

# Traditional Agricultural Systems and Emerging Markets in Yap, Federated States of Micronesia

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## Abstract

Changes in economic activities have resulted in a reemergence of the importance of producing what were once subsistence foods now as marketable crops. Due to the geographical logistics of small island states like Yap, there are times when traditional methods remain the only viable and sustainable alternative. This paper, based on fieldwork conducted in Yap State, FSM 2007-2009, looks at how what were once traditional subsistence agriculture activities in Yap are reemerging as economic activities. The paper addresses the impact of markets on the socio-economic well-being of respondents on Yap proper. Analysis is conducted through a socio-economic assessment of innovative marketing techniques, in particular micro-finance. Research was designed to identify crops currently being produced through subsistence activities on small and medium farms that are or have potential for market development. Through stakeholder input and the development of extension activities linked to converting subsistence crops to marketable products, research findings are used to assess needs of small-scale production in relation to marketing strategies in a way that is beneficial to local producers.

**Keywords:** traditional agricultural systems, cash crop cultivation, small and medium-sized farms, Yap State, Federated States of Micronesia, needs for the development of marketable crops, and micro-markets.

## Introduction

This paper is based on ongoing research conducted in Yap State, Federated States of Micronesia, 2007 through 2009. Fieldwork was conducted by a University of Guam team made up of Dr. Ann Ames, Dr. Todd Ames and Dr. Harley Manner, Professor Emeritus. This paper looks at how traditional subsistence agricultural activities in Yap are reemerging as economic activities. These once traditional subsistence activities have in the last few years gained

increasing importance as imported foodstuffs have increased dramatically in price due to increasing transportation costs.

Despite modernization and the inroads of the global economy in the Pacific, roughly 50% of the 11.9 million people in the Pacific islands gain a large part of their livelihood through traditional agriculture, using the knowledge and techniques developed by their ancestors. In Yap State, about 70 % of the population or approximately 7869 of 11241 people [1] owe their livelihoods mainly to traditional agriculture. Most if not all Pacific island societies appreciated and practiced the concept of agro-biodiversity. For these peoples, agriculture, food, and their relationship with the land and other natural resources, have a greater social and cultural significance to them than they do in Western societies [2] as “nature is an extension of society itself, and the creatures that share life with them are manifestations of past and future generations - of their own flesh and blood” [3].

On the islands of Yap, in the Federated States of Micronesia (FSM), traditional agricultural and agro-forestry activities have been practiced since the pre-contact period. These traditional subsistence systems continue to play an important role in subsistence activities today. Current Asian Development Bank estimates place about 80% of the FSM population as reliant on subsistence and semi-subsistence activities for their livelihoods [4]. Simultaneously, due to economic conditions between 1990 and 2000, dependency on subsistence activities for families in the FSM increased from 10% to 17% [5]. Recently, there has been a growing movement to use what were once solely traditional subsistence activities as income generating activities, as well. Converting subsistence crops to marketable products is an important topic for Micronesia, one that needs to be addressed through first hand research, educational training and market innovation.

There is a tremendous lack of first hand field research in Yap which links the importance of small and medium-scale agricultural and agro-forestry resources to business activities

**Table 1. Yap State's Agricultural Exports by Amount and Value in Contrast to Other Exports**

Agricultural Product	Amount Value	2000	2001	2002	2003	2004
Copra	kg	269,279		118,575		
	\$	104,118		45,850		
Banana	kg	137	77	29	217	28
	\$	166	94	35	326	44
Citrus	kg	662	815	1,922	4,439	660
	\$	1,632	1,502	2,537	8,499	285
Kava	kg					
	\$					
Betel Nuts	kg	122,651	161,888	173,129	173,812	153,280
	\$	607,121	801,347	856,989	434,530	294,300
Piper Leaves	kg	7,401	8,500	10,069	15,445	13,286
	\$	16,283	18,700	22,151	27,800	5,580
Root Crops	kg	1,118	3,081		19	
	\$	2,457	6,778		26	
Other Farm Produce	kg	902	1,382	2,470	3,248	6,126
	\$	1,133	1,542	2,892	1,378	880
Total Agricultural Produce	kg	402,150	175,744	306,194	197,180	173,380
	\$	73,2910	829,962	930,454	472,599	301,089
Total Marine Products	\$	47,924	30,946	55,117	12,424	7,953
Total All Others	\$	3,016,146	4,403,863	3,610,960	3,173,689	2,908,812
Garments	\$	3,010,249	4,391,265	3,590,644	3,171,962	2,901,847
Total All Exports	\$	3,796,980	5,264,771	4,596,531	3,658,672	3,217,854

