CARIBBEAN FOOD CROPS SOCIETY

22

Twenty Second Annual Meeting 1986

St. Lucia

Vol. XXII

SUBSISTENCE AGRICULTURE AND THE SMALL ISLAND ECOSYSTEM

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INTRODUCTION

The postwar marginalization of agriculture in small tropical islands has been persistent and worldwide. In the Eastern Caribbean, rural declines have been sharp and swift. According to Axline (1985), between 1960-1980 agriuclture's contribution to Gross Domestic Product (GDP) fell from 27 to 4 per cent in Antigua, from 40 to 5 per cent in Montserrat, from 45 to 20 per cent in St. Kitts-Nevis, and from 35 in St. Lucia and St. Vincent to 16 and 20 per cent, respectively. Such dramatic changes were associated with parallel declines in agricultural employment, gradual reduction in traditional staple exports (sugar, bananas, citrus) since the mid-1960's, and a seemingly irreversible tendency toward small-scale production. For example, Weir (1981) estimates that 95 per cent of all farms in the Commonwealth Caribbean island countries are less than 25 acres, and the majority are less than 10 acres. As a testimony to its policy significance, however, this small-farm sector produces most of the domestic fruits/vegetables, although it occupies only one-third of the available agricultural land.

A similar process of rural marginalization has accelerated in the Pacific Islands especially since 1960. In the more modernized and penetrated territories like American Samoa, Guam, and The Marianas, agriculture's contribution to GDP and employment is less than two per cent (Lucas, 1986).

THE CARIBBEAN

The resource and institutional constraints suggested to explain agricultural decline in the Caribbean include: steep topography, thin dry soils, flooding, excessively small scale operations due to fragmented family holdings, intense low-cost import competition, small insular markets, inadequate communications (roads), and increasing resource competition from the more profitable, high-wage sectors of government and tourism (Gumbs, 1981; Lucas, 1986). In addition to the above constraints, observers of Caribbean agriculture have emphasized the negative effects of controlled prices, limited access to capital markets, and increasing dualism: that is a few large-scale commercial farms in export monoculture, often on underutilized prime acreage (White, 1983), alongside a large number of small-holders specializing in domestic produce and livestock (McElroy and de Albuquerque, 1985). They have also stressed the corrosive impact of external migration of farm effort through the large inflow of off-island remittances which are quickly exchanged for imports (Rubenstein, 1983). Emphasis has also been given to the deleterious effects of the plantation legacy and policy neglect in the present. "Apart from official rhetoric, most governments have paid little attention to the objective of building up a viable small farming sector" (Weir, 1981: 325).

These trends toward declining farm effort and scale observed throughout the smaller islands of the region raise special concern not only because

such changes portend falling farm income, productivity, and viability in the future (de Albuquerque and McElroy, 1983), but also because they suggest the operation of long-term processes of agricultural encroachment which may be irreversible. Two of the most systematic of these forces are the restructuring of the colonial economy and the associated migration transition. The former identifies the deliberate strategy of small Northern and East Caribbean microstates to rotate the economic base away from traditional agricultural exports toward tourism, related construction, and to a lesser degree international finance, i.e., the so-called Bahamas development model (McElroy and de Albuquerque, 1986). The latter signifies a major demographic transition sporadically occurring thorughout the region whereby former stagnant labor-exporting societies, adjusting to the imperatives of modernization and rapid labor-intensive growth, become labor-importers as net migration and population increase turn positive.

Recent transformations in the U.S. Virgin Islands (USVI), Antigua and Barbuda, and Montserrat, exemplify a spectrum of experiences along these complementary economic/demographic transitions. Historically, all were land-scarce emigrant societies during the post-emancipation era which coincided with the large-scale decline of the colonial plantation economy. In recent decades, however, all have experienced rising population densities primarily because of heavy immigration in the USVI, and reduced emigration and some return migration in Antigua and Montserrat. Since 1960, population has tripled in the USVI, and has been increasing roughly 1.0-1.5 per cent annually in Antigua and Montserrat since 1972 and 1980, respectively (McElroy and de Albuquerque, 1986; Thorndike, 1985). Much of this demographic shift has been due to the emergence of tourism and related construction as the leading growth sector. In Antigua and the USVI, visitor activity accounts for close to half of GDP and employment. In Montserrat, tourism employs 25 per cent of the labor force. Moreover, in each case, in varying degrees, the impact of expanding tourism's labor-intensive demands has been associated with persistent declines in agricultural activity.

