

Changing Agricultural Environments in Small Islands

Cases of the South Pacific and Okinawa

BY HIROSHI KAKAZU

Roles of Agriculture in Small Island Economies

Agriculture plays crucial roles in economic development. As theory for vent-for-surplus suggests, agricultural surplus (production over domestic consumption) is a kind of savings which will be used for investments in the manufacturing sector in the early stage of development. Increase in agricultural productivity is not only important for supporting increasing rural population, but also it is an essential condition for an economy to pursue industrialization. Therefore, in the early stage of economic development, agriculture is usually taxed for industrial development as an important source of industrial capital formation. In the later stage of development, however, agriculture is subsidized because of its declining productivity coupled with national food security.

Food security is particularly important for a small, isolated island economy where a stable supply of food is often interrupted by natural disasters such as drought, typhoons, tsunami and unexpected environmental changes. Quite often, for these small islands, domestic food supply is the last resort for survival when natural disasters occur. This is particularly true for the South Pacific where islands are fragmented and located far from their major markets. Ironically, however, domestic food supply in these small islands has been neglected for a long time. Subsistence agriculture, which has provided basic necessity of foods to indigenous islanders, has been rapidly disappearing in all Pacific islands (Kakazu, 1994). Increasing food imports at the expense of traditional food supply have been major issues from food security and nutritional standpoints.

State of Agriculture in the Pacific Islands

Agriculture, which was the dominant industry in all Pacific islands during the 1950s, now accounts for 28% (Samoa) to 1.4% (Okinawa) of islands Gross Domestic Products (TABLE 1). The importance of agriculture tends to diminish as per capita income rises. This is because the agricultural sector tends to generate low incomes in part because of the low income elasticities of its products as a whole compared to those of other sectors -as the cost of producing farm products fall with technological progress, prices tend to fall. Moreover, the skills required for traditional agricultural production are less highly developed and do not demand extensive education. These island economies followed these pattern more than any larger market economy.



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Table 1: Land and agricultural shares in selected pacific island economies

	Total Land Area	Cropped Land	Population	Annual Population	Trade/GDP	Per Capita	Shares of Gross Domestic Products					
	(1000 sq km)	Per Capita (sq m)	(1000 persons)	Growth Rate (%)	(%)	GDP	Agriculture		Manufacturing		Services	
	2000	2000	2002	1995-2000	2002	2001	1990	2002	1990	2002	1990	2002
Okinawa	2.3	311	1,339	0.8	35	20,000	3	1.4	5.9	5.3	80.2	86.5
Taiwan	36.2	382	22,500	0.8	81.9	12,630	4.2	1.9	33.3	25.7	54.6	67.1
Cook Islands	0.2	3,911	18	1.1	69.0	4,270	21.1	12.4	3.9	2.9	73.8	83.0
Marshall Islands	0.2	590	57	3.8	65.0	2,190	12.4	13.8	1.2	1.6	71.8	69.0
Fiji	18.3	3,519	819	0.7	82.0	2,150	22.2	na	12.7	na	53.7	na
Tonga	0.7	4,786	101	0.3	50.0	1,530	34.7	28.6	6.0	5.6	51.7	56.4
Samoa	2.8	7,147	178	0.5	60.0	1,490	23.0	14.3	19.6	14.8	48.7	63.1
Tuvalu	0.03	n.a.	11	2.0	46.0	1,260	25.6	16.8	6.0	5.6	59.9	56.4
Vanuatu	12.2	6,260	202	2.7	46.2	1,050	20.7	17.4	5.5	3.9	67.0	73.4
Kiribati	0.7	4,379	87	1.7	56.0	830	18.6	14.2	1.2	0.8	73.8	75.0
Papua New Guinea	452.9	1,647	5,500	3.2	89.0	580	29.0	26.9	9.0	8.5	40.6	31.5

Notes: 2002 Figures for Okinawa, Cook Islands, Marshall Islands are refer to 2001, and Tuvalu to 1998.

Sources: Asian Development Bank, Key Indicators of Developing Asian and Pacific Countries. Okinawa Prefectural Government

Agricultural activities have been rapidly replaced by more productive secondary (manufacturing and construction) and services activities such as public works and tourism. In the case of small island economies, agricultural and manufacturing activities are severely constrained by their smallness and remoteness which deprive of any comparative cost advantage in the rapidly globalizing world.

Despite the general recognition that agriculture is more important in small island economies than the larger ones, they are facing formidable tasks to sustain their domestic sources of food supply. First, an increasing population pressure on extremely limited land forced islanders to cultivate smaller and marginal land for food production which contributed declining agricultural productivity. Marshall Islands, for example, has only 590 square meters cropped land per capita which has been rapidly declined with more than 3% annual population increase (TABLE 1).

