, such as those of the east coast of the North Island, it is the appearance of the first moon after the rising of Matariki (Pleiades) that signals the arrival of the new year. For yet others, it is at the full moon after Matariki rises that it is observed. In the Far North, the South Island and the Chatham Islands, however, it is the appearance of the star Puanga (Rigel) which marks the onset of the new year at this time.

When Matariki (annually) disappears (for one month) during the Great - Tangaroa (moon nights) of the twelfth (month of the year, Ma-rua-roa, and the extended two), it reaches Mauka-hau: It remains seven nights there then passes on to and reaches Tararau-atea. It remains seven nights there then passes on to and reaches Papawhakatangitangi. It remains seven nights there then passes on to and reaches Titore-Maahu-tu. It remains seven nights there then re-appears during the Tangaroa (moon-nights) of the First (Month of the year, June).

The re-appearance of these stars is a period of great significance for Maori in which they acknowledge and celebrate their unique place in the world. It is a time for people to gather together, to wananga (share and discuss), to take stock of the health and well-being of their whanau (families) and communities and to make plans for the year ahead. Matariki provides an opportunity to recall, reinvigorate and restore longstanding traditional concepts and practices particularly in relation to their natural environment. In addition, and most importantly, the new year is regarded as a time of remembrance, thanksgiving and homage. It is a time when Maori as

tangata whenua give respect to the whenua on which they live and admiration to their mother earth Papatuanuku.

Matariki is also increasingly acknowledged and honoured with feasting and festivities by other cultures in Aotearoa for whom such long-standing traditions and acknowledgments resonate with similar occasions within their own, often ancient cultures and societies, from whence they have come. This is entirely appropriate as Matariki is inclusive, and embracing of, the diversity of life.

The following traditional table focuses specifically on the occasion of the new year period outlining the various stars that make up Nga Huihui o Matariki. Each star is allotted a domain with a particular set of relationships and/or responsibilities that pertain to its respective domain. Tradition has it that it is from the union of Rehua and Matariki that the other stars were born i.e. that the Matariki cluster came into being.

There are many stories about its [Matariki] significance as a navigational star and also as a portent on whether the coming harvest will be plentiful. (Ref)

As stated earlier in the testimony of the kaumatua and navigator Papa Hekenukumai Busby, the predictive capacity of the Matariki is seen as being dependent on the brightness or lustre of each star within the cluster.

There are many stories about its significance as a navigational star and also as a portent on whether the coming harvest will be plentiful. If the stars in the cluster are clear and bright, it is thought that the year will be warm and productive. If they appear hazy and shimmering, a cold winter is in store for us, and all activities during the period of Matariki must take this into account.

Whetu(star)	Star name	Description
Rehua	Antares	Rehua: well-being, health and healing.
Matariki	Alcyone	Matariki: well-being and health.
Tupu-ā-nuku	Pleione	Tupu-ā-nuku: all the foods that are gathered from below the earth such as kumara (sweet potato) which is a staple food for Māori.

Tupu-ā-rangi	Atlas	Tupu-ā-rangi: all the foods that are gathered from the sky or above the earth such as birds, berries.
Pōhutukawa	Sterope	Pōhutukawa: represents all the people who have passed away during the past year; this is the star that we remember our loved ones by and pay homage and tribute to them.
Ururangi	Merope	Ururangi: the weather for the oncoming year, in particular the winds that will occur during the year and their strength.
Waipuna-ā-rangi	Electra	Waipuna-ā-rangi: the pure waters from above and the rainfall for the oncoming year.
Waitī	Maia	Waitī: the freshwater habitats and their associated species.
Waitā	Taygeta	Waitā: represents the ocean's realms and the saltwater species within.
Hiwa-i-te-rangi	Caleceno	Hiwa-i-te-rangi: represents Ngā wawata (aspirations) me ngā moemoea (dreams). The hopes and dreams for the coming year.

Maramataka Māori – The Māori Calendar

Practiced for thousands of years in Oceania and wider Polynesia, upon arrival in Aotearoa, the Maramataka (Maori Moon Calendars) continued to form the basis of the cultural life of the community, acting as an indicator of appropriate times for the onset or cessation of various activities. In Aotearoa however, the Maramataka had to undergo considerable adaptation to a southern hemisphere sky, seasons, and most particularly, a temperate as opposed to tropical, climate.

