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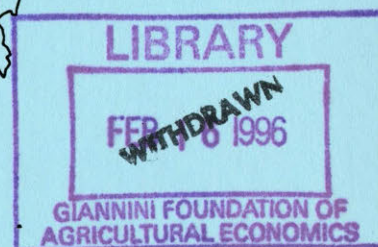
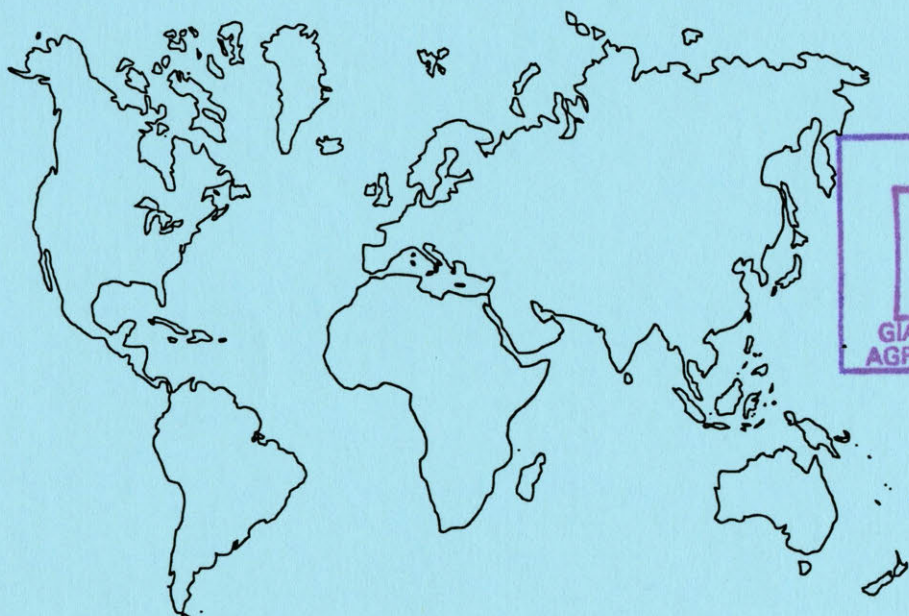
CHALLENGES TO INTEGRATING ECONOMIC AND
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CASE OF AGRICULTURE

By
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CHALLENGES TO INTEGRATING ECONOMIC AND ENVIRONMENTAL POLICIES INTO ANGLO-CARIBBEAN SUSTAINABLE DEVELOPMENT AGENDA: THE CASE OF AGRICULTURE¹

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INTRODUCTION

Resource Neutrality and Sustainable Development: A Caribbean Perspective

The interrelationships between environmental stability and agricultural practices continue to occupy public attention, thereby forcing policy makers to reconsider the impacts of agricultural policy on the environment. In turn, this concern is generally linked to the ideas of sustainable development and resource neutrality. Sustainable development seeks the objective of meeting the needs of the present without compromising the needs of future generation (World Commission on Environment and Development, 1987). Resource neutral policies seek to avoid distorting production decisions, asset values, marketing decision or environmental stability (Agriculture Canada, 1993). As such, the latter are fundamental components of sustainable development strategies.

There is a growing concern that the increasing reliance on free market forces and the imperatives for domestic and international competitiveness, derived in large part from the processes of *globalization* and *international regionalization*, will tempt policy makers and producers in the Caribbean agricultural sectors to pursue policies which are not resource neutral, and to bring environmentally sensitive land, that are highly susceptible to erosion and marginally productive, into production. The issues of economic survival, sustainable development and resource neutrality pose a real challenge to Caribbean intellectual discourse. This challenge is directly linked to the fact that economic theory and policy practice have yet to find an acceptable way of integrating these issues into one general framework capable of guiding strategies consistent with the principles underlying sustainable development and resource neutrality (Davis, 1992, 1994a 1994b; Pantin, 1994).

This paper seeks to make a modest contribution to this ongoing debate. It articulates an approach which hopefully, would permit the evaluation of important interrelationships between and among environmental assets, agriculture sector changes, and economic policy formulation and strategies in the Anglo-Caribbean sub-region, and possibly beyond.

ANGLO-CARIBBEAN AGRO-ECONOMIC STRUCTURE AND PERFORMANCE: A BRIEF PERSPECTIVE

Retrospect

Tables 1-4 present selected economic performance data on the four larger Anglo-Caribbean countries: Barbados, Guyana, Jamaica and Trinidad over the 1970-1991 period. Data on growth rates and agriculture's share in GDP for the 1980-1989 period are presented in Table 5 for six Eastern Caribbean states.

