

DRAFT FOR DISCUSSION

## **Traditional Knowledge: Lessons from the Past, Lessons for the Future**

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### **The nature of traditional knowledge and its devolution**

Traditional knowledge, here considered as a body of information and set of skills developed by a group of people over time, is in a constant state of change. As each generation matures, skills perceived as immediately useful are gained while others with a lesser perception of immediate value may be lost. Thus the body of traditional knowledge is never static but rather dynamic in its shape and substance. In order to consider the “preservation” of traditional knowledge, perhaps it would be useful to first explore the nature of this system, how it evolves over time, and identify some of the forces involved in its destruction. This section of the conference addresses the question of the composition of traditional knowledge and whether and how it might be protected.

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Long ago, T.S. Eliot understood the task at hand; writing in Tradition and the Individual Talent, he noted that “It [tradition] cannot be inherited, and if you want it you must obtain it by great labor.” In preparing a discussion paper, I have chosen to look at several site specific examples, based on the notion that a study of the past may provide perspectives for the future.

In looking at the loss of information considered as traditional knowledge, Wolff and Medin (2001) suggested that “with modernization, it may be that knowledge about living things has decreased, or as we say here, *devolved*.” The concept of devolution was derived from their study of undergraduate students at Northwestern University who were provided a list of 80 trees and asked to circle the species they “had *heard* of before, regardless of whether they knew anything about them.” One result of the survey was that less than 50% of the students recognized a group of trees that were frequently found in the area of their university, including alder, buckeye, catalpa, hawthorn, larch and others. The results were suggested to support the devolution hypothesis that linked modernization directly with loss of knowledge about living things. They suggested that this could be offset via “cultural support,” or, “...sufficient amounts of indirect experience with the natural world, through a culture’s media, talk and values...the degree to which a society promotes a particular area of knowledge.” For example, adults can teach children about living things, and thus help offset devolution as it relates to knowledge about the natural world and its components.

The extinction of language is an excellent example of devolution, as related to cultural knowledge. Nettle and Romaine (2000) reported that of the 6600

languages spoken today, fewer than 9%, or 600 have enough speakers to ensure their continuity into the next century. This loss of language includes 90% of the 250 Aboriginal languages in Australia near extinction, with only 18 having at least 500 speakers each. The authors also point out that “no young children are learning any of the nearly 100 native languages spoken in what is now the state of California.”

Concern for the loss of traditional knowledge is the driving force behind many of the ethnobotanical and culture-related projects now underway throughout the world. Workers in the ethno-sciences are collecting data, specimens and craft objects, and using modern technology to catalog and study this information. In the realm of ethnobotany, this work is sometimes referred to as “salvage ethnobotany,” along the lines of the “salvage botany” efforts that have been carried out for many years in endangered habitats of the tropics. These projects, for the most part, employ scientifically or technologically based approaches to recording information as their primary vehicle for the preservation of information. As I will discuss later in this paper, the scientific paradigm may be effective in documentation of information and data collection, but not as useful with regard to long term preservation of the actual knowledge.

In an attempt to quantify the rate of loss (or change) of information about traditional activities on Pohnpei, an island in the Federated States of Micronesia, Lee et. al. (2001) studied what they referred to as “cultural dynamism and change”. For example, with the trade in different species and varieties of food plants between islands in Micronesia, Alocasia macrorrhiza, an edible taro that was once a preeminent food source, has been

replaced by other taro species such Colocasia esculenta and Cyrtosperma chamissonis. These latter introductions are considered more palatable, and thus more desirable, and as a consequence of their adoption as a major food crop, it is likely that the cultural knowledge associated with Alocasia macrorrhiza has diminished, even become extinct.

As part of the effort known as the Micronesia Ethnobotany Project, a great deal of formal and informal dialog on the loss of cultural knowledge was held with traditional leaders and ordinary people on Pohnpei. Some of the results will be discussed further in this paper. Lee et. al. (2001) reported that:

“The traditional leaders we spoke to in Micronesia were concerned with a related, but qualitatively and quantitatively different phenomenon. Instead of their culture changing and evolving at a relatively slow “background” rate, over the last two generations a large percentage of traditions and skills specific to Micronesia have not been passed on, and will become extinct if an active program is not put into place to keep them an active part of local life.”

During an annual course on ethnobotanical techniques that we offer at the College of Micronesia (COM) in Pohnpei, in 1999 we carried out an informal survey amongst the students. This involved a series of questions regarding how many students remembered seeing their grandparents and parents making canoes, and how many of the students had ever made a canoe. The results were extraordinary but not all that unexpected—not a single person in the course had experience in canoe making. One year later,

during the next course we carried out a more formal survey about generational knowledge covering various components of Micronesian life: planting taro; using plants to stun and capture fish; fermenting breadfruit as a method to preserve it as a famine food; using marine plants as turtle bait; and, constructing outrigger canoes. The results, presented in Lee et. al. (2001) (Figure 1) showed the predicted loss of information between generations on this island. In addition, this paper developed a linear regression for the survey results from each set of traditional knowledge (Figure 2) and made a series of very tentative predictions about the time (expressed in generations) that each of these skill sets might become extinct. This regression showed that the traditional knowledge involving canoe making and turtle catching were at greatest risk of extinction, predicted to disappear in the generation represented by the college students.

