

Tuhke Koaros mie Koasoaipe de Poadope - Every Tree Has a Story

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ABSTRACT

I served as researcher at the College of Micronesia and suffered an injury to my arm. I was fortunate to be treated by honorable traditional healer Sounwini Lepen Lison Leon Aldis with his instructions for the use of traditional medicines, ceremonial prayers, and health practices. This article describes my experience with this beloved healer, traditional Pohnpei medicine and the myriad plant medicines of Pohnpei, Micronesia. Lepen's teachings guided me and here I report my experience with his permission. May he rest in peace. His memory is a blessing.

Many native plants are described with images to reveal their powerful attributes. The Story is told in narrative with photographs disclosing the richness of Pohnpei island medicines and the deep traditional food and medicinal knowledge held by Sounwini Lepen Lison Leon Aldis. I dedicate this paper in his blessed memory.

Keywords: Pohnpei, Micronesia, traditional medicine, agriculture, agroforestry

While serving as Sustainable Agriculture and Agroforestry Researcher at the College of Micronesia on the remote volcanic island of Pohnpei, I was attacked by a large and aggressive woman. Her Caucasian husband, my supervisor, was misappropriating United States Department of Agriculture monies and supplies. My Pohnpei colleagues and I reported that the "leadership" was "cooking the books"! This disclosure precipitated the attack.

My wrist was significantly injured in the assault, and the diagnosis was a triangular fibrocartilage complex injury. Serendipitously one afternoon, I met honorable Pohnpei traditional

healer Sounwini Lepen Lison Leon Aldis when he was sustainably collecting medicinal plants and reciting prayers in the tropical forest of the beautiful mountainous island.



Figure 1. Pohnpei

He prayed for my healing and for justice to be served. Sounwini Lepen Lison Leon Aldis invited me to his home, where he and his lovely wife, Lampein Leilani work tirelessly helping people heal any hour of the day or night. Their home was open to those in need of healing, and all were welcome.



Figure 2. Sounwini Lepen Lison Leon Aldis and his family



Figure 3. Sounwini Lepen Lison Leon Aldis and me.

Sounwini Lepen Lison Leon Aldis prepared and administered healing plants to treat my injury and trauma. I was placed under an umwulap with steaming medicinal herbs. Pohnpei has an extensive pharmacopeia, and Sounwini Lepen Lison Leon Aldis was a deeply knowledgeable and well-respected traditional healer.



Figure 4. Healing drink prepared by Sounwini Lepen

“Tuhke koaros mie koasoaiepe de poadope”- “Every tree has a story”, Pohnpei Director, National Archives, Culture and Historic Preservation at the Federated States of Micronesia National Government, Rufino Mauricio once told me.

While planting a memiap, *Carica papaya L.* tree in the Caricaceae on Pohnpei at Ohmine Elementary School with students and teachers, my Pohnpeian colleague Randall Harry casually removed his shoe, and a handsome centipede crawled out. “They never harm me,” he said calmly, “Centipede, Meninrahn is my clan.”



Figure 5. Planting *Carica papaya* tree at Ohmine Elementary School with students and teachers

The volcanic 344 km² western Pacific Island of Pohnpei is situated at 6° 54' N longitude and 158° 14' E latitude, north of the Equator in the Eastern Caroline Islands. Steep, rugged, and mountainous, Pohnpei is surrounded by mangrove swamps, naniak with an average annual rainfall of 190 inches (4800 mm). It is one of the wettest places on earth; its tropical climate, high rainfall, and deep volcanic weathered soils support a rich floral diversity. There are more than 935 vascular plant species on Pohnpei, of which 397 are indigenous and endemic (Herrera et al. 2010:1-2). For more than a hundred years, Pohnpei has been a center for agricultural experimentation and plant introductions in Micronesia (Ragone et al. 2001:290).

The strand vegetation, ni oaroahr (Herrera et al. 2010:2), medicinal shrub, remek, *Scaveola*

taccada (Gaertn.) Roxb. in the Goodeniaceae grows near the rocky shore where it experiences salt spray, high winds, heat, and sunlight (Balick 2009:9). Remek has white flowers (Glassman 1952:98) that are added to nih, *Cocos nucifera* L. oil as perfume. Its large leathery spatulate leaves are chewed, and the bitter juice is squeezed out and drunk. A Pohnpei elder informed me as he gathered the leaves along the shore for health. The buds are squeezed into the eyes to purify and cleanse them of debris in treating eye problems. For conjunctivitis, the white fruits are squeezed into the eye until better. Diabetes is prevalent on Pohnpei, and to treat type II diabetes, several young remek leaves are boiled in water and consumed until better (Balick 2009:401-402).

Dipwoapw, *Terminalia catappa* L., in the Combretaceae, is a medicinal tree originating from India whose native range is Madagascar, Tropical and Subtropical Asia to the Pacific. The seed kernel of the fruit is eaten as food when ripe. The flowers are greenish-white, and the fruits are green, ripening to yellow, containing an edible nut that tastes like an almond. Dipwoapw bark is administered to treat diarrhea on Pohnpei. The leaves possess potent antibacterial and antifungal properties (Lee et al. 2010:23-24; Glassman 1952:63; Balick 2009:356-358). Kapingamarangi expert Karmy Hicks informed us that the “Ghost Tree” is sometimes associated with spirit.

Sakau, *Piper methysticum* G. Forst., in the Piperaceae, is the sacred root on Pohnpei that is shared ceremonially with the greatest reverence and respect. Sakau is higher than the highest paramount chief or any living being or ancestral spirit on the island. Sakau defines the cultural

identity of Pohnpei, and it has been cultivated extensively in the upland forests of the volcanic island. Sadly, because of its high demand, the upland forests on Pohnpei have become depleted and the watersheds have been impacted by erosion consequently. Therefore, sakau farmers are strongly encouraged to “grow low” in the cultivated lowland agroforests.



Figure 6. *Piper methysticum*

Sakau is of divine heavenly origin according to Pohnpei stories and teachings (Ashby 2004:106), and all Pohnpeians acknowledge its extraordinary powers (Balick and Lee 2009:168). Sakau is used diversely in traditional healing. Its preparation involves squeezing the freshly pounded roots with a press of the inner bark of kolou, *Hibiscus tiliaceus* L., in the Malvaceae, on a special basalt stone slab. Pohnpeian sakau is unique throughout the Pacific islands since it contains the thick slimy consistency of kolou, *Hibiscus tiliaceus* tree sap. The brown mucilaginous fluid of the sakau and kolou inner bark strip press is squeezed

into a coconut shell cup and shared. “Happiness permeates the space where sakau is consumed” (Balick and Lee 2009:177-179, 183).



Figure 7. Preparing Sakau

The fresh green fruit of the palm, pwuh, *Areca catechu* L., in the Arecaceae, betel nut is chewed with powdered slaked lime (calcium hydroxide) prepared from fresh coral or clamshell, and wrapped in kapwoi, a *Piper betle* L. leaf, Sometimes, tipaker, *Nicotiana tabacum* L., in the Solanaceae is added. Lee et al. (2010:121) noted that prolonged chewing of pwuh, *Areca catechu* results in significant toxic alterations in the mouth, upper digestive tract, and the intestinal epithelial cell lining. Laboratory and clinical studies reveal that betel nut acts synergistically with tobacco to produce oral cancer.

Mwahng, *Cyrtosperma merkusii* (Hassk.) Schott, in the Araceae is giant swamp taro. It is among the most culturally significant food plants on Pohnpei and the outer atolls along with breadfruit, bananas, yam, and coconut. The hardy mwahng is regarded with great reverence as the staff of life for outer island peoples, and its corms are quite large. There are numerous distinguishing cultivars of mwahng on Pohnpei

and the outer atolls. It is rich in essential minerals, vitamins, and fiber to maintain excellent nutritional health, enhance food security, and a sustainable environment. Like the other taro species, it is available all year round and can withstand strong winds and hurricanes, dry atoll climates, and sandy saline soils. Mwahnng can remain in the soil for fifteen or more years and still be edible. The genetic diversity of taro cultivars on Pohnpei and the outer atolls is truly remarkable (Englberger et al. 2009:132-134, 139, 141, 146, 160).



Figure 8. *Cyrtosperma merkusii*

Sawahn awai, *Xanthosoma sagittifolium* (L.) Schott, and sawa, *Colocasia esculenta* (L.) Schott, in the Araceae are also important species of taro on Pohnpei (Glassman 1952:11, 108; Herrera et al. 2010:35). The nutritious corms are boiled and consumed. The red-stemmed sawa has been

used exclusively for treating sting wounds from a stingray, likendinikep. The roots are wrapped in cloth, soaked in water and placed on the wound to relieve pain and draw out the poison. *Colocasia* corms have antioxidant and anti-inflammatory properties (Lee et al. 2010:12). Native to South America, *Xanthosoma* was reported to have been brought to Pohnpei during the Japanese occupation (Ashby 2003:211) however Ragone et al. (2001:306) indicated that the period of its introduction is not known. Ohd, *Alocasia macrorrhizos* (L.) G. Don var. *macrorrhizos* is believed to be the second oldest food on Pohnpei. Its large leaves are used to cover the traditional uhmw for cooking and to line the ground around the sakau stone (Englberger 2009:144-145; Balick 2009:255).

As Sustainable Agriculture and Agroforestry Researcher at the College of Micronesia, I worked cooperatively with government and non-governmental organizations toward improving health and nutrition on Pohnpei where vulnerable populations experience diabetes, hypertension, obesity, and dependence on inferior imported food, as a stark and grave reality. We provided agriculture, agroforestry, public health, eye care and veterinary resources to outer island communities and enhanced conservation of aquatic ecosystems, vital marine resources, addressing the significant impacts of climate change on small island nations. Crops are affected by erratic climatic events, diseases and drought.

