SOCIETY OF WETLAND SCIENTISTS

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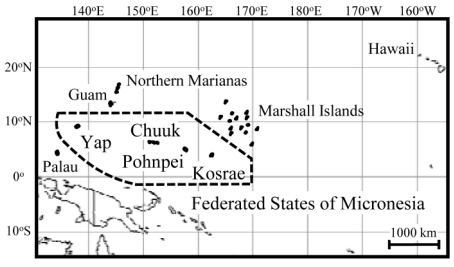
BRINGING SCIENCE AND MANAGEMENT TO REMOTE COMMUNITIES

Ecological research on tropical coastal ecosystems is often intended to support development of sustainable management practices in developing countries. In reality, however, adoption of research results from these important ecosystems is probably rare. Many mangrove forests and adjacent freshwater wetlands are still being degraded by unsustainable management practices, while others are lost due to land use conversion.

For several years, I conducted research with a team of scientists and outreach specialists on ecology and management of mangrove forests and freshwater forested wetlands, as well as stream ecology and management of mangrove crabs (*Scylla* spp.). Most of our research was conducted on high islands in the western Pacific, primarily on Kosrae, Federated States of Micronesia (FSM) (Fig. 1). During this time, we collaborated with indigenous natural resource managers not only on research but also on presentations to community groups, organization of workshops, internships, and preparation of educational materials on wetland ecology, awareness, and management.

Here I describe challenges often faced in exchanging ecological and management-related knowledge with remote communities in order to stimulate thinking about promising strategies and identify possible pitfalls for future efforts. I draw not only on our own experiences but on results from other studies as well.

Figure 1. Kosrae is the easternmost state of the Federated States of Micronesia in the western Pacific Ocean.



Institutional Status of a Coastal Wetland

Most mangrove forests are owned by a government: national, state, provincial, or local. On Kosrae, the state government owns mangrove forests, although rights to harvest and fill are often claimed by adjacent landowners. Most freshwater wetlands in Kosrae and probably elsewhere are privately owned, and little attention is paid to conservation.

Elsewhere, coastal wetlands may be protected by legislation and sometimes even by international treaties, such as the Ramsar Convention on Wetlands. Ownership and the terms of protection may have been imposed without much consultation with local inhabitants. Coastal forested wetlands still play important roles in subsistence lifestyles, but policy makers may not be sensitive to this or aware of issues that face natural resource managers living there.

Regional integrated coastal zone management programs often control activities in these wetlands. Local efforts instigated by a visiting scientist to improve resource use may therefore conflict with legislation written to encompass a broader perspective, which may itself be conservation-oriented. Moreover, traditional lines of authority controlled by chiefs or elders may involve unwritten policies. Local collaborators who understand the reasons for and implications of a proposed management regime may be more effective at operating through alternative power structures such as churches in explaining and coordinating these potentially conflicting interests.

Exchanging Information Effectively

Converting research results to actual management practices and policies must take place within the context of government institutions and both legal and traditional regulations. Information exchange must also be bidirectional, with knowledge contributed by the community even before research is initiated—not just when results are being interpreted—to be adopted.

The community's sense of ownership is essential for any change

Advocating a management practice sometimes means instilling an understanding of the need for any management at all. Traditional management guidelines passed down in ancient societies may be outdated by new threats facing the resources. Also, coastal residents in many places may be recent immigrants who do not know about or respect those guidelines. Finally, the growing importance of a money economy may offer new temptations and opportunities, such as export of products once consumed locally (e.g., mangrove crabs in Kosrae).

Involving the local community

In Kosrae, we provided funds to a state government agency to support employees to help with research and outreach. In fact, the entire staff, often assisted by other organizations, helped in many ways, such as conducting surveys and workshops (Fig. 2).

Among our early projects were economic valuations of forested wetlands. The results changed our research directions significantly by stimulating our interest in mangrove crabs. They also enabled local residents to view their natural resources in a new light.

Fig. 2. Kosrae Island Resource Management Authority education specialist Betty Sigrah helps attendees at a community meeting fill out a survey form.

"Depending on local community members to participate in the project is essential, but expecting them to volunteer is risky at best and thoughtless at worst."

