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Weather Magic as Environmental Knowledge in Southern Vanuatu

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Abstract. *This paper presents weather magic practices from the islands of Tanna and Aneityum, in southern Vanuatu, and highlights how this phenomenon is a critical domain of Indigenous environmental knowledge, particularly knowledge involving plants. Recent literature suggests that diverse cultural systems, such as music, can be viewed as domains of environmental knowledge, and we propose that magical systems should be afforded the same recognition. Although anthropological work in Melanesia has historically featured various magical practices, relatively little has been said about how these have been used to influence or understand the weather, and even less has been presented directly by Indigenous weather magic practitioners, who are co-authors on this paper. In this contribution, we intersperse anthropological and ethnobotanical commentary with verbatim narratives provided by three local experts in weather magic from southern Vanuatu, including oral histories, contemporary narratives, and the results of ethnobotanical surveys. The detailed knowledge that weather magic practitioners on these islands hold regarding their local environment represents an important means of transmitting not only cultural heritage, but also botanical knowledge, the maintenance of which may be critical for current and future conservation efforts. This research documents rich cultural traditions of local and global significance which are worthy of the attention and preservation afforded to other forms of Indigenous environmental knowledge. The goals of magic and those of science are not necessarily inherently opposed, and we show that magical practice can indeed involve and even preserve a detailed and powerful mode of knowing the environment.*

Keywords: ethnobotany, weather magic, environmental knowledge, Vanuatu, Tafea

“It is therefore better, instead of contrasting magic and science, to compare them as two parallel modes of acquiring knowledge.”

—Claude Lévi-Strauss, *The Savage Mind* (1966)

Introduction

The literature on magical plants is global and long-standing, and while most studies concern plants used for medicinal magic

(Bussmann and Sharon 2016; Cavender and Albán 2009; Evans-Pritchard 1976 [1937]; Myren 2011), a few discuss the use of plants in weather magic (de Beer and Van Wyk 2016; Moteetee 2017). Recent studies aim to legitimize the use of plants for magico-medicinal purposes by analyzing their pharmacological properties (Akendengue et al. 2005), while others have determined that the use of plants in magic can increase agrobiodiversity (Kawa 2012). However, despite increasing recognition that environmental knowledge is conveyed through a diverse

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array of Indigenous systems (e.g., music; see Balehegn 2016; Curran et al. 2019; Diettrich 2018) and the fact that the performance of magic requires a significant body of knowledge (Regourd 2013), magical practice has received little attention as a vehicle for environmental knowledge. Among those to recognize the ties between magic and environmental knowledge is Hviding (2003:173), who, writing on Marovo cultural practices from the Solomon Islands, suggests that “[magical] acts appear in daily life as highly pragmatic, observable ‘tools’ in handling problems posed by the environment.”

In Vanuatu, weather magic is a critical domain of magical thought and lore which, along with associated governance systems and traditional worship, are all part of *kastom*, the Bislama rendering of the English “custom.” We adopt Lindstrom’s (2020:5) definition of *kastom* as a Ni-Vanuatu “label [for]...festivals, along with any traditional or local practice, style, or belief.” Essentially, *kastom* is the set of things that ni-Vanuatu consider to distinguish themselves from other peoples; an evolving syncretism of Indigenous pre-European practices and contemporary ideas which “is as much rooted in tradition as it is in movement and change” (Bonnemaison 2000:79).

Molnár provides a strong grounding for the understanding of weather magic as “a particular type of magic, a structured set of beliefs and the rites connected to them, rites aimed at affecting changes in the weather” (Molnár 1994:62). However, in part due to the ways in which local peoples conceive of magic, there is an ongoing dialogue in anthropology about the intended meanings of the term *magic* itself (Trompf 1991). We note Rio’s (2019:334) cautionary advice that the word differs widely in popular usage from how anthropologists intend it: “If we are to use the terms ‘witchcraft’, ‘sorcery’, or ‘magic’ we have to extricate them from their English sense, and keep in mind that these terms can only be generalized approximations of indigenous concepts.”

Rio (2019:334) also notes that when one speaks of magic in Melanesia, in fact “[w]e are often dealing with a multitude of interpersonal relations that determine health and well-being.” In our conversations with ni-Vanuatu experts, they consistently frame weather magic as part of a holistic system of belief, expertise, and practice relating human well-being and the environment. We choose to use the term magic not to suggest that people in southern Vanuatu see these practices as something supernatural and distinct from everyday life; they do not, nor is there a local term to refer to magic as a general concept. Rather, we use the word to refer to the body of formalized ritual practices that special practitioners use through natural media such as stones and plants to affect the world around them. Despite the lack of Indigenous labels, magic as a whole and weather magic as a subset therein are talked about in those terms today, including during our Bislama- and English-language discussions on these topics.