We celebrated World Food Day, Rahn en Soumwet en Pohnpei. United Against Hunger, Miniminpense Sewese Perek Duhpek, in the historic Pwunso Botanical Garden and conducted

community-based natural resource management and organic agriculture and agroforestry for improving human and environmental health, nutrition and food security on Pohnpei and the outer islands. We documented and addressed climate change through partnership approaches for safeguarding against climate impacts and gleaned a greater understanding of the challenges facing Pacific peoples, and the magnificent biodiversity of tropical island ecosystems. We promoted conservation of coastal and terrestrial ecosystems, indigenous resource management, invigorating the economy and supporting traditional agriculture and agroforestry. I studied with Pohnpei traditional plant healers and experts.



Figure 9. World Food Day

We practiced, trained, and shared seeds, seedlings, saplings and knowledge in sustainable organic farming and the preservation and enhancement of indigenous plant genetic resources. We investigated, cultivated and disseminated underutilized plant and tree species for enhancing sustainable diversified agriculture, agroforestry, nutrition and health. I collected,

presented, and distributed nutritious fruits and other plant products and propagated fruit tree saplings and seeds of economically significant woody perennials.

Many economically viable trees in Kolonia's Pwunso Botanical Garden's living collection are aging, rotting, and not well maintained therefore we shared transplanted saplings and seeds for gardeners, farmers, schools and communities and created an arboretum of economically significant trees at the Agricultural Experiment Station in Palikir at the College of Micronesia. More than 433 new plants and trees have been introduced to Pohnpei in the past 150 years altering the natural environment and contributing to its subsistence and cash economy. The center of plant introductions was the former Agriculture Station, which is the Pwunso Botanical Garden. Plants were brought to Pohnpei from 33 different islands and countries. The Pwunso Botanical Garden's diverse trees and plants are a national treasure, which represents what was once the finest collection of economic and useful plants in the Pacific. May its 100-year legacy and germplasm be preserved (Ragone et al. 2001:298-302).

Weipwul, *Morinda citrifolia*, L., in the Rubiaceae is a large medicinal shrub or medium sized tree of the low coastal coral island forests of Pohnpei. It has large, deeply veined, glossy ovate leaves and small white flowers. The pungent edible fruits, flowers, terminal buds, leaves, stipules, bark, and roots have many diverse healing applications. Traditional stories indicate that weipwul was the first food on Pohnpei. Before there was breadfruit, mahi, *Artocarpus altilis* (Parkinson) Fosberg, and meipa, meikole,

Artocarpus mariannensis Trécul, weipwul was presented to the chiefs during feasts (Englberger et al. 2009:161, 172). The fruit extract of weipwul contains potent antioxidant compounds and antibacterial properties (Lee et al. 2010:13, 96). Small fruits and buds are used topically to bring down fever. Weipwul is taken nasally for migraines, and it soothes aches and pains. The terminal buds are applied for abscesses and the stipules are employed in treating wounds caused by scorpion fish. This woodland species' root bark yields a red pigment used for dyeing (Glassman 1952:19, 27, 94-95).

“Wein pein eni” - Fruit of the gods. Breadfruit grows freely and is available to everyone. – Pohnpei saying (Ashby 2003:208). The fruits of mahi, *Artocarpus altilis* (Parkinson) Fosberg, and meipa, *Artocarpus mariannensis* Trécul in the Moraceae are prepared as food on Pohnpei. They are rich in carotenoids, Vitamin C, protein, thiamine and dietary fiber (Balick 2009:443). The breadfruit tree collection in the Pwunso Botanical Garden is a valuable plant genetic resource that should be judiciously conserved, researched and maintained (Ragone et al. 2001:300). Stan from Yap explained that the dried androecium of *Artocarpus* is lit as a mosquito coil.

An extremely aggressive invasive species on Pohnpei is *Spathodea campanulata* P. Beauv., dulip en Aprika in the Bignoniaceae family. Native to West Africa, this fast-growing tree forms thickets and suckers competing with Pohnpei native plants for space, light, and nutrients. Dulip en Aprika's large orange-yellow flowers give rise to reddish brown seedpods with several hundred thin papery winged seeds that are widely dispersed by wind. It is quite difficult

and challenging to control the establishment of this species however young trees can be pulled or dug out. Islands are highly vulnerable to biological invasions thus some introduced species on Pohnpei have caused tremendous loss in biodiversity and the degradation of natural ecosystems (Englberger 2009:2, 11).

The fast-growing invasive aromatic perennial shrub, sakau likamw, *Piper auritum* Kunth, in the Piperaceae is under eradication on Pohnpei. Native to Mexico, the Guianas, Ecuador, and other countries in Central and South America, it grows on Pohnpei in thickets in the forest understory and on cleared land along with the traditional and deeply significant and sacred sakau, *Piper methysticum*. *Piper auritum* is quite difficult to control as it spreads by suckers and the roots break when pulled (Englberger 2009:4).

Another fast-growing invasive perennial shrub, limemeirpwong, kehsapahl, *Mimosa diplotricha* C. Wright ex Suavalle var. *diplotricha*, (Balick 2009:389; Herrera et al. 2010:123) in the Fabaceae is native to Brazil. It forms dense thickets of spiny tangled stems that can trap animals and injure humans on Pohnpei. During the dry season, it is a fire hazard and the seeds that are dispersed by animals and water, remain viable in the ground for many years (Englberger 2009:18).

Wisolmat, masikisik *Chromolaena odorata* (Balick 2009:337; Herrera et al. 2010:89-90) in the Asteraceae is a noxious weed in the lowlands of Pohnpei. The invasive native perennial of Tropical America with an extremely fast growth rate and prolific seed production is found in forest clearings, along roadsides and open disturbed

areas of the island. It is toxic to animals and is a potential fire hazard during the dry season (Englberger 2009:16).

Risiel, *Clerodendrum paniculatum* L. in the Lamiaceae is native to India and Southeast Asia. It is an invasive ornamental perennial shrub with large heart-shaped leaves and a pyramidal shaped inflorescence. The colorful flowers are used to create mwaramwar (garland or lei) and to decorate houses (Balick 2009:405-406; Englberger 2009:23).

Dihng, *Cheilocostus speciosus* (J. Koenig) C. D. Specht, which is a synonym of *Hellenia speciosa* (J.Koenig) S.R.Dutta in the Costaceae (Herrera et al. 2010:44) is a tall invasive herbaceous perennial that is native to Malaysia. It grows in disturbed areas along roadsides and in the understory of forests on Pohnpei. This plant is used in making mwaramwar and to treat karakar (high fever) (Balick 2009:273; Englberger 2009:17).

Aipikohrd, *Coccinea grandis* (L.) Voigt (Herrera et al. 2010:105), in the Cucurbitaceae is native to Africa, India and Asia. It is an extremely aggressive perennial gourd vine that produces white stellate flowers and smooth red fruits. Aipikohrd, which was introduced for food and medicine, smothers native vegetation and is under eradication on Pohnpei (Englberger 2009:6).

Okira, *Abelmoschus esculentus* (L.) Moench, in the Malvaceae is an annual cultigen; a plant that has been altered through selective breeding. It is cultivated successfully on Pohnpei, and its mucilaginous green fruits are rich in pectin, iron and calcium, and are a quality source of fiber and nutrients for the people.

Chaya, *Cnidoscolus chayamansa* McVaugh is a synonym of *Cnidoscolus aconitifolius* subsp. *aconitifolius* Breckon in the Euphorbiaceae. It is an arborescent shrub with milky latex, large palmately lobed leaves and white flowers that is native to the Yucatan Peninsula of Mexico. It is cultivated on Pohnpei for human and animal consumption. Its young leaves and shoots are cooked and eaten in soups. The whole plant is fed to pigs. Chaya is a nutritious leafy green vegetable that is high in protein, fiber, vitamins, and minerals (Kuti and Torres 1996:516-520; Balick 2009:372).

Duhrien, rawahn, manka, *Pangium edule* Reinw. in the Achariaceae is an evergreen tree whose native range is Nicobar Island to the Western Pacific and Southeast Asia. It grows in forests on Pohnpei and bears large, edible sweet fruits with yellow flesh that are rich in provitamin A and other carotenoids (Balick 2009:319). I brought some to share on World Food Day - Rahn en Soumwet en Pohnpei. United Against Hunger, Miniminpense Sewese Pereh Duhpek, and they were well received. The seeds are used to trap and poison wild chickens on Pohnpei, however the seeds can be processed for consumption and have an almond-like flavor.