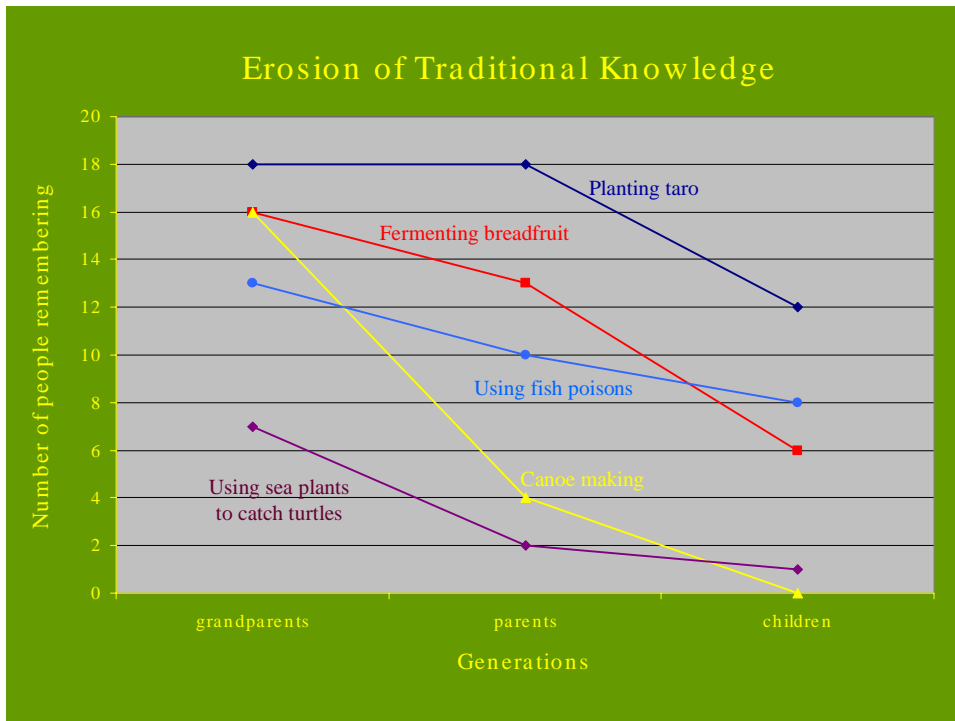


Figure 1. Erosion of traditional knowledge on Pohnpei, FSM.

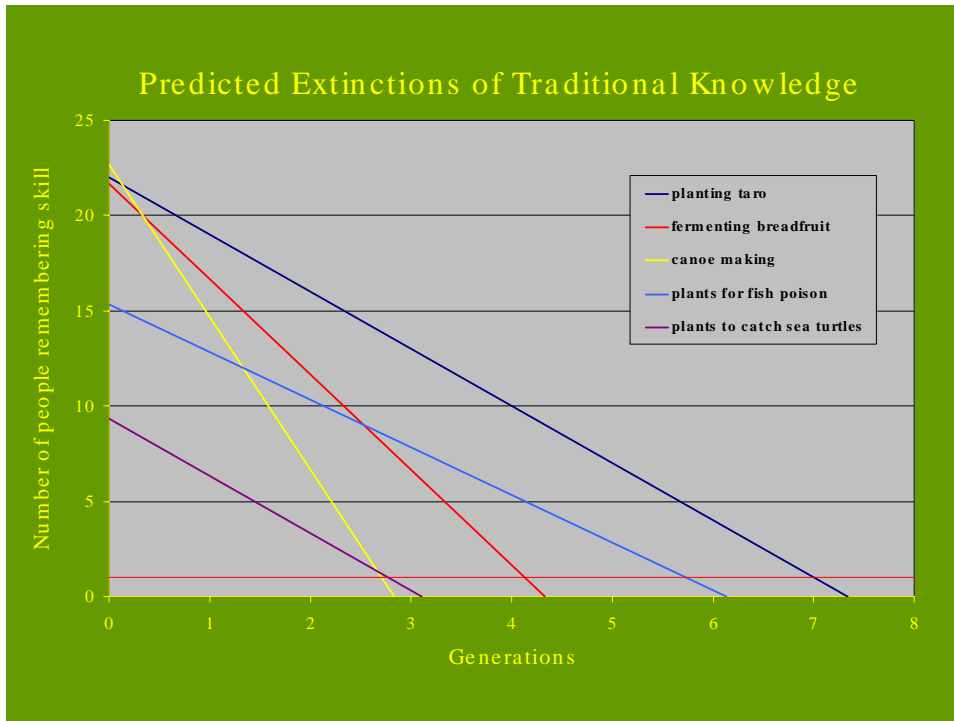


Figure 2. Linear regression suggesting the generation at which skill sets of traditional knowledge will be lost. Generations 3 was the current group of students in the COM ethnobotany class.