Reference [8] c.f. Reference [9]

and innovative marketing in relation to sustainable economic practices. The research project described in this paper is attempting to address these issues as one of its primary objectives over the next two years and to aid in the development and implementation of community level markets which support local food production in the Micronesian region. The need for local market development was highlighted in the 2008 Association of Pacific Island Legislatures (APIL). The APIL has adopted a resolution which encourages local food production and intra-regional trade of food products as a means to ensure food availability, affordability, and security for each island state [6].

Based on fieldwork in 1987, reference [7] reported that copra was the only cash crop for Yap State and that its production was decreasing because of the decline in world market prices. He noted that in 1985, Yap produced 663 tons valued at \$165,000. In contrast to reference's [7] report, however, production of agricultural goods for cash has increased as shown by export data from 2000-2004 in Table 1.

Reference to Table 1 shows that Yap's farmers produced for export copra, bananas, root crops, betel nut, piper leaf, citrus, and other agricultural crops. A review of the data indicates that the amounts and value of the various crops are variable and fluctuating. By far the most important agricultural product is betel nut with an average value of \$598, 857 for the period, followed by copra with an average value of \$29,934. The average total agricultural value for the period was \$ 653,395. It is clear that Yap as well as the other entities of the Federated States of

Micronesia has endeavored to increase agricultural exports and production, as a development process and reduce the imbalance of trade (annual average negative balance of \$18,987,896 for the same period). Of greatest interest is the fact that garment industries are no longer operating in Yap, further supporting the need for development of other economic activities-such as agricultural markets.

Previous research on the cultivation of traditional agricultural systems indicates the critical role kitchen and backyard (home) gardens play in helping families meet subsistence needs as well as contributing to their market-oriented activities [10]. Small-scale cultivation in the form of kitchen, backyard and mixed gardens [11] is an increasingly important economic activity on Yap proper and is vital to the existence for many Yapese living on neighboring islands and islets, such as Fais. Systems of cultivation and subsistence resource management are useful tools in determining the economic value of traditional agricultural systems. One such approach is the work on the management of terrestrial ecosystems [12], in relation to sustainability. In contrast to modern systems of agriculture, traditional agricultural systems are sustainable. Most systems reflect a high degree of integration with, and dependence on ecological structure and function. The traditional systems of agriculture in the Pacific Basin depend on biodiversity, "on the richly diverse biological resources and ecosystems that benefit from resources in natural habitats" [13] and are "nature intensive" [14]. Biodiversity is linked with sustainability, a vital market indicator which can not be ignored within the Micronesian context.

Other fundamental market oriented indicators include relations between waged labor and subsistence activities [15] linked to the socio-economic success of innovative marketing. Small-scale agricultural activities are useful in assessing change in business economic structures [16], which are creating a strong bond between formal and informal business activities. Previous work conducted by Manner, Ames, and Ames in 2007/08/09 in Yap proper indicated that while many Yapese still relied extensively on subsistence activities (initial analyses indicates a figure possibly as high as 60% for some family consumption rates, out of overall food sources consumed), increasingly many Yapese are also using small-scale agricultural and agro-forestry production to augment family incomes as formal employment is severely limited on the island.

This is especially critical with the recent decrease in Compact Payments (payments from the U.S. for economic assistance), and the geographical difficulties facing the region's intra-trade routes. The Federated States of Micronesia (FSM) was formed in 1979, in which Trust Territory Districts became the States of Yap, Pohnpei, Chuuk and Kosrae. The people of the FSM voted for approval of a constitution which paved the way for the 1982 signing of the Compact of Free Association between the FSM and the United States, which was finally implemented in 1986 [17]. The Compact of Free Association provides U.S. economic assistance, defense and migration privileges, to name a few.

Located in the Western Pacific, the FSM is made up of over 600 small islands, totaling an estimated population of 107,008 [18] at the turn of the century. Yap proper is located at coordinates of 137 km WSW of the Ulithi Atolls [19]. Yap proper is an economic core, linking the Ulithi Atolls with modern economic exchange.

To expand on the relevant body of knowledge to date, this research addresses the actual value of traditional agricultural systems in their contribution to market development, both as income generating activities and latently as substitution produce for store bought foodstuffs in Yap proper and the Ulithi Atolls. Traditional farming systems contribute extensively to cash, family, and cultural economies. Case in point is Pohnpei, as recorded in 2003, agricultural production per household was estimated as follows: 25% market sales, 53% subsistence, and 22% ceremonial or social usages [20]. Following within the steps of the agricultural goals put forth by ADB [21] for the FSM, there is a need to develop micro-markets internal to Yap State, while also looking at external trade between Pohnpei and Yap. This conclusion is formulated around the strategic goals of ADB which include the need to increase production of traditional farming systems and enhance surpluses to be placed in local and regional markets while promoting environmentally and sustainable agricultural systems within the FSM.

As noted by reference [22], there are a number of interrelated factors associated with the process of modernization and integration into the global economy that bear importantly on the viability and sustainability of

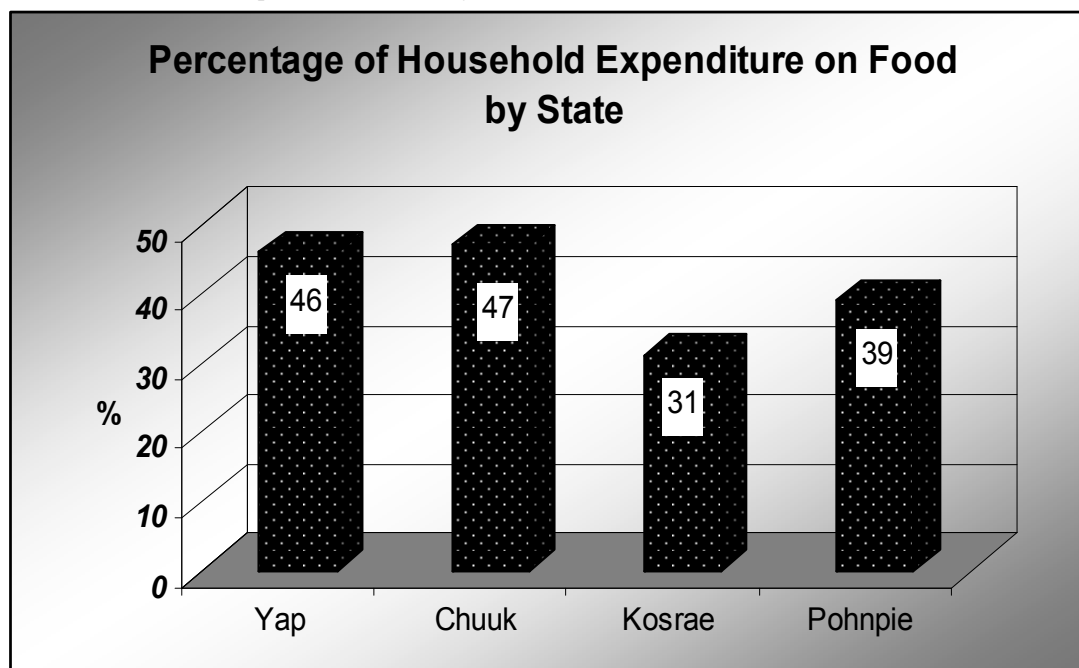
traditional agriculture. For one, traditional agriculture is no longer practiced for subsistence only as a growing number of farmers now grow part of their crop for the urban market or for export agriculture. In many islands and communities, the development of indigenous cattle, coffee, cocoa and other kinds of commercial and market oriented agriculture has resulted in the almost permanent removal of land for subsistence production, thereby placing greater strains on existing or remaining subsistence lands. Often, this expansion has occurred on marginal lands, thus increasing soil erosion [23]. On many atolls, the development of the copra plantations and a cash economy led to the abandonment of many taro pits in many of the islands as people grew coconuts for cash at the expense of maintaining the taro pits. The amount of land that was converted to coconut plantations was quite large. On some atolls, up to 70 % of the total land area was converted to coconut woodlands [24]. There is empirical evidence to suggest that participation in the cash economy and the introduction of trade stores may have a pronounced effect on traditional subsistence patterns [25] [26] [27].

We feel that it is important to demonstrate the socio-economic value of traditional subsistence agricultural and agro-forestry activities to small-scale business activities which would not have a negative impact on traditional patterns of subsistence. Stakeholders identify crops in relation to their subsistence and market values while still maintaining traditional methods of cultivation and land use. Of interest is that other than traditional crops such as taro, breadfruit and yams, newly introduced crops such as tomatoes, cucumbers, herbs and fruits are beginning to make appearances at local markets and are gaining in popularity and demand, contributing to sellers' incomes. Research findings illustrate the ways in which traditional practices continue to be transformed and expanded into market activities as production continues to shift to cash crop production and consumption to imported food products.

On Lamotrek Atoll in Yap State, taro and breadfruit are still the staples, but the percentage of purchased foods consumed has increased as the amount of locally available money has grown. As noted by Alkire, rice, canned meat, and canned fish are eaten more frequently and in larger quantities than in the 1960s. Nakano found that while traditional food supplies are abundant on Ulithi Atoll, imported rice and noodles (ramen) are the most consumed starches. Unless there is further development of agriculture for the increasing urban population of Yap, the dependence on imported foodstuffs will increase and thus jeopardize Yap's ability to produce its own foods [28]. Discussions with farmers during our field trips in 2007/08 demonstrated shifts to consumer goods, especially rice. There are three family owned stores on Falalop Islet. Items are imported via the regional field trip ship and include soy sauce, coffee, sugar, salt, canned meats, tobacco, batteries, and mosquito coils [29].

As noted by reference [30], household expenditures on food indicate not only amounts being spent on imported foods but helps demonstrate the ever increasing importance

Table 2: Household Expenditure on Food by State



Adapted from reference [31].

of imports to household consumption. As noted in Table 2, an estimated 46% of household expenditures went towards food consumption in Yap. In fact, all states of the FSM are demonstrating a reliance on bought food stuffs, substantiating the need for further research in the areas of production and trade.

As the FSM continues to develop, more and more families are relying on outside sources to meet their basic food needs. Marketing activities have a tremendous impact on the availability and affordability of these outside food products. Market activities also have a tremendous impact on family gross and net incomes. As noted in reference's [32] work on micro-finance as a marketing initiative, lower incomes are a result of two principles, one being that of market design and the other relating to flows of capital. Micro-markets within this context are designed to help participants generate incomes sufficient to meet basic family subsistence needs. Higher family incomes are reliant on other economic factors—some of which are inherent in micro-credit schemes (i.e. enhancing production skills and building upon existing or newly developed small-scale businesses). Other factors, such as the expansion of land for cultivation plus access to markets outside village economies are what are needed to generate higher incomes. More often than not, the flows of capital are limited to business expansion and family economies only. Factors which helped generate social mobility for participants of the micro-finance projects were land ownership and having a form of transportation which helped respondents expand markets. Amounts of land, transportation, and expansion of markets are three reoccurring themes evident within our work in Yap State to

date which help facilitate sufficient incomes for small and medium-scale farmers [33].