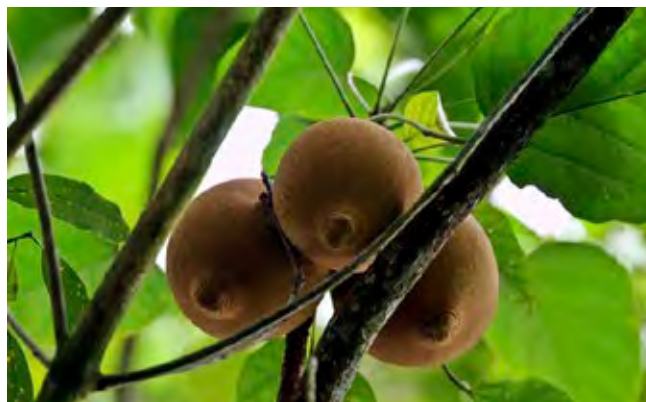


Figure 10. *Pangium edule*. Achariaceae

The fruit of kipar, deipw, *Pandanus tectorius* Parkinson ex Du Roi, in the Pandanaceae is a valuable indigenous Micronesian atoll food. The small to medium sized tree has aerial roots and stiff sword-shaped leaves that are barbed along its leaf margins and on the adaxial midribs. Its apetalous fragrant flowers are in a compact sessile head, and the aggregate fruit is large (Lee et. al. 2010:4-5) and bright orange. Fruit segments are an excellent source of provitamin A carotenoids, niacin, iron, thiamin, riboflavin, and Vitamin C with a high content of lutein and zeaxanthin (Balick 2009:292). There are numerous pro-vitamin A and carotenoid-rich *Pandanus* cultivars that should be promoted for their significant health benefits because Vitamin A deficiency is a serious health problem in the Federated States of Micronesia (Englberger et al. 2009:1-7). Some *Pandanus* species are cultivated for their large, sweet, and juicy edible keys (Herrera et al. 2010:63), fragrant flowers, useful leaves and stilt roots that are used as a building material. *Pandanus* roots and leaves are applied as medicine for curing the sting from a likendinkep, stingray (Lee et al. 2010:5; Rehg and Sohl 1979:231).



Figure 11. *Pandanus tectorius*

Mwoakil indigenous expert, Emihner Johnson of Island Food Community of Pohnpei and Lihn Mwoakilloa – Women’s Group of Mwoakilloa, are deeply committed to restoring and preserving the kipar, deipw cultivars on Mwoakilloa atoll. They proposed to vegetatively propagate kipar, deipw cultivars along the shoreline of their small atoll. Kipar, deipw cultivars are well adapted to the saline, sandy and coralline soils of Mwoakilloa, where agricultural production and provision of a nutrient-rich diet are a great challenge. Planting kipar, deipw would contribute to food security, economic development, and would serve as a sea break for erosion control. Their collaborative project would mitigate the impacts of climate change and rising sea levels on vulnerable outer island communities. They proposed to identify and record the diverse cultivars of *Pandanus* on Mwoakilloa for preserving their culture and transmitting intergenerational plant knowledge about this indispensable tree for the Mwoakil people.

Pandanus is one of the most utilitarian fuel and fibrous plants on the outer atoll where Mwoakil artists use the leaves to create large woven mats, baskets, trays, placemats, and hats. The nutritious, juicy, pro-Vitamin A rich multiple composite fruits composed of individual pieces referred to as keys that are attached to a fibrous core, are eaten raw or baked and prepared as a flour or paste, which can be preserved for years. Mwoakil people chew, suck, and eat the sweet pulp of the inner part of the keys as a healthy snack and it is regarded as a social activity. The orange fruits are an excellent source of carotenoids, niacin, iron, thiamine, riboflavin,

Vitamin C, lutein, zeaxanthin, and fiber, which is essential for proper functioning of the intestines and bowel (Englberger et al. 2009:107).

Fiber consumption is tied to reducing the risk of diabetes, control of blood sugar levels and cholesterol. Kipar, deipw fruits are boiled and eaten or steamed, pounded into a paste and then dried in the sun or over hot stones. The dried cakes are broken and made into flour. There are some *Pandanus* cultivars with fruits that contain small edible seeds. The seeds are strung to create necklaces, the fruit fibers and root tips are fashioned into paintbrushes and the strong aerial roots are used to make local apparatuses to catch fish. Stilt roots are split and serve as crossbars in the construction of traditional houses (Balick 2009:292). As medicine, central leaves are consumed and young roots and leaf shoots are pounded, squeezed in water, and taken internally, or as an admixture in topical preparations with coconut oil.

Uhn Mahng is a fibrous *Pandanus* cultivar of Mwoakilloa that does not bear fruit. It is used for handicrafts and the stems are fashioned into harpoons for fishing. Its leaves and fibers are smoother and finer for weaving and creating earrings, ornaments, fans, baskets, mwaramwar, hats and belts. However today on Mwoakilloa, handicrafts are rarely sold. According to a survey of twenty households that was conducted by Emihner Johnson in July 2010, ninety percent of the households on the atoll grow only about three or fewer *Pandanus* cultivars and roughly ten percent of the households have six *Pandanus* varieties (Emihner Johnson, personal communication, 03 November 2010). This is

critical because it is the most important tree on Mwoakilloa.

The Mwoakil people are noted for their superb carpentry skills in boat making. They use *Pandanus* for transport on the sea as part of their daily life; the mast, sail and outrigger are composed of its wood and fiber. The folklore, local art skills, food security and wellbeing of the Mwoakil community center around *Pandanus*. Emihner Johnson explained:

We still have our roots, our identity and our moral values that make us Mwoakillese however we are losing our landmarks because of erosion and the depletion of our *Pandanus* cultivars. There are no more trees. The rising sea has been eating away at the land. Our surveys reveal that *Pandanus* is becoming rare. We are committed to bringing them back and to produce more *Pandanus* cultivars because without them, the local skills will not be passed on. Through learning sessions and training, many Mwoakil people are dedicated to preserving our local talents, the crafting skills of our elders who will pass them on. We seek ways that we can help and gain the knowledge and skills to be passed on to future generations.

The Mwoakil people seek to understand and record Mwoakil-*Pandanus* interactions in their cultural and environmental context, their diverse cultivars, and significant indigenous knowledge associated with this Mwoakil giving tree of life. This study was designed to further biodiversity conservation and the preservation of native plant

genetic resources on Mwoakilloa through the community-driven activity of planting *Pandanus* cultivars by asexual reproductive field methods. Island life and culture revolve around biological diversity. This life-sustaining tree that provides food, medicine, fiber, tools, fuel and support gave birth to the Mwoakil civilization, and will continue to enrich the lives of the people for generations. There is a great need for *Pandanus* on Mwoakilloa to ensure food security, and human and environmental health. “This is what I grew up with,” Emihner Johnson explained. The nutritional value of *Pandanus* cannot be underestimated. She added, “The life of a developing *Pandanus* tree on Mwoakilloa, from 1-3 years, is tended to and monitored by women” (Emihner Johnson, personal communication, 30 November 2010). Restorative propagation of *Pandanus* with progressive community assessment and monitoring foster sustainable harvesting, equitable sharing of benefits from botanical resources, and sound coastal land management on Mwoakilloa.

Emihner Johnson stated:

From 1975, when I grew up on Mwoakilloa, my family had a very small land mass. We had about eighteen varieties of *Pandanus*. Now, based on our survey and scientific values, there are fewer, and they are hard to find. What has been the talk of most Mwoakil women is the need to plant for the wellbeing of the people. This is our heritage, to preserve the craft. Other community members are so enthusiastic about this project. They will go back to Mwoakilloa to help this project. They are retired teachers,

managers and congressmen who are willing to go back because it is significant to the next generation. There is a commitment, if we have financial assistance. We feel strongly about this initiative. Each will plant along the coast on one’s own land. It is hands on training.

For the vulnerable small island atoll of Mwoakilloa, sound coastal area management and biodiversity conservation are key to community survival. Mayor Edmond of Mwoakilloa, village leaders and the community are in full support of the project that will strengthen viable indigenous management systems and community-based protection of Mwoakilloa’s cultural and natural heritage. Local food educator, Emihner Johnson emphasized, “If I do this project, I know that I am going to move the sea!”

Emihner recently directed awareness in the Mwoakil community about local foods. Ninety-five percent of the women that she spoke with want to do something about the problem. Emihner explained:

We are a very small community. Once we commit ourselves for our children, we will complete this project for their benefit. It is strongly gender-based. These are our moral values and what we grew up with. Women do not have a voice in community meetings. Women do all of the domestic work, bearing children, fishing...we do all of this. Yet we cannot be elected. We do not have a vote. Compared to women on Pohnpei, we are the firewood provider, and we go to the taro patch. Men’s responsibilities are fishing and carpentry. However, building your own

cookhouse is a woman's responsibility! The women initiated and want to start this project. When I asked about it, the women really spoke out.

Improving vitamin A status in deficient populations can decrease health risks and health-related causes of mortality. Thus, *Pandanus* cultivars should be promoted as a strategy to diminish Vitamin A deficiency and to provide added health benefits, enjoyment and preservation of *Pandanus* genetic resources and the biodiversity of traditional Mwoakilloa indigenous knowledge systems.

Plant Medicines and their uses

Ilau, *Volkameria inermis* L. whose synonym is *Clerodendrum inerme* (L.) Gaertn. is in the Lamiaceae family. It is a native woody medicinal vine or small tree with aromatic opposite leaves and bell-shaped fragrant flowers. The leaves are employed to treat coughs, and to protect people from evil spirits while cooling fever, if the body is shaking. Pregnant women have been given ilau leaves during labor to protect them from evil spirits and to ensure a safe delivery. When combined with weipwul, *Morinda citrifolia* L. in the Rubiaceae, the leaves of ilau are applied to treat inflammation of the anal sphincter, and the young shoots are consumed to reduce stress (Lee et al. 2010:78, 88, 99, 119, 132). To treat a cough, rub the leaves between hands and rub under the chin. Consuming the diluted leaf juice may be beneficial for treating asthma. Yurlene gave me some leaves to apply to John's itchy scalp. I pounded the fragrant leaves and blended them with nih, *Cocos nucifera* L. oil and Sounwini Lepen Lison Leon Aldis' protective formula.

Ilau flowers and leaves are made into mwaramwar or worn directly in the hair. To treat headache, four young leaf apices are eaten (Balick 2009:404-405). The native range of ilau is Tropical and Subtropical Asia to the Western Pacific. The Kapingamarangi people use tihia, *Volkameria inermis* L. to reduce stress as it has antihypertensive properties pharmacologically. Glassman (1952:103) documented that the leaves are used in conjunction with other plants for treating rheumatism, as a hemostatic in menstruation and as an abortifacient.

