

Strategies for sustainable development of natural and cultural resources in the Paipai Indian community of Santa Catarina, Baja California

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Introduction

Baja California's native communities are among the poorest populations of the peninsula. Living in remote settlements, the few isolated enclaves that remain of the wide territory that was once their land, these groups struggle for daily survival, eking out a living raising cattle, farming, making traditional crafts and occasionally harvesting some of their natural resources such as yucca, acorns, pine nuts, herbs and flower seeds. Unfortunately, utilization of natural resources has been severely limited by the lack of access to government permits, since the process of carrying out the environmental impact studies, management plans and the paperwork required in acquiring permits is prohibitively expensive for these marginalized populations. Ironically, all of the communities are rich in terms of land base and natural, cultural and human resources. Furthermore, over thousands of years they have developed traditional methods of managing their natural resources, many of which may be applicable to new patterns of resource utilization. The purpose of the present study is to work with one of these communities -- Santa Catarina -- to create strategies for long-term management of these resources that will encourage sustainable development within the unique natural, social and cultural context.

This project has required the integration of data from across a wide variety of disciplines and sectors in order to reach the following objectives:

- to compile all the necessary bibliographic and field data;
- to create geographic information systems (GIS) in order to organize geospatial data for the assessment and monitoring of natural and cultural resource inventories;
- to design and carry out interviews for the identification of human resources and community priorities;
- to analyze the development potential for proposed activities;
- to identify legal configurations for facilitating the permitting process and assist the community in preparing the necessary paperwork;
- to create a feedback loop with communities and their leaders throughout the process; and
- to propose strategies for sustainable development.

Methodology

In order to compile all the information necessary to propose strategies for sustainable development, project investigators worked closely with indigenous community members, students and faculty from the Autonomous University of Baja California (UABC), individual researchers and private consultants. Perhaps the most important contributions to this effort are the documents *Sustainable Development in the Indigenous Communities of Baja California* (Wilken et al. 1998); *Indian Groups of the California-Baja California Border Region: Environmental Issues* (Kilpatrick et al. 1998); *Propuesta de manejo de ecosistemas de la Comunidad Indígena de Santa Catarina* (Ahumada et al. 1999), produced by students from the UABC's Masters Program for Ecosystems Management in coordination with the author; the master's thesis of Erika Rivera (2000); and Judith Bravo's (2000) field report.

The creation of the GIS database was carried out through the expertise of Mtro. Martin Escoto, then adjunct professor of the UABC Sciences Faculty. Escoto trained Paipai tribal members Andrés Albañez and Aracely Castro in the use of the Global Positioning System (GPS) in order to identify locations of their community's resources. These technicians were also taught to transfer the data to a computer and work with GIS programs. This information becomes part of the permanent GIS data base of Baja California's indigenous communities housed in CUNA's offices for use by the communities themselves as well as for future research.

Interviews for the identification of human resources and community priorities were designed by Erika Rivera for her thesis work in San José de la Zorra. These were applied by community members trained for the purpose. The same basic format was then applied in the Paipai community of Santa Catarina by community member Carmen Gonzales.

The analysis of development potential for proposed activities (primarily traditional handcraft production and ecotourism) is based on field work carried out by ethnologist Judith Bravo, the author's personal experience promoting these activities on a small scale and that of Lic. Francisco Detrell of Expediciones de Turismo Ecológico y Aventura, S.A. de C.V. A concurrent CUNA project, "Creating the Green Link for Sustainably Produced Indigenous Goods and Services", funded by the North American Fund for Environmental Cooperation, has also allowed CUNA to explore the economic feasibility of handcraft production and ecotourism and create marketing infrastructure that complements the proposals in the present study.

The identification of legal configurations for facilitation of the permitting process was carried out by biologist Alfredo Acosta. Based on the recommendations of previous CUNA and UABC documents, the formation of a Conservation, Management and Sustainable Wildlife Utilization Unit (Unidad de Manejo Ambiental; UMA) was proposed as a means of developing greater self-management of resources. Acosta compiled the data necessary to help the communities take that important next step.