Accordingly, whilst remaining faithful to its underpinning holistic, relational and spiritual values, the Maramataka was gradually refined and reconstructed in order to meet and utilise fully the newly encountered conditions, habitats and environs of the new home. As earlier noted, conservatism does not preclude change and the Maramataka, just as with other calendars, is an inherently responsive mechanism and institution.

Thus, the body of knowledge that is contained within the Maramataka continued its incremental expansion over many centuries and generations of Māori living in close contact with nature. Drawing from its original multiple sources including traditional Maori beliefs and teachings; from tohu - traditional Maori signifiers; from Maori prophecy and predictions; and not least from Maori

astronomy, the Maramataka became consolidated and entrenched, relevant, and most crucially - specific to Aotearoa.

Maramataka or Maori Moon Calendars then, reflect the sophisticated and comprehensive scientific knowledge bases and technological traditional practices of Māori time keeping. In the first instance, as we have seen from the earliest evidence of the use of the lunar calendar, these practices were born out of the basic need for survival and sustenance and the subsequent necessary provision and preparation of food in order to ensure that survival.

The institution of the Maramataka in accordance with the moon phases, established the appropriate times and the requisite procedures necessary to gain full potential from planting, harvesting, fishing and hunting. In turn the fruits of bountiful harvest and the ability to fulfil the cultural expectations of manaaki (hospitality) further enhanced the reputation, the mana (prestige) and the importance of the knowledge gained from the practice and successful application of the Maramataka.

In Aotearoa, the similarities as well as the differences between tribal (and hence physical and geographical) areas are also of interest. For example, horticultural activities feature strongly among the northern tribes such as Ngāpuhi due to warmer climatic conditions and the richness and fertility of the soil; sea fishing among coastal tribes such as Te Whānau-a-Apanui and Ngāi Tahu due to an abundance of migrational species and ready access; forest foods (birds and rats) among inland peoples such as Tuhoe and Waikato/Tainui tribes, again due to ready access and plentiful bird species, as well as freshwater fish and tuna (eels) .

There are several other aspects of interest in any analysis of these traditional calendars, including the origin and meanings of the names of each moon night; the rationale for their sequential arrangement and groupings in the calendar; the differences in the number of moon nights; and how the monthly moon calendar was synchronized with the sun-regulated seasonal cycle.

Maramataka – The Lunar Calendar

It is apparent then, that the role of the moon as a timekeeper was of utmost importance to Maori. This is demonstrated by the presence of the Maramataka based as it is on the number of nights taken by the moon to complete a revolution of the earth. It was indeed used, as we have seen, to mark the onset of the new year. However, the use of the Maramataka extended far beyond simply providing a marker for identifying and commemorating significant occasions throughout the year. Monthly moon calendars are more specific than seasonal cycles in that they specify the actual days on which certain activities are or are not advised. Each lunar phase represents the particular aspect or nature of the moon at this time of the month.

Po (Moon night)	Description
Whiro	This is the New Moon. It is a good time to go eeling however not so much for planting.
Tirea	It is a good time to go eeling, fishing and planting.
Hoata	The moon is starting to increase, this is a good time to plant and fish.
Ouenuku	It is a good time to go eeling, fishing and planting.
Okoro	It is a good time to go eeling, fishing and planting.
Tamatea Ngana Tamatea Kani Tamatea Kai Ariki Tamatea Whakapa Tamatea Aio	This is first quarter of the Māori lunar cycle. The weather will start to turn, be careful. The Tamatea lunar phases are a time in the cycle when the bad weather will set in. There are usually high winds, rains and floods during this time.
Huna	Not a good time for planting, it is a good time to go eeling, but not fishing.
Ari	It is not a good time to venture on the sea. The weather is very unforgiving.
Maure	The weather is still not good, it is better to stay in the garden.
Mawharu	It is a good time to go eeling, fishing and planting.
Ohua	All things are hidden therefore it is not a good time to try and harvest from the sea.
Hotu	Everything is vibrant and full. All foods are ready for the taking, it is a good time for fishing, crayfishing and eeling.
Atua	It is a good time to go eeling, fishing and planting.
Turu	This is not a time to go travelling or venture far from home. This is not the time to have meetings of significance.
Rakau-nui	It is a good time to go eeling, fishing and planting.
Rakau Matohi	This is the Full Moon phase. This was a very significant lunar phase, it is a time of celebration and when important events were held. The crowning and coronation of Māori royalty in kingitanga were always held on this phase. This is a good day for planting kumara.

