

Pohnpei's Watershed Forest Reserve: Towards Sustainable Management

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Introduction

Generally little is known of traditional systems of terrestrial forest management in Micronesia. What little we do know suggests a complex approach that has been developed over thousands of years. However, as with corresponding traditional marine resource management systems, rapidly increasing population and an expanding cash economy has led to growing resource degradation. In the meantime, the traditional management system has been slowly eroded through the conflict of values and perceptions that have accompanied change from a traditional to a more modernised society. This paper describes the traditional management system for Pohnpei's forests and presents a case study of the development of a community-based management scheme for the island's remaining forest resources, based on traditional island institutions and practices.

General Setting

The island of Pohnpei (formerly Ponape) is located in the Caroline Islands group in the mid-Pacific Ocean, about 4 983 km southwest of the Hawaiian Islands. Politically, Pohnpei is one of the four states of the Federated States of Micronesia and the location of the nation's capitol. The high volcanic island is surrounded by a barrier reef and a shallow lagoon. By virtue of its location, Pohnpei is one of the wettest spots in the world. Rainfall is high and temporally well-distributed throughout the year, with an average of 4 820 mm and 300 rainy days per year. Slightly less rain falls during the months of January-March, providing for a modest 'dry season'. Due to orographic effects, rainfall is believed to reach as high as 7 500 mm in the rugged interior (Spengler, 1990). November to June is the main period of the northeasterly tradewinds. Typhoons are fairly rare, most passing to the north and west of the island, although occasionally large storm events do occur.

The interior of the island is heavily forested, with vegetation consisting of several forest types, including upland, palm, swamp forests, and at the highest elevations, dwarf or cloud forest. Lower slopes and coastal areas are characterised by agroforest and secondary vegetation, with small areas of grass or fern savannah. Lowland areas consist of swamp forest or taro patches. Extensive mangrove forests up to 4 km in width line the coast.

Importance of the Upland Forest

The upland forest serves several important ecological functions. Perhaps most importantly, the forest vegetation with its extensive root system and litter layer serves to capture rainfall, retarding surface runoff and improving infiltration of water into the soil, where it is filtered and slowly released into the streams and rivers that eventually make their way to the coastal mangroves and the lagoon. Through the retardation of surface runoff, erosion and sedimentation are reduced, protecting these ecologically and economically important downstream environments from degradation. Flood severity and intensity are also reduced. The slow release of ground water ensures streamflow even during relatively dry periods.

The conservation values and biodiversity of Pohnpei's upland forests are as important as their hydrological buffering function. The upland forest on Pohnpei serves as habitat for at least 269 species of plants, 110 of which are known to be endemic. In all, 34.4% of all the plant species found on Pohnpei are found chiefly in the upland forest, while fully 90% of the endemic plant species are found there. Major endemic families include Euphorbiaceae (7 species), Orchidaceae (35 species), Polypodiaceae (10 species), and Rubiaceae (10 species). Twenty-four species of birds nest in the upland forest, at least five of which are endemic, including the Pohnpei Lory (*Trichoglossus rubiginosis*, local name *serehd*), the only endemic member of the parrot family in Micronesia. Many of these plants and animals, besides their numerous ecological functions, are also important subsistence and, to a lesser extent, commercial resources for the people of Pohnpei. Finally, the forest adds to the beauty and attraction of Pohnpei for residents and visitors alike.

Traditional Resource Use in the Upland Forest

Before humans arrived on Pohnpei, the entire island and most of the basaltic islets of the lagoon were covered by rainforest (Glassma, 1952). Over the next several hundred years, in the process of human settlement and subsistence, much of the coastal and lowland forests were modified to secondary forest and agroforest. Warfare and population growth gradually led to inland movement and habitation in upland areas (Haun, 1984). Declining warfare and depopulation from introduced diseases after European contact eventually led to the abandonment of these areas. The movement back to the coasts over the last few hundred years has left Pohnpeians with a strong cultural respect for the upland forest.

Pohnpeians traditionally utilise the upland forest and its resources in many ways:

Water:

Rivers, streams, and springs on Pohnpei are central to village life. These places, especially rivers, are places to wash, bath, swim, socialise, and just relax. Rivers and streams are also a major avenue of waste disposal. Springs and the upper reaches of streams and rivers also provide most of the drinking water for the island.

Soils:

The soils of the interior forests have always been used for the production of various subsistence and prestige crops, especially *sakau en Pohnpei* (*Piper methysticum*). Pohnpeians equate the healthy forest with good soil. Each *kousapu* (village) traditionally claimed a communal area in the forest called a *kahpu* where all *kousapu* residents were allowed to go to plant *sakau* and subsistence crops. Many of these areas have been in more or less continued use for hundreds of years. These *kahpus* provided a source of subsistence food, especially breadfruit, when they were out of season in lower areas.