Anthropologists of Melanesia have produced an extensive body of literature describing garden magic, protective magic, and—to a lesser extent—weather magic, which begins to reveal the connections between magic and Indigenous environmental knowledge. Malinowski (1935:62) notes of the Trobriand Islanders (of Papua New Guinea) that “...among the forces and beliefs which bear upon and regulate gardening, magic is the most important, apart, of course, from the practical work.” Special practitioners inherit the ability to influence the sun, rain, winds, and sea by using specific plants in combination with magic stones, rituals, and incantations (Lindstrom 1980, 2020). This hereditary magical ability is highly valued in Vanuatu, being, according to Spriggs (2007), the main source of chiefly power on the island of Aneityum. Among the earliest writings on these practices is Codrington’s (1891) work covering much of Melanesia, wherein he describes a broad range of magical practice. In another early

work, Humphreys (1926:172) notes: “The commonest form of magic [on the island of Tanna], as elsewhere in Melanesia... may be said to be the use of elements, rain, sun, wind, for or against the gardens of the people.” Ni-Vanuatu magic also enjoyed renown among neighboring cultures, such as the Polynesian outlier of Tikopia, in the Solomon Islands. As Firth (1966:476) writes: “The Tikopia believe that in the New Hebrides the natives possess magic of a very powerful kind which operates through the medium of leaves...” Bonnemaïson (1994) describes Tannese sun and rain rituals involving plants. The close ties between weather magic and the spirit or ancestor world are another key part of this system (Codrington 1981; Firth 1970; Malinowski 1935; Robertson 1903).

This paper focuses on the connections between weather magic and environmental knowledge, as described by contemporary local experts (including three co-authors on this paper—Neriam, Noar, and Wahe) from the islands of Aneityum and Tanna in southern Vanuatu¹. In our field studies, we explore how weather lore intersects with environmental expertise, and especially plant knowledge, through the words of weather magic practitioners (Noar) and other cultural experts (Neriam and Wahe). We fill a gap in the literature by recording the scientific names of 26 species of plants used in weather magic along with their vernacular names and uses.

Methods

Study Site

The Vanuatu archipelago consists of 80 inhabited South Pacific islands in the central-eastern portion of Melanesia between the Solomon Islands, Fiji, and New Caledonia. The country is a remarkable hot-spot of biocultural diversity. It is the most linguistically dense country in the world, with an estimated 138 languages spoken by a population of 270,000 (François et al. 2015; VNSO 2017). This linguistic diver-

sity corresponds to remarkable biodiversity; within the East Melanesian Islands Biodiversity Hotspot the archipelago forms the Vanuatu Rainforests ecoregion (Aalbersberg et al. 2012). Despite ongoing threats to both linguistic (François et al. 2015) and biological diversity (McNamara and Prasad 2014; Petz and Ginnetti 2013), ni-Vanuatu maintain strong *kastom* practices closely tied to the environment.

Tanna and Aneityum are volcanic islands in southern Vanuatu’s Tafea Province, neighboring the islands of Futuna, Aniwa, and Erromango. Tafea is the most biodiverse region of the country (Schmid 1975), with a cooler and drier climate despite frequent damaging cyclones (Aalbersberg et al. 2012). While only one language, Anejonĩ, is spoken on Aneityum (locally called Keamu) by a population of 900 people, five local languages are spoken on Tanna: Netwar, with 11,500 speakers; Narak (or Whitesands), with 7,000 speakers; Neuai, with 5,000 speakers; Naka, with 4,500 speakers; and Nafe, with 3,500 speakers (Eberhard et al. 2022). In this study, we primarily worked with speakers of Anejonĩ, Nafe, Naka, and Netwar.

Plant Collections and Interviews

On field expeditions to Tanna and Aneityum in 2016, 2018, 2019, and 2021, we gathered and talked about plants and weather magic as part of the *Plants and People of Vanuatu* project (Figures 1 and 2), recording verbatim narratives on the subject. This project is a collaboration between a diverse group of scientists, including botanists, ethnobotanists, mycologists, local *kastom* experts, linguists, and conservationists based at eight local and international institutions, working in partnership with local communities. During discussions, we linked cultural information on the specific uses of a plant to physical collections of each species, as a voucher for current and future research. Herbarium collections are deposited at the Vanuatu National Herbarium (PVNH) in Port Vila and international institutions, including



Figure 1. Botanist Thomas Junior Doro pressing plant specimens on Tanna Island as part of the process of studying the biocultural diversity of Vanuatu.

the New York Botanical Garden (NY) and the South Pacific Regional Herbarium (SUVA) in Fiji, among others.

Our field notes include the date, location, and habitat of each plant, along with a physical description of the plant (size, color, etc.), and a listing of the names of all those who participated in making the collection. Ethnographic data includes the vernacular name (always noting the language) and any uses or beliefs associated with that species. Building on this plant-specific dataset, we conducted interviews about various topics related to plant knowledge in Vanuatu, including weather magic. Questions posed during the interview process were open-ended, inviting anyone in the community to share any information that they wished to contribute. Our project collected only general knowledge about plants, and we asked all contributors not to disclose knowledge that is considered secret or

proprietary as part of our Prior Informed Consent process. Field notes were sometimes enhanced through use of audio and video recordings made during discussions. The narratives included in this paper are taken from discussions conducted in English and are transcribed verbatim. Other work was conducted in local languages, including Bislama, a creole *lingua franca* spoken by most ni-Vanuatu.