Finally, in order to create a feedback loop with the communities and their leaders throughout the process, project supervisors and researchers met periodically with community leaders, presented preliminary findings for discussion at community meetings and provided copies of GIS print-outs and other information of special interest to the communities. A special day-long exhibit and interactive workshop was also held as part of the Kuri Kuri 2000 Indigenous Gathering held at San Miguel Village on July 15, 2000 for the purpose of disseminating information and demonstrating the powerful potential of GIS as a tool for environmental management. Indigenous community members who had received GPS and GIS training had the opportunity to share the information and their experience with members of all of

Baja California's indigenous communities and with the public in general. The results of these studies have also been integrated into Spanish and English posters that have been displayed at a variety of conferences and events.

It is the hope of all involved in this important project that the strategies proposed here may soon be put to work for the benefit of the communities themselves. We also sincerely hope that this kind of multidisciplinary, cross-sector approach may serve as a model and be reapplied to help other communities in their struggle to gain greater economic self-sufficiency through the sustainable use of natural and cultural resources.

Santa Catarina: description

Land use and economic activities

Before the arrival of non-Indian cultures, the ancestors of the Paipai were semi-nomadic hunters and gatherers who developed a highly mobile way of life based on the utilization of a diversity of natural resources from a variety of ecosystems. Some aspects of this traditional lifestyle (e.g., gathering of plant foods and medicines; hunting; use of soils, plants and animals for manufacture of traditional arts) are still important in Paipai subsistence strategies. However since the mission period beginning in 1797 and with the establishment of a sedentary way of life, livestock grazing and to a lesser degree agriculture have become increasingly important forms of land use.

For the last century and a half, many Paipai have made a living outside the community, working as wage laborers for neighboring ranches, in mines (during Baja California's gold rush from 1860 to 1880) and in agricultural projects. Today, along with the economic activities mentioned above, many Paipai make a living through the manufacture and sale of traditional handcrafts, extracting natural resources such as yucca and firewood for sale to outsiders, working for state-run road maintenance projects or teaching in the local school.

Infrastructure and services

A network of dirt roads crisscrosses the western portion of the territory, the area of Santa Catarina (Figure 1), where most community members live and carry out a variety of economic and social activities. Currently, road improvement programs (a major source of employment for the Paipai) are focused on improving access to the eastern desert area of the community's territory.

Homes and ranches are constructed from a variety of materials, including traditional brush huts, adobe, stone, wood, cinder block and recycled materials (Figure 2). During 2000, a solar-powered water system servicing the main settled area was installed through a collaboration between two NGOs (AquaLink and CUNA) and the Baja California state government. During the same year the state also provided small solar energy systems to each home or ranch, since the community lacks a central energy system or access to Comisión Federal de Electricidad lines.

A primary school, cafeteria and boarding facilities as well as a *telesecundaria* (secondary school with televised course components) provide basic education for approximately 50 children. The elusive goal of bilingual education (Spanish and Paipai) has proven difficult to attain; however it continues officially to be a priority. Many children are exposed to both Paipai and Kumatl (apparently a hybrid of Kumiai and Paipai), and although these native languages are losing

