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THE ENVIRONMENTAL AND SOCIAL IMPACT OF TRADE AND ECONOMIC LIBERALIZATION: IMPLICATIONS OF TRADE LIBERALIZATION FOR THE ENVIRONMENT IN THE OECS

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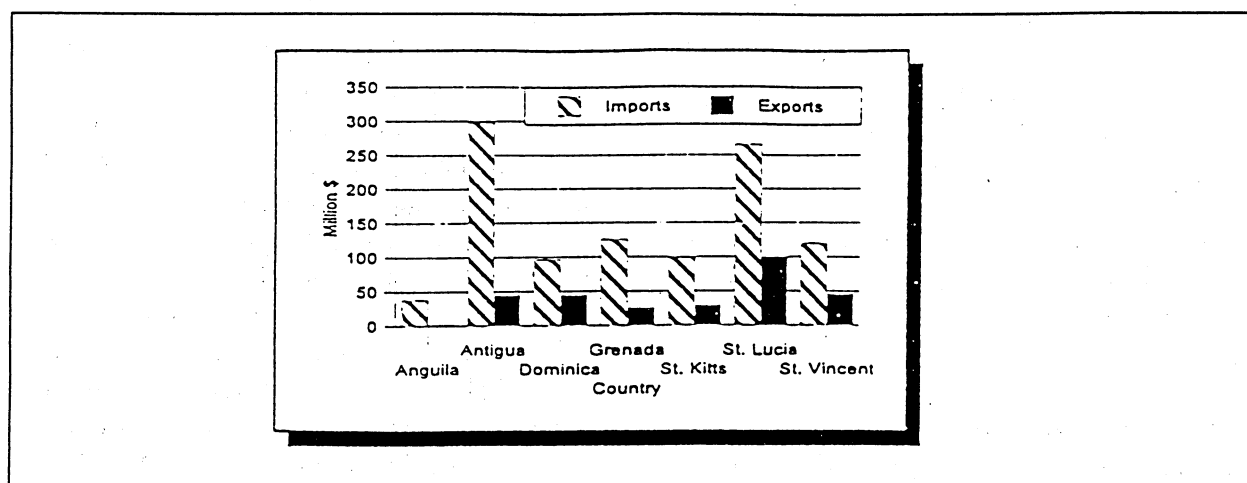
INTRODUCTION

The Organization of Eastern Caribbean States (OECS) is bombarded with a wave of new technology (information superhighway, Internet, email, teleconferences), while at the same time it must adjust to the challenges of the General Agreement on Tariffs and Trade (GATT), and the requirements of a World Trade Organization (WTO). With the new GATT rounds, a number of explicit and implicit trade barriers are expected to be eliminated. Tariffs and non-tariff quantitative barriers such as quotas must be tariffed and reduced by an average unweighted 36 percent by the year 2001 (Ingersent et al. 1995). Though developing countries have been exempted from most of GATT's requirements and receive special treatment under the new provisions, these sweeping new changes of the GATT have not spared some countries, especially the OECS. The Windward Islands and St. Kitts, whose economies depend largely on bananas and sugar, have already begun to feel the brunt of imposed requirements by GATT and the WTO. These Countries receive an inordinate share of their income from the export of a single crop, which has been receiving preferential treatment from U.K. and U.S.

markets, or supported under the Lome Convention. With the advances in GATT, it is expected that most of the OECS member countries will forfeit valuable sources of income and a number of jobs. These changes are bound to have substantial consequences on the physical and social environments of the OECS countries as they are forced to compete on the global market. In this paper, the effects of trade liberalization on the physical and social environments of the OECS are evaluated.

The OECS is comprised of a group of islands that are in close geographic proximity, but are extremely diverse. The OECS group is made up of the Windward Islands (Dominica; Grenada, St. Vincent, and St. Lucia) and the Leeward Islands (Anguilla, Antigua, St. Kitts, Nevis and Montserrat). In spite of the countries' heterogeneity, they possess certain common characteristics that bundle them as a single group. All the countries import more goods and services than they export (Figure 1).