Table 1 indicates unimpressive growth performance of these four economies since 1970. Except for Jamaica's positive growth for the three consecutive years 1989-91, and Trinidad's 1990-91 for the two consecutive years, the table is revealing for the negative and low positive growth rates in these economies.

Historically, agriculture has been one of the central planks of Anglo-Caribbean economies, accounting for a substantial share in the composition of National Product, providing employment for rural labor, the earning of foreign exchange, and contributing substantially to domestic food requirements. Table 2 indicates, however, that the growth performance of agricultural sectors of these economies have been declining over the past two decades. Although

Table 1. Growth of GDP in Selected Caribbean Economies, Constant (1980) Market Prices, Selected Periods, 1970-1991.

	1970-80	1980-85	1989	1990	1991
-----Percent-----					
Barbados	2.7	-.05	3.7	-3.4	-4.1
Guyana	1.4	-3.8	-4.5	-2.7	5.5
Jamaica	-1.2	-0.4	6.2	3.8	2.0
Trinidad and Tobago	4.9	-2.6	-.05	2.2	1.8

Source: (Economic Commission for Latin America and the Caribbean, 1992).

Table 2. Growth Rate of Agriculture Sectors in Selected Caribbean Economies, Selected Periods, 1970-1991.^a

	1970-80	1980-85	1989	1990	1991
-----Percent-----					
Barbados	-1.1	-1.8	-9.0	7.2	-3.4
Guyana	0.9	0.1	-3.0	-13.7	12.2
Jamaica	0.3	1.4	-4.3	3.8	2.0
Trinidad and Tobago	-3.0	-3.7	1.6	19.3	-7.7

^a Including Forestry and Fishing.

Source: (Economic Commission for Latin America and the Caribbean, 1992).

Table 3. Share of Agriculture in GDP (1980 = 100), Selected Caribbean Economies, Selected Periods, (1970-1991).

	1970	1980	1985	1991	1984-91
-----Percent-----					
Barbados	14.2	9.7	9.1	7.0	7.8
Guyana	23.5	22.2	27.1	24.1	25.8
Jamaica	7.0	8.2	9.0	7.2	8.1
Trinidad and Tobago	5.6	2.6	2.4	3.8	3.2

Source: (Economic Commission for Latin America and the Caribbean, 1992).

Table 4. Agricultural Exports as a Percentage of Total Exports, Selected Caribbean Economies, Selected Periods, 1970-1991.

	1970	1980	1985-91
	-----Percent -----		
Barbados	53.7	36.9	23.4
Guyana	37.9	43.4	42.5
Jamaica	22.8	13.4	23.3
Trinidad	8.4	2.0	4.8

Source: (Economic Commission for Latin America and the Caribbean, 1992).

Table 5. Growth of GDP and Share of Agriculture in GDP in Selected OECS Countries, Selected Periods.

	Real Growth Rate 1980-1989 (1987 = 100)	Agricultures's Share in GDP 1989
	----- Percent -----	
Antigua	6.8	6
Dominica	4.6	31
Grenada	5.9	21
St. Kitts/Nevis	5.6	10
St. Lucia	6.6	16
St. Vincent	6.0	20

Source: The World Bank Atlas, 1990.

periodic positive growth rates have been observed, it should be noted that over the 1970-1980, 1980-1985, 1989, 1990 and 1991 periods, negative growth rates were recorded in 4 of the 5 periods for Barbados, three periods for Trinidad and Tobago, two periods for Guyana, and one for Jamaica (Economic Commission for Latin America and the Caribbean, 1992).

Table 3 shows agriculture's share in GDP for these four economies. The data indicate that starting in 1980, agriculture's share in GDP has registered significant declines compared to the 1970, with the exception of Guyana and Jamaica. Further, the relative share has remained

fairly constant over the 1980-1991 period. Of major importance, is the fact that the relative decline of agriculture's share of GDP, rather than being a product of the expansion of other sectors as is generally associated with growth, can be largely attributed to declining levels of food production and stagnation and/or decline in traditional exports (Harker, 1989). Table 4 presents data on the ratio of agriculture exports to total exports. With the exception of Guyana, the data show that agriculture exports share declined in 1980, but recovered over the 1985-91 period.

With regards to the Eastern Caribbean States, Table 5 shows that these economies have recorded impressive growth rates over the period 1980-1989, and, with the exception of Antigua, agriculture is still a major contributor to GDP.