Pwulok, *Xylocarpus granatum* J. Koenig is a medicinal mangrove tree in the Meliaceae with tannin-rich smooth bark, well-developed buttresses and an intricate above ground root system. It has alternate leaves, small white or pinkish flowers, and the fruit is a large, globose, pendulous woody capsule. The heartwood is reddish brown and the extraordinary Kapingamarangi carvers use this wood in their works of art. Pwulok is among the most important wood for making canoes and it grows in the naniak, mangrove forest on Pohnpei in tidal swamps of brackish or salt water (Glassman 1952:21, 23; Herrera et al. 2010:2). The bark scrapings are employed in the umwulap treatment for healing muscle, joint or backpain (Balick 2009:441).

Mahrek, *Cyclosorus heterocarpus* (Blume) Ching in the Thelypteridaceae is an indigenous medicinal fern of Pohnpei lowland and primary forests and cultivated land. The young fronds of mahrek in circinate vernation are pounded and applied as a poultice on boils to reduce swelling (Lee et al. 2010:43). To use as soap, the fronds

are mashed and rubbed onto the skin. The fronds are employed as a wrap for other medicines on Pohnpei (Balick 2009:249).

Wihnmoar, *Barringtonia racemosa* (L.) Spreng. in the Lecythidaceae is a medium sized medicinal tree of freshwater swamps on Pohnpei whose ellipsoid or conic fruits are used as laundry soap (Balick 2009:11, 418). The fruit scrapings mixed with nih, *Cocos nucifera* L. meat, are rubbed onto skin rashes and the stem epidermis is employed in treating back pain in men. The bark has analgesic properties as it contains phenolic and steroidal constituents (Lee et al. 2010:58, 154). The terminal buds are used to alleviate pain after childbirth and for treating earaches (Glassman 1952:62). The seed scrapings of the fruit are applied to fungal infections (Balick 2009:420).

Oahr, tepwek, *Premna serratifolia* L. in the Lamiaceae is a lowland, low-growing medicinal shrub, or small tree with opposite leaves. Its leaves, when placed on a fire to create smoke, repel mosquitos. Young shoots are used as a charm to improve luck when fishing. Bark scrapings are boiled in water and consumed to treat asthma. For fungal infections, many fruits are pounded, wrapped in cloth and rubbed gently on the skin (Balick 2009:409-410). Pounded leaves are mixed with nih, *Cocos nucifera* L. oil and applied to insect bites until healed. Tepwek leaves are crushed and placed on boils held in place by another fire-warmed leaf with nih oil. The stem epidermis is scraped and wrapped in cloth and the juice is placed in water and consumed to treat coughs. Tepwek shoots are

pounded and placed in cloth and the juice is squeezed into each nostril for relieving severe headaches. On Mwoakilloa Atoll, oahr leaves are boiled in water and patients with hepatitis are showered with the infusion (Lee et al. 2010:15, 50, 83, 95, 115). Under an umwulap, tepwek leaves are applied as a steam inhalant for clearing the lungs.

Konok, *Piper ponapense* C. DC. in the Piperaceae is a fragrant indigenous ornamental vine that grows on *Ficus* and other tall trees. Its plant parts are used to alleviate stomachaches (Glassman 1952:55), headache, joint and back pain, conjunctivitis, sore eyes, boils, cuts, toothache, symptoms of syphilis in men, and depression. The vine is used to scrub clean the *Piper methysticum*, sakau stone with water. The leaves and vines are made into mwaramwar (Balick 2009:470-473; Lee et al. 2010:90, 111).

Kaikes, *Adenanthera pavonina* L. in the Fabaceae is a native, medicinal fast-growing deciduous nitrogen-fixing tree whose native range is Tropical Asia (Glassman 1952:74) to Northern Australia. Its leaves are bipinnately compound, and the flowers are small and yellowish. Kaikes has dehiscent pods with nutritious shiny scarlet red seeds that are roasted and eaten by children. The young leaves can be cooked and consumed. Its trunk is used as a stake for supporting *Piper nigrum* cultivation and its wood is fashioned into small structures such as cookhouses (Balick 2009:379-380). Kaikes grows in the nansapw, the secondary agroforest (Balick 2009:10) and the area of agricultural cultivation and human settlement on Pohnpei (Herrera et al. 2010:2).

Luwekindenloal, *Phyllanthus mariannensis* W. L. Wagner & Lorence in the Phyllanthaceae is a tree or shrub with ovate leaves that is endemic to the Mariana Islands (Lorence and Wagner 2011:79; Herrera et al. 2010:160). Shortly after marriage, women drink an infusion of the plant parts to aid conception. Some luwekendenloal plant parts are applied to relieve emotional distress (Glassman 1952:70), and the fruits are consumed to decrease anxiety. Two fruits of the plant are wrapped around young leaves and eaten each morning for eight days to treat a broken heart. Four or eight fruits are consumed for treating depression, or four leaves are pounded, wrapped in cloth and squeezed into water, and drunk. To stimulate a baby's appetite, the parent chews eight leaves until soft, placing small pieces in the baby's mouth (Balick 2009:461-462).

Several species of *Cinnamomum* are grown and utilized on Pohnpei. Madeu, *Cinnamomum carolinense* Koidz., in the Lauraceae is a native forest tree of low elevations with fragrant bark, abundant yellowish-white flowers (Glassman 1952:53), alternate, ovate leaves, and round fruits (Lee et al. 2010:81, 148). It is used to prepare a refreshing beverage, as a seasoning (Ashby 2003:223), and as medicine. The yellowish-brown bark is cut from the tree, boiled in water and consumed regularly as tea, and is regarded as an immunostimulant. Madeu has been administered to treat syphilis, arthritis, and joint pain on Pohnpei. The bark contains the carcinogenic compound safrole that has been known to cause liver cancer however, when the bark shavings are boiled during the traditional Pohnpeian preparation of madeu as tea, the safrole is degraded and cannot be found in

the prepared beverage (Balick 2009:414). The bioactivity of safrole is altered, thus preventing the hepatocarcinogenic effect (Lee et al. 2010:81). The inner bark has been used as a hemostatic for excessive menstrual flow (Glassman 1952:53). The pounded stem epidermis of madeu, *Cinnamomum carolinense* with inipal, coconut fibers, are used to treat back pain in men. The juice is squeezed into water and consumed daily for eight days (Lee et al. 2010:148). *Cinnamomum verum* J. Presl, whose native range is Sri Lanka, was introduced from Java during the Japanese occupation of Pohnpei and is used as a spice (Balick 2009:415).



Figure 12. *Cinnamomum*

Katar, *Sphaeropteris nigricans* (Mett.) R. M. Tryon, a synonym of *Cyathea nigricans* Mett. is a pantropical tree fern in the Cyatheaceae with a large black, pubescent midrib. Its brown spores are contained in numerous sporangia on the abaxial surface of the fertile fronds. The thick and fibrous trunk, with its inner solid core is a support for *Piper nigrum* and orchid cultivation (Figure 16) (Figure 17). As a result, this species is at risk of endangerment and possible extinction on Pohnpei (Lee et al. 2010: 131).

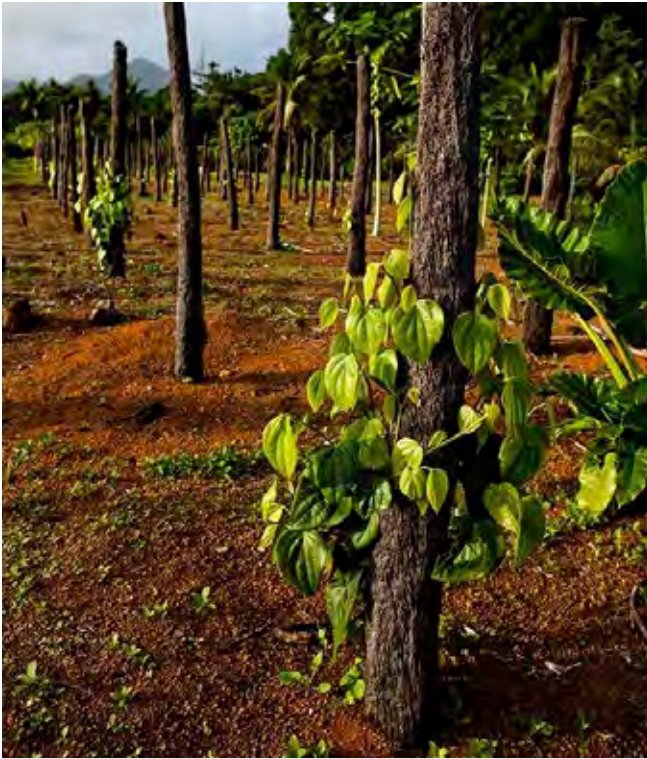


Figure 13. *Sphaeropteris nigricans*

Katar grows in the highland nannahna, wet and humid dwarf elfin moss forests on Pohnpei (Herrera et al. 2010:4-5). The fronds are eaten as food, and the durable trunks are used as posts in house construction (Glassman 1952:20) and for making footbridges. When it is raining and chilly in the forest, the fronds are utilized as thatch for hut walls, and roofs, and Pohnpeians cover themselves with the fronds as a blanket to keep warm and dry. The fronds also make a soft sleeping mat. Katar is applied as a styptic to stop bleeding, prevent infection, and heal wounds. The frond petiole is cut, and the meristem tissue is scraped and mixed with the frond fiber and a young frond in circinate vernation and placed inside the wound (Balick 2009:228-230). An infusion of the fronds is employed as a contraceptive for women (Glassman 1952:40).