The U.S. Virgin Islands: Table 1 sketches changes in agricultural activity in the USVI between the 1960-1982 period, which corresponds roughly to the duration of the tourist economy. The broad indicators demonstrate steep declines in the number of farms, acreage in farms, average farm size, and farm employment. Harvested crop land fell sharply by over 75 per cent during this period. Likewise, specific crop production figures portray a general weakening of effort. Except for small increases in vegetables, grapefruits, oranges, and plantains, fruit and nut output fell substantially over the 22 years. Previous studies suggest that much of this decline occurred between 1960-1970, the decade of most intense tourism growth (de Albuquerque and McElroy, 1983), and that other indices of agricultural marginalization can also be implicated--decreasing scale, declining commercial sales, increasing off-farm employment, and specialization in pasture land for small livestock production (McElroy and de Albuquerque, 1985).

Antigua and Barbuda: Between 1977-1981, tourism in Antigua boomed as total overnight (75 per cent) and cruise (25 per cent) arrivals more than tripled. Table 2 shows the labor force adjustments during this five-year period of major change. The employed labor force grew by some 3,000 workers, or by over 3 per cent per year, out-pacing the rate of natural

Table 1. Selected indices of agricultural effort, U.S. Virgin Islands, 1960 and 1982[1/]

Item	1960	1982
No. of farms	501	303
Acreage in farms	44,062	20,824
Average farm size (acres)	87.9	68.7
% Agricultural employment	7.2	0.5
Harvested cropland (acres)	4,272	819
Sugar cane (acres	3,676	3
Sorghum (acres)	3,531[2/]	403
Selected field crops (acres)[3/]	98	46
Selected vegetables (acres)[4/]	32	43
Avocados	37,945	31,874
Coconuts	26,107	13,066
Bananas	20,539	11,532
Grapefruits	1,375	4,615
Limes/lemons	29,860	12,472
Oranges	3,758	6,246
Plantains	401	950
Pineapples	1,407	74

1/ Source: McElroy & de Albuquerque (1985).

2/ 1975

3/ Corn, dry beans, cassava, sweet potatoes, tannias, yams.

4/ Carrots, okra, onions, peppers, eggplant, squash, tomatoes, green beans, celery.

Table 2. Employed labor force according to industries, Antigua, 1974-1981 1/

Industries	Number employed by years							
	1974	1975	1976	1977	1978	1979	1980	1981
Agriculture, livestock, fishing	2,194	2,394	2,291	2,366	2,099	2,092	2,092	2,090
Quarrying	55	55	61	26	71	75	68	60
Manufacturing	1,510	1,417	1,345	1,355	1,447	1,539	1,619	1,718
Electricity, water gas	321	575	491	392	392	319	337	340
Construction	2,201	2,131	1,906	2,044	2,369	2,476	2,564	2,577
Distributive trade, hotels, restaurants	3,785	3,833	3,849	3,866	4,671	4,867	5,038	5,201
Transportation, storage, communications	2,342	2,253	2,219	2,294	2,427	2,596	2,564	2,575
Finance, banking, business	803	814	849	864	699	742	765	778
Community, social, personal services	6,070	6,334	7,002	7,026	7,231	7,322	7,444	7,883
Total	19,281	19,806	20,013	20,233	21,306	22,028	22,491	23,222

1/ Source: C.B. Baker et al. (1983).