Weather Magic Narratives: Origins and Present Practice

Aneityum

Much of the weather lore on the island of Aneityum concerns the sun, and the people maintain oral traditions describing sun worship. Reuben Neriam, Spokesman to Chief Simon of Anelcauhat, narrates local beliefs about traditional local beliefs, the sun, and weather magic on Aneityum:



Figure 2. Author Gregory Plunkett (right) consulting with Vanuatu cultural experts, including Presley Dovo (seated at center, looking to the left) at the village of Ipuangin, North Tanna.

Where I come from, our ancestors, but we no longer use it now, were sort of sun god worshippers. They come out to a place where there's a big red [area] without tree growing in them, and then before the sun comes up you get there first. And then before the beams comes up, that's when you practice the worship. You find the knees, put the knees in the ground, you stay there maybe one to two hours, and then get back to where you come from. And they believed that the god, the sun god, is the god, which we have a name: *Nagesega Rada*. '*Nagesega*' is sun, and '*Rada*' is something like 'god worship.' He will answer your belief or he will give it to you... That's where you also can find this—the other sign of the Walking Sun... it's part of Umej, up east into Anejo. *Nagesega Atga*... It has two legs, and if you look closely to it, you can find those beams—there are about six or seven of them—it symbolize the governance system... They call [the legs] the two brothers. One long, the other short. Sometimes, without these,

you can find same thing but with circles that goes around.

In the governance system, there are two main jurisdictions: the "South" (eastern half of Aneityum) and the "North" (western half). According to stories recounted by Neriam (from the South) and Wopa Nasauman (who hails from the North of the island), two waves of settlers known locally as *Matua Ailed* or "Paddle People" settled on the island after the original people, the *Nupua Naiwanma*. These settlers are credited with the introduction of sun worship and new technologies such as irrigation and stone walls. Over time, the people of Aneityum adopted sun worship and developed a *kastom* governance system which is integral to understanding Aneityumese sun worship and weather lore.

Each jurisdiction of Aneityum is headed by a Paramount Chief. These chiefs, alongside the "Holy Priests," called *Ilpūatimarid Itap* in the South and *Ilpusohos Itae* in the North, are those who can influence the sun, weather, and sea. The details of this governance system are represented in the image of *Nagesega Atga*, the Walking Sun (Figure 3).



Figure 3. Two variants of the image of *Nagesega Atga*, the Walking Sun. A: Aneityum islanders Orien Namu (left) and Chris Nevehev (right) and their sand drawing of a rayed sun, near Anelcauhat. B: Aneityum islanders Wopa Nasauman (left) and Kelly Makoy (right) with a sun petroglyph found near the village of Umeij, featuring concentric circles.

Around the solar circle seven rays are drawn. Four rays represent the principal districts (Anelcauhat, Anejo, Anawonjei, and Umeij), and these alternate with three rays that represent the subdistricts (Anawonse, Anaiji, and Anivat). Beneath the solar circle are two legs of unequal length. The longer of the two legs is a tall spirit named *Nagesega Rada*, meaning “we worship the spirit of the Sun God.” *Nagesega Rada* is associated with the southern paramount chiefdom and comes from Matthew Island (Uñai Nupni in Anejom̄). The shorter leg is *Nowaneañ Anivat*, a short spirit (from which the coconut comes). *Nowaneañ Anivat* is associated with the northern paramount chiefdom and comes from Hunter Island (Uñai Neañ in Anejom̄). The Holy Priests of the northern and southern paramount chiefdoms were traditionally granted their powers during journeys to Hunter and Matthew Islands, respectively.

After when the Christianity came, well we didn't say the activity that brings the Christianity it's a wrong thing; it's a good thing. And then it's just stopped, the idea. So that's when everything is just stopped, and then we intend to worship God. But as for me, I would believe if instead of honoring the stones or the tree

or what, you just keep remember in your mind, that there's someone did that, in the past. But according to the beliefs and the ritual activities and the structures in there, we're supposed not to get rid of them, or some of those powers. We're supposed to not get rid of them. And then when the missionaries came, “don't do this, don't do that, you are worshipping devil” and this, and then we just let go everything. (Reuben Neriam)

Long after the development of the *kastom* government, the arrival of European traders and missionaries and the diseases which they carried led to collapse of the population of Aneityum and its traditional governance, pushing sun worship underground. From a projected population of nearly 6,000 people in 1830 (before arrival of Europeans) the population crashed to below 200 in the 1930s (Spriggs 2007), and the great majority of the remaining people gathered together in just a few population centers. Some people fled to the remote eastern coast of the island, around present-day Imtanya, bringing with them many of the island's sacred stones. Today, most people on Aneityum hold on to aspects of the traditional belief system, including reverence for the sun and sacred sites on the inland and eastern coast of

the island. These beliefs include a detailed system by which the people of Aneityum influence the sun and the weather.