Katar is used to alleviate excessive menstrual flow. A young shoot is cleaned and combined with the meat of a young ripe fallen fruit of nih, *Cocos nucifera* L. The nih drupe fruit is cut in half, and its endosperm is scraped out and pounded together with the young katar shoot and inserted into the vagina. This treatment is reported to stop excessive menstrual bleeding (Lee et al. 2010:131).

I encountered the erect, spreading medicinal perennial, *Calotropis gigantea* (L.) W. T. Aiton in the Apocynaceae on Pohnpei along the margin of woodlands and in sandy soils. This fiber-producing shrub's native range is from South China to Tropical Asia however it has become naturalized in many countries. Its showy corolla is lilac to purple, its fruit is an ovate follicle, and its thick fleshy leaves are opposite and entire. This toxic plant produces milky latex, and it is bitter.



Figure 14. *Calotropis gigantea*

Peinuhpw, *Paraderris elliptica* (Wall.) Adema in the Fabaceae is a vine or liana (Herrera et al. 2010:123) with entire oblong leaves, pink flower petals, and brownish winged fruits. Traditionally, young stems are chewed to treat stress. Peinuhpw has powerful antioxidant and antibacterial properties. Rotenone, the highly potent mitochondrial toxin, was isolated from the root

(Lee et al. 2010:103-104) and used for poisoning fish (Glassman 1952:76). The roots are pounded to prepare the fish poison, which stuns reef fish. The pounded roots are placed under coral rocks to catch the fish. Roots are collected, mashed, and placed underwater beneath rocks, where the fish live. Within minutes, the fish are stunned or die. For treating itchy skin or skin rash, roots are cleaned, pounded, and mixed with shredded copra placed in a cloth or Cocos fiber and applied to the skin. The large stems are used as rope, and the young leaves are applied to treat ear and vaginal infections. Young leaves are ingested to ease labor, and for bedwetting in children, very young leaves are rubbed in the hands and the juice is squeezed onto the child's penis or labia majora (Balick 2009:390-392). Peinuhpw is also used to treat pigs that have worms. Anna at the Village informed us that peinuhpw is used as a natural insecticide on Pohnpei. The roots are squeezed to extract the juice and sprayed onto agricultural plants. She added that it is also mixed with nih, Cocos oil and applied to the skin to treat dermatitis and infections.

Tuhke karisihn, *Falcataria moluccana* (Miq.) Barneby & J.W. Grimes, a synonym of *Falcataria falcata* (L.) Greuter & R. Rankin is a large, introduced, fast-growing tree in the Fabaceae with pinnately compound leaves and small white flowers. It is used as firewood on Pohnpei. Ringlen Wolphagen informed me that this highly flammable tree produces a light, soft wood that makes excellent canoes. Nitrogen-fixing tuhke karisihn improves soil fertility for growing mahi, *Artocarpus altilis* and sakau, *Piper methysticum* (Balick 2009:387-388). Tuhke karisihn's native range is Maluku to the Santa Cruz Islands.

Pwuhr en Pohnpei, *Fagraea berteriana* A. Gray ex Benth. Is an epiphytic tree in the Gentianaceae, whose native range is Papuaia through the Pacific. It grows in the nanwel, the greatly threatened upland forest of primary vegetation on Pohnpei (Herrera et al. 2010:4; Balick 2009:12). Pwuhr en Pohnpei has many branches, smooth, thick leaves, fragrant, fleshy tubular flowers, and succulent fruits. The fruits are applied to treat boils that develop under arms and on testicles (Lee et al. 2010:48). The sticky flesh of the peeled fruit is used as a flytrap to draw flies away from food. The flowers are made into special mwaramwar, head garlands, and leis, and as a charm for protection against sorcery. The fruits and buds are used to treat kilsarawi, shingles, *Herpes zoster*, and the fallen leaves are used to treat kanahria, gonorrhea. Young shoots are pounded and ingested with water to treat kidney stones and pounded young shoots and leaves are consumed with water for treating other kidney ailments (Balick 2009:398-399).

Ais, *Atuna racemosa* Raf. Subsp. *racemosa* is a large tree in the Chrysobalanaceae that grows in the nanwel, the highly threatened upland forest ecosystem of primary vegetation on Pohnpei, whose substrate is of weathered volcanic rock (Herrera et al. 2010:4; Glassman 1952:29). Large ancient trees grow on the weathered volcanic substrate of this richly resplendent tropical forest (Balick 2009:11; Herrera et al. 2010:4). The enduring wood of this tree is used for house construction and spearing fish. Ais fruits are a source of glue or paint. The nuts are scraped and mixed with the red soil of Nanpwoarenais, Madolenihmw. This mixture is placed in a pot over a fire and stirred until it becomes a thick red

resin used to paint and protect the wood of canoes from rotting. The roasted and grated seeds are a source of varnish. A protective paint is also made when the seeds are roasted in a metal container in an uhmw for half an hour. Seeds are then grated and squeezed to obtain the liquid used to paint canoes with inipal, *Cocos nucifera* L. fiber. Fruits are used as an insect repellent by placing them in a fire, whereby the smoke keeps mosquitoes away. The fragrant fruit and seed scrapings mixed with nih, *Cocos nucifera* oil are applied to enhance skin and hair. The ripened fruit is applied to the skin to make it beautiful, and the white seed oil is placed on rashes. Ais bark is used to treat bloody diarrhea and amoebic dysentery. The grated seed is employed as medicine for treating dysentery and yaws, *Treponema pallidum* subsp. *Pertenue*, the chronic disfiguring and debilitating tropical bacterial infectious childhood disease (Balick 2009:349-350; Glassman 1952:19, 73).

Nih, *Cocos nucifera* L. in the Areaceae is the palm of life for Pacific peoples. This tall pantropical species grows in the low coral island forest or atoll forest and in the nansapw. This is where agricultural and agroforestry cultivation and human settlements are found on Pohnpei (Balick 2009:9; Herrera et al.:2). Kapingamarangi friend, Karmy Hicks, informed me that pahi, slings are made from the husks of tiniu, *Cocos nucifera* L. in Kapingamarangi language. Uhpw, the sweet liquid inside the fruit of *Cocos nucifera* is a refreshing drink. Oil is extracted from copra, which is produced after the endosperm of the fruit is dried in the sun. Leaf base fiber is employed as cloth for placing and squeezing medicinal plants rubbed on the skin. Nih flowers are applied to

dog bites and are consumed as liquid for treating dysentery. As an eye wash, the inner part of the leaf stalk is scraped in cloth and squeezed into the eye. The roots are pounded, squeezed, and consumed in water for treating seizures (Balick 2009:263, 265).



Figure 15. *Cocos nucifera*

Oil from the fruit of nih is a valuable emollient, and the husk fiber extract has antibacterial and antiviral properties for treating skin infections. The roots of nih are cut, cleaned, pounded, and wrapped in cloth, and the juice is squeezed into water and consumed to treat Hepatitis A (Lee et al. 2010:17, 114). Nih is an indispensable ingredient in many medicinal preparations for treating diverse ailments on Pohnpei.

Nih husks provide sennit, cordage for binding traditional house beams, fastening outriggers to canoes, and as fuel. The hard shell of the coconut serves as an excellent container for liquids and is fashioned into jewelry. “Sohte wasa ehn nih me sohte ah doadoahk.” – “There is no part of the

coconut palm to throw away.” – Pohnpei belief (Ashby 2003:215).

Puka, *Pisonia grandis* R. Br. is a synonym of *Ceodes grandis* (R. Br.) D. Q. Lu in the Nyctaginaceae. It is a tropical island native tree with soft light wood and large light green elliptic, oblong, or ovate leaves with long petioles. It grows in dense stands on coral cays and islands in the Indian and Pacific Oceans and adjoining coastal areas, from Madagascar to Polynesia. Kapingamarangi expert Karmy Hicks informed us that the large, pleasant-tasting leaves are eaten fresh or cooked. Puka is used as medicine for treating hypertension and diabetes. The leaves are also fed to pigs. Puka can be propagated vegetatively. Adelina Lepehn indicated that this tree is called mehs in Mwoakilloa language. According to the Missouri Botanical Garden, thickets of this tree are preferred nesting sites for some seabirds that disperse the sticky seeds from island to island.

Oahs, *Metroxylon amicarum* (H.Wendl.) Hook.f. is a tall native palm in the Arecaceae with a large paniculate terminal inflorescence. It grows in coastal freshwater wetlands and highland rainforests of Micronesia. Its imbricated fruits, which are round to pear-shaped are carried by ocean waves, and its seeds are disseminated by water or wind. The roots are employed as medicine for treating high fever, caused by shaking sickness. The root pulp is consumed with water until shaking ceases. Boiled oahs roots in water are also reported to treat back pain. The patient drinks the beverage copiously for eight days (Lee et al. 2010:120, 151). Oahs bark is scraped, pounded, squeezed into a cup,

and consumed to treat diarrhea. The roots are pounded, wrapped in Cocos fiber, and squeezed into a cup of water and consumed to treat seizures (Balick 2009:266-267).

Oahs is a valuable palm for weaving, construction, and ornamentation (Ashby 2004:234). For many years, buttons have been manufactured from the fruits of the ivory nut palm (Glassman 1952:19). The large leaves are harvested and sewn together for roof thatch, and the wood is employed as lumber. The ivory are carved into necklaces and small sculptures.



Figure 16. Oahs

Chrysophyllum cainito L. is the introduced tropical American star apple tree in the Sapotaceae cultivated for its nutrient-rich edible fruit (Ragone et al. 2001:322). The delicious oval-shaped subglobose fruit is smooth-skinned and purple when ripe. Pohnpei children apply the sticky leaf petioles with shiny elliptic leaves to their face and ears.