Because the small and biased ( e.g. limited to a college class) sample yielded such tentative results, the following year we carried out a survey of traditional knowledge in Pohnpei, involving an instrument that contained 72 questions, in Pohnpean, administered by Pohnpeans, with a sample size of 160 people, approximately 0.5% of the entire island's population. This survey included a significant focus on canoe making, patterns of sakau

(Piper methysticum ) consumption, and quality of life questions. The results from this survey are currently being prepared for publication, and are consistent with the conclusions of the preliminary surveys—it is clear that there is a rapid rate of loss of traditional knowledge about canoe making, along with other skills on Pohnpei. Through their quantitative approach, these studies have also demonstrated that some skills and knowledge are more vulnerable than others, thus offering the possibility that priorities could be developed and evaluated for possible remediation of this loss, based on the rate at which the skill is being lost as well as its importance.

### **Studying traditional healing in Belize**

From 1988 to the present, a group of traditional healers and conservationists in Belize has worked with The New York Botanical Garden on a project to inventory and catalog the flora and ethnobotanical knowledge of that country. The objectives of the project include the preservation of cultural and traditional knowledge, natural products research through the National Cancer Institute, technology transfer, institutional development and training. The scope and flow of activities are illustrated in Figure 3, evolving from the establishment of an ethnobotanical inventory program. Collaborators have included eight governmental and non-governmental organizations in Belize, with over 120 individuals active in the project. The most significant printed results of the project have been the production of a primary health care manual, a checklist of the flora of Belize, and a forthcoming encyclopedic treatment of the useful plants. From the standpoint of traditional knowledge, one of the most important results has been the establishment of an association of traditional healers, allowing the development of a community

of individuals dedicated to this practice. During fieldwork, over 8000 plant specimens were collected, representing nearly 20% of the holdings of the Forestry Department Herbarium in Belmopan, the capital of Belize. The project also promoted conservation of biodiversity, through various local initiatives including the establishment of an ethnobiomedical forest reserve, public displays, post-secondary classes, youth camps, school competitions, field trips and guest lectures. I will touch on some of the lessons learned during this project in this paper.

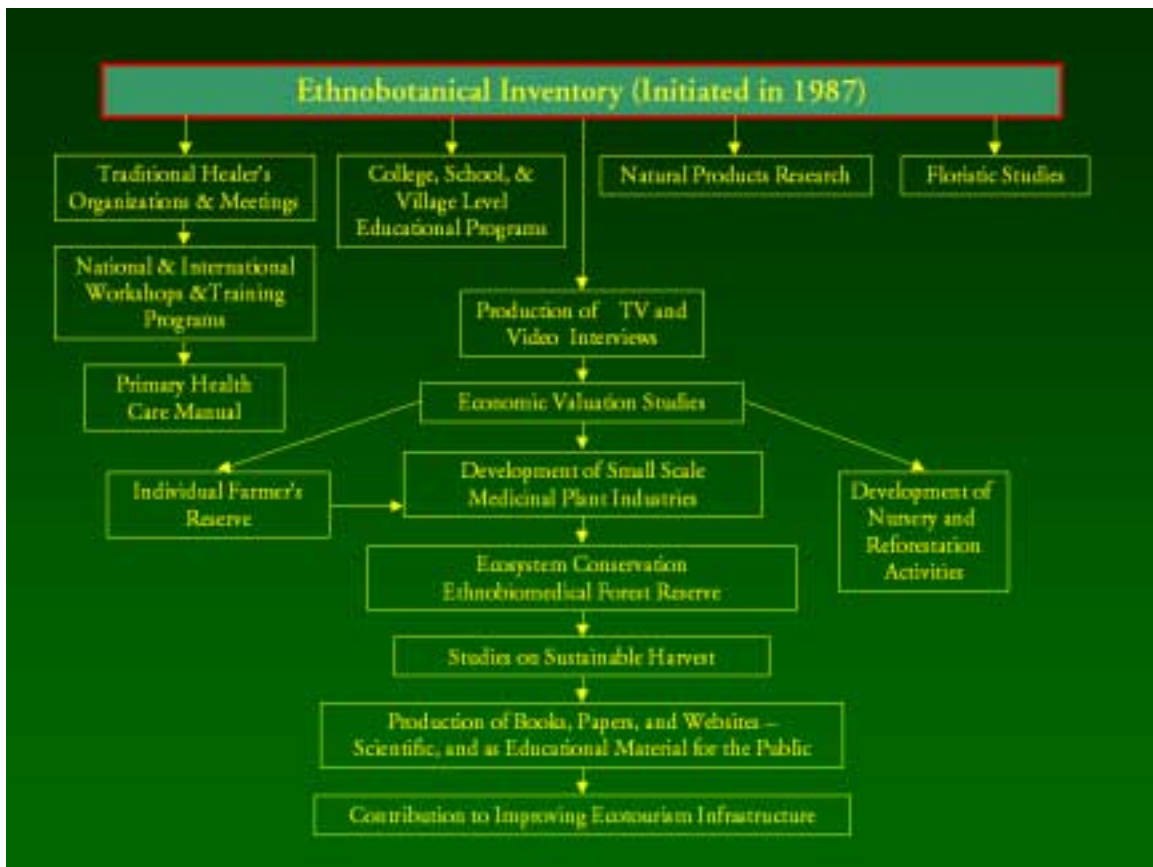


Figure 3. Chart of activities that developed as part of the Belize Ethnobotany Project.