population increase of roughly 1 per cent (crude birth and death rates of 18 and 7 per cent, respectively (Baker et al., 1983). The 300 jobs displaced in agriculture were more than compensated by 1,300 new jobs in hotels and restaurants, etc. and by 500 additionsl jobs in construction. Over the same five-year time span, acreage planted in all selected domestic crops and vegetables fell, except for carrots and cabbages (Table 3). In aggregate, the planted acreage in all crops combined, declined by over 50 per cent. In addition, catches of fish and lobsters declined 43 and 68 per cent, respectively, between 1979-1981, while the real values of imported food and live animals doubled (Table 4). These major production shifts, concentrated in such a short time, indicate some of the associated negative influences of economic restructuring and modernization on agricultural resource use. Supportive data also suggest other increasing tendencies toward declining farm effort, including the growing importance of small livestock (pigs, sheep, goats) and small farm size: 95 per cent of all farm units are less than 5 acres.

Montserrat: Postwar agriculture in Montserrat has declined in significance under the earlier pressures of external migration, and more recently of internal movement of land and labor resources into the expanding sectors of tourism and related construction. Since 1960, agriculture's contribution to GDP has decreased from 40 to about 5 per cent today (McElroy and de Albuquerque, 1985). Farming is beset by an unproductive dual farm size structure. Over 90 per cent of all farms are less than 5 acres, yet these uneconomic units occupy most of the cultivated land; much of the larger choice tracts over 50 acres in size remain underutilized in rough pasture and woodland.

During the seventies, Montserrat distinguished its identity in the Caribbean tourism market through promoting itself as a quiet, scenic vacation and retirement destination for older North Americans. Between 1970-1980, the number of tourists doubled with the majority being repeat visitors. During the more recent 1975-1985 decade, visitor arrivals doubled again. As one result of this buoyant demand for condominium and second home construction, the number of farms declined 10 per cent and agricultural employment fell nearly 50 per cent (Government of Montserrat, 1985).

In specific agricultural markets, the assumed impacts of the tourism transition were somewhat mixed. Overall, however, the trends suggest a generally weakening farm effort. For example, between 1975 and 1982, production of most fruits and vegetables declined (Table 5). on the other hand, fish and poultry output, increased, while egg production remained constant (Table 6). The value of meat production (excluding poultry)--beef, mutton and pork--adjusted for inflation over the 1975-1982 period, declined almost 10 per cent. Although some of this attrition could be associated with resource development, undoubtedly it could also partly be due to poor animal nutrition deriving from the relatively large number of livestock per acre grazing on basically unimproved pastureland (World Bank, 1979). In recent years, a reforestation program has been implemented in Montserrat to undo past damage caused by overgrazing and erosion.

Reviewing these three case studies together suggests three main conclusions. First, agricultural deterioration is one of the dominant features

Table 3. Areas planted by small farmers, selected crops, Antigua/Barbuda, 1976-1981[1/] (Acres)

Crop	1976	1978	1979	1980	1981
Corn	160.0	112.5	64.8	55.3	61.6
Sweet potato	355.0	171.2	152.4	134.9	144.6
Cassava	145.0	93.6	53.2	29.2	46.4
Yam	127.4	94.0	33.4	23.2	35.2
Tomato	157.0	82.8	81.5	78.1	66.8
Cabbage	48.4	30.6	49.8	56.8	72.8
Carrot	55.3	56.0	59.4	47.7	56.4
Onion	23.7	25.6	27.7	12.4	18.4
Eggplant	96.8	43.6	42.7	41.5	55.2
Pumpkin	70.1	32.9	24.5	17.9	26.8
Total	1239.7	742.8	589.4	497.0	584.2

1/ Source: C.B. Baker et al. (1983).