Figure 17. *Chrysophyllum caimito*

Pouteria campechiana (Kunth) Baehni in the Sapotaceae was cultivated in Pohnpei's historic Pwunso Botanical Garden for its nutritious fruit. The sweet and delicious smooth yellow-orange eggfruit is rich in carotene (provitamin A). Many drupe fruits had fallen from the tree and their seeds germinated. Bill Raynor and I collected and widely shared the large glossy seeds and young saplings with farmers and gardeners as it grows beautifully on Pohnpei. *Pouteria* leaves are evergreen and alternately arranged, and the slender trunk is furrowed, producing white latex. Its spreading crown with young velvet brown branches gives rise to fragrant flowers. The native range of this wonderful tree is Mexico to Central America.



Figure 18. *Pouteria campechiana*

Mworopw, *Inocarpus fagifer* (Parkinson ex F.A.Zorn) Fosberg in the Fabaceae is an evergreen tree native to Malesia and the South Pacific islands. It grows along the coast of Pohnpei, beside riverbanks, uplands, and taro patches. Tahitian chestnut has a dense canopy of glossy, oblong alternate leathery leaves, and fragrant white flowers. It produces irregular, ovoid, or oblong, slightly flattened edible fruits that are boiled, roasted, or baked. On Pohnpei, the nutritious fruits are boiled for an hour or two, and the skin is removed. Mworopw is a medicinal tree whose inner bark is scraped and mixed with other healing leaves for treating diarrhea. A strip of the inner bark with pounded leaves of marasau, *Aglaia mariannensis*. Merr. in the Meliaceae are wrapped in cloth and squeezed into a cup of water and consumed to treat amoebic dysentery. Bark scrapings are pounded and wrapped in inipal, Cocos fiber, or cloth and squeezed into water, and drunk for treating joint and muscle pain and headache (Balick 2009: 388-389, 438-439). Glassman (1952:78) noted that mworopw wood is an excellent kindling.



Figure 19. *Inocarpus fagifer*

There are several medicinal fungi on Pohnpei. Saleng en eni, *Favolaschia manipularis* (Berk.) Teng = *Filoboletus manipularis* (Berk.) Singer in the Mycenaceae is a bioluminescent Basidiomycetes fungus that grows in clumps on dead wood in Pohnpei forests. Didimwerek is its common name, which means phosphorescent and sparkles because it glows in the dark (Balick 2009:221; Rehg and Sohl 1979:205). It has a white to pale cream convex to bell-shaped umbonate pileus with a brown tinted central raised umbo and rounded symmetrically arranged adnate pores on its undersurface. Its central, white to ivory-colored stipe is covered with minute scales.

On Pohnpei, earaches are treated by placing saleng en eni into half a nih, *Cocos* shell. Heated stones are then put on the fungi and the other half of the *Cocos* shell with a hole in it encloses and covers the bottom nih shell. The steam, which comes out of the shell hole is directed into the painful ear. Saleng en eni is also rubbed onto sore arms, etc. to relieve pain. Eni refers to ghost, usually malicious (Rehg and Sohl 1979:9).

Some Pohnpeian people fear and consider bioluminescent fungi to be related to eni (ghost) and they tell little children to behave or eni in the forest may torment them (Balick 2009:221).

Diospyros discolor Willd. In the Ebenaceae was planted in the historic Pwunso Botanical Garden on Pohnpei. This tree was introduced from Hong Kong during the German occupation for its edible fruit (Ragone et al. 2001:311; Balick 2009:369; Herrera et al. 2010:105). Mabolo is a dioecious species with evergreen alternate leaves, white waxy 4-merous flowers, and beautiful oblate yellow, orange, dark reddish-purple young fruit that is mildly sweet, tart, and mealy. Its native range is Formosa to Borneo.

Dillenia indica L. in the Dilleniaceae was also planted in the historic Pwunso Botanical Garden for its edible fruit (Ragone 2001:311; Balick 2009:369); Herrera et al. 2010:105). The elephant apple is a medicinal tree with large, beautiful fragrant flowers and edible fruit composed of fleshy sepals that can be eaten raw or cooked. Its native range is temperate and tropical Asia, from India to China and West and Central Malasia.

Nihn, *Ficus tinctoria* G.Forst. in the Moraceae is a medicinal tree which begins its life as an epiphytic strangler that develops into a large banyan tree with prop roots. Its dark green and glossy ovate leaves are alternately arranged, and its axillary syconium fruits are usually paired. On Pohnpei, nih roots are harvested to treat back pain. They are placed in cloth with a hot stone and applied to the painful area until symptoms subside (Lee et al. 2010:91-92). A liep, which is a cord looped around ankles for climbing nih, *Cocos*

trees, is made from a strip of bark of a small nihn sucker that is softened and twisted. Ropes, belts, and enduring fishing lures are also made from nihn bark. The wood is used in construction and as firewood. This powerful plant is used to keep ghosts away from an ill person. The latex from the cut trunk is applied to cuts and wounds. The fruits or leaves are pounded and placed in a cloth and squeezed into the ear to treat earache (Balick 2009:446-448). Pohnpei expert Melvin informed me that the milky sap from chewed leaves can be applied to dog bites and other wounds. Nihn is native to Hainan, China, and the Pacific.

Spondias dulcis Parkinson is a vigorous deciduous tree in the Anacardiaceae with smooth pinnately compound leaves, small white flowers in terminal panicles, and sweet and acidic oval fruits whose endocarp has spiny projections. It was introduced on Pohnpei for its edible fruit (Ragone et al. 2001:305; Balick 2009:324; Glassman 1952:87). Its native range is East Malesia to the Santa Cruz Islands.



Figure 20. *Spondias dulcis*

Manilkara zapota (L.) P.Royen in the Sapotaceae family was introduced from Java to Pohnpei for its latex during the Japanese occupation. It is native to Central and South America and is grown pantropically for its edible fruit (Balick 2009:496; Ragone et al. 2001:322), medicinal properties, wood and latex. Glassman (1952:22) indicated that it was cultivated in the Agricultural Experiment Station on Pohnpei for its fruit. *Manilkara* is an ornamental and medicinal tree grown in tropical regions for its fruit, and its bark yields latex for chicle-chewing gum. Various parts of the tree have diuretic and tonic properties for treating inflammation, pain, fever, coughs, dysentery, and diarrhea.

Koatun, *Ceiba pentandra* (L.) Gaertn. is a tall, deciduous ornamental tree in the Malvaceae with a straight trunk that is wide and buttressed at its base. The smooth bark has conical spines and the palmately compound leaves have 5-9 foliolate, narrow elliptic-ovate entire acuminate leaflets. Kapok is native to Mexico through tropical America (Glassman 1952:67) and was introduced on Pohnpei during the German and Japanese occupations for its fiber (Ragone et al. 2001:308; Balick 2009:426). The brown, oblong fruits are capsules containing smooth black seeds that are surrounded by silky cotton-like fibers. Koatun is employed to treat boils on Pohnpei. The shoots of young leaves are pounded and applied to the boil as a poultice until it opens and drains (Lee et al. 2010:40-41). Some Pohnpeian people eat the black seeds, and the fibers are used for making pillows.

Auleng, *Curcuma australasica* Hook.f. is a native medicinal turmeric on Pohnpei in the

Zingiberaceae. Its leaves are applied to prepare mahr, preserved, and fermented breadfruit. Many auleng leaves are placed in the ditch for wrapping fermented food (Balick 2009:80). Welsiher from Pingelap informed me that she dries the rhizome of auleng and pulverizes it for healing wounds and rashes. For making skin smooth, the rhizome is scraped and mixed with grated nih, *Cocos nucifera*, and is squeezed onto the body before showering. For treating infections and infected cuts, the tuber is cleaned, pounded, and squeezed onto the infected area (Balick 2009:311-312). Glassman (1952:107) reported that auleng is frequently found in the rainforest on Pohnpei.

Eugenia uniflora L. is a medicinal, ornamental, and many-branched small tree or shrub in the Myrtaceae with opposite, simple, oblong leaves and fragrant white flowers. The fleshy and juicy green fruits with 1-3 resinous seeds turn deep scarlet, bright red, orange, crimson, dark purple, or maroon when ripe. *Eugenia* is native to Brazil and southern South America. It was introduced on Pohnpei at the Agricultural Experiment Station for its edible fruit (Ragone et al. 2001:317, Herrera et al. 2010:154), an excellent source of Vitamin C.

Santol, *Sandoricum koetjape* (Burm.f.) Merr. is a large tropical, medicinal ornamental evergreen tree in the Meliaceae that produces delicious, golden colored globose or oblate fleshy edible fruits that are eaten raw or cooked. Its native range is Malesia to New Guinea, however it is widely cultivated and naturalized. Santol was introduced on Pohnpei in the Agricultural Experiment Station for its nutritious fruit (Ragone et al. 2001:316) that can be dried, candied, or made into jams, jellies, and

marmalades. The ripened fruit is also fermented with rice to make an alcoholic beverage. Augustine called the fruit, a capsule, “golden apple star” and said that it was like soursop in the center. The tree has spirally arranged trifoliate leaves that are elliptic to oblong-ovate. Its fragrant wood is used for its aromatic properties in perfumery, and the bark is employed in tanning fishing nets in the Philippines. *Sandoricum* is also valued in Asia for its wood and as a shade tree. On Pohnpei, santol was growing below the track by PICS, Pohnpei Island Central School.