Still the young people now they still introduce this until today. If you go to some places in the east, and you happen to walk on some places that are forbidden, not for people to go, there will be heavy rainfalls or big sea. So, you have to go back ritually, to get some leaves and put them on top of the stones, and then it will calm back down. So, what we're saying is, it's still there, but maybe we just try to rebuild it back and try to find a way that we can—I mean, our ancestors' spirits are still there. (Reuben Neriam)

Weather magic on Aneityum involves requests to the sun god and to each tribe's spirits, which have control over domains such as yams (*Dioscorea* spp.), kava (*Piper methysticum*), fish, and weather. When Aneityum still had functional *nakamals* (ceremonial gathering grounds), all people from a given tribe (e.g., all the taro-tribe people, a local usage of "tribe" more akin to totemic groupings) would gather together in the special *nakamal* for that crop (e.g., the taro *nakamal*). While there, they would prepare kava, discuss matters, and make "reports" from their individual gardens. The chief of that *nakamal*, called the *Natimarid Uilpuaca*, would then make the *tamāva* (*tamafa*), or ritualized spitting of kava as a means of communicating with the spirit world (Lindstrom 1980)². By making the *tamāva*, the *Natimarid Uilpuaca* "stamps" the report for the whole tribe. The *tamāva* must be completed before the sun sets. The setting sun then receives the report, and carries it as cargo on its back, delivering the report to the moon after sunset. As the moon rises and crosses the sky, it talks to and delivers the report to *Iplu-Halu Comñomoi*, which is the constellation of the Pleiades and is also a spirit. This constellation then relays the message back to the *graon* (Bislama for

"ground," "land," or "earth") before daylight. If the report indicates that things were not going well in the gardens, then the *graon* can adjust the amount of sun, rain, or wind. In addition to making a *tamāva* to "stamp the report," a *tamāva* can be made as a direct request for changes in the weather which the sun will deliver to the spirits of a tribe.

Plants play a key role in the weather magic of Aneityum Island, as is illustrated in Neriam's narrative and Supplementary Table 1, which details rituals and lore associated with specific plant species. Some are *tabu* plants, which if touched can cause problems with the weather, while most are used intentionally for desired changes in the weather and seas. Sometimes, people on Aneityum call for a destructive force which will heal the land. There is a legendary ritual to invoke *Namlainhas*, a great increase in the strength of the sun, which Neriam recounts in detail:

I don't know about the other areas, but especially where I come from, where our ancestors at one time they were sun god worshippers: we have legends, we have stories. My grandfather told me that you can ask the sun to burn all full island, and it will happen. Kills everything. We call it *Namlainhas*, a real hot sun. And then, to reduce the power of the sun again, we do the replanting...

We have some plants... Aneityum is a round island, I mean we have north, south, east, and west. And we have some plants like *nijiga*, *nedun nijiga* [*Vaccinium macgillivrayi*], for example, I can only name two or three. *Nedun nijiga*, *nedun nanad oḗa* [*Heliotropium arboreum*], and some collections there. And you collect them from the west, you follow top of the mountain to the east, and there are places that, they call it *Nedun Necdaduin Cap*. And that's where you do the burning. But, for doing the burning you have to cleanse yourself, in a way that—you are not allowed to

sleep with your—if you have a wife. You are not allowed to eat certain foods. For clean your body, you go to eat a pig with everything, the intestine, without cleaning it. And then you go mess for two to three days and it cleans all the body. And then you have to, you have some other leaves you rub it [on yourself] and then you swim. Then you get to where you do the sacrifice. So, there's a big hole in there, you put every woods inside, and you burn, and that's when you believe it, you worship it, it happens. And now, until today, it's not allowed to burn that hill...

We call it *Namlainhas*, and if you say “*Namlainhas*” to Aneityumese people, they know. Everything will burn. Everything. Nothing. When *Namlainhas* come, there are some plant like *naligaj* [*Curculigo orchioides*] they dig up, and now they start talking about, “Oh, maybe this is happen because of some reasons” and they will start to talk and find out the reason why this is happen, and then they have to do some other ritual activities to confess or well repent or come back to the system or something like that and then that will be removed. The way of removing that, you have to get some more plants, put them in a *laplap*, the red *laplap* leaf, and then you follow the hill down to the bottom, pour it from side to side, and there are songs that you have to sing. It's all like worshipping, yeah. At the end of the day, the black clouds appear upon the clouds, pour that sun down, and everything germinates back. (Reuben Neriam)

While these customs are still known to the people of Aneityum, they are practiced less and less. The suppression of Indigenous beliefs and the collapse of the island's population during missionary times ended the *kastom* government, along with the order of priests that specialized in Aneityumese magic. However, there are ongoing efforts to

revitalize the traditional practices and beliefs of the island.

Tanna

Jean-Pascal Wahe of Kamanatuwan and Chief Johnson Noar of Port Resolution, both Nafe-speakers from southeastern Tanna, introduce Tannese weather magic:

In Tanna, we have a system—we say the governance system, traditional governance system—but we have some people in the system that they are very special in, you can say the weather man, the weather people, that they can make the sun, they can make rain, they can make wind for planting crops. So, like in my village, I have... he's like a old *tabu* man. He's looking for the sun. And he got the stones and got the leaves and got everything that he can name all the position of the sun and the long day and the short day. And also he can burn down the clouds when there's a lot of clouds, he can make a fire and burn the clouds... To clear the clouds. And if there is a lot of clouds then there will be rain and sometime when a lot of rain there, a lot of flood you can make a fire or something, some ritual to burn down the clouds or move out, moving the clouds away. Or sometime we were in south where we have a lot of volcano ashes, so we can make the wind and the sun to blow out the ashes from the south. (Jean-Pascal Wahe)