## **Factors contributing to devolution**

Based on experience derived from several projects in various regions over the past two decades, we can identify some of the reasons for the loss of traditional knowledge, and the constraints to addressing this devolution. Modernization is probably one of the foremost issues involved in changing the focus of people's educational endeavors. Emerging generations in many locations around the world now have new career trajectories, based on opportunities derived from modernization and globalization that are the result of the information age. This modernization has been accompanied by the inability of people, particularly the young, to recognize value in traditional ways, as related to their daily lives. In many cases there do not seem to be perceived economic returns from engaging in traditional activities. For example, in the early 1990's, I was in a taxi in Belize, and the driver, a young man in his 20's asked the purpose of my visit. When I replied that I was a student of bush medicine, he enthusiastically launched into a monologue, laden with sentiment, about how his grandfather was a great bush doctor, who knew all of the uses of the plants in the forest, and would treat ill members of the family with great success. His father, the young man explained, knew much about the forest, and the uses of plants, but was not as skilled as his grandfather. The taxi driver himself had no interest in the forest, plants or traditional healing when he was growing up, and did not accompany either his grandfather or father in the forest when they went about their work. His goal, instead, was to have a vehicle, and a

modern life filled with the most modern music, culture and food. Thus, as a result, at the point that his dream had been fulfilled, he felt trapped within it, as there were no longer options to learn family wisdom as both his grandfather and father had died without passing along their knowledge to family members. All too often, this is the case, and by the time young people begin to develop a passion for their roots, it can be too late.

In many places, the diffusion of the family as a unit has tended to reduce interest in traditional activities. As Hezel (2001) has pointed out in Micronesia, these changes have resulted in a complete reshaping of daily life in this region. On the island of Guam, the erosion of traditional culture has been linked to a rise in youth gang membership and criminal activity (Schmitz and Christopher, 1997). They noted that,

“within Micronesian cultures, family kinship, community cohesion, folk knowledge, and religious pageantry have long shaped the cultural life of the community. Courtesy, respect, deference to elders, cooperation, and community hospitality are cultural virtues. Traditional society hinges on family cohesion and community consciousness.”

In recent times, the ideology of modern Western society, individualism, leaves a vacuum in the lives of peoples accustomed to living as a community, and thus Schmitz and Christopher concluded,

“...gang membership provides a perceived solution to disintegrating traditionalism and the unattractiveness, or unattainability, of

modernism. Gang members ascribe to a moral vision based on traditional tribal warrior values.”

In many locations, the introduction of television has become a substitute for family and village storytelling and conversations during which traditional knowledge was formerly transmitted. In the early 1980's I worked with the Apinaje Indians of Northeastern Brazil, on a project involving the use of the babassu palm as an economic crop (Balick, 1988). We chose to go to these people because of their vast knowledge of the babassu, known as the tree of life in this region. The community would go into the forest surrounding their village at least 3 days a week, collecting babassu, Brazil nuts and jaborandi, the source of a leaf made into a pharmaceutical medication for glaucoma. As people sat in the forest and cracked the nuts, they would tell stories, transmit community information and gossip, and teach the younger members of the group about traditional life. This informal training would last for many hours during collection days, and continue around the fire at night. I was able to record stories, lore, songs, and other information through my presence in the collection activity. Ten years later, in 1993, I returned for a brief visit to these people, to see how they had progressed now that a railway and highway were constructed near the reserve. Upon entering the village, the most striking new addition was the parabolic antenna, constructed next to the main communal palm thatched house. Inside, nearly all of the village's children were seated, facing a color television, watching a blond haired, blue eyed entertainer based in Rio dance and sing along with her

audience of children. There were many complaints from the village leaders about the lack of interest in traditional values and activities now that television had arrived. The major role model for the children had become a series of television shows, rather than the traditional leaders.

There is also the fear that traditional knowledge will be used to the advantage of groups outside the culture, perhaps as a new drug or food plant, and thus there is often hesitation to collaborate on projects that might yield benefit to the community as far as preservation of knowledge is concerned. Over the past decade or two, this fear has been exacerbated by outside forces whose stated objectives are to protect, guide and council indigenous groups in order that they not be taken advantage of. While much of this guidance has been very useful in shaping local perspectives on the appropriate nature of the partnership and collaboration with outsiders, other efforts have resulted in the complete disenfranchisement of the cultures from potential opportunities that could rekindle interest in traditional knowledge and activities.