Pwompwomw, *Passiflora foetida* var. *hispida* (DC. ex Triana & Planch.) Killip is a synonym of *Passiflora vesicaria* var. *vesicaria* L., according to Kewscience Plants of the World online (<http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:184938-2>). Pwompwomw is a slender herbaceous vine in the Passifloraceae. It is native to Tropical America and was introduced and has become naturalized throughout the tropics. It grows along roadsides and abandoned fields on Pohnpei (Glassman 1952:26). The tart and fleshy orange ellipsoid or globular fruits are eaten as food. They have a distinctive odor when opened. The vine is used as medicine to treat fever and skin diseases in babies and other children’s illness and the tendrils are pounded with stone and applied to boils to drain and reduce pain (Balick 2009:461; Lee et al. 2010:46-47)). Pwompwomw has three-lobed leaves with glandular hairs, and the bracts subtending the flowers and fruits are finely and deeply dissected.

Ketieu, *Ixora casei* Hance in the Rubiaceae is used as medicine on Pohnpei to treat childhood illnesses such as skin diseases and boils. Ketieu

is employed in treating the stings from rarahni, crown of thorns starfish (Lee et al. 2010:6, 39). It is native to the Caroline Islands, Marshall Islands, and the Gilbert Islands, and it grows in the nansapw, secondary vegetation on Pohnpei. The nansapw is where agricultural cultivation takes place and human settlements exist (Herrera et al. 2010:3-4; Balick 2009:9-10). The roots of ketieu are used as a hemostatic in menstruation. In the past, spears were made from its wood (Glassman 1952:94), and currently, a nahi, stick is made from a short piece of ketieu wood for lashing to the breadfruit harvesting pole with pwehl, *Cocos* fiber cordage (Balick 2009:76).

Rose Mulholland, an innovative farmer in Dolonier, Nett observed that tiny black ants were eating the white flies on her *Capsicum* L. plants. So, she sprinkled sugar around her *Capsicum* plants that had white flies to draw the ants, and the following day, she observed that the leaves of her *Capsicum* plants were cleared of white flies!

Ioakim was given a *Garcinia mangostana* L. sapling After two months, I noticed that the little tree looked more developed than any other *Garcinia mangostana* sapling I had encountered on Pohnpei. I asked Ioakim what he was doing to enhance the growth of his sapling, and he stated, "I added a little salt to the soil. Since people need some salt, I thought that plants do too." The leaves looked very well.

Garcinia xanthochymus Hook. f. ex T. Anderson is an evergreen tree in the Clusiaceae that was introduced to Pohnpei for its edible fruit (Balick 2009:353; Ragone et al. 2001:310). The fragrant yellow acidic globose or ovoid fruit is

eaten raw or cooked. It can be made into jams, jellies, curries, sherbet, and vinegar and the fruit's juice produces a dye. *Garcinia xanthochymus* is the source of a useful gum-resin. Its native range is the Indian Subcontinent to Yunnan and Southwest Guangxi Provinces, China, and Indochina.

Mwerer, *Syzygium cumini* (L.) Skeels medicinal trees in the Myrtaceae grew in Kittu by the Nanpei Church and cemetery. Mills Santos informed us that his grandfather Nanpei brought the seeds from Hawai'i and broadcast them in Rohn, Kittu. This large, medicinal evergreen tree's native range is Tropical and Subtropical Asia to North Queensland, Australia. It is widely cultivated in Asia, Africa, and South America and has become naturalized. The sweet and sour ellipsoid or subglobose fruit, seeds, leaves, and bark are reported to have antidiabetic, antioxidant, and anti-inflammatory properties due to various biologically active phytochemical compounds. The astringent and nutritious fruits can be eaten raw or made into jams, jellies, preserves, vinegar, wine, and other fermented beverages.

Kirekiniwel, *Syzygium stelechanthum* (Diels) Glassman is an endemic woodland tree in the Myrtaceae with very dense hardwood (Balick 2009:454), white flowers, and edible cauline red fruits. The berries have been taken along on mountain trips by Pohnpei native people (Glassman 1952:2, 62). Its native range is the Caroline Islands of Micronesia.

Isidro Alfonse spoke of growing *Vitis vinifera* L. in the Vitaceae on Pohnpei. *Vitis* was formerly

grown on Pohnpei for its fruit during the German occupation. The vine was introduced from California (Balick 2009:512; Ragone et al. 2001: 324), and wine was produced from the green grapes.

Raphael Alfonse grew an abundance of delicious *Passiflora edulis* Sims fruits in the Passifloraceae. The sweet and tart aril and seeds of the *Passiflora* fruit are eaten or made into a beverage. The fruit is cut in half, and the aril and seeds are scraped out and consumed or placed in water as a refreshing drink (Balick 2009:459; Ragone et al. 2001:318). With great enthusiasm, I recommended that he bring his wonderful fruits to market. The native range of this herbaceous perennial climber with beautiful solitary flowers is Brazil to Northeast Argentina.

Neolamarckia cadamba (Roxb.) Bosser is an economically important medicinal, tropical tree in the Rubiaceae. It has simple, smooth opposite leaves, a capitate globose inflorescence and 5-merous fragrant flowers with partially exerted stamens. The drupaceous fruit is glabrous and edible. The buds and leaves smell like wintergreen, and the seeds are dispersed by bats. Its native range is South China to Tropical Asia, and it has been planted to rehabilitate degraded, deforested land in Sarawak. This deciduous tree was growing by the river across from the Pwunso Botanical Garden on Pohnpei.

Kehamwise, Kasik, *Vitex trifolia* L. subsp. *trifolia* in the Lamiaceae is a medicinal, ornamental shrub or small tree with smooth bark and fragrant purplish to blue flowers. The Kapingamarangi people use it to keep mosquitoes

away. The aromatic leaves are burned and placed around the house in the evening (Balick 2009:412).

Ngih, *Pemphis acidula* J.R.Forst. & G.Forst. is a medicinal shrub or small tree in the Lythraceae with simple and entire opposite leaves, flowers containing hypanthia and reddish capsulate fruits. It grows among the ni oaroahr, strand vegetation on Pohnpei, and the basaltic islets of Micronesia. Its durable wood is used for house posts, rafters, spears (Glassman 1952:25, 58), tool handles, and utensils and is considered the strongest tree on Pohnpei. The bark scrapings treat dysentery and ulcers (Balick 2009:421-422). The Kapingamarangi people use the dense, hard wood of kini as a wedge. Its native range is Somalia to Mozambique and the Pacific.

Ikoik, *Cordia subcordata* Lam. is a medicinal shrub or small tree in the Boraginaceae with alternate leaves and beautiful, fragrant orange flowers made into mwaramwar and added to nih, *Cocos* L. body oil for its lovely scent. Its ripened fruit, which is a nut is eaten as food, and the leaves and bark are employed in healing (Balick 2009:341-342). The handsome dark-grained wood of lakaume is used for carving by the Kapingamarangi people. House posts and furniture are made from ikoik wood. It grows along the ni oaroahr, strand vegetation on Pohnpei, and the basaltic islets (Glassman 1952:20-21, 25). Its native range is South Somalia to Northern Mozambique, the Indian Ocean, and the Pacific.

On June 12, 2011, plant veterinary medicine with utun-we-usel, tikap, *Musa textilis* Nee

(Balick 2009:285; Glassman 1952:106) fiber in the Musaceae were applied to Mauka, the pup's swollen leg and distended bleeding abdomen. Sounwini Lepen Lison Leon Aldis prepared frozen healing plant medicine, and this compress was placed on Mauka's swollen leg and distended bleeding abdomen. Mauka tolerated the treatment quite well and licked some of the plant medicine. *Musa textilis* Nee was introduced on Pohnpei during the Spanish and German occupations for its excellent fiber. It is now naturalized there, and while the fruit is inedible, the succulent petioles are a water source (Ragone 2001:317; Balick 2009: 285; Glassman 1952:106).

Thankfulness to the Plants and the Healer

Honorable Pohnpei traditional healer Sounwini Lepen Lison Leon Aldis, prepared a mixture of healing plants for my injured wrist. He gathered four buds of kolou, *Hibiscus tiliaceus* L. in the Malvaceae, four fronds of kideu, *Arachniodes aristata* (G.Forst.) Tindale in the Dryopteridaceae, which is added for sweetening local medicine and to "make the insides good." The new fronds of kideu taste sweet (Balick 2009:233). Four fronds of *Microsorium scolopendria* (Burm.f.) Copel. in the Polypodiaceae is another fern he gathered called kideu, which grows in the naniak, mangrove forest (Glassman 1952:23). The naniak, which encircles and protects Pohnpei, is in swamps affected by ocean tides and contain saline or brackish water (Balick 2009:8).

Sounwini Lepen Lison Leon Aldis collected four leaves of the slender perennial trailing



Figure 21. *Microsorium scolopendria*

vine, sonsol, *Ipomoea pes-caprae* (L.) R.Brown subsp. *brasiliensis* (L.) van Ooststroom in the Convolvulaceae, which grows among the ni oaroahr, strand vegetation where the sandy land rises from the water, along the rocky shore. These plants experience salt water, drying, high winds, heat, and full sunlight (Herrera et al. 2010:2; Balick 2009:9; Glassman 1952:25). Lepen added four nih, *Cocos nucifera* L. roots to this mixture.

Sounwini Lepen Lison Leon Aldis prepared four buds of rehdil, *Asplenium protensum* Schrad. in the Aspleniaceae, four buds of kolou, *Hibiscus tiliaceus* L. in the Malvaceae and four buds of omp, *Ipomoea littoralis* Blume, in the Convolvulaceae. On Pohnpei, a poultice is made of omp leaves rubbed together with nih, Cocos oil poured over them for treating boils. The poultice is applied to the boil as a plaster and repeated when the leaves dry and fall off. To reduce stress, four young shoots of omp are chewed and swallowed each morning for four to eight days (Lee et al. 2010:45, 102).