Table 4. Selected economic indicators, Antigua and Barbuda, 1977-1981[1/]

Year	Fish (lbs.)	Lobster (lbs.)	Imports of food/live animals (1969 EC $'s)
1977	--	--	42,916
1978	4,298,493	343,850	46,214
1979	3,203,571	290,160	62,817
1980	3,171,328	183,399	81,490
1981	2,438,704	110,339	90,129

1/ Source: C.B. Baker et al (1983)

Table 5. Selected agricultural production (estimates) Montserrat, 1975-1982[1/] ('000 lb)

Crop	1975	1976	1977	1978	1979	1980	1981	1982
White potatoes	600	600	280	200	80	70	60	60
Sweet potatoes	400	370	340	330	280	310	340	335
Carrots	120	130	100	90	90	120	140	135
Onions	80	100	70	50	30	20	25	25
Tomatoes	160	170	210	160	160	150	140	140
Dasheen	90	85	70	65	55	60	60	60
Cabbage	70	65	60	60	60	80	80	80
Tannia	50	50	50	55	55	55	55	55
Bananas	150	140	130	130	120	130	140	140
Limes	80	100	100	80	80	70	70	70
Peanuts	10	10	10	10	10	20	20	20
Hor pepper	50	50	50	200	600	300	200	150
Seed cotton	120	200	110	60	20	10	75	50
Live plants	-	-	-	5	30	35	45	45

1/ Government of Montserrat (1983).

Table 6. Selected agricultural production, Montserrat, 1975-1982[1/]

	1975	1980	1981	1982
Fish (lbs.)	196,085	239,565	229,198	244,620
Poultry (lbs.)	1,582	2,060	1,662	2,294
Eggs (doz.)	70,475	74,416	71,139	76,331
Meat (EC $'000 (nominal values)	$296	$561	$533	$623
Food Price Index	135.1	282.4	297.5	312.2
Meat (EC $'000)[2/] (real 1969 values)	$219.1	$198.7	$179.2	$199.6

1/ Source: Government of Montserrat (1985).

2/ Estimated using the formula: $\frac{\text{nominal values}}{\text{food price index}} \times 100$

associated with economic modernization and restructuring away from traditional export staples toward labor-intensive tourism and construction. Second, rural encroachment tends to accelerate with tourism intensity and style. Contrast the sharp production and acreage declines in the U.S. Virgin Islands--an affluent, mature, mass-tourist destination--with the more modest losses recorded in Montserrat's transition to an emerging, relatively specialized, low density, long-staying, vacation and retirement tourism style. Along the continuum, Antigua and Barbuda represent an intermediate stage between these two extremes, both in the level of tourist development and in the severity of rural decline.

Thirdly, agricultural policy as currently practiced--public provision of subsidized inputs, mechanized services, marketing and distribution support--has been chronically incapable of resisting encroachment against the fundamental processes of economic and demographic transition underway in the latter half of the twentieth century. This conclusion is inferred from the three case studies presented plus more cursory documentation elsewhere of similar patterns of rural decline in other Caribbean microstates in various phases of the transition (McElroy and de Albuquerque, 1986). These include the Cayman Islands and Turks and Caicos groups in the Northern Tier with Anguilla, British Virgin Islands (BVI), and St. Kitts-Nevis along the Eastern rim. All these islands are aggressively promoting tourism as the leading economic sector and are experiencing reduced emigration (or increased immigration in the BVI and Caymans), population expansion, and declining farm effort in tandem with the level of tourism intensity. In view of the systematic and widespread nature of rural marginalization and the failure of contemporary agricultural policy to reverse matters, new strategies and research efforts are warranted.

NEW DIRECTIONS

Presently, agricultural planners in the region are faced with a self-reinforcing syndrome of policy paralysis. As the more bouyant and promising sectors are fostered--tourism, finance, manufacturing exports, through tax concessions, promotion, etc., farm capital, labor, and land migrate into higher-payoff, non-farm opportunities, and agriculture's contribution to GDP, employment, and foreign exchange (exports) falls both relatively and absolutely. As agriculture's economic significance wanes, its budgetary importance and public policy commitment decline, exacerbating land encroachment and resource displacement. Breaking through this cumulative paralysis requires exploring some fundamental aspects of how island systems function, a subject which has received scant attention in the literature. Two areas briefly examined in this paper are, first, the integrated nature of island ecosystems, and second, the subsistence nature of small holder agricultural production.