Finally, there is often the lack of a structure or support system for traditional knowledge and the activities related to its maintenance. For example, in many areas, people skilled in traditional activities cannot become part of a larger community of those with similar interests, nor are they supported by governmental or educational institutions. Prior to the development of the Belize Association of Traditional Healers and the Traditional Healers Foundation, people in Belize who were skilled in this aspect of their culture acted alone as individuals. They were belittled by their families and friends, criticized by local educational and religious institutions, and in the most

severe cases, persecuted by the law. Once a community had been established, with standards for membership, and seminars and workshops developed, more and more prestige was given to this group of elders in Belizean society. Through a series of television shows, educational videos distributed to the schools, and related activities, children in Belize now accept that fact that traditional knowledge about medicinal plants is an important subject to learn, and there is presently much greater interest shown in ethnomedicine, than ever before.

One way of strengthening the position of the traditional healer employed in the Belize project has been to consider these people as colleagues and teachers, rather than as informants. The more traditional way of giving healers an unknown identity can be an insult to them as in most cases it is their knowledge or intellectual property that guided the research (H. O'Brien, personal communication). By including traditional healers who provided information for research as co-authors or providing acknowledgement using their names, all parties benefit.

An example of this is to be found in Glinski et al. (1995), a pharmacological research project. After discussing the interest in identifying bioactive compounds with Belizean healer Don Elijio Panti, he suggested a group of plants for testing in various screens by the Glinski lab. One of these, Psychotria acuminata, was subsequently identified as a source of phenophorbide a, a green pigment that inactivates cell surface receptors. According to the resulting publication, "our investigations suggest that the inactivation of cell surface receptors contributes not only to the antitumor effect of PDT [photodynamic therapy], but also to the systematic

immunosuppression, a serious side effect of PDT.” It was found that an extract of this plant inhibited cytokinin and monoclonal antibody binding to cell surfaces, and this was attributed to the presence of phenophorbide a and pryophenophorbide a. This discovery was a contribution to the corpus of scientific information about natural products chemistry and bioactivity, but not relevant to the development of a new drug. Importantly, Don Elijio Panti was a co-author of this paper, published in Photochemistry and Photobiology, acknowledging, in the judgment of the research team and reviewers, that his discovery and utilization of the plant for many decades constituted a crucial and significant intellectual contribution to this paper. This is a standard that we, and increasingly more of our scientific colleagues, have attempted to adhere to in our ethnobotanical studies. Authorship of this paper was one of the achievements of which Don Elijio was quite proud, and the reprint was predominantly displayed on the wall of his home for many years. It was also extremely useful in dispelling the gossip from the teachers and religious leaders of the village that because this man believed in the Maya spirits, and practiced ancient medicine, he was not deserving of people’s respect. After collaborating with us for over a decade, he passed away in 1996, at the age of 103. Today, Don Elijio’s house is a small museum and shrine to this master of traditional knowledge, and younger people in the village now practice Maya healing.

### **Moving forward and letting go**

In the realm of traditional knowledge, what are the parameters for deciding what skills and data survive and what goes extinct? Who makes this decision and what should it be based upon? Perhaps it would be useful to

disengage this part of the discussion from the legal issues of intellectual property rights, and learn from traditional perspectives. In 1999, I recorded a conversation with Ashok Ripoché, a Tibetan monk who came to the United States as an emissary of the Dalai Lama. He is the Director of the main library at Dharamsala, India and had recently been charged with a project to introduce Western science to Tibetan students, via the translation of significant textbooks and references. His group chose to concentrate on physics first, and biology second. We posed the question as to how a culture such as his can survive in the presence of another, more powerful culture that surrounds it. He replied:

“Tibetan culture will never be the same as it used to be before. It is always changing....It will never be the same culture after 10 years, after 15, or 20 years....sometimes of course I am disturbed, but sometimes we know that this is a phenomenon. It will never be the same, it keeps changing, look at history....And then whether we have any authority or the power to control the change or not—do we have it or not? Sometimes we think, yes we have some power or some control. And sometimes we find that there is no control. But if we could give some greater contribution—even though we know that it keeps changing—that includes the change of the culture from one point to the next...we can give a greater influence and the change will turn into favorable ways. And that way, maybe we can say we are preserving our culture...In many cases we have to say goodbye [to the past] but in many ways we have to cling on, hang on, and say, we give a good contribution so that the change will turn into a favorable way....the cultural aspect keeps changing in one form to another.

Sometimes we see a loss. Another time we don't see a loss, we see an improvement, so we don't know exactly what's really improved and what's really lost—this is really difficult to see...before changing or losing whatever it is, we have to learn what it is—the heritage...At least we should have gotten the message from it, and then let it go. We cannot keep it.”

Ashok Ripoché then recounted the story of coming to Dharamsala in 1959, and having a greater respect at that time for Western medicine as compared with traditional Tibetan medicine, which he and others considered primitive. Gradually, however, he learned via the interest that Western physicians showed in traditional Tibetan medicine that the latter had value, and 40 years later now feels “...more comfortable taking a Tibetan pill everyday, rather than a Western chemical medicine.” His overall sense of the issue involved in devolution of traditional knowledge was that people had to decide, on their own, or with outside help what subset of traditional knowledge to leave behind and what subset to move forward.

