Research Collaborators, Methods & Traditional Ecological Knowledge and Practice (TEKP)

Daud and me in the forest near Moa, Sulawesi, Indonesia
My first experience living and working in a forest-dependent community was in the village of San Vicente in Leyte, Philippines. San Vicente is located on the eastern edge of a coastal plain where steep slopes rise to rugged limestone mountains that form the backbone of the island. These mountains contain the only remaining primary forests on Leyte.
San Vicente is poor. Most households are landless. In her M.S. degree studies, Jill Belsky, my wife and colleague, found that most residents were unable to meet household rice/food needs through cultivation as either owners or tenants and that food insecure households were highly dependent upon forest farming and forest product collecting for basic subsistence (Belsky, 1993).

The mountain forests east of San Vicente contain several commercially valuable rattan species. Villagers gathered canes for sale to furniture makers in the town of Baybay. This “subsidy from nature” was illegal (the area is a national park), but provided the only means of survival for many village households.
Our entre into life in San Vicente entailed hiring villagers to build a bamboo and nipa palm (*Nypa fruticans*) thatch hut where we lived for 15 months. Like other villagers, we “illegally” gathered dense, rot-resist hardwood poles from the national park. Nido lashed nipa palm shingles to a bamboo and wood frame using split *Calamus* sp. canes.

From our home we watched the seasons progress through the rice cultivation cycle. Here, landless villagers transplant rice seedlings; they earned about $0.25 a day in 1984.
One of the major challenge in ntfp (non-timber forest product), agriculture, or any conservation and development work, is appreciating the diversity of social and biophysical parameters and contexts in which livelihood and land/resource use decisions are made. This is not only a multi-disciplinary undertaking, but requires investigations at multiple scales, from the level of individuals, households and farm parcels to national government policies, macroeconomic forces and global climate change.

Not surprisingly, research of this breadth and depth can overwhelm a single individual. Jill, whose expertise is in environmental sociology, and I have worked closely with one another for decades for precisely this reason, beginning with our first long-term research project in the Philippines (1983-84). We expanded collaboration in our dissertation research in Kerinci, Sumatra which was supported in part by a collaborative Fulbright grant. While I learned a great deal about locally important social, economic and political issues through conversations daily with rattan collectors and upland farmers, I relied upon Jill to understand the significance of and interactions between the many socio-economic and political forces that operate at local to national/international scales. We informed one another of our accumulating understanding on a daily basis, which freed us to delve more deeply into our respectively disciplines and to uncover and build upon local traditional ecological knowledge and practice (TEKP).
Absolam relied upon the collection and sale of rattan canes to feed and cloth his family. I accompanied him on many rattan collecting trips and he assisted me in the collection of rattan specimens and other locally valued forest products. Absolam and his wife, Gloria, helped us understand the role, importance and challenges associated with rattan collecting and forest farming as a livelihood strategy and means of subsistence.

Here, Absolam weeds cogon (Imperata cylindrica) grass from his hillside farm. Intensive cultivation in the uplands of Southeast Asia has led to widespread establishment of exotic invasive species and reduced crop yields.
Jill and I conducted our doctoral dissertation research on socio-political and agronomic aspects of conservation farming, respectively, in the highland valley of Kerinci, Sumatra, Indonesia in 1987-88. The Kerinci valley is home to over 250,000 people and is surrounded by forested mountains which were designated Kerinci-Seblat National Park in 1982; all utilitarian use of the forests, including the collection of rattan, was subsequently prohibited.
The forests of Kerinci have provided rattan to valley residents for generations. Canes, particularly the small rattan *Calamus exilis*, are used in basket and handicraft-making, and harvesting continued after the park was established.
The village of Sungai Tutung is well known for rattan basket and handicraft making. I worked with local cane collectors and artisans for several years investigating the abundance and distribution of economically-important rattan species, and effects of cane harvesting on the survival, growth and yield of the small-diameter rattan, *Calamus exilis*.

Harun, a respected rattan artisan, and Tapri, a young cane collector, helped guide my research, provided invaluable logistical support, and became good friends.
Throughout the 1990s and into early 2000s I investigated the ecology, use, management, effects of cane harvesting and the cultivation potentials of economically important rattan species in Central Sulawesi. The village of Moa was the site of much of this research and became my home while in the field each year.

North of Moa’s rice fields are rattan-rich forests which were incorporated into Lore-Lindu National Park in 1982; all rattan harvesting and forest farming were then prohibited despite the fact that local people had used and managed these forest for centuries.
When in Moa, I lived with Arnol and his family. Arnol was a valuable research partner and a good friend. His comfortable porch offers fine views to forested hills that while now inside LLNP have been planted to shade-grown coffee for decades; the birding was excellent.

Always a joker, Arnol dresses to hunt forest rats which were feeding on his shade-grown cacao crop.
My principal rattan collaborator in Moa was Daud, one of the most knowledgeable forest ecologists I’ve ever met. His guidance and assistance were invaluable in my research.

Daud taps an Arenga palm for the mildly alcoholic beverage *sagueir* which we often enjoyed after a day of field work.
In addition to Moa, I worked in other villages along the Lariang River, including Au, a half day walk downstream from Moa. Yasirule, former Au village head and a well-known rattan collector, helped me inventory the abundance and distribution of rattan in nearby forests. Yasirule was a dynamic leader who attempted to limit rattan harvesting in forests around Au to local residents. This effort was never recognized by the Indonesian Government, but was respected by cane collectors and traders throughout the 1990s. Yasirule, seen here splitting a *togisi* (*Calamus leptostachys*) rattan cane, passed away in the early 2000s.
Research methods:

My rattan research in San Vicente, Kerinci and Moa focused on documenting the uses made and importance of rattan to resident people; the abundance, distribution, and growth/yield of economically important species; ecological effects associated with cane harvesting; prospects for sustainable harvesting; and the cultivation and management potential of several especially valuable rattan species.