Internships: A Solid Investment

Exposing students to possible career opportunities may have significant long-term value. The University of Hawaii, USDA Forest Service, U.S. Geological Survey, and The Nature Conservancy, as well as other local organizations and businesses, collaborated to provide internships enabling Pacific Islanders enrolled in college to return to their home islands to participate in a supervised, environmentally oriented project.

Tara Tara (left), a native Kosraean, held one of these internships, sponsored by the USDA Forest Service. Assisted here by Kosrae State Forester Erick Waguk, Tara became a co-author of a journal paper that included the results of his project. (see Additional Reading). He went on to become a teacher in the Kosrae High School, where he often assisted with presentations of our research results and development of laboratory exercises. Many of our former Micronesian interns now hold positions of responsibility on their islands; many others are informed (and often involved) citizens.

Kosraean research assistants helped us gain access to local ecological knowledge. In other tropical coastal settings, however, high rates of immigration may dilute this reservoir of knowledge. Also, we found that people were sometimes reluctant to share information, such as mangrove crab spawning times, not knowing what we really intended to do with it. Such resistance may lessen only over a period of several years, as a scientist builds trust and a community finds that it is benefiting from research results.

One important lesson we learned was that attitudes and decision-making in a traditional culture may not match an expatriate scientist's expectations. Avoidance of nepotism and other conflicts of interest is standard operating procedure in developed countries, but in many other cultures, one is expected to help relatives first should resources come their way (such as the opportunity to hire another helper or have a particular job done). In some societies, women have little direct influence outside the household. They may attain more respect with age, although their influence may still be mediated through a husband or son. This is changing gradually as women complete college degrees

In many cultures there may be a disconnect between age and authority. For instance, an eager young field assistant who rapidly learns new information on a project may not be able to wield influence commensurate with his or her understanding. By the same token, an islander returning home with an advanced degree may not be able to use that training right away if he or she appears to challenge the job or authority of an incumbent who is older (and hence wiser, in the community's eyes). At the other extreme, a new professional may be vested with more authority than he or she is qualified to handle. Awareness of these attitudes and decision processes may help a scientist judge how best to deploy resources and work with promising collaborators.

Formal and informal education

Educational materials based on research results are welcomed by remote communities. Such topics as the characteristics of particular species, sediment delivery, and hydrologic regimes can be incorporated into materials appropriate for high school science programs (Fig. 3).

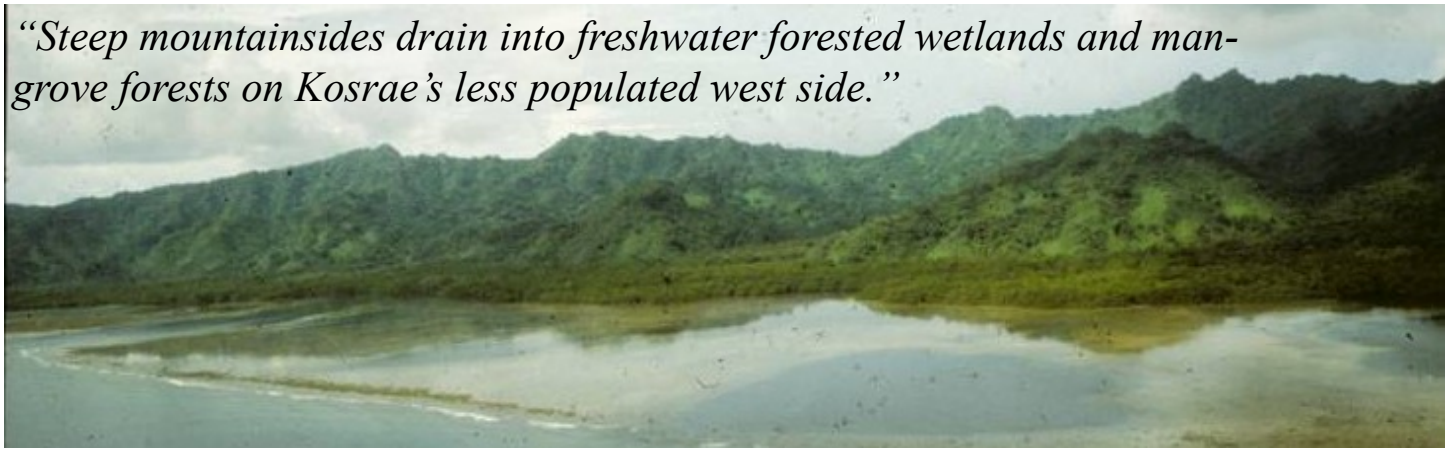
Fig. 3. Forest Service ecologist Ken Krauss explains sediment accumulation patterns to high school students on the island of Pohnpei.