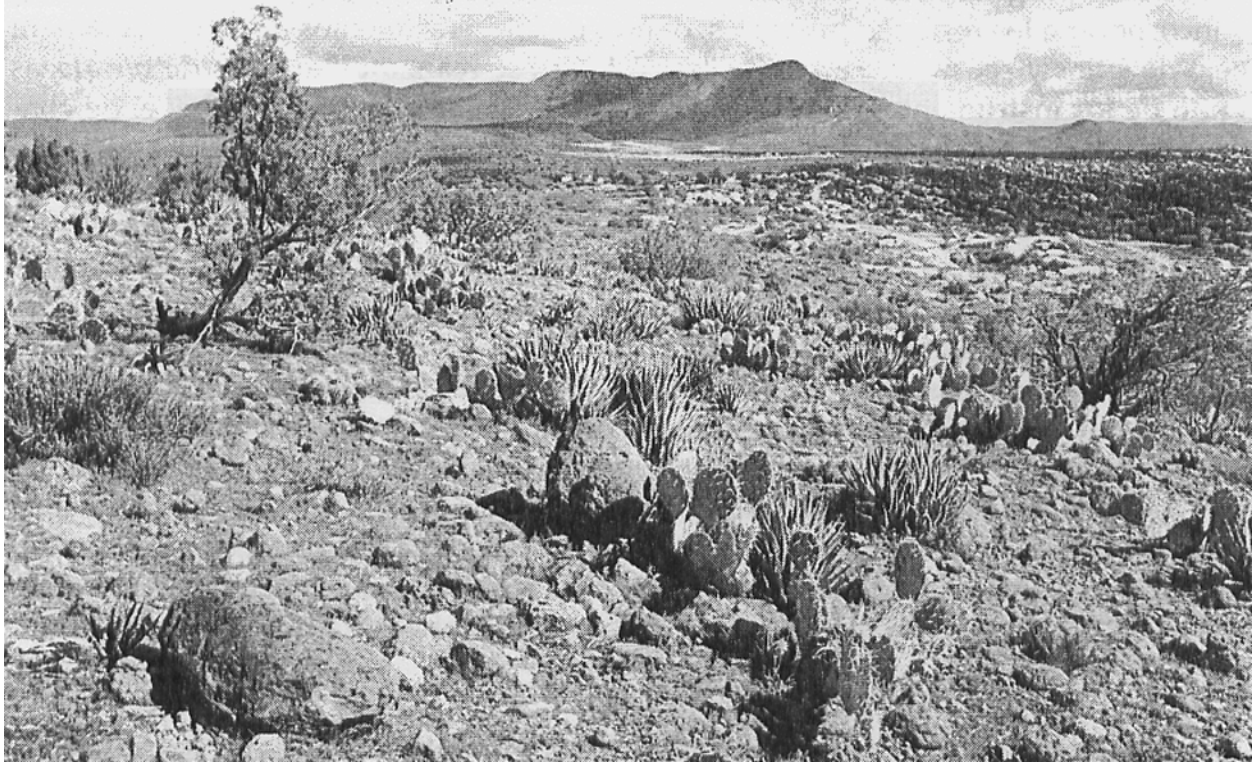


Figure 1. A landscape near the mission of Santa Catalina.