There are a number of inferences which the data in Tables 1-4 would allow us to make. Immediately obvious is the relatively poor performance of these economies over the past two decades. There are a number of reasons which could be advanced for this state of affairs. It might be useful, however, to situate our arguments within the context of the colonial and post-colonial history of these economies. The colonial period is important because it established certain structures and institutions and influenced the general contours of the Caribbean economies that persisted long after independence. On the other hand, the post-colonial period is important for the alternatives to the previous period which were presented by the nationalist movements in the region. It is out of this historical analysis that we hope to offer explanations for the deep crisis in the production, distribution, exchange systems and environmental integrity interactions that are confronting the region today.

Under colonial administration the Caribbean's *global role* was defined in large part, on the basis of Ricardian comparative advantage trade theory, as producers of tropical staples and minerals. Agricultural activities were pursued extensively, but was characterized by a dual

structure, expressed in terms of in a high concentration of large-scale plantations system on the one hand, and on the other hand, a smallholder (often landless) peasant systems, engaged in varying degrees of subsistence or near-subsistence agriculture, along with some export cash activities (Marshall, 1968). The focus of the agricultural economy was the export of sugar, and to a lesser degree, banana, coconut and spices. Whenever attempts were made by the Colonial authority to develop the peasant sector, (e.g. rice in Guyana), this was done in a way that complemented, rather than competed with the traditional plantation production system.

During the period of the Second World War, some amount of light manufacturing was encouraged. Indeed, it was during periods when the region was faced with a crisis (depression in Europe, wars, hurricanes, etc.) that some attempts were made to develop a broader-based agriculture. Unfortunately, such attempts were ephemeral, as policy makers receded to monoculture in a type of reflex action when "normal" conditions returned. Thomas (1974) argues that three major consequences have emerged from this type of general political economic orientation. They are: (1) emergence of a lack of *organic link* between resource use and domestic demand, and a divergence between domestic demand and needs of the population; (2) failure on the part of the Colonial state to recognize the developmental implications of these tendencies and to develop and implement policies and strategies to reverse negative impacts and (3) associated widespread regional poverty, underdevelopment, and dependency.

Jamaica and Trinidad and Tobago gained political independence in 1962, Barbados and Guyana in 1966, and other countries followed shortly thereafter. In the wake of political independence, Anglo-Caribbean economies pursued conscious policies and strategies to achieve rapid growth in three sectors: manufacturing, mining, and tourism (Girvan, 1973, 1978). Although the 1945 West Indian Royal Commission (Moyne Report) considered industry as being uneconomical for the Anglo-Caribbean, the incipient development of light manufacturing during

the war years convinced nationalistic leaders that regional industrialization was possible. In this regard, they were guided in large part, by the theoretical insights of Lewis' industrial model, which was based on the Puerto Rican experience (Lewis, 1950). In addition, attempts were made at diversifying the national economies by establishing sectors such as mining, tourism, the introduction of new industries, and the restructuring of export agriculture. Finally, new institutions were developed and a regional integration movement was established.

Contemporary and Prospective

Meaningful discussion regarding the current reality of Anglo-Caribbean economies must situate the region within the context of two major processes which are currently underway. These are: (1) the *globalization* of the world economy, and (2) the intensification of international *regionalization*. Both of these processes are unfolding rapidly, and involve major restructuring of national economies, the international division of labor, and the international socialization of production (Watson, 1994). At the core of these processes is the making of a new industrial revolution, undergirded by computer integrated manufacturing (CIM) and all that this implies (flexible production systems, just-in-time technology, computer assisted designs and other high technology production configurations). Concurrent with these developments is the intensification of an international regionalization economic block building (NAFTA, European Union, AFTA, MERCOSUR, APEC, ACS).

Out of these initiatives, the production and trade regimes of the countries involved are being rapidly restructured. Under these restructuring initiatives, concepts such as *competitive advantage* and *non-reciprocity* are increasingly being substituted for concepts such as *comparative advantage* and *protectionism*, long-standing bedrock of developmental philosophies in the region. In reality, the concepts of globalization and international regionalization are

complementary. Globalization is consistent with market liberalization and takes concrete expressions in international regionalization markets. These latter encourage and sustain policies such as: (1) deregulation (i.e. elimination of exchange and price controls, and subsidies); (2) devaluation of local currencies; (3) promotion of the private sector (which is implicitly seen as a corrective to inefficient economic policies); (4) reduced public sector; (5) strict fiscal discipline, and (6) wage controls. It is against this background of restructuring of the world and national economies that major challenges are posed for Caribbean agriculture sector, as part of the broader sustainable economic *cum* environment asset quality imperatives.