Second, most of these islands are suffering from accelerated sea-level rise which is thought to be linked mainly with El Nino weather phenomenon caused by global

warming. Some of islands in Kiribati, Tuvalu and Nauru are about to disappear beneath the ocean. Pacific island countries have contributed just 0.06 per cent to global greenhouse gas emissions. But now, the changing climate and sea levels linked to global warming are affecting their water supply, food production, fisheries and coastlines. (Tutangata, 2000)

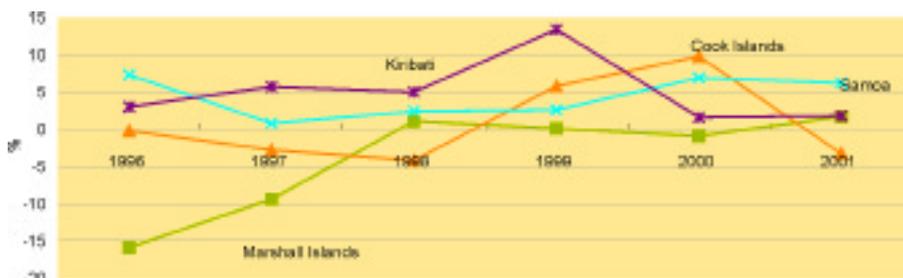
Third, these islands are specialized in a few export crops such as copra, sugar, palm oil, cocoa, banana, taro and squash which are highly vulnerable to the weather and external market conditions. Almost all Pacific island economies were severely hit by devastating droughts of 1998. Owing to the droughts, Fijis sugar, which accounted for about 40% of its export earnings, fell by two-third. Tongas squash crop, about half of its export earnings, was cut in half. Export prices of these products have also been depressed for many years. Because of these unforeseen external shocks, economic growth rates of these small island economies subjected to a wide range of fluctuations which backfires any macroeconomic planning and management (FIG.1).

Fourth, almost all South Pacific island economies are facing the age-old problem of efficient use of agricultural land due largely to complex land tenure systems. Most common pattern in the Pacific islands land tenure regimes is that land proprietary rights are concentrated in extended family or clan with restricted but complex rights of individual cultivator. Restrictions on access to property rights will always restrict the full realization of the potential productivity of the land (ADB, 1998). Fijis sugarcane production, for instance, has suffered from a complex land leasing contracts between Indian sugar growers and indigenous Fijians land owners. Although it is clearly understood that both parties would get benefits from stable, secured and productive use of cane land under the long-term lease contract, Fijians have been reluctant to do so owing to socio-political reasons.

Agricultural Success Stories of the Pacific Islands

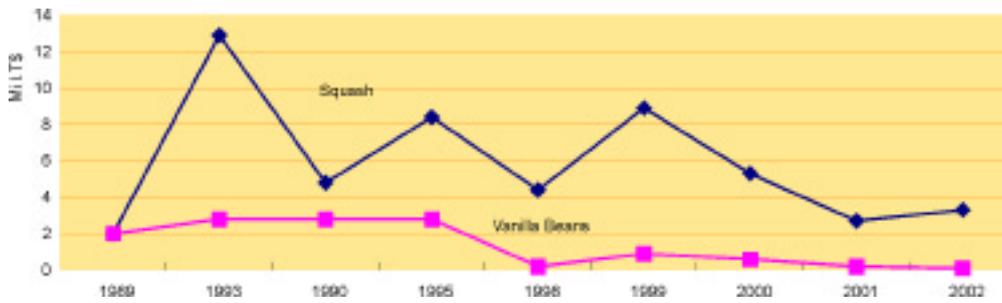
Despite increasingly adverse agricultural environments in these Pacific islands, some success stories are reported. One well-documented story is Tongas squash (small pumpkins). In the late 1970s, Tonga started diversifying its cash products from traditional products such as desiccated coconut, coconut oil, taro, yams, sweet potatoes and bananas to vanilla beans and squash. Vanilla beans gradually replaced coconut products and became the most important export crop by 1988 accounting for more than 30% of total agricultural exports. After many years of gestation periods, squash emerged as an important cash crop in 1989. Squash exports

Fig.1 Economic Growth Rates of Selected South Pacific Economies, 1996-2001



Source: Same as TABLE 1.