Figure 1. Imports and Exports of OECS, 1994



It is important to note that Antigua and St. Lucia have relatively larger trade deficits than the other islands, and both islands show an increased dependence on tourism (Table 1). The OECS countries face negative trade balances, low Gross Domestic Product (GDP) per capita, and high levels of consumption. The Windward Islands, which are more dependent on agriculture, have much lower per capita incomes than the Leeward group. Per capita annual incomes for the Windward group range from a low of US\$2124 for St. Vincent to US\$3932 for St. Lucia, while those of the Leewards range from US\$5494 for St. Kitts to US\$6972 for Anguilla (Table 1). The percentage contribution of agriculture to export ranges from 19 percent for Grenada to 80 percent for St. Vincent. Due to the smallness and limited market power of the OECS, international market forces heavily influence the standard of living of the inhabitants. Agriculture as an engine of growth is constrained by the fact that most farmers in the region are price takers in a global market where they produce less than 4.0 percent of the total market share of export crops. Hence, any revolutionary effort at modifying the economies of the OECS to reduce their vulnerability to vagaries of external market

forces is bound to affect the environment.

The OECS countries have been concerned about environmental problems and have worked with CARICOM (Caribbean Common Market) Heads of Government to ensure proper health standards for their citizens. CARICOM has been preoccupied with pollution of the surrounding waters and the transshipment of hazardous waste through the region (Millman, 1989 and Morrissey, 1988). However, many developing countries fear that environmental protection regulations may be disguised ways of implementing barriers to trade by the more prosperous nations.

Many of the OECS countries joined GATT and the WTO to ensure that their voices were heard, and for protection, but trade liberalization is likely to increase the severity of competition and the level of protection for weak economies, such as those of the OECS, is likely to evaporate. Environmental concerns are likely to be given lower priority than food security and rural labor employment. Poor countries show less concern for the environment and pay more attention to their own survival. As nations become stronger and environmental

awareness spirals, inhabitants can afford to pay for improving environmental quality (Vogel, 1995). In an economic sense, environmental quality is desirable but, from the perspective of a poor country it is a luxury. Certain countries may be more willing to accept industries with high pollution capacity since their environment may be still able to assimilate pollution (Fairchild Benson, Seale and Moulton, 1986).

In this paper, the potential threats of trade liberalization on the social and environmental well being of the OECS are evaluated, and the policy implications of trade liberalization on the investment strategies of the OECS are examined. We first begin by examining GATT and the environment; then we look at OECS trade with major trading partners, followed by a section on how present agricultural production and trade affects the environment. Finally, we discuss the advantages and disadvantages of strategies for development and trade.

GATT AND THE ENVIRONMENT

The global trade talks of the Uruguay Round of GATT which ended in 1994 established the WTO in 1995 (Sanford, 1995). The WTO creates a permanent forum for member governments to address issues affecting their multilateral trade relations as well as supervising the implementation of the trade agreements negotiated in the Uruguay Round. The Uruguay Round represents significant advances in the world trading system in terms of reduction of trade barriers (Krueger, 1995; Cline, 1995; Hamilton and Whalley, 1995).

Environmental concerns were first given consideration in trade liberalization talks during the last Uruguay round. However, the underlying intent of the Uruguay Round was trade liberalization through the removal of the remaining implicit trade barriers, and improving trade relations among contracting parties. Trade liberalization was never linked to the environment, but the removal of trade barriers may have serious repercussions on the well being of trading partners (Schultz, 1995). The WTO Committee on Trade and Environment in 1994 gave the environment serious consideration. The GATT/WTO contains two agreements governing national laws on the environment (and/or public health): the agreement on technical barriers to Trade (TBT) and the Agreement on Sanitary and Phytosanitary Measures (SPS). The TBT deals with government regulations on products, and the SPS Agreement deals with government regulation on import bans regarding food safety and disease-spreading products.

There are two disturbing features about the GATT legislation that might be dangerous to humans. One is that GATT does not rule on the production process, but on the final product. The second major concern is that governments do not have to follow international standards in determining the level of risk their citizens must bear. These rulings are critical to all countries, particularly aid-receiving small open economies (SOE's). Members of the OECS have limited technologies to detect elements in food or clothing that might be dangerous to humans. Countries that are more technologically advanced may choose to export goods that are unfit for their own citizens, claiming that the governments of these SOE's have agreed to receive them. Countries wanting to improve the standard of living for their inhabitants may resort to

attracting investments that are dangerous to the environment and harmful to the same people the investments were intended to help. As Ferrantino (1997) has noted, some countries wanting rapid development may deliberately set low environmental standards to attract international capital, thus transforming themselves into pollution havens.