Back in Pohnpei, following the implementation of the various surveys, a group of Pohnpeian elders and young people involved in the Micronesia Ethnobotany Project met to offer their perspectives on the importance of traditional information, including the development of a prioritized list of traditional skills (Table 1). It is interesting to note that many of the skills categorized as most important involve construction of traditional structures such as houses and canoes, as well as the production of traditional dress, knowledge of traditional healing, and fishing skills. Least important skills included items that were already made obsolete by the availability of



inexpensive plastic and nylon substitutes on the island—spoons and forks, hats, and canoe bailers.

## **Table 1. Traditional skills on Pohnpei and their levels of importance\***

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### **Very important skills**

1. Wiahda ihmw en Pohnpei (making local house)
2. Wiepen sapwasapw (traditional farming system)
3. Wiahda wahr (making canoe)
4. Wiahda koal (making grass skirt)
5. Wiahda likoutei sang kilin mahi-likoumeimei (making breadfruit bark skirt)
6. Preparing local medicine from native plants
7. Pahda kahdeng sang ahlek (weaving curtain from ahlek plant)
8. Pahda lirou ohng mehn didih ihmw (weaving lirau plant to be used in house construction)
9. Wiahda pweten lihli (making local basket from coconut leaf for the preparation of uhmw en lihli [type of traditional breadfruit paste])
10. Wiada kisin pwehl (making local rope from coconut husk)
11. Wiahda kopwou sang idahnwel (weaving basket from idahnwel plant)
12. Wiahda litopw sang wahn ahis oh pwehl (making local paint from the ahis tree and soil)
13. Wiahda kopwou sang tehn nih (basket or local purse from coconut leaf)
14. Wiadha uhk en laid sang dipenihd (making fishing net from coconut husk)

### **Important skills**

1. Wiahda lohs sang mwatal (weaving mat from the mwatal plant)
2. Wiahda pwili ohng wie mar (making the seashell for traditional preparation of mahr [breadfruit])
3. Wiahda padil sang kolou (making paddle from hibiscus)
4. Wiahda kpennok sang dipenihd (making broom from coconut husk)

5. Wiahda kilahs en du sang tuken Pohnpei (making diving/fishing goggles from native trees)

### **Not as important skills**

1. Wiahda spoon sang poundal (making spoon and fork from coconut shell)
2. Charcoal sang pohndal (making charcoal from coconut shell)
3. Wiahda lisoarop sang deipw (making local hat from pandanus)
4. Waiahda mehn limalim sang kelou (making canoe bailer scoop from hibiscus)

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\*This list was prepared by Pelihter Raynor, Ally Raynor, Robert Gallen, Elpiana Amor, and Mark Kostka following discussions with various people in Pohnpei

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This series of exercises, including formal and informal surveys and grassroots conversations and meetings, has helped Pohnpei to begin to set its priorities regarding the conservation of traditional knowledge. On other islands that are lacking in traditional leadership and interest, such knowledge is disappearing much more rapidly, a topic of concern that has been addressed by several recent conferences of Micronesian traditional leaders over the past few years.

Another factor often associated with traditional knowledge-- particularly that concerning healing and medicinal plants-- is the power that comes with its possession. In many cultures, including Western, a person who can influence

a person's health, whether by offering therapies or ameliorating the perceived cause of the condition holds respect and thus power in the community. Amongst certain practitioners of Ayurvedic medicine that I observed in Sri Lanka, the concern was that the source of their influence and power to heal depended on a series of secret cures that they possessed. Furthermore, if these were to be taught to their students, then the teacher would lose his/her power, become ineffective at their profession, thus they could no longer practice. In this type of setting, certain therapeutic regimens are expected, even obligated to become extinct following the death of the practitioner. In other systems and areas, this secret information is considered to be family or clan property, and is not taught outside of the group, but passed on to the younger generation as a valued inheritance. However, despite the expectation that family information will be preserved by the next generation, in many locations at present, there is often lack of interest in carrying on the elder's work in healing, resulting in greater rates of disappearance of this type of information.

### **Rethinking strategies for protecting traditional knowledge in ethnomedicine**

In thinking about how best to “protect” traditional knowledge, it might be useful to examine the qualities of traditional knowledge that makes it somewhat unique. Each of our disciplines look at this topic through its own set of lenses, which can offer different vistas of the same image. In many cases, projects to protect knowledge have involved significant components that involve documentation. Many of these projects are based in part in academic settings, and an important requirement for funding natural and

social science research projects is the use of the scientific method, where hypotheses are put forward and tested as a major component of the project. These hypotheses involve data gathering, then imply that the activity or knowledge can be reduced to discrete collection of data points, gathered by the scientists or assistants. Once entered into the data base, it can be analyzed, evaluated, and preserved, and publications and web sites produced. This is the operating model for much ethnobotanical work, where hypotheses are proposed, use information is gathered based on interviews and observations, and results are evaluated. This reductionistic viewpoint presumes that, using modern scientific tools, a collection of individual pieces of data can be reconfigured into a reconstruction, and therefore an understanding, of the whole.