Research begins with an idea or hypothesis which typically builds upon previous research and is imbedded in a theoretical framework. It is then necessary to identify or develop appropriate research methods to rigorously address the hypothesis (i.e., answer the question) or develop new lines of inquiry. Many of the specific hypotheses that I explored over the years were developed following conversations with Daud, Arnol and other rattan collectors. Indeed, much of my rattan research sought to scientifically validate traditional ecological knowledge and practice (TEKP).

TEKP is invaluable in ecological research, particularly applied studies that address development, conservation or management needs. There is a large and growing literature re. the value and loss of TEKP, ways of integrating TEKP into “scientific” research, intellectual property rights and the ethical responsibility of researchers.

In addition to collaborating with experienced cane collectors, I often hired young boys to help with tasks such as transplanting rattan seedlings.
Ecological field research typically requires the use of replicated and randomized sampling. In plant population studies this can be accomplished through use of sample plots or transects which can vary in size, length, shape, as well as factors investigated. In my rattan research in Moa I found that multiple belt transects, each 10 x 1000 m in length, established at random and run directly up slopes, enabled me to estimate rattan abundance and distribution over an elevation gradient with greater ease and speed than using sample plots. Each transect was permanently marked and changes in rattan populations were resampled annually. I also marked hundreds of individual plants with flagging and metal tags to monitor and assess effects associated with different cane harvesting rates. I selected areas to sample based on recommendations from cane collectors, specifically important collection sites and areas that had never been harvested, to assess cane harvesting effects.
One of the more challenging research efforts I undertook involved exploring the cultivation potential of *Calamus zollingeri* (*batang*) from both seeds and cuttings. I explored this in collaboration with rattan collectors from Moa and national park officers in Gimpu. In each site we constructed a small nursery which was fenced to exclude livestock. We then collected thousands of ripe *batang* fruits and vegetative cuttings from wild rattans in the forest, scarified the seeds to enhance germination, and potted the seeds and cuttings in plastic seedling bags. These were watered as needed (usually every few days) and plant survival and growth monitored for 18 months. The rattan collectors in Moa proved to be reliable researchers; the rattan were very well cared for. In contrast, the study in Gimpu failed: the plants were not watered and the nursery was not maintained.
It is often necessary to modify and adapt research plans as conditions change or new information becomes available. My original intention was to transplant rattan into forest near Moa to increase the abundance of harvestable cane near the village, reduce harvesting inside the park and minimize potential conflict with park officials (i.e., enrichment planting). However, my rattan collaborators noted that it was illegal to harvest rattan in the park, even though they had done so for decades before it was established, and that they would lack legal rights to any rattan they planted. Instead they suggested we transplant *batang* cuttings in their rustic coffee and cacao farms where environmental conditions, they said, were comparable to primary forest (i.e., light, temperature and soil nutrient and moisture). We collectively decided to transplant 100 *batang* cuttings into each of six rustic farms. I then measured light and soil conditions, and monitored survival and growth for 18 months; the results were very promising.
Another modification I made in the rattan cultivation experiments was to use only cuttings. We had excellent plant survival and growth using both cuttings and seedlings (i.e., plants germinated from seed) and plants, including rattan, grown from seed are generally more vigorous than those propagated vegetatively (i.e., from cuttings). However, my rattan collecting colleagues noted that *batang* seeds are only available at certain times of the year and only then at great distance (6+ km) from the village due to intensive cane harvesting pressure (i.e., canes are harvested before flowering and fruiting). Consequently, the on-farm cultivation trials involved *batang* cuttings only.

Working with rattans can be painful and challenging as they are armed with long, stiff, needle-like spines, such as this noko (*Daemonorops robusta*).
Discussion topics:

1) TEKP exists not only among indigenous forest dwellers in the tropics, but among long-term residents the world over. People who have intimate, site-specific knowledge and experience valuing, using and managing forests, rangelands, wildlife, fisheries and other resources are an invaluable source of information that can help guide applied research and are essential to identifying and pursuing socially acceptable and ecologically appropriate conservation and management efforts and in developing management policies.

   a) identify and explore examples of TEKP in your local environment/community. For example, in western Montana morels and huckleberries are valued NTFPs with domestic non-market and commercial value. Both of these species are associated with ecological disturbance; they follow fire, albeit at different time scales. Morels abound the year immediately after fire in coniferous forests, while huckleberries may establish several years after a fire and persist for decades.

c) the anthropological and increasingly ecological literatures provide a wealth of TEKP examples and case studies. See publications in the online journal *Ecology and Society* ([http://www.ecologyandsociety.org/](http://www.ecologyandsociety.org/)) for case studies of TEKP that integrate social and ecological analyses within the resilience framework (i.e., that seek to maintain social and ecological adaptive capacity), and Davis (2007) for eloquent essays on the value and impending loss of TEKP around the world.

2) There is profound and growing tension between understanding, incorporating and using TEKP in western science and management, and respect for and protection of intellectual property rights among those with particularly valuable TEKP. Some contentious examples include:
   a) bio-prospecting by pharmaceutical companies of traditional medicinal plant knowledge among indigenous forest dwellers, and
   b) ongoing efforts by multinational corporations to patent crop genetic resources (especially maize). This topic can be explored online by selecting either a resource/plant (e.g., maize) or a region (e.g., Mexico or India).

References:


