

“Nainu” agriculture: an alternative for the management of natural forests, Panama

GENERAL INFORMATION	
<i>Sources of information of the practice</i>	“Nainu agriculture practiced by the Kunas of Panama: an alternative for the management of natural forests” by Geodisio Castillo and published in the <i>Ethno-ecological journal</i> Vol.6 No. 8. 84-99 pp.
<i>Relevant contacts</i>	Geodisio Castillo, Executive Director of the Kunas Employees Association Email: gubi@pty.com or geodisio@verdeamerica.zzn.com
<i>Useful links</i>	Asociación de empleados Kunas (Kuna Employees Association) http://pananet.com/aekpemas/frames.htm
INFORMATION ABOUT THE PROGRAMME OR PROJECT PROMOTING THE PRACTICE (IF APPLICABLE)	
<i>Programme or project</i>	The programme for ecology and management of wildlife in Kuna Yala documented this indigenous practice for agriculture and forest management
LOCATION OF THE PRACTICE	
<i>Region</i>	Central America and the Caribbean
<i>Country</i>	Panama
<i>Province, Districts, Villages</i>	The Kuna Yala area, Municipality of Narganá
<i>Climatic zone</i>	Humid
<i>Other descriptive information</i>	In the mountains, rainfall reaches 5,000 mm per year and 2,600 mm on the coast
INFORMATION ABOUT THE PRACTICE	
<i>Practice category</i>	Managing natural resources sustainably
<i>Practice type</i>	Technology for natural resource management
<i>Sector</i>	Forest management and conservation
<i>Beneficiaries of the practice</i>	Local communities
<i>Users of the practice</i>	Small and medium scale farmers
<i>Natural resource used or accessed (if applicable)</i>	Land and forests
BRIEF DESCRIPTION OF THE PRACTICE	
<i>Background/problem statement</i>	<p>The Kuna Kala region is comprised of approximately 550 000 hectares and lies in the north east of the Panama and Darien Province. This region has the highest level of poverty and an infant malnutrition index of 70%. Kuna Yala has a population of 31,885 inhabitants (census of 2000). The practice is carried out in Narganá, one of the four areas of the Kuna Yala area. Narganá has a surface area of 1000,000 hectares. There are 29 communities and a total population of approximately 14,000 inhabitants. Narganá was declared a protected area in 1994 by the national government.</p> <p>The vegetation in the lowlands is secondary as a result of rotating agriculture (nainu). The highlands are mainly covered by primary forests. Agricultural production is for self consumption but it is not sufficient. The main crops are plantain (<i>Musa spp.</i>), cassava (<i>Manihot esculenta</i>), yam (<i>Dioscorea spp.</i>), maize (<i>Zea mays</i>), rice (<i>Oryza saliva</i>), and fruits such as coconut (<i>Cocos nucifera</i>), avocado pear (<i>Persea Americana</i>), orange (<i>Citrus supp.</i>), mango (<i>Mangifera supp.</i>), guabas (<i>Inga. spp.</i>), custard apple (<i>Annona muricata</i>) and pejiballe (<i>Bactris gasipaes</i>). Plantains, cassava and maize are the most important crops for the diet, whilst coconut constitutes the only commercial</p>

	<p>crop that makes its way on the Colombian market. This generates some income but even this has significantly reduced in recent years.</p>
<p><i>Approach followed</i></p>	<p>“Nainu” agriculture is a natural forest management system in the Kuna Yala area. A main characteristic of the system is the planting of useful trees along with a great diversity of vegetable species. This helps conserve biodiversity and allows sustainable soil management on the hillsides that are particularly prone to erosion, “Nainu” agriculture is practiced on coastal and alluvial planes and is characterized by the use of natural methods to renew soil fertility, above all “land or plot rotation” in secondary forests.</p> <p>Here are some descriptions of different “nainu” agricultural systems practiced by the farmers of Kuna Yala:</p> <p>Forest crop system for fallow periods, or hillside crops</p> <p>This practice is carried out on hillsides where the vegetation dries out quickly and wind and rain destroys the little fertile layer of soil. With these characteristics in mind, the farmer practices “nainu” agriculture sequentially or cyclically using rotated plots in which fallow periods are planned. . The slash and burn cycle has six stages: site identification, clearing, burning, planting, weeding and protection, harvest and fallow. The primary forests are situated on steep, craggy hillsides and are considered sacred places or as fragile ecosystems that the population refers to conserve. For this reason, site identification and clearance takes place in secondary forests and depends on soil fertility as well as on the distance from the community and river. The cleared and burned plots are mainly used to cultivate maize (<i>oba</i>), rice (<i>oros</i>), cassava (<i>mama</i>) and plantains (<i>masi</i>). The first crops to be cultivated are: maize (<i>zea mays</i>); <i>sipu</i> rice (<i>oryza saliva</i>) and <i>gonid</i> rice (<i>Oryza rufipogon</i>). During clearance, valuable plants and trees that provide wood for canoes, for artisans or medicines, are protected. Harvesting is carried out of acorns (<i>Tabebuia pentaphyla</i>), almonds (<i>Dypterix panamensis</i>), espaval nuts (<i>Anacardium excelsium</i>), geniper (<i>Genipa Americana</i>), guaba (<i>Inga spp.</i>), amongst many others. On cleared land the same crop is rarely sown twice consecutively times. Experience shows that the intercalated and / or mixed crops give better results. First the cereals are sown. These crops demand more nutrients. Afterwards the plot lies fallow for four years before cassava (<i>Manihot esculenta</i>) is sown. In this first “nainu” stage, annual crops that require a lot of sunlight are planted. They are then joined by trees or fruit trees of different heights. Some are more tolerant to shade such as taro (<i>Xanthosoma spp.</i>), cacao (<i>Theobroma cacao</i>), and plantains (<i>Musa spp.</i>) amongst others. The “nainu” follows its cycle until it reaches the stage of secondary forest within 20 years or more. The natural succession can begin again and very often, this practice actively contributes to the final reestablishment of the forest.</p> <p>Crop plantation in a “nainu”</p> <p>Traditionally, the Kunas sow a single crop on hillsides before laying a plot to fallow. Maize, rice and cassava crops are incorporated in to the slash and burn / fallow cycles, even if with different periodicity. Due to the different plot sizes and the ecological demands of the crops, the decision to sow maize, rice or cassava is taken before the area is cleared. Once the decision has been taken, land preparation for the said crops begins. The plots are cropped using the slashing technique. During the dry season they are burned and are sown or planted in the rainy seasons. The Kuna farmers know that the land can vary a lot over the years in so far as soil quality and water drainage is concerned. They therefore maintain genetic diversity of the cassava so there is always an appropriate one for any given specific area.</p> <p>In “nainu” agriculture, agrochemicals are not used and instead organic material from the forest is used as organic fertilizer. A lot of ground geniper (<i>Genipa Americana</i>) or ant waste is also used and mixed with the seeds at sowing time. Hoes and other agricultural tools are not used to work the land instead “zero farming” is practiced.</p> <p>The virgin forest is used in a sustainable way for the collection of medicinal</p>

	<p>plants and foods or non wood forestry products, which provide materials for construction and artisan crafts. Protected sites known as sacred places still exist in the virgin forests. Forest conservation in these areas provides benefits and ecological services to the population.</p> <p>System family market gardens This system plays an important role between the farmers and the Kuna families. This agricultural practice is carried out intensely in coastal areas, on alluvial or black soil. In family market gardens a range of useful plants can be found for foods, medicines, and artisan crafts. For example the coconut palma (<i>Cocos nucifera</i>), a commercial plant for the Kunas as for the Colombians, the artesan tree <i>Crescentia cujete</i>, the fruits of which are used to make containers and fruit trees such as cashew, mango, guineo bananas, mamey (<i>Pouteria sapota</i>), amongst others. Also condiments such as hot peppers (<i>Capiscum annum</i> and <i>C.frutescens</i>) are found, as are vegetables such as pumpkins (<i>Cucurbita</i>).</p> <p>Riverside market gardens of Morning Glory plants (<i>Ipomea</i> sp.) When river levels fall, alluvial sand accumulates on the banks. Farmers make the most of this alluvial soil to sow maize. Sowing takes place before the rains because afterwards the land floods.</p> <p>Agricultural system with bordering trees The most significant characteristic of this traditional system is the use of different combinations of trees and fruit trees as annual and / or perennial crops. The trees, mainly the fruit trees such as mango (<i>Mangifera indica</i>), asue (<i>Persea mericana</i>), nalup (<i>Bactris gasipaes</i>) are found on the perimeters of the plots and serve as fences since enclosures and wire fences don't exist. If the plots don't maintain annual crops, the stubble is left to provide wood and posts for construction.</p>
<i>Innovative elements</i>	Recognition of the value of local knowledge about the environment and indigenous systems of natural resources management.
<i>Impacts on natural resource base</i>	<p><u>Actual:</u> Agricultural production in forest plots without losing the diversity of the natural space. This system of indigenous agricultural management does not destroy the forest, but replaces it with a series of revivals creating a variety of eco zones, allowing the harvest of various crops, the collection of wild plants and better hunting. The farmer uses and manipulates the forest plot, eliminating competing species and directing nutrients towards food crops.</p> <p>Wildlife, as well as a great diversity of forestry and vegetable species can prosper in these Kuna agriculture systems.</p>
<i>Impacts on livelihood of the practice users</i>	<u>Actual:</u> "Nainu" agriculture is a strategic response to conserving the natural forest and living resources in the area. It does not damage its resource base and at the same time it generates income and social benefits for families and future generations.
<i>Other impacts</i>	<u>Expected:</u> There is no doubt that these ancestral practices are of great importance for people such as the Kunas. Considerable knowledge of the environment and natural resources has maintained the existence of the Kina village to this day.
<i>General success factors</i>	<ul style="list-style-type: none"> • The traditional political system is based on participatory democracy. Each community has a Local Congress, where different social, economic, political and spiritual themes are debated daily. There is also a General Congress of Culture where religious leaders, botanical doctors and cultural singers meet. This is where customs, spiritual beliefs, medical knowledge and agricultural methods are passed on. • The nation and the culture are very much linked to nature. The concept of nature conservation manifests itself through traditional medicine and "nainu" agriculture. • The "nainu" production system is generally found to be associated with mini-exploitations under a family private property regime. Knowledge of the soil through existing original and / or secondary vegetation, as well as of the weather or climate, are decisive factors for the agriculture, the type of crop to be sown or the management system to be applied. For these reasons the farmers use zoning to improve land management.

<i>Technology success factors</i>	Maintain or increase biodiversity No adverse environment effects, preventing erosion and improving soil fertility
<i>Institutional success factors</i>	Ownership by end users
<i>Problems remaining to be resolved</i>	Local knowledge of systems to sustainably use the forests is often forgotten or badly passed on. This could be harmful and cause extensive destruction of the Kuna tropical forest if the population increases and the population puts higher demands on the land. It would also be harmful if traditional agriculture was substituted with inappropriate agricultural practices.
<i>Keywords</i>	Agriculture, agroforestry, biodiversity, nature conservation, forest conservation, forest management, forest plantation, forest resources, forests, local knowledge, natural resources conservation, natural resources management, renewable resources.