Fig. 2: Exports of Tonga's Squash and Vanilla Beans, 1989-2000



Source: Same as TABLE 1.

amounted to \$13 million in 1993 accounting for 70% of its agricultural exports (FIG.2). The success due largely to easy market access to Japan as well as Tongas October-March squash production season which fits neatly into the off seasons of other competitive suppliers. As is reflected in fluctuating export trend, squash production has been suffering from risks arising from uncertain market prices and weather conditions.

Another success story is Okinawa's rising exports of diversified agricultural products such as flowers, tobacco, string bean, green pepper, bitter melon, mango and various healthy foods. Traditionally sugarcane and pineapple have been the most important cash crops, accounting for more than 20% of all farm incomes and 50% of cultivated land. Incomes from sugarcane and pineapple production, however, have declined significantly in recent years as a result of stagnant prices and productivity as well as increased international competition (FIG.3). Okinawa's sugar industry has only been surviving through the government's price support programs. Only fresh pineapple and pineapple wine are holding their own, and this as a result of tourists' consumption. It has been an urgent task for the local government and farmers to diversify from sugarcane-centered monocultural agriculture into other diversified cash crops.

Okinawa's promising agricultural products are in the area of high value-added "Healthy foods." "Okinawa" is fast becoming a brand name for "health and longevity" because of its world-renowned "healthy islands" image. Okinawa's life expectancy, in the past two decades, has increased from 72 to 77 years for men, and 79 to 85 years for women, making Okinawa the healthiest place in the world. Okinawa's longevity is the product of

a complex combination of climate, culture, closely-knit social organizations, foods and lifestyles. Foods are considered to be the most important factor for long life. Okinawans are accustomed to consuming less salty, mineral rich foods than mainlanders.

Various healthy foods have been developed and marketed nationwide, including ukon (turmeric), bitter melon (well-known as goya) products, naturally processed salt, sea vegetable products (mozuku), dietary ostrich meat, and various deep-sea water products, just to name a few well-known examples. Bitter melon especially became popular and the best selling healthy vegetable. Although production scales of these "niche" products are still small, they possess comparative advantages in uniqueness of resource use and technology. Furthermore, these products usually require more local inputs, including raw materials and labor, than conventional trading products.

A breakthrough towards high value-added, diversified agriculture came after the complete eradication of the melon fly from all the Okinawa islands in 1993 (Kakazu, 2003). The melon flies affected more than 40 important vegetables and fruits including highly-priced mangos and bitter melon, thereby preventing

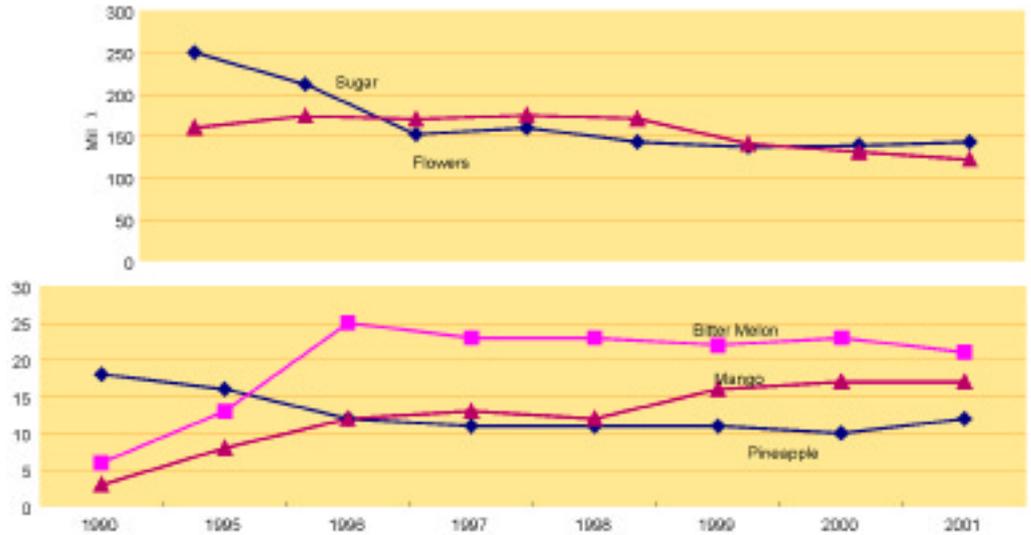
these infested products from exporting to fly-free areas in mainland Japan. As can be seen in FIG.3, mangos and bitter melon became Okinawa's star cash crops after the melon fly eradication.