So, on the island of Tanna we have that people still look after the weather. Like, me one in there, my community. For showing that, the daylight, we have a special plant to use it. To call the sun. And with the kava roots. Then, when the cloud is thick in the day, so they send us the kava and I drink the kava and talk to the god and then he will open the cloud and we can see the daylight. We can see the sun. And then sometimes, you don't know that this is the plant for

the rain, then you cut, and put, drown it in the sea, under the water, and then it can rain. Any times. Might you think that this tree, it's nothing, so you cut and drop them down in the sea or in the river and about an hour you can find that rain is coming. And you might think that someone's doing rain, or God sent you rain, but that's only false, that you don't understand that this is the tree that they use for the rain. (Chief Johnson Noar)

In addition to chiefly roles, there are men on Tanna who have special responsibilities for particular activities, including various aspects of agriculture, fishing, and diagnosing/healing illnesses, among others. These men are known as *tupanas* (Nafe), *tupunus* (Netwar), or *tipunis* (Naka)³, and among them are men who influence or control a specific domain of the weather, such as the sun, rain, individual winds, or the strength of the sea⁴. Individual *tupanas* maintain particular magical stones, which are generationally inherited. Each stone has its own unique name and domain and is kept in a miniature canoe called a *niko* (in Netwar), which is stored in an *iik awsim* (*tabu* place). To cast weather magic, the *tupanas* can perform rituals, including the application of certain plants (see Supplementary Table 2) to stones from his *niko* and by "making *tamafa*" (ritually spitting kava). First, however, a *tupanas* must be "perfect," meaning that for a prescribed period of days, he must drink only kava, eat nothing but roasted food, bathe in certain sacred places, and abstain from sleeping with his wife. Once a *tupanas* is perfect, he is ready to perform his magic. To better understand how people influence the weather, we will first discuss the oral history of Tanna as it was recounted on different parts of the island, which elucidates the origins of weather magic and the role of sacred plants and stones in these systems.

Tannese people tell that the first people on the island were living stones, or "stone men," who moved around the entire island. These stones gave rise to different kinds of

food, such as yams, taro, and fish, as well as the sun, moon, wind, rain, and thunder. At some point before the current inhabitants came into being, a race of diminutive, mysterious people appeared on Tanna. In Naka they are called *Kaunun*, and in Nafe they are known as *Iapar*. They can still sometimes be heard at night and will occasionally lend their voices during dances and celebrations to create a fuller sound. In the Naka story, sometime after the *Kaunun* appeared, two stones on a sandy beach gave rise to two baby girls, and from the stones blood could be seen flowing. Later, these two girls had babies, for which the vines of *manolu* (*Ipomoea pes-caprae*) were the fathers. In the Nafe telling, present-day people were also born from two stones: a stone in north Tanna gave rise to woman, while man originated from a stone in south Tanna. Today's people are the descendants of those born from the stones.

Two Netwar *tupunus* named Nepio and Loman, from Lamanafa village, provide a version of the story that explains the origins of weather magic on Tanna. As they tell it, in the early days, the living stones were the sole inhabitants of Tanna. They roamed the island, talked, and had magical powers over nature through spirits who inhabited them. At this time, the stone men drank only *nakwiam* (wild kava) in their *nakamals* and there was everlasting day. The sun scorched the ground, and the stone men had no time to rest. Then the legendary hero Kalpapen⁵ appeared with a kava root, a black rooster, and *iawitaleg*, a kind of cicada. Kalpapen prepared his kava, and his wife Nahunu prepared food and handed it to him while remaining hidden in *nuig* (wild cane), to prevent her from seeing the kava. Then Kalpapen set free the rooster, who started crowing, and the *iawitaleg*, who started to sing, and the very first night began falling on the earth. As the sun set, Kalpapen knelt on the slopes of Mount Tukosmera (where the depressions of his knees can still be seen today), took the first drink from a kava shell, and spit the first *temahwa* (*tamafa*).

The arrival of night on Tanna caused the stone men to shake, and as they shook, men came out from the stones. The stones retained their magical powers, which are inherent to them, but they would no longer roam about and talk. Their “human essence” came out in the form of real men, who were the first *tupunus*. Therefore, the *tupunus* of present-day Tanna trace their ancestry back to the particular stone whose name they bear, the name of the original stone man (who today is a stationary stone) not being a simple appellative, but the being itself—the yam stone is the yam, and the lightning stone is lighting itself. Each *tupunus* retains a spiritual connection with the stone from which his ancestor emerged and with its magical powers. In a sense, they are two halves of the living stone man.

This ancestry is traced through the male line, each *tupunus* passing on his connection to the original stone man to his sons or close male relatives. When the *tupunus* performs his work in the evening, the time between day (the time dedicated to humans) and night (the time dedicated to stones and spirits) when *iawitaleg* sings, he recreates the first *temahwa* of Kalpapi and uses it to enter again into a close connection with the stone man from which his ancestor emerged. United again though kava with his stone self, the *tupunus* communicates his desire to the spirit of the stone, and his desire is granted.