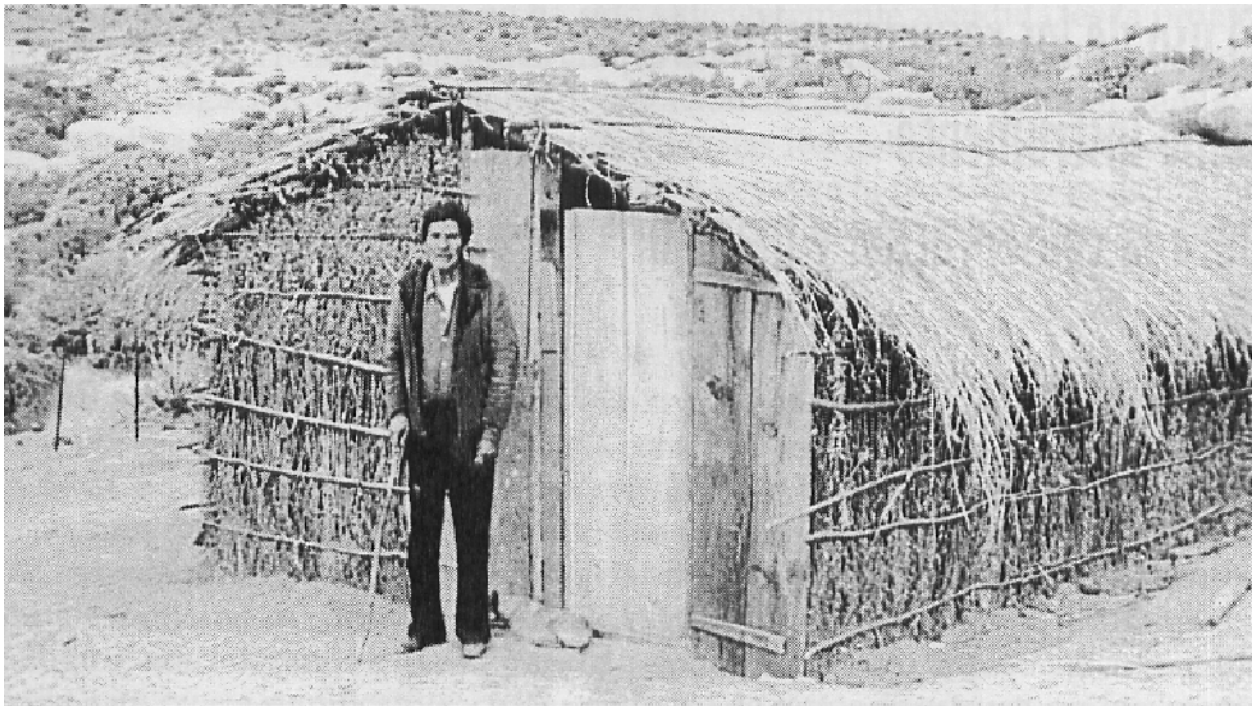


Figure 2. Benito Peralta, cultural authority of the Paipai community of Santa Catarina, with a typical house made from local materials, 1981.

ground to Spanish, fluency is still much higher than in other Pai communities north of the border. Increased funding for expanded language preservation programs is critical and would represent an important investment in this rare and valuable cultural resource. Students who want to study beyond secondary school must move to Trinidad Valley, Ensenada or other towns with high schools. Currently CUNA's scholarship program provides basic support for the nine secondary students and 15 high school level students from Santa Catarina.

Health services are provided to the community through CUNA's medical aid network and the Instituto de Servicios de Salud Pública del Estado de Baja California (ISESALUD). Many members of the community retain traditional knowledge of medicinal plants (Cortés 1994) and often prefer to self-diagnose and treat before resorting to biomedicine. A clinic in the community has recently been renovated by ISESALUD, and a doctor has been assigned to make regular visits.

The community has no tribal office or infrastructure to support its elected officials except for a partially constructed meeting hall for monthly *juntas* or meetings where issues of interest to the community are discussed and decisions are made.

Environmental issues

Water quantity and quality

The main stream of Jacotobojo provides the settlement of Santa Catarina with an adequate drinking water supply through the newly functioning solar water pumping system. Outlying ranches at Jayuacahuatl (Agua Colorada) collect surface water in buckets or storage drums or gravity-fed hoses. Many other springs throughout the territory provide water for single-family ranches (e.g., Rincon de Santa Catarina, Agua Escondida, Jamin and San Miguel) or for seasonal camps (e.g., Agua Caliente, La Parra and El Alamito). In many cases these springs have been dug out and small earthen dams formed to retain water.

Water quality is better than in other indigenous communities of the region; however, high nitrate levels may be the result of waste contamination or fertilizer runoff (Wilken 1996). Livestock is often seen grazing in the riparian area upstream from the water system intake, and the area has not been fenced off to avoid contamination in the immediate area. Washing of clothes in the stream and bathing may also affect water quality (Ahumada et. al. 1999). The new water system pumps all water up to one central holding tank, offering the possibility of chlorinating or otherwise treating the water. This measure has been proposed to the community; however, there is resistance to the possible effect on the taste of the water and a feeling that the Paipai are already accustomed to the local water flora.