Perhaps ethnomedical systems are more complicated than, say, the DNA of a fruit fly. If so, other models of analysis need to be developed that involve a more holistic understanding of the system, rather than one which seeks to reduce it to a collection of parts. For example, when a healer treats a patient complaining the of lower back pain, the observing ethnobotanists' response usually is to collect the plant being used, identify it and assign it to a use category, and write a few words about the preparation of the medication. Then it is entered into a data base, and, in increasing frequency, the process of collection or even treatment may be filmed.

However, from a medical viewpoint, lower back pain is a symptom of many different conditions. First, it must be categorized as either acute, mechanical lower back pain, as with a lumbar strain, degenerative disc disease or fracture; non-mechanical lower back pain, as with a neoplasia, infection or

inflammatory arthritis; or, lower back pain with neurologic signs—such as a herniated disc. A patient history is called for and the patient is asked how motion, posture and rest affect the pain, whether there is fever, weight loss or rash, and whether the presence of visceral disease—vascular, gastrointestinal, or kidney--is evident. The physician has a wide range of possible diagnoses to contend with including lumbar strain, spondylosis, fractures, congenital diseases, facet joint asymmetry, neoplasm, infection, renal diseases, infection, aortic aneurysm, pancreatitis, cholecystitis, penetrating ulcer and prostatitis to name a few. A plant that might be used for “cough” might actually be used to treat seasonal allergies, upper respiratory illness, gastroesophageal reflux, lung cancer, tuberculosis, asthma, or chronic obstructive lung disease. (R. Lee, personal communication). The physician has a lot more at stake than the ethnobotanist—after all, the outcome of a poor ethnobotanical interview is at most the eventual rejection of a manuscript, while in medicine, it may be the loss of the patient! How then is the best way to preserve this practice?

This is not to argue against the value of ethnobotanical inventories. In the same way that in many regions of the earth there exist no inventories of the native and introduced biodiversity, the case is also the same for an ethnobotanical understanding of the area and its people. Just as a checklist of the plants and animals of the regions is a tool for conservation and preservation—not an actual conservation unit in and of itself-- an ethnobotanical inventory is also a tool, not an endpoint for preservation of traditional knowledge. Additional actions are required. It would seem appropriately humble, in the case of the preservation of traditional knowledge, to admit that an effective, science based methodology for

ensuring its indefinite preservation does not yet exist. In essence, a study involving the documentation of traditional knowledge or skills is a snapshot in time, freezing our concept of its framework, technologies and use of raw materials. It could be argued that, due to the way in which the body of traditional knowledge is formed—constant experimentation and change, as well as its complexity, the snapshot approach can never be effective in achieving the goal of preservation. For example, under the paradigm utilized by many ethnomedical systems, each patient seen by a traditional healer is treated individually and often with different modalities or plant species, even though their conditions might be the same. In many cases, our present efforts comprise little more than producing a list of ingredients that bears little resemblance to the actual product. Each of the modern collection techniques has a place in capturing bits of data, and some of that cache may be appropriate to direct other scientific research, such as in pharmacology and drug discovery, and thus give it immediate value to Western society. From our perspective, we are often interested in saving what we need, and there is certainly benefit to this. It is clear, however, that the most effective way of saving traditional knowledge as a dynamic, living and vital system is to keep it in practice—to encourage its practitioners, to give economic and other importance to its end products, to incorporate its teaching into formal and informal curricula, and to incorporate its ethical values into everyday lives.

How can a scientist contribute to this goal? Perhaps it is time to dissect ethnobotanical methodologies, and see where strengths and weaknesses are found. At a superficial level, greater emphasis needs to be put on data capture using the most modern available tools—including digital videos. We have made films in Belize that chronicle traditional knowledge and beliefs of

bush doctors, and these films continue to inspire young people who view them, long after the elders have passed on. Books in local languages, geared to primary health concerns are extremely important contributions, and again, help keep family lore alive. The creation of a cadre of local ethnobotanists is an extremely worthy goal. Outside scientists have the responsibility of being role models to people they interact with. This can include teaching people to gather data and appreciate the values found in their communities. Local institutions need to be supported as well, and initiated if they do not yet exist. Academic research projects should always leave something behind that has a perceived value to the community. Prior to the initiation of a project, thorough discussions with the community must be held, mutual expectations established and risks and benefits outlined.

In the arena of benefit sharing, there is a great deal of room for developing innovative strategies that go beyond what is considered the gold standard—a royalty sharing provision in the contract, along with up front benefits. Others will speak about these mechanisms at this meeting, so I will not dwell on this topic. Cox (2001) outlines a novel benefit sharing program that has resulted from his work with an anti-viral phorbol isolated from Homalanthus nutans in Samoa. Prior to the production of a commercial compound from the plant, there has been over \$480,000 supplied to the village of Falealupo, the home of the two traditional healers who taught Cox the use of the plant, as part of what he refers to as the “Falealupo Covenant”. If a drug is to be developed from the plant extract, the government of Samoa will receive 12.5% of the net profits of the Aids Research Alliance, with 6.7% going to Falealupo village, and 0.4% going to each of the families of the two healers.