From our perspective, it is clear that Caribbean agriculture has to strive for greater competitiveness. Rapid breakthroughs in biotechnological applications in food crop production facilitate the pervasive use of high level technological know-how (Forrester, 1987). These make for competitive advantage which is industry-specific, will render labor redundant, and according to the United Nations, will reduce the share of agriculture and services in world output, relative to the share of manufacturing (United Nations, 1990). The issue of competitiveness has been raised by Caribbean economists from time to time, although few seem to appreciate the profoundness of the globalization/international regionalization evolution in this regard. Nicholls (1989) argues that the lack of competitiveness of Caribbean agriculture lies in the historical tendency for regional products to be sheltered against the vagaries of the world market through access to guaranteed markets. Increasing protection, excess capacity, short-falls in foreign exchange earnings and so on, are increasingly being viewed as *symptoms* of a lack of export competitiveness.

Other writers lamenting lack of Caribbean competitiveness, stress factors such as: (1) problems of attracting foreign capital (Worrell, 1991); (2) the adoption of an aggressive export-promotion/marketing policy (Downes, Holder, and Hyginus, 1990), and (3) increased access to

the US markets for Caribbean products (Paster and Fletcher, 1991). Watson (1994, p. 72), argues that the root cause of lack of competitiveness in the Anglo-Caribbean is "technological underdevelopment". This he defines, as the inability of the region to support or effectively use: (1) modern production facilities; (2) useful/available knowledge; (3) effective organization/management; and (4) technical abilities/skills. The challenge then for the Caribbean is how to mobilize these four elements of development to enhance the competitiveness of its industries.

SOME OBSERVATIONS ON THE THEORETICAL UNDERPINNINGS OF CARIBBEAN DEVELOPMENT STRATEGIES

Historically, Caribbean development strategies have focussed on four major economic activities: (1) agriculture (including forestry); (2) industry and mining; (3) tourism, and, (4) trade. During the Colonial period primary export agricultural activities were emphasized, with some light manufacturing developing during World Wars I and 2. Tourism emerged in the mid-1950s, but like mining and industry, accelerated in the post-Colonial period, with agriculture still maintaining an important part in income generation, employment and food production. Each, or a combination of these sectors was projected as the engine of growth at one time or another - agriculture in the Colonial period, industry, mining and tourism in post-Colonial period -- with trade both as an engine of growth in itself, and as a facilitator for the full realization of the potential and actual output from the three other sectors of the economy.

In effect, therefore, the development strategies were all natural resource based. Agriculture on land, water, soil nutrients, climate, etc.; mining on mineral deposits, and tourism on the blue sea, sandy clean beaches, pleasant sea breezes and the scenic beauty of the tropical flora, fauna and general contours of the land. Explicitly or implicitly, the vision that guided the development strategies sought to maximize growth in agriculture, mining, tourism and industry,

as expressed in high GDP and per capita income, through international trade. The latter was itself driven by metropolitan demand for the products of these sectors. In the Colonial and post-Colonial periods, therefore, we observe a convergence of the development paradigm on three broad areas: (1) the exploitation of natural resources, (the environmental stock), as the engine of growth and development; (2) catering to metropolitan effective demand through reciprocal trade; and, (3) an adherence to a trickle-down theory of income distribution.

It is important to note that although much of the economic activities of the Caribbean revolved around the environmental stock, there was no *formal* recognition of the environmental stock/economic development interdependence either in the Colonial or the later period. Girvan puts it cogently:

"The traditional neglect of the environment in Caribbean economics stands in sharp contrast to the extreme degree of environmental-sensitivity of Caribbean economies. Natural resource-intensity is, and has historically been, an outstanding feature of productive activity in this part of the world" (Girvan and Simmons, 1991: xii).

This omission (oversight or neglect) is remarkable for its consequences on the environment. Watts (1987) noted that the pervasive influence of sugar cultivation in Barbados resulted in the virtual total removal of rain forests, tropical scrubs and much of the native fauna, so that even so early as 1665, only small pockets of forests could be found in gullies of isolated districts. In addition, due to neglect of land use policy and inequality in land distribution, considerable environmental damage on hill sides has occurred since emancipation. It has also been estimated that since 1952 at least 62,735 acres of land have been disturbed by bauxite mining in Jamaica, with adverse consequences on the natural and physical environment (Geddes, 1990).

The issue of the environmental/economy interdependence takes on even greater importance when considering small island states that make up the Caribbean region. In the context of development and the environment, the literature cites three major disadvantages

associated with small islands (Pantin, 1994; Seawar, 1990; and Blackman, 1988): (1) environmental fragility; (2) physical remoteness from major land mass and markets; and (3) vulnerability to natural disasters. That smallness and fragility are highly correlated can be readily gleaned from reported empirical evidence. For instance, Collymore, McDonald and Brown (1993) have estimated that hurricanes in the Caribbean over the 1722 - 1990 period resulted in 43,000 fatalities, and damages of US \$3 billion between 1960 - 1990. Volcanic eruptions took 30,621 lives, while earthquakes have recorded 16,000 fatalities since 1691. Finally, Gomes (1993) reported individual claims totalling over US \$1 billion involving wind damage in 10 of the 15 most recent natural disasters in the region.