Environmental concerns have only received some discussion in the latest GATT round, but it is important that developing countries take the time to examine the impact of present production and trade on their environments. The loss of markets for traditional export crops may be translated into the loss of much needed revenue by a number of countries. But, it may also signal the opening of new opportunities for the less developed countries to increase production of non-traditional crops and the manufacture and sale of items no longer produced by the more developed countries. However, because of environmental costs (usually externalized to society as a whole) the

benefits of such changes need to be evaluated carefully and critically.

OECS AND TRADE

The OECS can be described, in development terms, as outward looking. However, most of their exports have been bulk commodities and dependent on a single crop, either bananas, citrus, cocoa, cotton, sugar or nutmeg. In spite of the heavy dependence on the sale of plantation crops in the past, these countries have recently placed emphasis on agricultural diversification programmes. In Table 2 we see that the percentage dependence on agricultural exports had decreased from 1986 to 1990.15 for most of the OECS, with slight increases in tourism contribution to GDP for that same period. Diversification programmes have led many of these island nations to seek other markets outside of the U.K., their previous, principal business partner. Since the initiation of the Caribbean Basin Initiative (CBI) in 1984, North America has become the principal trading partner for most of the OECS countries.

Figure 2 OECS Agricultural Exports to the United States, 1992 - 1996

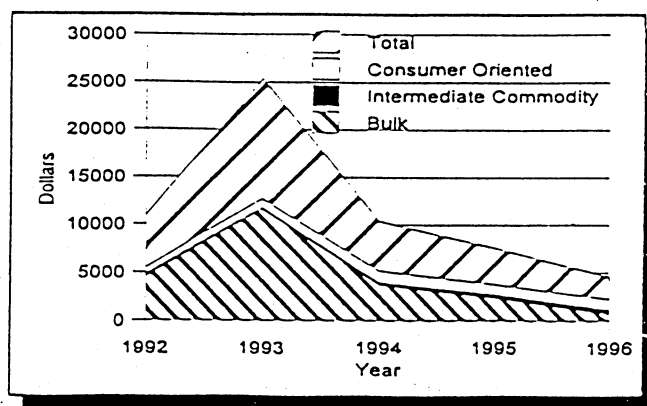
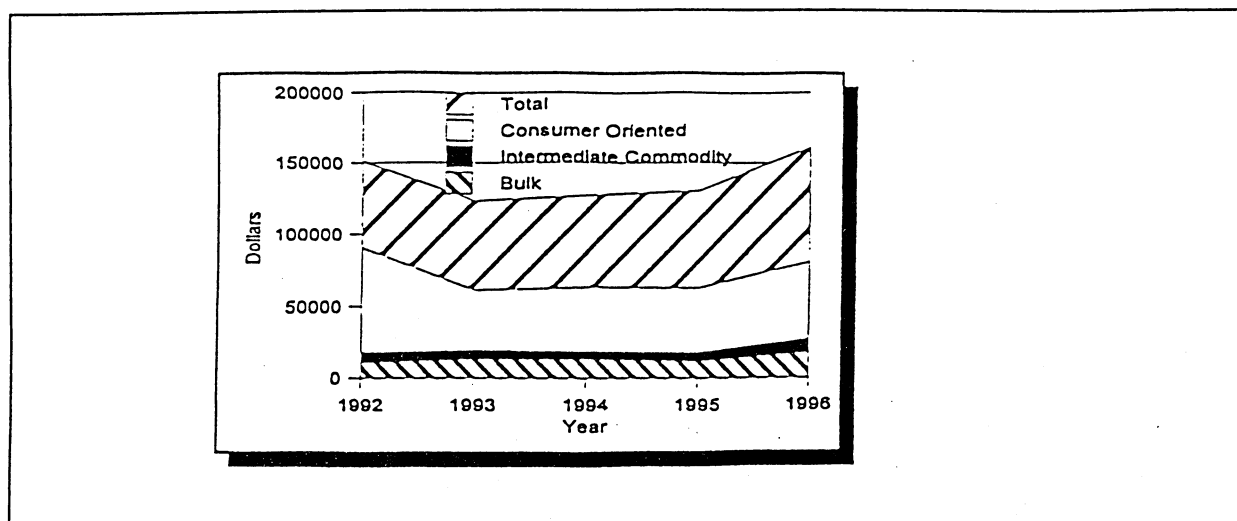


Figure 3 U.S. Agricultural Exports to OECS, 1992 - 1996



The CBI was initiated to foster growth and development in the Caribbean and Central America, but the U.S. has dominated the trade agreement throughout the existence of the CBI. An U.S. trade deficit with the CBI turned into a surplus of \$2.3 billion by 1995. Further, the CBI countries accounted for 2.7 percent of overall US imports in 1984, but by 1995, that share had dropped to 1.7 percent. In Figure 2 we see some trade flows occurring between the OECS and the United States, with a large proportion of exports from the OECS being bulk commodities. The United States has experienced a positive trade balance with the OECS from 1992 to 1996, exporting a larger percentage of consumer goods (Figure 3). The OECS have not been able to take advantage of the non-reciprocal, preferential treatment accorded to them under the CBI, since some of their manufactured goods, particularly textiles and certain fruits, have been exempted. While the initiative was intended to lower trade barriers, the number of non-tariff measures increased. Clark and Zarrilli (1994) stated that overall, 16 percent of all CBI goods had some non-tariff measures. Brown (1988) stated that product exclusion, rules of origin, and other-non-

tariff measures severely limit the impact of any trade agreement.

Even with efforts directed at diversification, the OECS are still dependent on agriculture for employment of a large segment of the employed population. Policy makers in each of the islands see agricultural diversification as the sole means of stimulating economic growth and employment creation, even with the impending environmental threats from agriculture. The changes in GATT meant that the OECS might be forced to give up the production and export of traditional crops in which they have no detectable comparative advantage.

AGRICULTURAL PRODUCTION AND THE ENVIRONMENT

Plantation crops have dominated agriculture in the Windward group, and most of the islands depend on one or two crops to earn foreign currency. In the case of Dominica and St. Lucia, the predominant income earner is bananas, whereas nutmeg and arrowroot are the principal foreign income earners for Grenada and St. Vincent (Table

3). The Leeward Islands are even more agriculturally diverse. For Antigua it is vegetables, for St. Kitts-Nevis it is sugar, and for Anguilla it is sugar. The economies of the OECS, with the exception of Antigua, depend heavily on agriculture, which competes with the other sectors for land and other non-renewable resources.

The OECS are facing a number of emerging development problems. The trade-off between environmental quality versus economic growth through international trade is a matter of serious concern. There are many threatening environmental concerns, but on the other hand, the OECS is a relatively safe physical environmental haven for the moment. Most of the islands have more than 10 percent of their land area in forest, with the lowest being St. Lucia, at only 8.0 percent and the highest being Dominica, at about 59 percent (United Nations Statistical Yearbook, 1992). The number of threatened land species is about the same among the islands, and the number of extinct species is negligible (Table 4). It is, however, disturbing that only a small amount of the lands of the OECS are placed in the protected area category.

The effects of agricultural practices on soil erosion and environmental degradation throughout the OECS, though in general plantation crops have had a negative effect on the environment, both in terms of soil erosion and the loss of primary vegetation (Ahmad 1975). Grenada has suffered less from soil erosion and fertility exhaustion, while in St. Vincent soil erosion is a serious problem due to the production of crops such as cotton, arrowroot and peanuts which involve soil disturbance (El-Swaify et al., 1982). Soil erosion is a major problem in St. Lucia, but less severe in Dominica, which produces the same plantation crops as St.

Lucia. Other than the soil losses in the Leeward side of Dominica which are attributed to poor farming practices, the high permeability of the soils and forest cover limit widespread erosion (Lang, 1967). The Leeward Islands have less erosion problems than the Windward Islands. Only on the mountainous areas in St. Kitts-Nevis, is there soil loss related to indiscriminate agricultural practices. In Antigua, the low rainfall and relatively level topography have helped to keep erosion in check. In spite of the limited soil problems, the continuous removal of flat lands from agriculture for housing, establishment of industrial shells and the construction of hotels and recreational facilities have forced small farmers to cultivate export crops on very marginal steep slopes susceptible to erosion under intensive cultivation.