Currently, water for irrigation comes primarily from ground water. An irrigation ditch diverted from the Jacotobojo stream, parts of which date from the mission period, has long been used to water some of the fertile plains along the riparian area near the main settlement. During the last several years, several kilometers of hose have been used to irrigate crops in the former settlement area of San Miguel. The area also has at least two wells which are not currently functioning. According to the hydrology map, the San Miguel area should have plenty of ground water for irrigation. The eastern desert areas are also indicated as potentially having good sources of groundwater which could be applied to agricultural projects. The Paipai have expressed interest in developing their land's agricultural potential; however, they have also pointed out the failed agricultural projects of neighboring communities, where natural species

have been cleared and then the plots abandoned, leading to an accelerated process of desertification (Wilken 1997:144). Traditional and contemporary management of already established native plants such as yucca, jojoba, juniper, barrel cactus and many other species has also been described by some researchers as a form of agriculture (Blackburn and Anderson 1993), which may be preferable to large-scale irrigated agricultural development for the Paipai.

Air

Although no studies have been carried out in the community, air quality appears to be excellent, and there is no visual or pathological evidence to suggest air quality problems. Fresh air is itself an important resource that may be an added attraction for ecotourism in the community. According to the UABC study, the only possible sources of air pollution would be dust from wind erosion resulting from changes in land use (loss of vegetative cover due to grazing and new roads) and occasional burning of trash.

Soils

Contamination of soils does not appear to be a problem in Santa Catarina; however, soil erosion appears to be increasing due to extensive livestock grazing, increasing volume of dirt roads and vehicular traffic (several major off-road races pass through the community each year) and clearing of land for habitation and agriculture. Much of the fertile soil formerly used for agriculture along the riparian areas has washed away during floods in the last half century, perhaps due to changes in land use up watershed. A small amount of clay is mined for the manufacture of traditional pottery, as will be dealt with later in this article.

Trash

The community has no centralized infrastructure for disposal of wastes. Trash often accumulates near living areas until it is burned. The UABC study recommends that the community designate a landfill area to which trash can be removed on a regular basis, possibly with the cooperation of the municipal government (Ahumada et al. 1999).

Cultural resource management proposals

Santa Catarina is blessed with a rich diversity of cultural resources, perhaps more than any other native community in Baja California. Historic sites from ancient, mission, ranch and modern periods; vast knowledge of the land, its flora and fauna; living traditions of language and arts; native construction experience, including traditional housing and adobe manufacture; cowboy culture; and many other aspects of Paipai lifeways represent valuable resources for Santa Catarina. Community members often express their interest in preserving these aspects of their culture, especially since they help reinforce their identity as Native Baja Californians. A highly effective means of ensuring the transmission of these components of indigenous culture is through revitalization of their value within the Paipai economy.

The revival of traditional handcraft production illustrates how this process can help native artisans preserve, practice and reinterpret the knowledge passed on from their ancestors, while at the same time strengthening and diversifying their tribal economy and self-sufficiency.