Flora:

Plants and their numerous products have been part of the Pohnpei material culture for thousands of years. Many of these are collected in the upland forest areas. Even today, with an increasing reliance on imported goods, rural Pohnpeians still make use of a variety of forest products in their daily life (Anson and Raynor, 1991; Merlin *et. al.*, 1992 and 1993).

Fauna:

Birds have been traditionally hunted in the Pohnpei forest. Of the 40+ species of birds found on Pohnpei island, at least 24 nest and/or otherwise inhabit the upland forest (Engbring, Ramsey, and Wildman, 1990). Other fauna which were traditionally exploited include the freshwater shrimp and a variety of freshwater carp. A species of deer, introduced during the German Administration (1899-1914), is hunted for food and cash.

Major Threats to the Forest Ecosystems

Conversion to Agroforestry and Other Agriculture

On Pohnpei, the cultivation of *sakau en Pohnpei* (*Piper methysticum*) has been identified as the most important agricultural threat to the upland forest. *Sakau*, a perennial plant the roots of which have a mild narcotic effect, is an important crop on Pohnpei, both for ceremonial and recreational use.

Since WWII, the use of *sakau* by the general populace has been steadily increasing and its cultivation and marketing has become commercialised. The easy market for *sakau* has resulted in increased crop theft, and this along with the plant's need for rich organic soils, has led to increased cultivation in the upland forest. The clearing of overstory trees during cultivation has contributed to increased erosion and mass wasting on steep slopes. Little data exists on the level of *sakau* cultivation, but indications are that it is substantial.

Settlement

Homesteading has already encroached into the upland forest in some parts of Pohnpei. Anson *et al.* (1985) reported that settlement patterns tend to be along streams, up to as high as 500 m elevation, and added that several landslides and other mass wasting was noted in or adjacent to man-made clearings associated with burning. Population combined with unequal land tenure are the major exacerbating factors involved in increased settlement of the island's interior. So far the Pohnpei State Government has done little to address the issue of 'squatters' in the upland forests, despite their status as 'public lands'.

Road Construction

Roads are a threat both in terms of their negative environmental effects and the function they serve in making watershed lands more accessible for agriculture, settlement, and other types of use. Many existing and planned (already funded) secondary and tertiary roads reach the vicinity of the upland forest on both islands, and often these roads are undesigned, with virtually no surfacing and extreme gradient (Zeimer and Megahan, 1991). At present, there is little coordination on this key issue between municipal and state governments and various agencies carrying out road construction.

Hunting

On Pohnpei, several of the popular gamebirds, especially the Micronesia Pigeon and the Caroline Islands Ground Dove (*Gallicolumba kubaryi*) are suffering population decline believed to be due mainly to over-hunting from increasing population, inland settlement, and growing markets in the district centers and off-island. The entire Pohnpei population of the Micronesian Pigeon was estimated to be only 822 birds in 1983 and the Ground Dove was even lower (Enbring, Ramsey, and Wildman, 1990). Currently there is no agency dealing with terrestrial wildlife on the island.

Tourism and Trails

Growth of tourism on Pohnpei has meant that more people desire the experience of visiting the upland and cloud forests. Traditional dependence on the upland forest for various products has led to a system of existing trails, consisting of 'feeder trails' and a system of ridge trails in the interior of both islands. According to Griswold (1992), the trails on Pohnpei are little more than unconstructed paths of least resistance evolved over many years of use, sustained without resource damage by the 'light' overall use. With increasing impact, e.g. hiking boot-clad ecotourists, these trails could soon become muddy eroded gullies in the steeper sections, with damage quickly accelerating as "hikers attempt to avoid walking in the eroded sloppy ruts - a typical pattern of resource and trail degradation that could quickly result". Extractive use of forest resources by tourists and other forest visitors, e.g. cutting of trees for firewood and bedding, can also be locally severe.

Developing a Sustainable Management Strategy

In 1983, the Pohnpei State Division of Forestry requested assistance from the Pacific Islands Forester Office (USDA Forest Service Institute of Pacific Islands Forestry) to delineate and develop legislation to establish a watershed forest reserve area on interior public lands. Utilising aerial photos, soils survey, and aerial reconnaissance, the watershed boundaries were determined by "carefully mapping, from the air, places (on Public lands) where people have not yet settled on the highly erodible soils" (Anson, 1985). As a result, the Pohnpei State Legislature enacted the *Pohnpei Watershed Forest Reserve and Mangrove Protection Act 1987* (S.L. #1L-128-87), designating some 5 100 ha coastal mangrove forests of Pohnpei Island as a protected area.