Many studies on the Caribbean have noted the special characteristics of these economies as well as dependence on natural resource based activities. The issue of size was addressed by Lewis (1950), and later pursued by Demas (1965), Best (1971) and Thomas (1974). Further, the dichotomy between resource use and consumption patterns was theorized by Thomas (1974) while the economics of mining was addressed by Girvan (1978) and others. While all of these works recognized the economy - natural resource nexus of Caribbean reality, and that somehow size and "islandness" conferred upon these economies a kind of "special case", they did not develop an articulated ecological economics. This is not a criticism of these works, for the obvious reason that the issue of the environment was still to be a major item on the development agenda. Further, the failure to develop any link between economic activity and its effects on the environment is not unique to the Caribbean. Developed countries for centuries systematically degraded their environment and have only recently begun to address this issue. In the case of the Caribbean, the issue of the interdependence of the economy and the environment was side-stepped for two reasons. First, the development strategies pursued viewed the economy not as interdependent sectors but compartmentalized into sectors with economic

functions. Second, the thrust of the works mention above focussed on the issue of the beneficiaries of the growth/development process.

EMERGING PARADIGMS OF ECONOMIC AND ENVIRONMENTAL INTERACTIONS

Essential Ingredients

There is growing evidence that the received paradigm of development in the Caribbean and elsewhere, is giving way in favor of a Biospheric View of Development. This paradigmatic shift has also gained the attention of Caribbean leaders, technocrats and policy makers, as witnessed by their attendance, participation and commitments at the 1992 Earth Summit in Rio de Janeiro and the 1994 SIDS Conference in Barbados. Further, it is now a common feature of technical assistance packages to include specific environmental considerations to which aid recipients must adhere. All this suggests therefore, a move beyond rethoric to a growing consciousness of the importance of linking the economy and the environment.

This Biospheric View of Development received endorsements at the 1992 Earth Summit and the 1994 SIDS Conference. This new approach, which has been elaborated by a number of scholars (Davis, 1992, 1994a, 1994b, 1994c; Daly, 1992; and Francis, 1993), emphasizes that the economy is "nested" in the ecosystem so that although economic development depends on the environment their interdependence is fully recognized. When the issue is posed in this way it becomes more meaningful to pursue the question of how to meet the requirements of employment, growth and poverty reduction in environmentally benign ways. This also brings into sharp relief the visioning of a sustainable development process and as an extension the elements of a sustainable agricultural development process.

Agro-ecological assets (natural and man-made capital stock) are flows that provide resources (inputs) into the production and consumption processes, assimilate the resulting wastes from these processes, and finally, provide utility via their aesthetic properties (Davis, 1994c). These functional roles of Agro-Ecological Assets (AEA_t) are economic in content and would be assigned positive values if exchanged on the market, though in numerous instances, many agro-assets are not assigned positive values (Pearce and Tuner, 1990), and thus are mistreated. To meet the imperatives of a sustainable agricultural development process, the Agro-Ecological Assets must satisfy two laws of Thermodynamics (the Law of Conservation of Energy and the Law of Entrophy). Following Pearce and Turner (1990) these requirements are met when: (1) the rate of AEA_t use is less than the regenerative rate of AEA_t; and, (2) the rate of waste flows associated with AEA_t use are below or at lease equal to the capacity of AEA_t to assimilate such waste. Viewed from this perspective, agro-ecological sustainability suggests a *non-decline* (Davis, 1994c) or *constancy* (Pearce and Turner, 1990; Davis, 1992), in the value of AEA_t resource flows. An additional requirement suggested by Davis (1994c) is the economic viability of AEA_t used in satisfying the imperatives of production and consumption, and by extension the enhancement of the quality of life of farmers and the rural economy.

THE SUSTAINABLE AGRICULTURAL DEVELOPMENT PROCESS

Components of the Process

The concept of sustainable agricultural development is grounded in the initial ideas of the World Commission on Environment and Development (1987) which suggested the Biospheric World View, but has evolved through various stages to relate specifically to agriculture (FAO, 1989; FAO/TAC, 1988). Allowing for the expectations of different interest groups in society, the concept is premised on agro-systems that are *equitable*, based on *stewardship*, and are geared

to meeting the long-term food-sufficiency through resource use policies that are environmentally friendly (Eswaran, Virmani, and Spivey, 1993).