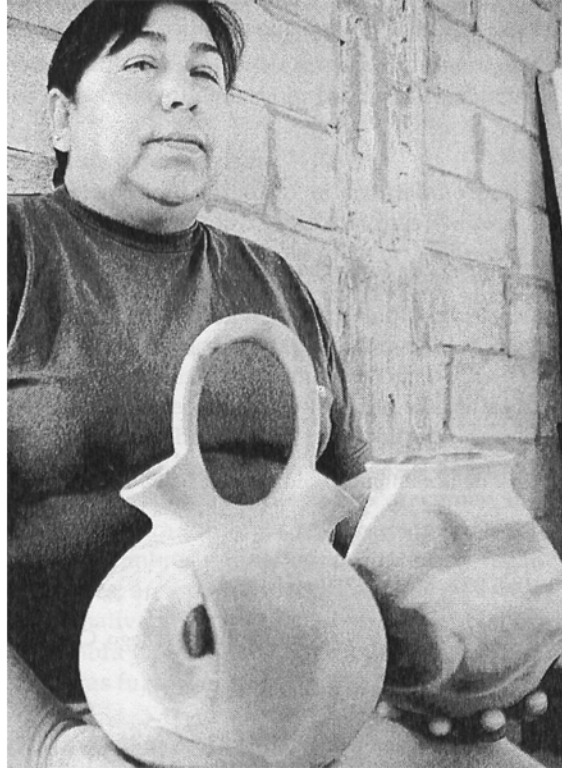


Figure 3. The ollas of Paipai artisan Daría Mariscal are made with traditional techniques and a unique artistic vision.

Ceramics, agave fiber nets, bows and arrows, and other tools, originally indispensable utilitarian components of Paipai material culture and economy, were rapidly falling from use by the middle of the twentieth century due to the introduction of new materials (Owen 1962). Twenty years ago, only four older women of Santa Catarina occasionally made pottery, mostly for sale to infrequent tourists who happened on the community. Younger women rarely took the time to learn the skills for what seemed to be a dying art. Today, however, this trend has been entirely reversed. Growing interest and emerging markets for their wares have allowed many of the artisans to dedicate all their productive hours to traditional handcraft production (Figures 3-4). Daughters and granddaughters have learned the skills and become recognized artisans; older and younger men have also become specialists in the making of bows and arrows, wooden ladders, gathering buckets, rabbit sticks and leather goods, or providing raw materials for the ceramicists. New forms, such as the pine needle and palm basket, have been developed and quickly perfected, while traditional wares are also evolving in exciting and dynamic directions.

These developments have been greatly enhanced by the ability of artisans to access markets throughout the original territory of their Yuman ancestors: California, Arizona and Baja California. Over the last eight years, artisans have been invited to participate in events and gatherings in museums, Indian reservations, schools, historic sites, state parks and conventions. They are often asked to teach classes to students in related Indian communities of the U.S., reinforcing the transmission and preservation of these skills in areas where these ancient traditions had been lost. Clearly, both the knowledge and the products of these skills have taken on a new value in the Paipai economy. Fortunately, most of the handcraft processes involve sustainable environmental management practices, and even at significantly higher commercial levels they can continue to provide important economic benefits without sacrificing the integrity



Figure 4. Paipai artisan Teresa Castro shows a willow bark skirt and agave fiber sandals.

of the environment. This is especially useful as these and other culturally based activities allow the Paipai to replace environmentally degrading activities such as poorly managed cattle and goat ranching with better-paying, environmentally friendly jobs.

Increasing handcraft production

The dramatic increase in quality and quantity of handcraft production reflects a variety of changing dynamics in the Paipai economy. Growing appreciation for traditional arts creates new markets. Younger people choose to stay in their communities due to new and more diversified economic opportunities. Handcraft cottage industry provides better income than non-sustainable activities, with increased initiative, empowerment and self-sufficiency (especially for women). Partnerships are developed with outside organizations, communities and individuals that assist or do business with artisans.

Currently the limits on handcraft production include:

- the need for wider and more consistent markets for products;
- the need for improved infrastructure for the promotion and distribution of products;
- the lack of legal permits for the utilization of natural resources used in manufacture;
- the lack of long-term environmental management plans for the resources used;
- the lack of tribal members with advanced marketing, business administration and foreign language skills; and
- the need for training of apprentices by master artisans to increase quantity and quality of production.

Fortunately there are several concrete steps that can be taken by native community members, tribal and governmental and non-governmental organizations in order to overcome these limitations. The widening of markets and ensuring of a more consistent income for artisans goes hand-in-hand with the improvement of infrastructure for production, promotion and distribution of products. At a local level, one recommendation is to encourage the development of outlets for products within the communities themselves. Currently, a limited number of buyers occasionally visit the communities; however, many potential retail and wholesale customers may not even know the communities exist or lack the information to find them. For this reason, it is important to create a destination such as a community museum (providing important contextual information regarding the handcraft traditions) with a marketplace space accessible to all artisans (see the ecotourism section below).