Takirau	It is a good time to go eeling, fishing and planting.
Oike	It is a good time to go eeling, fishing and planting kumara if you are going to make kumara kao, a Māori delicacy.
Korekore Whiwhia	It is a good time to go eeling, fishing and planting.
Korekore Rawea	This is not a good time to plant, fish or other such activities. It is perhaps a good time to prepare all your equipment for the following period that is about to come.
Korekore Hahani	Preparation is the key in this time.
Korekore-Piri-ki Tangaroa	It is not a good time to go eeling, fishing or planting in the morning, however in the evening you may be able to start fishing.
Tangaroa-a-mua	This is the most optimal time of the Maramataka. It is the best time to go fishing. The sea will be plentiful with food.
Tangaroa-a-roto	This is a good time to go planting, fishing, eeling, crayfishing, whitebaiting. It is the best time to go and collect food from the sea.
Tangaroa kiokio	This is a good time to go planting, fishing, eeling, crayfishing, whitebaiting. It is the best time to go and collect food from the sea.
Otane	This is a good time to go planting, fishing, eeling, crayfishing, whitebaiting. It is the best time to go and collect food from the sea.
Orongonui	This is the Last Quarter
Mauri	It is a good time to go eeling, fishing and planting
Omutu	It is a good time to go eeling, fishing and planting
Mutuwhenua	The moon is in darkness. This is a good time to view the stars as the moon is in total darkness.

Nga Tau – The Seasons

All human societies particularly in temperate climates have to make use of a variety of seasonal indicators to predict the season of the year. Seasonal changes can be measured in various ways, including division into a “wet” and a “dry” season typical of tropical regions. In temperate regions the equinoxes (vernal or spring, and autumnal) which in the Southern Hemisphere occur in September and March respectively, when the sun is above and below the horizon for equal lengths of time and thus the lengths of day and night are equal, help divide the year into four

rather than two seasons. These two seasons are personified by Hine-takurua and Hine-raumati. Tama-nui-te-ra (the Sun) had two wives. In the winter time he would reside with his wife Hine-takurua (the Winter maiden) and then in the summertime he would reside with his wife Hine-raumati (the Summer maiden). Below are the four names for the seasons of the year for Māori:

Tau(Season)	Description
Koanga	Koanga takes place from Mahuru to Whiringa-a-rangi.
Takurua	Takurua takes place from Pipiri to Here-turi-koka.
Hotoke	Hotoke takes place from Poutu-te-rangi to Haratua.
Raumati	Raumati takes place from Hakihea to Hui-Tanguru.

Nga Marama – The Months

The monthly calendar and table of attendant stars outlines what is happening during this period and what to expect. It provides a series of weather observations and the anticipated temperatures that will ensue for that particular time of the year.

Marama(Months)	Whetu(star)	Description
Pipiri	Pipiri or Pipirioterangi and the two stars Hamal and Sharatan in the constellation of Aries	This is the month when winter starts to appear, the ground starts to get cold and everyone starts to gather together to begin Wananga(learning workshops).
Hongonui	Takurua is Sirius in Canis Major	This is month is the depth of winter when everything is closed up.
Here-turi-koka	Te Toru Here Pipiri is Perseus	Winter is still present, people stay close to home by the fire.
Mahuru	Mahuru is Alpha Hydra	It is starting to warm up and the flowers and trees are beginning to bud.
Whiringa-nuku	Kōpū is Venus in the morning	The earth has now become quite warm.
Whiringa-rangi	Whitiānaunau is Leo	Summer has arrived and the weather is hot.

Hakihea	Hakihea is Centauri	This month we feel the heat of summer.
Kohi-tatea	Rehua is Antares in Scorpius	Fruits are in abundance and ready to harvest and eat. Preserving is a must during this time for the winter.
Hui-tanguru	Rūhiterangi is Alniyat in Scorpius	Make the most of the food that is plentiful, preserve and prepare the food for the winter months.
Poutu-te-rangi	Poutūterangi is Altair in Aquila	The crops are ready to harvest, the kumara are ready. This is the time to celebrate after the work has been done.
Paenga-whawha	Paengawhāwhā is Pegasus	The celebrations of the harvest are complete and now the tasks begin of starting to get ready for the encroaching winter period again.
Haratua(May)	Haki Haratua is Pegasus	All the crops have been preserved and stored in preparation for the winter. The Store pits should be full with the kumara harvest that was bountiful from the summer.