The process of sustainable agricultural development involves different scales (or levels) of operation (e.g., a water shed or catchment area, a farmer's field, a reservation, a country, etc.) and different levels of actors or participants (e.g., individuals, families, private organizations, non-governmental organizations, governments, multi-lateral organizations, etc.). The effectiveness of the process, however, depends, in the first instance, on *stewardship*. This latter concept presupposes, and relies upon, the existence of individuals, organizations, governments, etc., whose commitments, dedication and proactive involvement are needed for the success of sustainability in agriculture. Stewardship must be viewed as a *social scaffolding* or *social legitimizing process* that sets general parameters for behavior consistent with the imperatives for sustainable agricultural development. Stewardship must therefore involve all levels of actors, but should begin at the level of the government in the form of policies, programs and incentives. Once these are in place, other levels of the society (individuals, families, NGOs, etc.) can take on the responsibility.

In Figure 1 (adapted from Eswaran, Virmani and Spivey, 1993) we elaborate on the process of agricultural sustainability. We have identified five major dimensions to the process. These dimensions are posed both as an *interplay* and as a *sequence* of iterative activities which could be applied at any level -- farm, watershed, country, etc.

The iteration begins with the Diagnostic Dimension where the system is critically evaluated. Briefly, the Diagnostic Dimension consists of four components: (1) a Robust Measurement Indicator Framework; (2) a Legislature Framework; (3) an Institutional Framework; and (4) a Resource Mobilization Framework. The Policy Development Dimension articulates a vision for a desirable future that is both necessary and consistent with the