The Integrated Island System: To halt the present patterns of resource encroachment, mobility, and destruction, means essentially to incorporate within the development strategy, land (and marine) resource uses which will sustain long-term benefits and outputs sufficiently prized by society to warrant the opportunity of foregone, alternative non-farm activities. To design these renewable agricultural resource uses, however, demands that planners understand the island system as a set of interacting components or subsystems of which the three dominant include the environment, the

economy, and the political system. Interdependence rules. For example, the stability of the environment depends on the character of the economy as well as legislated protection (e.g. zoning, construction codes). The tourist economy obviously depends on amenity preservation while public services and enforcement are tied directly to the tax base and success of the economy and so on. In particularly small East Caribbean islands, changes in one subsystem invariably affect all others.

A review of the island ecology literature suggests several conclusions that are important to agricultural policy. First, interrelated terrestrial and marine ecosystems are in such delicate balance that prime farm land is highly pervious to adverse development-induced spillovers from the alteration of either upland watersheds or downstream wave energy buffering systems. Second, the productivity of island soil--often relatively poor in its natural state because of thin structure, leaching, solar decomposition, and high evaporation rates--has become further weakened by generations of extensive denuding of the original forest and vegetative cover for plantation monoculture, livestock grazing, and so on. Such practices in combination with the recent pressures of over-urbanization have led to the loss of lowland aquifers. Thirdly, to achieve renewable uses in the face of these constraints demands planning caution, the design of a comprehensive holistic approach to island development, and the formidable task of soil fertility restoration.

Specific suggestions for agricultural policy include redirecting emphasis from large-scale export monoculture towards small-scale domestic polyculture production. This approach is not only compatible with observed declining postwar farm-size trends, but also tends to minimize off-farm disturbances in contiguous ecosystems because of reduced use of non-recycling inputs, e.g., imported fertilizers. In contrast to larger-scale capital-intensive systems, a smallholder strategy has the attendant benefits of generating more employment per acre and greater income equality, and of providing improved nutrition, greater biological diversity to withstand major pest infestations and plant diseases, and more long-term rural stability because small-farm practices are more socially adaptable to traditional mores (Lucas, 1986).

A small-farm orientation also favors agro-forestry, the advanced form of polyculture still practiced even in many highly-developed Caribbean microstates. This is primarily a subsistence production system which combines fruit trees and nuts (mango, papaya, banana, coconut, etc.) with annual crops (cassava, corn, beans, sweet potato, etc.) intercropped with nitrogen-fixing legumes (Poole, 1985). Productivity is renewed by the interaction of the system components through the natural operation of the plant life cycle. The forest canopy cools the soil for moisture retention and the decomposition of pruned and fallen plant biomass. The released nutrients are recycled through the tree and crop root networks to produce food and fibre mostly for domestic consumption. Shade form the forest cover also reduces weed growth, while biological diversity inhibits pests and disease through natural mechanisms.

Mixed agro-forestry is also particularly suited to the scattered, heavily encroached agricultural sectors common in Caribbean microstates promoting tourism, because it fosters renewable productivity with reduced

labor time by optimizing low-tillage, nature-intensive nutrient recycling, minimized adverse spillovers on downstream ecosystems, and thus retains the scenic vegetation and tropical serenity valued in the visitor experience. Additionally, agro-forestry is specifically adept at reducing erosion and maintaining steep slopes in long-disturbed island systems where soil fertility restoration and environmental enhancement are primary concerns.

In summary, the tradition of resource abuse characteristic of the Caribbean, and farm-size constraints imposed by modernization, suggest a strong policy in support of agro-forestry as an attempt to apply ecological principles to agriculture to achieve sustainability and mitigate spillovers. Research and extension efforts could enhance productivity in several non-intrusive ways. These include determining improved plant/tree combinations, spacing, pruning and weeding practices, and the like (Poole, 1985), as well as developing high-yield, low-till, shade tolerant varieties amenable to mixed farm systems and which are nutritionally rich and tasty and easy to prepare (Falanruw, 1985).