Maramataka i te ao hurihuri – Maramataka Today

Today, while many Māori may be aware, and thankfully increasingly knowledgeable, of fishing and planting practices as proscribed by the Maramataka, for various reasons including urbanisation and loss of land and resources it is not a practice that is necessarily prevalent. With so many accessible modern conveniences, Maramataka can be considered time-consuming, irrelevant and somewhat laborious. However if we are to regain, retain, and restore valuable mātāuranga, our traditional knowledge, it is imperative that we pass on and instill this knowledge into our children. In so doing, Mātāuranga Maramataka (wisdom, knowledge, understanding of Māori Moon Calendars) can and will provide a catalyst to trigger simple behavioural shifts, based on long-standing cultural precepts, that will enable more productive and sustainable lifestyles not only during our lives, but just as importantly, in the lives of the generations to follow - tērā te moemoeā (that is the dream).

References

- Abbott, I. A. (1992). *Lā'au Hawai'i: Traditional Hawaiian uses of plants*. Honolulu: Bishop Museum Press.
- Berkes, F. (1998). *Sacred ecology: Traditional ecological knowledge and resource management*. London: Taylor & Francis.
- Depuydt, L. (1998). *Civil calendar and lunar calendar in ancient Egypt*. Leuven: Peeters en Departement Oosterse Studies.
- Duncan, D. E. (1998). *Calendar: Humanity's epic struggle to determine a true and accurate year*. New York: Bard.
- Kirch, P. V. (January 01, 1994). The pre-Christian ritual cycle of Futuna, Western Polynesia. *The Journal of the Polynesian Society*, 103, 255-298.
- Marean, C. W. (January 01, 2010). When the Sea Saved Humanity. *Scientific American American Edition*, 303, 2, 54-61.
- Matamua, R. (2017). *Matariki: The star of the year*. Wellington, Aotearoa, N.Z: Huia Publishers.
- Mondragón, C. (2004). Of Winds, Worms and Mana: The Traditional Calendar of the Torres Islands, Vanuatu. *Oceania*, 74(4), 289-308. Retrieved from <http://www.jstor.org/stable/40332069>.
- Nakashima, D. J., United Nations University., & UNESCO. (2012). *Weathering uncertainty: Traditional knowledge for climate change assessment and adaptation*. Paris: UNESCO.
- Nishida, A. K., Nordi, N., & Alves, R. R. (January 01, 2006). The lunar-tide cycle viewed by crustacean and mollusc gatherers in the State of Paraíba, Northeast Brazil and their influence in collection attitudes. *Journal of Ethnobiology and Ethnomedicine*, 2.
- Nishida, A. K., Nordi, N., & Alves, R. R. (January 01, 2006). Molluscs production associated to lunar-tide cycle: a case study in Paraíba State under ethnoecology viewpoint. *Journal of Ethnobiology and Ethnomedicine*, 2.
- Oliveira, C. (January 01, 2009). The Moon in the Perception and Measurement of Social and Ritual Time. Comments on the Pre-historic Record. *Astronomical Society of the Pacific Conference Series*, 409, 364-369.
- Roberts, M., Weko, F., Clarke, L. (2006). *Maramataka: The Māori moon calendar*. Lincoln University (Canterbury, New Zealand), New Zealand: National Centre for Advanced Bio-Protection Technologies AERU.
- Selin, H., & Xiaochun, S. (2000). *Astronomy Across Cultures: The History of Non-Western Astronomy*. Dordrecht: Springer Netherlands.
- Tawhai, W. (2013). *Living by the moon: Te maramataka a Te Whānau-ā-Apanui*. Wellington, Aotearoa, N.Z: Huia Publishers.
- Woodward, E., Jackson, S., Finn, M., & McTaggart, P. M. (January 01, 2012). Utilising Indigenous seasonal knowledge to understand aquatic resource use and inform water resource management in northern Australia. *Ecological Management & Restoration*, 13, 1, 58-64.