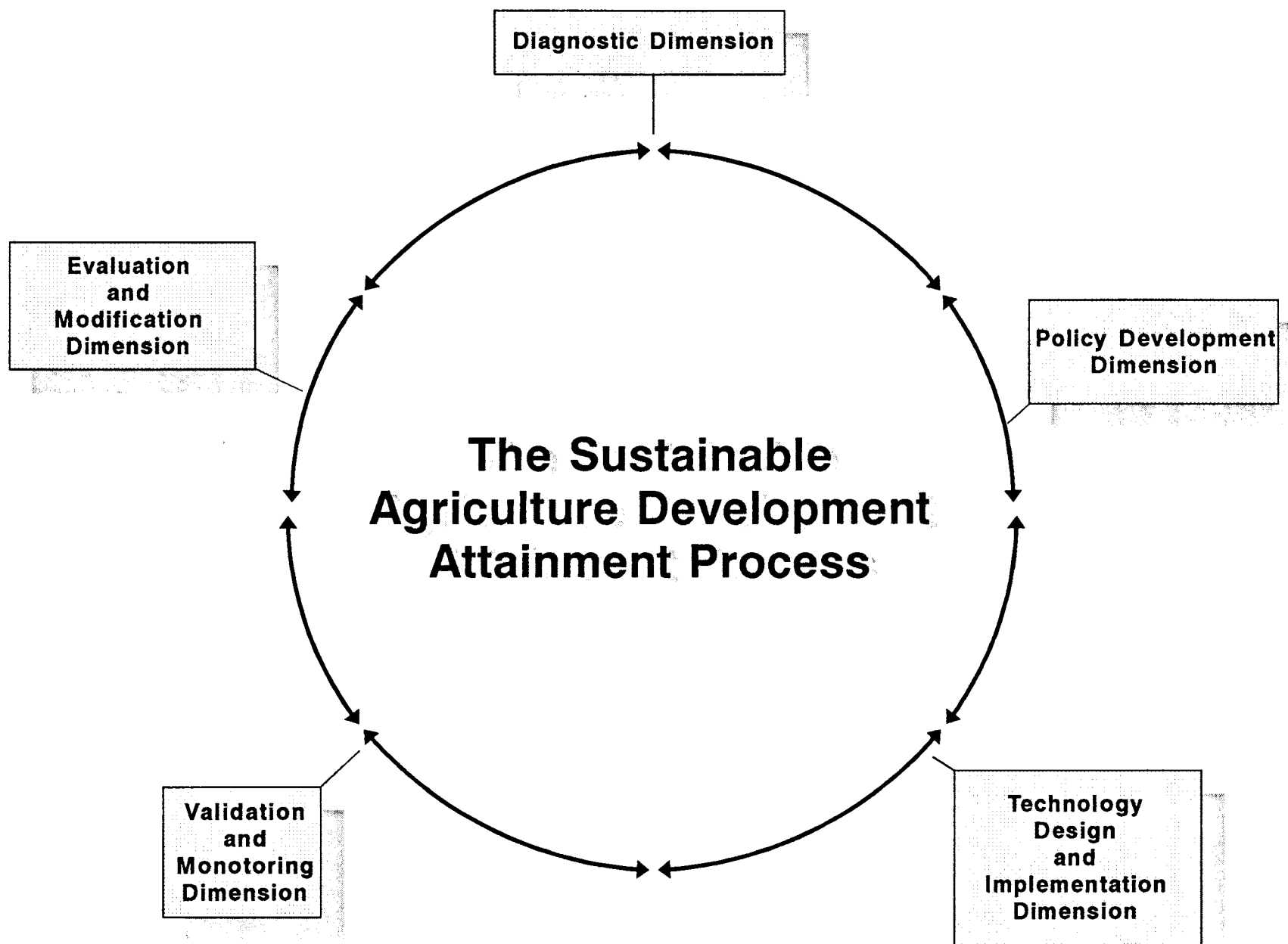


Figure 1. Conceptualizing the Sustainable Agricultural Development Process (Eswaran et al, 1993)

requirements of a sustainable agricultural development process. We need to emphasize that the Biospheric World View seeks to forge, explicitly, a significant relationship between visioning a desirable future (a necessary condition) and visioning a sustainable agricultural system (Francis, 1993; Davis, 1994c). Components of this Dimension would include food sufficiency, resource conservation, intergenerational equity, an enhanced quality of life, and so on. The Technology Design and Implementation Dimension would consist of such components as farming systems, conservation programs, environmental quality, human health, and water quality. The Validation and Monitoring Dimension gathers information, through surveys, census data, resource inventories and other data bases, on the causes of resource depletion and resource degradation, water and air pollution, loss of biodiversity, and decreases in the carrying capacity of land. Finally, the Evaluation and Modification Dimension provides an *assessment* of policies implemented in the process. The components included here are technological feasibility, economic viability, political and social acceptability, and environmental soundness.

IDENTIFICATION OF THE ENVIRONMENTAL AND ECONOMIC POLICY NEXUS

In Figure 2 we have presented, in a compact way, a conceptual linkage "matrix" of the sustainable agricultural development process. We have identified the critical nexus components that integrate the economic and environment policies, and some broad policy mechanisms in relation to the Caribbean economies. An examination of the components in each of the Dimensions identified in the sustainable agricultural development process discussed in the previous section, in relation to the issue of an organic link between economic and environmental dimensions in the agricultural development process, suggests to us that high priority should be given to the four components of the Diagnostic Dimension. Each of the components of this

Components of the Sustainable Agri. Development Process	Critical Nexus Components	Key Adjustment Areas	Caribbean Perspectives	Implementation Policy Mechanisms
Diagnostic Dimension	Robust Measurement Indicators	National Income Aggregates - environment adjusted Values - subsidies	National Income Accounting Data	Direct Regulations, via - environmental legislation - regulatory instruments - monitoring systems - sanctions
Development Policy Dimension	Legislature Framework	Resource Inventories - land use capabilities - soil types - crop mixes	Resource Depletion Adjustments - oil, bauxite	Technology Based Regulations - effluent/emissions standards - construction standards
Technology Design and Implementation Dimension	Institutional Framework	Externalities - resource depletion - resource degradation Agro-Investments - R & D - infrastructure	Resource Degradation - soil, water, air, forestry, land fragmentation	Economic Incentive Instruments - effluent/emission charges - user charges - grants, soft loans - tax incentives - market intervention
Validation and Monitoring Framework	Resource Mobilization Framework	Biotechnology Applications - biodiversity - computer applications	Agro-Systems - large farms - small holdings - plantations - export agriculture - domestic agriculture	Moral Suasion
Evaluation and Modification Framework		Agricultural Institutions - farm technology management - social and water management - inorganic input management - research and development - markets, credits and rural infrastructure - education - land tenure/reform - Extension (targeting, technology transfer)	Institutional - education/awareness - stewardship - laws and legal framework - market access - credit	

Figure 2. Conceptual Linkage "Matrix" for Economic Policy and Environmental Integration: Essentials of the Linkage.

dimension derives its *raison 'd etre* from the philosophical Biospheric World View that guides the entire agricultural sustainability process. Further, given the highly interactive and iterative nature of the process, these four components are applied at all other dimensions as well. As such, the degree to which economic policies and environmental issues are integrated would be reflected in the extent to which these four components of the Diagnostic Dimension are reflected in the other dimensions and in the process as a whole.