Tamafa is not the only method by which people on Tanna can influence the weather today. Noar, himself a Nafe-speaking *tupanas*, discusses a weather magic ritual involving plants:

That plant, you have to cut a branch and put [this] end down, [the branches] up, and push. Call the wind. It's mean we call the wind, to lift this, to open the cloud... The name of the plant is *nefeg* [*Macaranga dioica*]... Sometimes, if you have a party and the rain come, we can, you might see someone send me a kava to stop the rain for your party... It can take—I can do today, and you can see

the answer today. And he can, the sun can shine for a week or for a month... I'll take the stake down, the root down, put it in the ground, and then the rain can come back or the cloud can come back... And sometimes people can, you can walk around the village to where you can find the fruits of the coconut. They tie up two of them and hang up in a tree. That's mean they call the rain to come back... Because we are in a season for making garden. Yeah, so they want rain to wash the plant. (Chief Johnson Noar)

Weather magic practitioners on Tanna pay close attention to weather patterns, observing the shape and appearance of clouds, and shifts in wind directions. To Nafe-speaking people, an important job a *tupanas* does for the crops on the island is listening to the report of the sun as it sets. The sun rises each day in the east, on the side of the island where Nafe speakers live. As the sun crosses the sky, it visits all the gardens of South Tanna. It then sets in the west, crossing a mountain pass called the “doorway of the sun” or “Kwarua,” and sets at a place called “Yariwaru,” which is the coastal area of southwest Tanna where there is a black sand beach and a large black stone in the ocean surf. As it sets, the sun “stamps” the large rock with a “report” of all the gardens it visited (and you can feel the earth move as it stamps the rock). If the report is bad for any individual garden (which probably means the gardener did something wrong), then the crops will not grow well there. However, in such a case, the *tupanas* can make it rain and the garden owner can start a fresh garden. There are different ways to stop rain, such as the *nefeg* ritual described in the above narrative, which is accompanied by a *tamafa*, the ritualized spitting of *nikauah* (kava). *Tamafa* accompanies many different weather magic rituals on Tanna, and is done during a variety of other important events and ceremonies (see Lindstrom 1980). Across Tanna, other

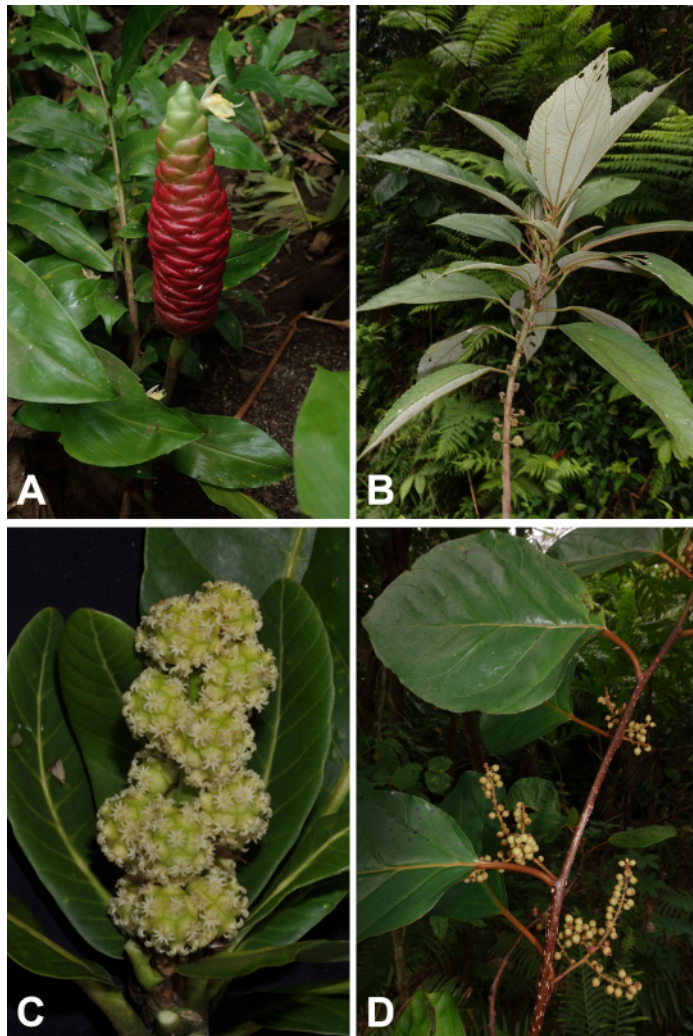


Figure 4. Species of plants used by Nafe-speaking *tupanas* to influence the weather. A. *Mari mari* (*Zingiber zerumbet*). B. *Namariunu* (*Leucosyke capitellata*). C. *Karuarua* (*Meryta neoebudica*). D. *Namap* (*Maesa* sp.).

special plants can also be used to stop the rain, call winds, bring out the sun and calm the sea (Supplementary Table 2; Figure 4).