Artisans from both Santa Catarina and San José de la Zorra can take advantage of the proximity of a major highway (Carretera Federal 3) with sufficient traffic to guarantee a certain level of sales. A small but highly visible booth with appropriate signs would require a minimal investment and could provide ongoing returns.

Wholesale distribution to retail stores in the urban areas of the Baja California border region is a strategy that is recently being explored by enterprising younger tribal members. The cost of fuel and vehicle maintenance limits the feasibility of this.

The establishment of retail outlets specializing in native handcrafts with promotion through the internet provides worldwide exposure for indigenous handcrafts. One example of this is *Nativa Indian EcoArts* in Ensenada, a non-profit project of the CUNA designed to assist native artisans through the promotion and distribution of sustainably produced indigenous handcrafts.

Although the lack of legal permits for utilization of natural resources used in handcraft manufacture is currently not a major limitation, it is an issue that will begin to affect artisans as their work becomes more widely distributed, since the Mexican government's environmental secretariat (SEMARNAP) requires permits for the commercial use of most natural resources. Permits may also be required for the export and/or certification of handcrafts. Fortunately, the system of *unidades de manejo ambiental* (UMAs) can help communities get the permits they need through the management of their natural resources.

For long-term environmental management planning, communities can benefit by partnerships with academic and research institutions such as the UABC, the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE) and civil associations such as CUNA, which can collaborate with the communities to carry out studies of individual species and ecosystems, as well as creating natural resource data bases through geographic information systems.

In order for indigenous communities to realize more economic benefits from handcraft production, tribal members need to develop advanced marketing, business administration and foreign language skills. Currently, few tribal members have had the opportunity to continue their education beyond the primary level. For this reason, it is imperative to identify and support native students interested in developing careers in these areas. Support is needed for long-term scholarship programs that help students all the way through their studies.

Programs for the training of apprentices by master artisans may be available through the Mexican government or international foundations and would be an excellent investment in order to increase quantity and quality of production. Furthermore, since most artisans are fluent in their native languages, classes could also encourage the transmission of this vital aspect of culture.

Sustainable pottery production

Potters from Santa Catarina have identified at least two sources of clay in the vicinity of their community. These deposits have been mined for at least half a century and probably much longer, as evidenced by numerous potsherds found throughout the area. Because relatively small amounts of clay are needed to support the small level of production, the impact on the deposits is minor, and they appear to still contain a large amount of raw material for continued production. A small area of vegetative cover (approximately 80 m²) appears to have been affected. This impact is miniscule compared to that from cattle grazing, agricultural projects and road construction.

As in the past, clay is mined with pick and shovel. One kilogram of raw clay yields approximately 500 g of fine clay powder, which is hydrated and kneaded to make workable clay. A finished pot weighing 500 g can be sold for approximately 50 pesos (U.S. \$4.50), over 160 times the price paid for clay sold as adobe. Clearly the cultural value added makes pottery the best possible use of clay soil resources.

Currently, eight artisans regularly make pottery, and many of their children are also learning the skills of the trade. For many of these ceramicists, pottery represents their primary source of income. Pottery is also a key element in Paipai cultural identity and in recent years has become an important link with other indigenous groups of Baja California, California and Arizona, as Paipai teachers are contracted to teach their skills throughout the Yuman region. Considering that the Paipai have over 68,000 hectares of land and there are undoubtedly other clay deposits within their community, pottery represents an excellent option for years to come, even at increased levels of commercialization. The geographic information system that has been developed for Santa Catarina may be useful for detecting potential deposits for mining clay.