As noted in the Sustainable Agriculture Research and Education work entitled *Sustainable Marketing Strategy in Micronesia*, pilot marketing approaches need to incorporate production and consumption into the research design [34]. Included in a production/consumption model is the need to determine the most widely planted crops, which are highest in demand, and what the most common problems are in terms of production and selling. Incorporated into the design is the need to assess which crops do not sell and why, as well as which crops have limited impact on existing environmental practices. Other positive factors evident in our research on Yap include access to community loans through Micro Traders, a micro-finance project operating on Yap proper, plus the need to establish links to regional markets and intra-relations with other income-generating groups in the general area. Consumers at the People's Market were all local, very few tourists were reported, and however, the biggest buyers were female government workers. Data demonstrates that there is a need not only to assess market effectiveness by determining the value of subsistence crops and the need for value-added activities. There is also the need to incorporate consumption into our market design by establishing baseline consumer profiles.

As farmers reiterated, incomes generated through Micro Traders support their families primarily in terms of meeting basic needs. Financial crisis, illness of family members, loss of crops and livestock are factors which relate more to a group's vulnerable position within any informal economy [35]. Community market schemes need to realistically generate social networks and social support systems which change the market relations vulnerable groups find

themselves operating in [36]. As demonstrated throughout this research, one such substantial change which would have an impact on farmers' vulnerable economic activities is market expansion of island economies.

Yapese and other Micronesians are experiencing a resurgence of interest in the development of island economies as increasing numbers of people return to subsistence activities as a response to worsening economic conditions. Research and educational workshops need to respond to this change, providing important information to those involved with the development of agricultural and agro-forestry production for family and island economies. As noted by reference [37], there are few formal definitions of traditional agriculture. For the purposes of this discussion, traditional agriculture refers to those simple to complex farming systems developed mainly by the indigenous inhabitants of a region primarily for subsistence [38]. These systems are adapted to a localized cultural-ecological context and do not rely on the use of mechanization, chemical fertilizers and pesticides, or the technologies of modern agriculture. Additional characteristics and attributes of traditional agriculture include its emphasis on sustainability, local scale self sufficiency, reliance on locally available natural resources, to name a few [39] [40]. In this discussion, "traditional" does not imply a stasis nor an antiquity of knowledge, but rather it emphasizes that the way knowledge is acquired and used is a socio-cultural process [40], a process which also has an impact on ways in which groups respond to other forms of economic development [41].

Traditional agriculture in Yap and the islands of Micronesia can be classified into the following categories based on their methods of cultivation and land use [42] [43] [44]. These systems are: a) mixed tree gardens, agroforests, or arboriculture, b) shifting cultivation (intermittent gardens, swiddens in forest or bush, including slash and burn systems), c) intensive open field agriculture in fern and grass savannas, including ditching for drainage, d) wetland taro systems for *Cyrtosperma chamissonis* and *Colocasia esculenta*, e) kitchen or backyard gardens, and f) animal husbandry.

The best descriptions of present-day mixed tree gardens are from the Micronesian high islands of Pohnpei and Yap. In their study of traditional agroforestry on 57 Pohnpeian farms, reference [45] found 161 species of plants, 102 of which were cultivated and uncultivated trees, shrubs, and crops, while the rest were herbaceous weeds. Of the 102 species, 58 were cultivated species, 20 upland forest, 18 secondary forest, and 6 swamp, strand and mangrove forest species. The typical Pohnpeian mixed tree garden is three layered with an upper canopy dominated by coconut (92 trees/ha) and breadfruit (72 trees/ha), rarely exceeding 20 meters in height. Other species, such as mango, kapok or remnant upland forest species are emergents and reach 26-28 meters in height. Each breadfruit tree may also support between 2 to 4 yam vines (*Dioscorea spp.*). The subcanopy ranges between 2.5-8 m and is made up of plantains and bananas (110 and 49 plants/ha, respectively), Hibiscus *tiliaceus* (37 trees/ha), *Morinda citrifolia* (30 trees/ha), yam

vines, *Annona muricata* (17 trees/ha), *Eugenia jambos* (5 trees/ha), and other secondary forest species. Where the garden has been allowed to revert to a semi-fallow stage, *Cananga odorata* (47 trees/ha) and yam vines (29 plants/ha) and younger upper canopy species at 8-12 m in height are dominant. The under story is characterized by herbaceous food species, *Alocasia macrorrhiza* (47 plants/ha), *sakau* or *Piper methysticum* (137 plants/ha), with pineapple, *Colocasia* and *Cyrtosperma taros*, and *Curcuma spp.* and other weedy shrubs, grasses, ferns and herbs. A diagrammatic cross-section of the typical Pohnpeian mixed garden can be found in reference [45].