From our analysis of the available evidence from the Caribbean, there is not yet in place any *systemic* approach or ethics/value system that has forged an *organic link* between the economic and environmental dimensions in these four components. This is not to deny that currently some forms of *ad hoc*, discontinuous procedures and practices do exist. For example, by-laws exist in some countries regarding sand-mining, lobster fishing, bird-hunting, etc. Also, a few projects funded by donor agencies require adherence to some form of environmental integrity. We argue, however, that these practices neither form an organic whole nor are they derived from a vision of unconditional stewardship. Consequently, there is a distinct possibility that the environment could be compromised at the whims and fancies of the respective actors.

To get an idea of how each of these four components can facilitate a link between economic and environmental dimensions, we shall examine each in turn.

Economic Accounting Elements

The task here is three-fold. First, policy makers must *recognize*, and be *receptive* to, the need for increasing the robustness of traditional measurement considerations. Among environmentalists and increasingly among economists, it is commonly accepted that current measures of national income accounting aggregates fail to account for natural resource depletion. So far, only a few developed countries (Norway, Sweden and France) have attempted a

"Greening their national accounts" resulting thereby in environmentally adjusted national aggregates. Second, public and academic institutions have to foster and make commitments to develop the necessary human capital skills to develop and use the robust economic indicators (REI). Third, the REIs are established as the standard Impact Assessment indicators which can be used to identify the level of unsustainability in the environment.

Legislative Framework

Once the Robust Economic Indicators provide the necessary information of the level of unsustainability, an appropriate legislative system would set the legal guidelines regarding rules, rewards and penalties for violation or confirmation of the environmental integrity. Legal-based policy instruments include prohibition, technical standardization, and Prior Approval (Pantin, 1994). Legal-based market instruments would include various tax changes and incentives, and non-tax instruments such as user charges, permits and so on (Pantin, 1994).

Institutional Framework

The institutional values that emerge from the agricultural sustainability process include, *inter alia*, discriminatory land use policies, resource use that is environmentally friendly, economic viability, improved and sustained productivity, intergenerational equity, enhancement of the quality of life, and so on (Eswaran, Virmani and Spivey, 1993). To protect and/or realize these values an appropriate institutional framework (or set of working rules) must exist. Two essential institutions are: (1) the market; and, (2) the nation-state. As an economic institution, the market requires as necessary conditions for its existence, possibilities for clearly defined contracts, and legal rules on property rights, credit and

banking. On the other hand, a coherent political entity (the nation-state) engenders the legal institutions that provide clear guidelines of authority, clarity and precision in legal rules, mechanisms are processes for the protection of property rights, etc. (Bromley, 1994). The implication then, is that the institutional and legislative framework are required to provide a predictable structure within which agricultural sustainability can take place.

Resource Mobilization

There are many aspects to this component, three of which are discussed here. First, an equitable distribution of land must be implemented. It is antithetical to the very premises of a sustainable agricultural process to deny farmers and rural people "naturally" more productive lands than that which many of the currently occupy. Second, a facilitatory structure which is research and development (R and D) based is necessary to permit the use of appropriate production techniques consistent with both increased productivity. We stress here that the underlying Biospheric World View would define the appropriateness of the technology used. Further, the issue of the substitution between man-made and natural capital is bound to surface from time to time, an issue yet unresolved in the literature (Castle, Berrens and Polasky, 1994). Finally, financial resources to meet various aspects of the sustainability process have to be sourced. An intuitively appealing first choice would be to follow the principle "polluters must pay", whereby environmental charges, on emission, effluents, solid wastes, etc., are passed on to polluters. Apart from the income this would generate, it also serves as an "incentive" to minimize the level of environmental damage.

CONCLUDING OBSERVATIONS

A sustainable agriculture should be a goal, not an option, for Caribbean economies. In addressing this issue we are at the cross-roads of seeking to integrate economic policies and environmental considerations. While other countries also face this task, the Caribbean is unique in its structural openness, high dependence on natural resource-based economic activities for survival, and a high correlation between smallness and environmental fragility. Time has been elevated as an essential variable in the equation of a sustainable agricultural development process.

In the spirit of this conference, that has brought together technocrats and policy makers, it is imperative for participants to have clear perspectives of the relevant concepts. This paper touched on the historical paradigm that guided past (and current) development strategies in the region, and noted the outlines of a new and emerging paradigm. Critical to this latter is the concept of *stewardship* that converges upon the sustainable agricultural development process. We have singled out four components and articulated their importance as critical nexus factors for the integration of economic policies and the environment. We then presented in broad outlines the ways in which the Economics/Environment nexus could be established through the Measurements Indicators, the Legislative and Institutional Frameworks, and through the Mobilization of Resources. We conclude that out of this conceptual framework might emerge a robust framework with some pragmatic elements, and that the debate and dialogue at this conference will put some flesh on the outlines raised in this paper for integrating economic policies and the environment.

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