A common weather magic ceremony for both Nafe and Naka speakers is performed by the *tupanas* to obtain sunny weather:

In Port Resolution we have the one, just only one [sun magic ritual]. And some people are filling the leaf in a pipe, and hanging up inside the house, and making fire under the basket and the smoke heat the basket and calling the sun... Hang-

ing up in the house, inside the house, that house is holy. Nobody can go. Just only the man who looks after the house. (Chief Johnson Noar)

While much of this ceremony is well known, parts remain secret; only the *tupanas* knows which plants will work. Sunny weather is only requested for special events, such as *kastom* ceremonies and circumcisions, as usually people want rain to help their gardens. To call for sunny weather, the *tupanas* for the sun collects leaves from

a special tree and places them in a woven basket. He then builds a “cyclone house,” hangs the basket inside, and lights a fire beneath it using a secret kind of firewood. As long as smoke rises through that basket and the roof and up into the sky, and the *tupanas* remains “perfect,” there will be sunny weather (Figure 5).

Naka speakers also perform a number of weather magic rituals that reveal strong connections between magical practice and the local environment. In this part of Tanna, special *tipunis* have powers to influence *Luwātu*, the north wind. This wind brings rain and fog, and can be invoked during the planting seasons, but *Luwātu* also brings cyclones to the island. The *tipunis* can perform rituals to “block” cyclones, but since these storms are also believed to play a role in replenishing the soil, he can also use his authority to advise villagers to construct traditional cyclone-worthy houses just prior to releasing the block or even actively calling for a cyclone. In another set of rituals, the *tipunis* for the ocean first calms the sea by throwing a basket with secret leaves and stones into the waves. Then, when the waters surrounding Tanna have been calm for too long, the beach becomes *toti*, or “dirty,” so a different bundle must be thrown into the water to call rough, cleansing waves.

Magical Practice as Environmental Knowledge

Western sciences typically exclude magic as a legitimate domain of knowledge. However—often despite histories of colonization—many of the world’s peoples are not invested in this dichotomy. As Jolly (2008: 1249) puts it, “in Western thought, then, magic has become something marginal, separate from or opposite to a main-stream tradition of religion or science. Non-Western practices of magic seen in their own cultural context are not the opposite of religion or science, but are complementary to their political, social, and religious orders; magic is not the other in their worldview, but is part of the norm.” According to Tambiah (1990:83),

views of magic as a domain outside of (or opposed to) science “will disappear only when we succeed in embedding magic in a more ample theory of human life in which the path of ritual action is seen as an indispensable mode for man anywhere and everywhere of relating to and participating in the life of the world.” Our investigations of weather magic in Vanuatu strongly support this view: “magic” is a concept imposed from the outside, as there is no strong dichotomy between magic and the mundane/natural in Indigenous ni-Vanuatu thought. Magic in southern Vanuatu is a lens through which people know and learn about the world around them, and the associated histories and stories reinforce an intimate relationship to environment and place. In addition, while magic and science can certainly come into conflict in the context of ni-Vanuatu weather magic, these systems also very clearly require detailed knowledge of the local environment for successful practice and serve as vessels to encode and transmit this knowledge.

Our local partners described for us and assisted us in collecting and identifying herbarium specimens of nearly 4,000 plants. Of these, 26 were disclosed as being used in weather magic on land and sea and are not considered secret (Supplementary Tables 1 and 2). The inherited nature of weather magician status on these islands, stretching back to the stone men who originally inhabited Tanna and the traditional Aneityumese orders of priests and chiefs, precludes any notion that weather magic practices can be stolen. Even should a thief possess knowledge of the plants or rituals, lacking magical or priestly ancestry, he simply could not perform the magic. Today, a small portion of weather magic rituals and their associated plants are general knowledge, known beyond the formal practitioners. Yet, despite Codrington’s (1891:255) nineteenth century claim that “[ni-Vanuatu weather magicians’] arts once secret are now pretty well known,” most weather magic is still passed on in secret, to be practiced only by those who inherit it. Though much of the



Figure 5. Building a Nafe cyclone house made entirely of plants, used to protect islanders from dangerous storms and also built by the *tupanas* for the sun as a holy house used for magic.

weather magic lore of southern Vanuatu is shared only amongst hereditary magicians and knowledge holders, what is considered general knowledge, appropriate for a global audience, reveals much about the relationship between magic and environmental knowledge. Most of the plants used to influence the weather in southern Vanuatu are native or naturalized plants found growing in the wild. Weather magic practitioners must know when and where to find them, and how to properly harvest them. In most cases, the plants used for weather magic have multiple uses, but eight of the 26 species recorded in this study appear to be used exclusively for weather magic. By both general and hereditary dissemination, magical knowledge and its associated plant knowledge continue to be preserved.

Vanuatu frequently experiences extreme weather, such as cyclones and acid rain (on

Tanna and other active volcanic islands), and therefore weather magic practitioners must constantly be aware of the state of the weather to protect both people and crops. For Loh Islanders in northern Vanuatu, skill in observing and interpreting cloud patterns is key to one's magical prowess (Mondragón 2004). The same can be said for the south, where most people keep careful track of the seasons and changes in the weather by observing a number of natural phenomena such as clouds, the flowering of plants, the phenological cycles of sea creatures, and the movements of celestial bodies. These time-reckoning systems "cannot be reduced to a question of 'calendars, clocks and cyclic rhythms'" (Mondragón 2004:291), but rather utilize the deep environmental knowledge of Melanesian peoples to organize time. "Calendar plants" are a widely utilized element of these systems in southern Vanu-

atu, important for weather forecasting and other time-reckoning purposes (Balick and Plunkett 2018). Weather magicians must perhaps be even more aware of these signs than others, as their respect is tied to the success of their magic, which in turn is tied to discerning when their magic is or is not needed.