It quickly became evident, however, that community awareness of the law was virtually nonexistent. The proposed rules and regulations, failing to recognise traditional Pohnpeian resource use in the forest areas, were universally rejected. The government boundary survey team was turned back in many areas of the island, sometimes forcefully. This led to the formation in 1990 of the Watershed Steering Committee (WSC) task force made up of representatives from several Pohnpei State Government agencies and NGOs.

Based on municipal meetings and field surveys, the group designated three areas as priorities for watershed education and negotiation - the Koapin Soamwoai area of Kitti, the Lehda-Senipehn area of Madolenihmw, and the Nanpil area of Nett Municipality.

In 1991, the Pacific Island Forester's office funded a pilot watershed extension project targeting the Koapin Soamwoai area. A local NGO group, Woaun Koapin Soamwoai Board (WKSB), made up of representatives of four villages and their chiefs, convinced that watershed forest protection was needed in their area but desiring more input in watershed management, agreed to cooperate with the Division of Forestry and the WSC in watershed education and negotiation. The resulting highly successful programme involved this group, the four communities concerned, and the WSC in education and negotiation meetings both in the communities and in the district center, Kolonia. Since then, the programme has been extended to all other municipalities, with the resultant formation of local NGO management groups in each area. The education programme will culminate in the redrafting of rules and regulations and presentation back to the Government some time in late 1993, followed by implementation of the new community-based management structure.

A Community-based Management Approach

In response to community input, a community-based approach to the management of the island's upland forests has been developed. Known locally as 'co-management', this approach recognises several cultural and social factors:

1. Government resources are inadequate to actively manage, monitor, and enforce the watershed forest reserve;
2. The upland forest is not strictly a common property regime - past exploitation was regulated by traditional authority including various land-use designations;
3. Communities have a much greater stake in forest resources and values than do government managers - this 'enlightened self-interest' should be encouraged through participation in management activities;
4. Local community institutions will be more effective than the Government in detecting infractions and imposing sanctions to regulate resource exploitation; and,
5. The legally-protected forest areas represent only 15% of Pohnpei's land area and less than half (42%) of remaining dry forested area. Sustainable land use practices must extend to a greater area for management success.

The resulting management programme combines local community and traditional institutions with the Municipal and State Governments. Four entities are proposed to participate in watershed management. The Division of Forestry (DoF) is designated as the lead agency, maintaining the ultimate responsibility and authority to develop and implement the management programme and regulate use within the Watershed Forest Reserve. The DoF Chief acts as Chairman of the Watershed Steering Committee (WSC), which will serve as the advisory board to the DoF and its parent agency, the Department of Conservation and Resource Surveillance.

Municipal Watershed Protection Officers will liaise with the DoF/WSC in matters related to the watershed, particularly infrastructure development. Local autonomous Watershed Area Management Committees (WAMCs) will be formed for each discrete watershed management unit (about 10), consisting of the local *soumas en kousapu* (village chiefs) or their delegates, and will act as co-managers with the DoF.

Following completion of the community education programme in each unit, the WSC will work with the WAMCs to develop and implement Watershed Unit Plans (WUPs). These plans will cover the entire watershed unit, from the cloud forest to the reef. Outside of the legally designated areas, the plans will only recommend action - compliance will be largely voluntary - but by involving the communities and their leaders, compliance is expected to receive more support. The plans will also integrate existing and proposed infrastructure, including roads, trails, and water systems. Road construction in the vicinity of the WFR will be highly discouraged.

Data generated during the planning process will be organised and made available to all management entities, and will eventually result in a management system based on zoning and permits. Suitable use areas in the WFR and surrounding buffer area will be designated as agricultural, tourist, wildlife (non-hunting), or historical/cultural zones. The remaining areas will be left unzoned and protected through a permit system.

In addition, realising that conservation efforts will only be successful if people are able to maintain/improve their standard of living, a number of sustainable development projects will be identified by the various communities during the planning process. These are envisioned to include small-scale ecotourism projects, alternative crop production systems (especially for *sakau*), and other small-scale sustainable resource extractive activities.

Finally, using the Pohnpei watershed area as a model, exchanges of extension and technical personnel between the island and other states in the Pacific region will be promoted and a nation-wide workshop will be held to encourage the delineation of watershed areas, development of legislation, and promotion of forest conservation education.

Conclusions

The forests of Pohnpei are unique biological treasures worthy of protection. The continued health of these important ecosystems under current trends is dependent on involving the traditional leaders and local communities in their management and preservation. Pohnpei's experience demonstrates that while legislation 'on paper' is an important first step, real success can only be realised by its adoption by the local community. Modern and traditional resource managers of Pohnpei's forests have been able to develop a mutually agreeable strategy of co-management, effectively incorporating community and landowner input into forest planning and management. Their success has been largely based on effectively integrating traditional forest management practices with sound scientific information. With continued local support and appropriate external assistance, the proposed management approach for Micronesia's upland and cloud forests will become a reality.

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