The melon fly eradication project itself has been regarded as a great success

story in the Asia-Pacific agricultural development because it employed the Area-wide Integrated Pest Management Method based on the Sterile Insect Technique (SIT) which is not only cost effective for controlling of the pest insect but it is also friendly to the environment for reducing the need for insecticides. The eradication completed in Kume Island in 1978, followed by the



Fig.3: Traditional and diversified cash products of Okinawa



Source: Okinawa General Bureau, the Cabinet Office

Miyako Islands in 1987, the Okinawa Islands in 1990 and finally the Yaeyama Islands in 1993. The total project costs during the eradication period amounted to about \$172 million, utilizing 320,000 man-hours.

Based on estimating assumptions and conventional cost-benefit analysis, I attempted to estimate the net benefits of the eradication project. The results of estimation show that the project produced net accumulated benefits within 6 years after the project completion

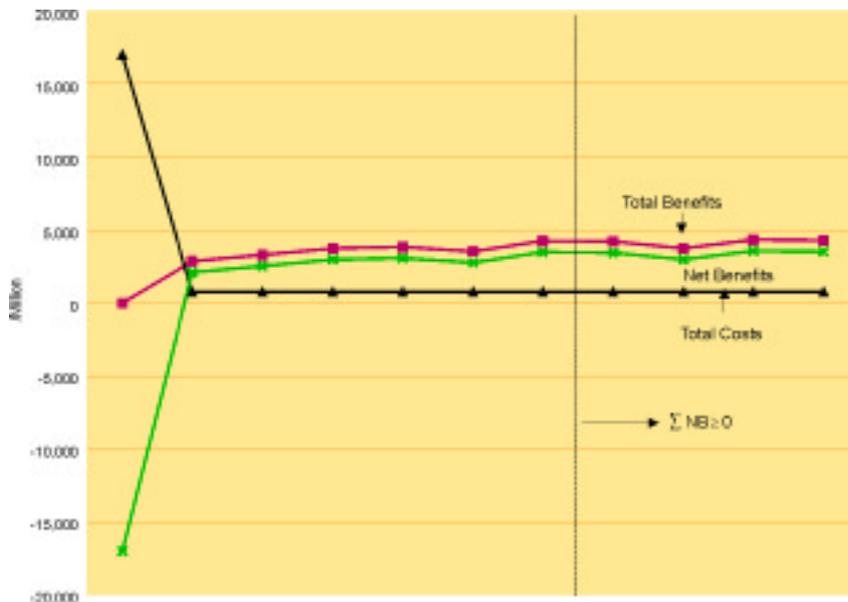
with zero opportunity cost of capital because of interest-free public funding (FIG.4)

The net benefits estimated in this study are those arising from the commercial shipments of melon fly host products. If we include environmental and preventive benefits such as pesticide-free farming, preservation of the natural enemies, and above all preventing the insect pests from further spreading into mainland Japan, the net private as well as social benefits far exceed the estimated

commercial benefits. The project proved to be viable even on commercial basis. Assuming 3.26% real discount rate during the project implementation period, the project pays itself (self liquidating) in 1998 with net present value of the project roughly equals to the total project costs. That is to say, the project recovered its total investment costs within 8 years after project completion, while covering the opportunity cost of capital.

Any success story is accompanied by a great deal of painstaking effort, both in research and development as well as massive mobilization of human and capital resources. Most important, avid support of the local people and public organizations, were an integral part of the success story. Okinawas success story probably contains more than it was told. The technological know-how and strategies for the success will be transferred successfully to infested areas worldwide, particularly island areas such as Hawaii and the South Pacific.

Fig. 4: Net benefits (NB) of the melon fly eradication project in Okinawa, 1991-2000



	1980-1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Benefits	0	2,858	3,291	3,739	3,835	3,525	4,251	4,210	3,740	4,330	4,277
Total Costs	16,984	765	765	765	765	765	765	765	765	765	765
Net Benefits	-16,984	2,093	2,526	2,974	3,070	2,760	3,486	3,445	2,975	3,565	3,512

Source: Kakazu (2003)

References

- ASIAN DEVELOPMENT BANK. 1998. *Improving Growth Prospects in the Pacific*. Manila: ADB Pacific Studies Series. pp.1-130.
- KAKAZU, H. 1994. *Sustainable Development of Small Island Economies*. Boulder: Westview Press.
- _____. 2003. Economic Evaluation of the Melon Fly Eradication Project in Okinawa. *INSULA: International Journal of Island Affairs*. Year 12, No.1, pp.41-50.
- TUTANGATA, T. Sumer 2000. Sinking Islands, Vanishing Worlds. *Earth Island Journal*, Vol.15, No.2, p.1.