Another unusual benefit sharing program, resulting from the previously discussed ethnobotanical work in Belize, was derived from the publication and sale of a primary health care manual, Rainforest Remedies: 100 Healing Herbs of Belize (Arvigo and Balick, 1993). As outlined in Johnston (1998), a pension program was devised for the 11 traditional healers that contributed knowledge to the book. Proceeds from the sale of the book are distributed twice per year to the healers—in July and December--through the Traditional Healers Foundation. As of early 2000, the total distributed was over US\$20,000. The publisher, Lotus Press, also has contributed a portion of its profits from the sale of the book to the Traditional Healers Foundation. The book has been adopted as a primary health care reference by many people in Belize.

However, as the example of Don Elijo Panti given previously shows, there is much more to benefit sharing than monetary value. The concept of cultural support, expressed by Wolff and Medin (2001) and discussed earlier in this paper, becomes a very important part of benefit sharing. It is not limited by the financial resources of the investigator, but rather only by their level of cultural sensitivity, understanding and desire to make a difference.

Finally, I would like to offer an unusual example of how traditional knowledge is being saved—through export to other regions-- as people immigrate to new islands, countries and continents. Most traditional cultures around the world have diseases or illnesses that are specific to their culture or region. Patients with these conditions seek treatments that are often traditional in their origins, but when symptoms become severe, also present at emergency rooms or to physicians in clinics. Such culture-bound diseases



have received a great deal of attention, particularly in the field of psychiatry. The DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders published by the American Psychiatric Association contains an appendix, “Outline for Cultural Formulation and Glossary of Culture-Bound Syndromes” on this topic. This document suggests,

“The term culture-bound syndrome denotes recurrent, locality-specific patterns of aberrant behavior and troubling experience that may or may not be linked to a particular DSM-IV diagnostic category.” It further suggests that “many of these patterns are indigenously considered to be ‘illnesses’ or at least afflictions and most have local names. Although presentations conforming to the major DSM-IV categories can be found throughout the world, the particular symptoms, course and social response are very often influenced by local cultural factors. In contrast, culture-bound syndromes are generally limited to specific societies or culture areas and are localized, folk, diagnostic categories that frame coherent meanings for certain repetitive, patterned and troubling sets of experiences and observations. There is seldom a one-to-one equivalence of any culture-bound syndrome with a DSM diagnostic entity.”

The manual lists 25 culture-bound syndromes, including *hwa-byung* from Korea, *koro* from South and East Asia, *locura* from Latin America, *mal de ojo* from Mediterranean cultures, *shenkui* from China and *taijin kyofusho* from Japan. *Hwa-byung*, describes a Korean “anger syndrome” and includes symptoms such as panic, dysphoric effect, and indigestion. *Locura*, refers to a severe form of chronic psychosis in which patients will exhibit

incoherence, agitation and sometimes auditory and/or visual hallucinations. *Mal de oj*, or “evil eye” in English, is a Mediterranean condition in which children are most vulnerable. It presents with symptoms of crying without apparent cause, insomnia, diarrhea, and/or vomiting.

It is interesting that the American Psychiatric Association has recognized the traditional disease concepts that characterize different cultures as a significant problem in contemporary Western society. Our work on urban ethnobotany in New York City has included much experience with traditional healers in the Dominican community, centered in Washington Heights. Thousands of miles away from their island homes, Dominican traditional healers are practicing their trade, and providing an effective, parallel system of health care in the heart of the allopathic medical community. Ethnomedical systems continue to be carried out, and elders are teaching the younger generation. Stores such as *botanicas* are well stocked with plants that are collected in the Dominican Republic and sent to New York City, or grown in local farms on the east coast of the United States. Far from being destroyed by the Dominican governmental programs of past decades that minimized the value of traditional Dominican medicine, it is alive and well, both in the Diaspora and at home. The same scenario is true for any number of ethnomedical systems of the multitude of cultures that flourish in the United States and elsewhere in the world outside of their origins, a sort of “reverse globalization” of which cultures can take great pride.

There are many actions that could contribute to the preservation of traditional knowledge, from a broad variety of disciplines. So far, top-down

international mechanisms have been relatively ineffective. Grassroots efforts seem to be working in some locations. Attempts aimed at preservation of traditional knowledge are constrained by the lack of significant funding, and the lack of agencies and institutions responsible for supporting this activity. The general nature of funding—e.g. short term grants that need to be renewed every few years and contain an innovative “twist” each time they are resubmitted for consideration—does not lend itself to addressing this problem. It is time for a sincere global commitment to the preservation of traditional knowledge, one that does not get caught up in layers of biopolitical bureaucracy. Scientists must rethink how, if at all, their studies and other activities can contribute to keeping traditional practices alive. It is time to enlarge the group of disciplines typically involved in this topic, and identify new ways of approaching an age old problem that is getting worse with time.

Traditional knowledge is rich in content and heritage, and an important legacy of those who have created it. We must also consider traditional knowledge the foundation on which to practice one’s cultural belief system, and thus a basic human right—analogueous to religious freedom--deserving of preservation and protection against the contemporary forces that seek to destroy it in so many parts of the world, as well as in our own backyards.

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