For teachers who are not trained in teaching science or are not from the area, special workshops to "teach the teachers" can be helpful. Recent immigrants especially may not know the names of trees nor have ever visited a local wetland. Having materials translated into the local language helps the community absorb the messages and incorporate information into their own knowledge base.

We regularly presented research results in public meetings. The greatest usefulness of such presentations may be simply the openness they project: people want to know what you have been doing in their community. Local resource managers played integral roles in making these presentations, initially acting as translators and later presenting the results themselves (Fig. 4).

Fig. 4. Jason Jack, Kosrae Assistant State Forester, presents the results of a recent Forest Service research project to a community group.

Sending back scientific reprints (or copies of theses) at the end of a project is respectful but often has limited immediate use, especially if these materials are not written in the local language. In Micronesia, as in many other tropical regions, important information was traditionally transmitted orally. Paper documents cannot be preserved easily without air conditioning or accessed without a library or other meaningful filing system. Nevertheless, providing theses and papers is an important symbol, and future indigenous resource managers may be able to make use of them. Because people in many remote communities now have at least occasional access to a computer, a CD or DVD with an important, relevant message may be just as useful as a printed paper or report. Videos produced during the early years of our team's activity were still in use nearly a decade later.



"Steep mountainsides drain into freshwater forested wetlands and mangrove forests on Kosrae's less populated west side."

The concepts of stakeholder identification and involvement are now well-embedded in management science, and adaptive management and co-management are widely accepted as appropriate protocols, even though they are often not successful. When visiting scientists propose to test a new management practice, such as through adaptive management, depending on local community members to participate in the project is essential, but expecting them to volunteer is risky at best and thoughtless at worst. We found that some prospective community volunteers resented others being paid to participate as part of their job, e.g., local state agency employees. The highest priority for people who lead a subsistence lifestyle is providing for their families, and although they may be genuinely altruistic at first, it is best to reimburse them, with either money or gifts, for any effort they put forth.

What Makes Things Happen?

Some of our recommendations on resource management in Micronesia have taken root and others have not. Our research on hydrologic connections within watersheds bore some fruit, as the Kosrae State Government is now working with the USDA Forest Service and The Nature Conservancy to establish a system of conservation easements, including landowner compensation, for watershed protection.

Temporary restrictions on mangrove crab harvests in designated areas were considered because of familiarity with marine protected areas set up by an indigenous non-government organization on a neighboring island.

The research topics we selected resonated with professional colleagues around the world, but other issues might have been more important to islanders. In other countries, failure of a local community to implement seemingly appropriate management practices in mangrove forests has been attributed to excessive demands on the resources of the public authorities who would be responsible for them, failure to engage the local community, the narrow focus of a management plan, and the failure of policy makers to recognize the importance of (and need for) subsistence production.

Local capacity building may be the best long-term strategy to acquaint natural resource managers with the kinds of management practices available, help them prioritize the issues they face, and enable them to take better advantage of visiting scientists who want to help. Working with a community for a long time is most likely to yield results.

Additional Reading

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Mangrove trees are harvested in Kosrae primarily for firewood.

Kosraeans gather to hear about a research project.

Wetlands dominated by *Terminalia carolinensis* are often productive and sustainable agroforests.

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Moses Palik helps intern Kenye Sigrah capture a mangrove crab.

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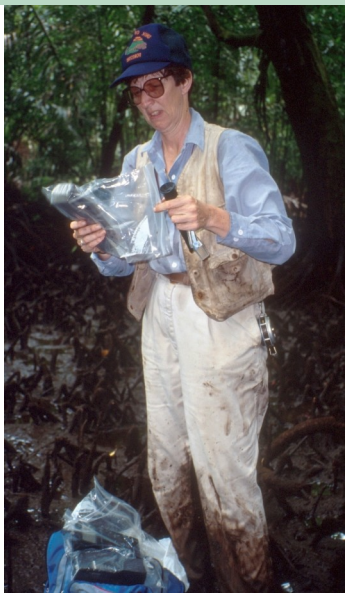

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