The preferred material for firing pottery is the dead, dried stem of the Mohave yucca (*Yucca schidigera*), although cow manure can also be substituted. Yucca is not considered to be a species with any special conservation status. The firing is carried out in shallow pits and appears to generate a minimal amount of smoke. This simple firing process uses no glazes or other potentially harmful chemicals.

Over time, the mining of clay leaves a shallow depression between 40 and 110 cm deep over about an 8 m² area. The potters have pointed out that this is eventually filled in during flood conditions, erasing any signs of impact. As production increases, clay deposits should be inspected twice annually to assess the impact on vegetation. If the impact appears to be adversely affecting large areas of vegetative cover, other clay deposits should be identified while impacted ones are allowed to fill in by natural processes.

Ecotourism proposal

Carefully managed ecotourism can allow the community to utilize while conserving its most valuable resources: unique landscapes, pristine habitat, biodiversity, historic sites, knowledge of the environment and native people's role in it, traditional indigenous culture, "cowboy culture" and many other natural and cultural resources. In order to take advantage of this potential, basic infrastructure needs to be established. Based on interviews with the Paipai tribal council and consultations with the community at their monthly assembly as well as the experience of CUNA and EcoTour Adventures, S.A., a special area for ecotourism operations has been designated, and the following infrastructure needs have been identified:

- adobe or stone principal structure to include office/registration, kitchen and dining area, restrooms;
- twelve traditional houses (six *wa*-style brush houses made from juniper, willow, agave stalks and other local materials; six adobe cabins) with rustic beds, table, chairs and chimney;
- camping area;
- shade armadas;
- solar energy system to provide minimal electricity to area;
- men's and women's restrooms with environmentally appropriate toilets and showers;
- picnic-type tables;
- campfire area;
- access roads;
- parking areas;
- fences;
- signs; and
- protection of native flora and carefully planned landscaping with native plants to provide shade and screening of parking, water tanks, etc.

Mission Santa Catalina

One of the outstanding historic sites in the community is the ex-mission of Santa Catalina, founded by the Dominicans in 1797 (the name was later changed to Santa Catarina). The excavation of this site could help lead to a better understanding of this critical period in the community's history and could provide many years of employment for local community members who could be trained as para-archaeologists. A full-scale excavation of the site, carried out in collaboration with the Instituto Nacional de Antropología e Historia (INAH) could also attract students interested in archaeological field work, provide a basis for the construction of a replica and museum, thereby creating a more attractive destination for ecotourism, all of which would generate income for the community.

Museum

A community museum, possibly housed in the replica of the mission or nearby, would give the Paipai the opportunity to tell the story of their people and culture, including mythology, native lifeways, evolution of traditional handcrafts, ancient and recent history, language or whatever they consider important and appropriate to share. The museum could also include spaces where local artisans could exhibit their wares and demonstrate techniques of manufacture.

Suggestions for further study

Many other activities to promote sustainable economic development have been identified by the indigenous community. However, further studies are needed to ascertain the feasibility and sustainability of these activities, to ensure a dynamic, diversified economy for the community. In order to avoid the prohibitively high cost of paying private consultants for these studies, many of them can be carried out through the continued collaboration of the indigenous community with CUNA, UABC, the Southwest Consortium for Environmental Research and

Policy (SCERP) and other foundations. Furthermore, the GIS data base which has been formed for the community can be used for, and enhanced by, future studies. Some priorities for research include:

- long-term water planning;
- evaluation of agricultural potential;
- establishment of nurseries for the production of fruit trees, native plants and others with commercial potential;
- utilization of specific plant species (juniper, yucca, barrel cactus, cholla, etc.);
- processing plant for making finished products from yucca, herbs and other natural resources;
- production of furniture made from native plants and other local materials;
- collection and/or propagation of native flower seeds;
- development of the Agua Caliente hot springs location;
- water park addition to Paipai EcoVillage;
- livestock management; and
- extraction of flagstone.

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