Sounwini Lepen Lison Leon Aldis and his lovely wife Lampein Leilani provided me with a poultice of these plants for massaging my injured arm. The soothing mucilage of kolou, *Hibiscus tiliaceus* L. is very useful for its gliding quality mixed with the other medicinal plants for healing. I returned to his home for four days. Sounwini Lepen Lison Leon Aldis gave me the root of nih, *Cocos nucifera* L. to ingest with a piece of upw, *Cocos* “meat”.

Sounwini Lepen Lison Leon Aldis told me to return after the four days of treatment if my injured arm was not healed. A few weeks later, my arm needed stronger medicine and protection. Therefore, I returned on May 29, 2011. Sounwini Lepen Lison Leon Aldis requested that I return lakapw (tomorrow) for treatment.

On May 30, 2011, Lampein Leilani first welcomed me when I returned and anointed my body with fragrant nih, *Cocos nucifera* L. oil. The oil was applied from head to toe. Lampein Leilani’s strong and skillful hands were very warm as she gently massaged my arm with natural floral fruit essence and nih oil.

I was given a soothing treatment of a healing umwulap, steam inhalation under a light sheet. A hot bucket of steaming plant medicine steeped in the bucket like a small healing volcano. The bucket was placed beneath my legs, and I placed my injured arm over the heat, which was very comforting. I remained under the sheet in the healing umwulap for about thirty minutes breathing in the vapor of the healing plants.

My diagnosis at Pohnpei State Hospital was ulnar nerve damage, and Dr. Joel provided me

with a sling on May 30, 2011. Neuropraxia, peripheral nerve injury, would require 3-6 months to heal. Lamentably, the large woman who attacked me continued to harass me and photographed me against the orders of the President of the College of Micronesia. I informed Sounwini Lepen Lison Leon Aldis that the father of the woman who attacked me had recently died, so she returned home and left the island. It was a comfort that she was not on Pohnpei; however, I felt sorry for her pain and loss.

On June 2, 2011, after drinking a cup of bitter medicinal plants tea, Sounwini Lepen Lison Leon Aldis prepared a bucket of steaming leaves and stems of the four plant species arranged in a mwaramwar, garland for the umwulap treatment. After thirty minutes under the sheet, Sounwini Lepen Lison Leon Aldis and I spoke together. He informed me that the healing medicine is prepared in the latter part of the day at sundown. “This is when the power of the good medicine returns.” Koht, God (Rehg and Sohl 1979:173) gave Sounwini Lepen Lison Leon Aldis this gift. We offer sakau, *Piper methysticum* G. Forst. as a way to honor the spirits of the plants and as an acknowledgment of their healing power. He added sakau (ava) is also prepared in Samoa.

One heals because of one’s belief in God. It is not just the power of the plants. It is the goodness of God who has endowed Sounwini Lepen Lison Leon Aldis with this ability and the love of people. He performs treatments in the evening because this is when the power of good medicine returns. “There is evil in the daylight hours.”

Sounwini Lepen Lison Leon Aldis relayed a story about nih. The coconut was split on a reef,

and a woman from the west chose the part with the eyes. The other half was selected by a woman of the east.

Sounwini Lepen Lison Leon Aldis and Lampein Leilani's medicine is strong and good. It gave me strength, and I could sleep deeply through the night. On June 3, 2011, I returned to drink a bitter tea and young nih, *Cocos nucifera* L., with the prepared plant medicine for protection. Traumatologically, I felt the attacker's hand around my arm this morning when I awoke. It was still quite painful. I would try to rest my arm and to be moderate at work until it is healed. I was in good hands with Sounwini Lepen Lison Leon Aldis and Lampein Leilani.. Safe.

For eight days, I returned for treatments. Sounwini Lepen Lison Leon Aldis prepared and gave me a bitter tea containing kideu, *Arachniodes aristata* (G.Forst.) Tindale in the Dryopteridaceae, and *Microsorium scolopendria* (Burm.f.) Copel.in the Polypodiaceae with young nih, *Cocos nucifera* L. There are several plant medicines used in this admixture for tea. The tea and steaming plants have a positive effect on aiding in deep sleep and rest. Still, the pain sometimes awakened me at night.

Sounwini Lepen Lison Leon Aldis emphasized that the medicine from the plants must be accompanied by thankfulness and prayer to God and the spirits of the plants for the healing to be effective. On my last day of treatment, I gave an offering of sakau, *Piper methysticum* G. Forst. to the spirits of the plants for giving their medicine. After sundown is when the plant medicine is most effective. Its goodness returns. One must believe in the healing power of God for the plant

medicine and healing treatments to be effective. At the home of honorable Sounwini Lepen Lison Leon Aldis and Lampein Leilani, the dear children and family, patients, and friends all contribute to a loving, healing environment. Lucky, the sweet puppy lay beside me just outside while I was under the sheet with the steaming plant medicine of the umwulap. The bucket of steaming plants caused sweating and clearing, and the moist warmth on my injured arm was soothing. Lucky playfully nipped at me through the sheet. His playful happiness was a comfort that contributed to my healing.

Kau is the untwisting of the nerves that damaged, compressed and impacted my arm. Nih, *Cocos nucifera* L. and other plant medicine in the young coconut clears this. My arm felt lighter and clearer after this drink, which I took after consuming the bitter tea of kideu and other plants. Sounwini Lepen Lison Leon Aldis gave me exercises to perform in the morning to heal my arm. We drank sakau, *Piper methysticum* G. Forst. together to commemorate Sounwini Lepen Lison Leon Aldis for his healing gifts, and we also gave thanks to the spirit of the plants for giving their medicine. I returned in the evening with sakau from Awak, which is considered the best on Pohnpei.

June 6, 2011, was my final treatment with Sounwini Lepen Lison Leon Aldis. I presented him with four bottles of fine quality sakau, *Piper methysticum* G. Forst. from Awak. Kroan Augustine Primo delivered them even amid yet another funeral in his family. Peter, Sounwini Lepen Lison Leon Aldis' brother, and several other men ceremonially prepared the roots of a

ten-year-old sakau, *Piper methysticum* plant from Awak, and we drank it together. I gave blessings of gratitude to Sounwini Lepen Lison Leon Aldis and Lampein Leilani and the spirit of the plants for healing. I thanked all who were present for their work and love. I would miss nightly treatments at Sounwini Lepen's home. It is dynamic, warm, and loving with the beauty of the children and the kindness of family and friends.

Sounwini Lepen Lison Leon Aldis instructed me to apply the fragrant nih, *Cocos nucifera* oil before leaving the house for protection. The woman who attacked me was to return to Pohnpei on June 16, 2011.

Sounwini Lepen Lison Leon Aldis recommended planting kehp, *Dioscorea Linnaeus* in the Dioscoreaceae when there is a full moon. The vine is trained from right to left as it climbs for support toward the sun. On Pohnpei, kehp is the most significant root crop, and knowledge of its cultivation is surrounded by great secrecy. It is

a seasonally cultivated crop on Pohnpei, and one must never plant kehp on rainy days or when one is ill or feeling weak as it is believed that this could be transferred to the yam itself (Raynor et al. 2009:40, 44, 52).

Sounwini Lepen Lison Leon Aldis likes to view the lay of the land from the hillslope to the sea. His memory is a blessing.

Chief of Public Health and Preventive Medicine, Dr. Rally Jim once said that "After a funeral, there is a sun shower. It is a way for the departed to say goodbye to their family members."

Isipahu, King Hebel of Madolenihmw told us that Nan Madol was built in 1160. It is the dwelling place, burial site, and temple of his ancestors. Isipahu is deeply concerned about the possibility of the Pohnpei Government's proposed casino development with a Chinese corporation in Madolenihmw, Pohnpei.



Figure 22. Pacific Ocean

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Dr. Amy Eisenberg teaches at the University of Arizona and is an Associate Scholar with Center for World Indigenous Studies. Amy is a scientific artist whose work is in the Hunt Institute for Botanical Documentation and has been exhibited internationally and nationally. She is a steward in the Tohono O'odham Haki:dag - sacred homeland of the Tohono O'odham Nation, and a botanist, ethnoecologist, organic sustainable agriculturist and agroforester. Amy was Licensed Researcher with the Hopi Tribe – Cultural Preservation Office on the International Repatriation of Hopi and Pueblo Human Remains and Sacred Funerary Offerings, which were taken from Mesa Verde and exported without permit or permission. They were in the National Museum of Finland since 1909 and came home in September 2020 for proper and rightful ceremonial reburial back in Mesa Verde where they were once laid to rest.

Amy was International Conservation Liaison and Research Fellow for Yu Shan National Park and Professor at Yushan Tribal College, Formosa. Amy was Earth Island Institute Director of Conservation in the Yaeyama Islands of Japan. Amy conducted participatory research with the Aymara Marka (Aymara Nation) in the Andes of Arica y Parinacota, Chile through USAID and the International Cooperative Biodiversity Group Project. Amy was Agriculture and Community Development Cooperative Research and Extension Agent at Northern Marianas College and Organic Sustainable Agriculture and Agroforestry Researcher at the College of Micronesia. As International Expert at the Research Institute of Anthropology and Ethnology and Visiting Professor in the Department of Biology and Environmental Sciences, Jishou University in Xiangxi Tujia – Miao Autonomous Region of China, Amy conducted collaborative UNESCO-LINKS UNPFII UNDESA research with the Kam people of China and ministries responsible for ethnic development.