The OECS countries are environmentally vulnerable to intensive agriculture, but produce a number of crops, compatible with hillside land conservation. Agricultural production takes up a large portion of the total land area of all states. The need to increase agricultural exports has led farmers to produce crops, such as bananas, on steep slopes, which are unsuited for intensive cultivation. Artificially high prices, due to preferential treatment received from the U.S. and the U.K., have stimulated farmers to intensify. Farmers are increasing yields per acre by using a number of chemicals included in the "Dirty Dozen" which are only used with strict guidance in the United States¹. Grossman (1992) listed a number of

¹ The Pesticide Action Network established the "Dirt Dozen" list in 1985 to encourage stricter regulation of particularly hazardous pesticides that are sold worldwide but are banned, unregistered, or severely restricted for use in the United States. Of all the pesticides on the list, paraquat (Gromoxone) is the least regulated worldwide.

chemicals which are harmful to man and animals, but presently used by a large number of banana producing households in St. Vincent. Use of the nematicide DBCP, which is associated with sterility in humans, is encouraged in order to increase crop yields. Thrupp (1988) revealed that over 800 Costa Rican men had become sterile through exposure to nematicides. She also stated that the use of many organophosphates in the production of bananas, cotton, sugar, coffee and cocoa were dangerous to the environment and killed fish, birds, small animals, and made streams and waters become barren. These chemicals were made accessible to small farmers: through credit and loan schemes. Chemicals were given to encourage farmers to increase yields per acre. Figure 4 shows that farmers use of pesticides in the Windward Islands increased abruptly in the mid 80's, and maintained this level up to the present, but output increased at a much lower rate. Use of these pesticides increased even though total production remained constant. The amount of pesticide used per acre and per worker followed the same trend for the Windward Islands and the OECS islands on a whole (Figure 5).

MODEL DEVELOPMENT

A general model, developed to evaluate the effects of pesticides and selected factors on agricultural output in the OECS, was specified:

$$AGOUT = f(PESTAREA, NITRAREA, POPAREA, T)$$

where the terms are defined as follows:

AGOUT = the agricultural production index from 1980 to 1994

PESTAREA = the deflated value of pesticides in US dollars applied per area in agricultural production in the OECS 1980 to 1994

NITRAREA = the deflated value of nitrogen fertilizer in \$US per area in agricultural production in the OECS countries from 1986 to 1994

POPAREA = the population employed in agriculture per area in the OECS from 1980 to 1994

T = technology and other trend variables

Figure 4. Pesticides Applied Per unit Area in Agriculture in the Windward Islands, 1980-1994