The Subsistence Tradition: In addition to the problem of declining scale, agricultural planners must come to grips with the subsistence of marginal nature of smallholder agricultural production within the context of the household economy. Evidence throughout the small Caribbean islands suggests, in addition to modernization, declining small-farm commercial sales, rising levels of off-farm employment, and increasing pasture-to-cropland ratios, all of which are indices of reduced labor effort. In contrast to Pacific islands where subsistence affluence still conceals surplus land and family labor available for cash crop production--and thus relatively painless development options toward greater rural profitability (Fisk, 1982)--Caribbean agriculture is beset by subsistence scarcity whereby farming and fishing have largely become a secondary pursuit; a low-input cheap source of supplemental food and/or cash in a household economy characterized by diverse productive activities but primarily dependent on wage labor for continuous employment and income.

This widespread regional pattern of multiple individual and family job-holding is partly the historical response to the repeated failure of traditional farming and fishing specializations to sustain livelihoods, because of the vagaries of resource scarcity, sporadic natural disasters, and unfavorable shifts in international markets and post-colonial commercial policy. The demise of slavery and plantation sugar, plus a series of short-lived boomlets in other agricultural exports, spawned a chronic and continuing tradition of emigration in search of foreign wage work specifically characterized by its occupational heterogeneity (harvesting, stevedoring, construction, etc.) and intermittent duration. In recent decades, labor out-migration from agriculture, along with capital flight and land redeployment, has accompanied and accelerated the urbanization process associated with labor-intensive tourism development and the growth of the public sector, even in the larger independent islands (Hope, 1982).

The present position of small-scale subsistence farming in the island-wide context of the postwar modern economy is fragile because uneven growth rates have created severe sectoral imbalances which increasingly intrude upon traditional agricultural resource use. Three spillovers in particular

threaten the stability of farm activity even at current low levels: wide income differentials including long-term job security and career mobility in the modern sector, the low-cost availability of competitive imported foods which discourage local commercial production, and escalating real estate values which encourage speculative land-holding rather than productive uses. Because these sectoral discrepancies are so sharp, and because they persist along with the continuing resource deployment out of agriculture, it is clear that the existing package of incentives, subsidies, and in-kind input services are inadequate to stabilize farm effort at existing levels.

Stronger and more realistic policy is needed. This will demand widespread recognition and acceptance that, increasingly, the dominant type of Caribbean farming is mainly supplemental in nature while not exclusively "production for provisioning" (Sahlins, 1971). A related research priority for planners is to conduct a comprehensive regional farm operator survey to determine the precise contours of non-farm income to total family earnings, the proportion of labor time in farm work, the farm share of reinvested household capital, subsistence versus commercial production, the specific mix of crops/livestock, and so on. This information is crucial for measuring the extent of smallholder farm effort, for specifying more clearly the motivations, farm practices, and constraints of the producers targeted by policy, and for designing support systems that truly coincide with farmer needs and which fit into customary patterns of farming behavior.

Given the agricultural/modern sector imbalances expressed in sharp income-earning differences between farm and non-farm resource deployment, more restrictive policies are necessary to restrain the continuing rural land/labor out-migration through the normal functioning of market forces. Such measures could include, for example, permanent zoning of prime agricultural land exclusively for productive (not simply grazing) farm uses. Or alternatively, rural protection legislation could be drafted toward the same purpose, analogous to environmental law relating to critical habitats or areas of particular ecological fragility (urban coastlines, steep mountain watersheds), already stressed by population and development pressures.

Certainly in small, rapidly developing, land-scarce islands, such initiatives would require justifying the legal retention of agricultural resource use on other than commercial provitability criteria, especially given the economic marginality and supplemental nature of smallholder production. For such islands in transition to a tourist economy, that basis should logically be the preservation of environmental amenities in general, and through support for agro-forestry practices in particular, the renewability of unique tropical vegetation, land forms and uses, and scenic qualities for the sustained commercial employment of visitors and the long-term cultural, educational, and recreational values of residents. Such a policy basis is also compatible with a holistic frame of reference embracing both economic and environmental interactions within the wider island system. In addition, the general focus on renewable fertility and sustainable uses through natural life cycles respects the native "genius of the place".

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