A number of non-magical plant-related practices help people survive the hardships caused by severe weather and mitigate storm damage. For example, “cyclone houses,” made entirely of plants, can withstand the ravaging winds of the Pacific cyclone season much more effectively than imported structures composed of concrete blocks and corrugated metal sheets (Figure 5).

One species of yam, *Dioscorea alata*, known as *noyeiwow* on Aneityum, is grown because its strong vines survive cyclone-force winds. Since other crops may be badly damaged, people have identified emergency foods, such as the endemic palm species *Caryota ophiopellis* (*nipitauri* in Nafe). This plant grows deep in undisturbed forests, and in times of disaster, the inner tissues of its trunk can be used to produce a starchy food (similar to the sago palm), which can replace staple root crops and be stored for weeks, as it was after cyclone Uma in 1987. The people of Aneityum and Tanna have also identified trees and shrubs which they can use to prevent coastal erosion: *nejeñ* (*Bruguiera gymnorhiza*), a mangrove species found on Aneityum, is locally protected because of its ability to stop big waves, and the native shrub *Scaevola taccada* (*nanas* in Nafe) is planted along the coast to protect from storms.

Weather magic stands in complementarity—not opposition—to these non-magical practices for surviving extreme weather. Theoretically, though the efficacy either of cyclone houses or of weather magic alone could obviate the need for the other, both continue to be used in tandem because both have their benefits. Traditional knowledge of the ecology and architectural uses of

the many plants used to construct cyclone houses is maintained, and at the same time the *tipunis*’ knowledge of seasons, plants, and weather is also perpetuated.

Lastly, weather magicians on Tanna and Aneityum use their knowledge of the local environment to perform a kind of magical ecology. This can be seen in the preservation of the legendary *Namlainhas* ritual on Aneityum, through which the entire island of Aneityum is burned by the sun. This highly destructive ritual is viewed as a regenerative event, one that will allow a restoration of the island’s plant life on a blank slate, growing back stronger and healthier. Similarly, the Naka *tipunis* for *Luwātu*’s practice of calling a cyclone once the island has gone too long without one reveals a belief that even destructive natural events have a place in the world. In this case, since the island has gone so long without a powerful storm and the associated rains, it is thought that the ground has become unhealthy, and the storm is necessary for the continued success of the area’s crops. A similar belief is evident in the practice of calling cleansing waves when Naka shores have been calm for too long. By summoning a scorching sun, rough waves, or a powerful cyclone, the weather magicians of southern Vanuatu restore and bring balance to their local ecosystems.

Conclusion

On Tanna and Aneityum, weather magic, culture, and environmental knowledge are tightly connected. Despite past and current threats to both the traditional practices of this region and its remarkable ecosystems, these weather magic systems persist as a powerful means of encoding and transmitting the environmental knowledge and cultural heritage of southern Vanuatu. Including weather magic in efforts to document and preserve this knowledge is imperative, especially in the words of the experts who know and practice it. Further, the proper recognition and incorporation of all Indigenous knowledge systems, includ-

ing magic, will ensure that environmental conservation efforts are as well informed as they can be.

People on Tanna and Aneityum believe that a strengthening of traditional beliefs and practices will simultaneously help people maintain their cultural identity and allow them to tackle challenges, such as climate change. To that end, they are working to revitalize their *kastom*. With the island's population recovering, the people of Aneityum are spreading back to their ancestral lands and working to re-establish their system of traditional governance, preserve their Anejoñ language, and reinstate *kastom* ceremonies. On Tanna, local efforts are being developed to achieve similar goals, such as the *Kastom Skul*, which formally transmits environmental knowledge to younger generations of Tannese people.

To come back into normal, it's like a mustard seed, a little seed that will grow very big and the collective of everybody's idea, we stay together...when the community's broken, the system is broken, but we need everybody to come together and to build up that faith into change. We can. Together we can change it. (Reuben Neriam)

Notes

¹ Gender plays a role in access to cultural knowledge in Vanuatu. During our research, women's roles in weather magic were not openly discussed. As the co-authors of this paper, ni-Vanuatu and otherwise, are all male, we acknowledge this as a limitation of the research and an area for future exploration.

² The *tamafa* ceremony is found in other parts of Vanuatu, most notably Tanna, but Aneityumese people believe it originated on their island. The Aneityumese term *tamāva* is derived from the statement "*tamu eva ren akaija*," meaning (roughly) "whatever we seal, that's what we stand for" as a sign of solidarity. An alternative phrasing was given as "*tamāva iran akaija*," which was translated for us as "we depend on it" (i.e., we depend on whatever has been agreed to in the report).

³ We use words from several languages of Tanna in this paper and do our best to make it clear based on context which language or language area is currently being discussed. Occasionally, the forms *tamafa* and

tupanas are used generally.

⁴ The formalized position of *tupanas* is only held by men, though women are also involved in healing, magic, etc.

⁵ Kalpapen and other legendary cultural heroes of Tanna are said to have been stone men, rather than real men.

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