On Yap, the mixed tree gardens form a conspicuous formation around a village. Initially, food trees were planted on the raised and drained areas along village paths and around home sites to form "home tree gardens" and over time, these home tree gardens coalesced with other plantings to form the mixed tree gardens of today. The low areas and depressions surrounding the village were planted to taro [46], resulting in a mosaic of mixed tree gardens and taro patches. On Yap, mixed tree gardens cover approximately 27% of the total land area [46] and contain some 55 species of trees producing food or spice products and another 62 species of useful shrubs and herbs [47]. Significant portions of the Micronesian islands of Yap, Pohnpei, and Chuuk contain large areas under agroforests. The most important tree species are coconut, breadfruit, and Tahitian chestnut [48]. Other species are betel nut (*Areca catechu*), cacao (*Theobroma cacao*), mango, a wide variety of plantains and bananas, papaya, guava [49], and *Crataeva speciosa* [50]. Cultivar diversity is also high. The Yapese have 21 named varieties of coconut, 28 for breadfruit, and 37 for bananas [49].

Although traditional systems linked with natural ecosystems and the cultivation of traditional food crops are still very much a part of island economies; growing, cultivating and collecting mono-crops to sell demonstrates a contemporary shift away from family subsistence economies, linking subsistence with cash crop cultivation. This contemporary economic structure embedded in the informal economies of Micronesia works in tandem with reference's [51] model of the tribal economic structures of the indigenous populations of Malaysia, the *Senoi*. The contemporary economic model for both Yap proper and parts of the Ulithi Atolls demonstrate the desire to procure and accumulate money which gave rise to the transformation of the Yapese economy from one that is subsistence-oriented to one that is now also cash-crop, commodity and market-oriented [52].

Within this mixed economy, small-scale marketing initiatives take on a variety of forms. The design and implementation of micro markets has linked market development and income-generation activities together, with the common axis revolving around participation in a co-operative. For the purpose of this work, the Asian Women in Co-operative Development Forum's (AWCF) structural definition of co-operates (i.e. members' roles and responsibilities) best describe the strategic approach to

market development in informal economies found in Yap proper:

What does being a “co-op member” mean? It means that a person pools his or her usually limited resources with those of others in the co-op as an association that they have put up voluntarily. Their objective is to meet their common economic, social and cultural needs and aspirations through an enterprise that they own and control as a group, with themselves as the members with equal voting rights. The members use the co-op’s services and, at the same time, fulfill membership responsibilities. In a co-operative, therefore, the members are “the investors, the owners, and the users” rolled into one [53].

The way knowledge is acquired and used within the Micronesian socio-cultural context is vital to the success of micro-market development. The investors, owners and users of the markets are represented through stakeholder groups; in particular farmers, members of Micro Traders, and various women’s organizations. Joint participation of stakeholder groups is key to identifying and determining the value of crops, the need for value-added activities and the establishment of baseline consumer profiles. Capacity building and stakeholder participation through market and environmental education and management programs will increase economic opportunities through the continued development of community managed markets in Yap State and the expansion of external market linkages, in particular linkages throughout Micronesia.

In Conclusion changes in economic activities have resulted in a reemergence of the importance of producing what were once subsistence foods now as marketable crops. While demands for traditional foods remain the highest, newly introduced crops, such as tomatoes, cucumbers, herbs and fruits are gaining in demand as well. This has resulted in the requirement to adopt new production techniques. Due to the geographical logistics of small island states like Yap, there are times when traditional methods remain the only viable and sustainable alternative. Due to increasing shipping costs and demands for cash resources, marketing of traditional and non-traditional crops will require new and innovative approaches to marketing.

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