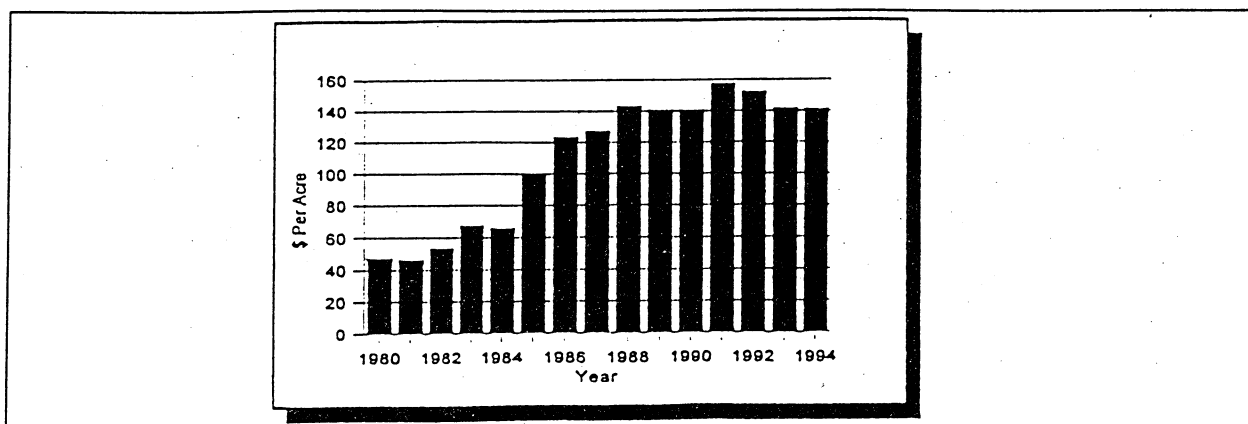
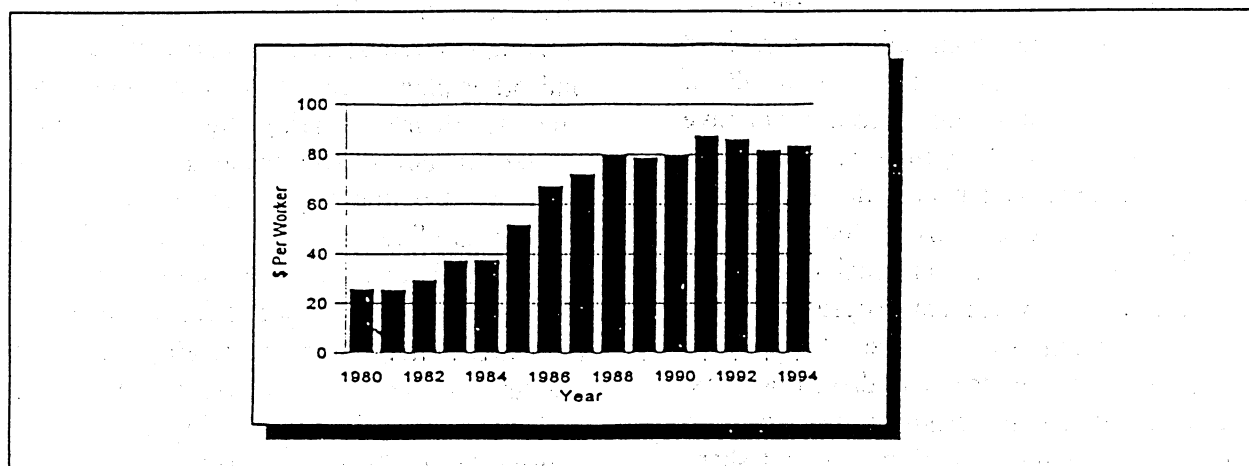


Figure 5. Pesticides Applied Per Worker in the OECS, 1980-1994



Linear regression and SAS were used to apply the model to bananas, sugar and agricultural production in the OECS. Data were collected from the United Nations Statistical Yearbook and from communication from the Statistical Division, Ministry of Finance, Dominica. The final statistical model was:

$$AGOUT = b_0 + b_1PESTAREA + b_2NITAREA + b_3POPAREA + b_4T + U$$

and U is the error term.

It was expected that $b_1 > 0$, $b_2 > 0$, $b_3 > 0$ and $b_4 > 0$.

The models for bananas, sugar and agricultural production all had good fit (Table 5). The F's for all three models were significant at the .05 level. The variation in the independent variables for Windward Islands banana production explained 86 percent of the variation in the dependent variable. The D.W. static was close to 2.0 that indicates that there is no major problem with serial correlation. Not all the signs of the coefficients of the independent variables were as anticipated, and significant at $\alpha = .05$. The model, however, showed that banan

ana production increased with pesticide use and that a 1 percent increase in pesticide use resulted in an 8.8 percent increase in banana production. The quantity of nitrogen fertilizer used did not significantly affect banana production; however, the number of agricultural workers per unit area had a positive effect on banana output.

The sugar production model showed that the independent variables explained 67 percent of the variation in the dependent variable. However, only technological change over time influenced the quantity of sugar produced in the Leeward Islands.

The combined model for the OECS showed that the variation in the independent variables explained 61 percent of the variation in the dependent variable ($R^2 = 0.61$). Pesticide and the amount of agricultural labor employed per unit of land were positively related to agricultural production. The results showed that a 10 per cent increase in pesticide use would generate a 3.1 percent increase in agricultural production. Here it seems that agricultural production is less responsive to pesticide use than that of banana production, the principal export of the Windward Islands. Farmers will increase pesticide use as long as

output increases. The same result was obtained when the value figure of banana exports was used indicating that farmers are responsive to price signals and the perceived benefits of those chemicals. The result of fertilizer use is ambiguous since farmers have been noted to use less than recommended application rates, and hence, do not receive the maximum benefit from fertilizer use. Pesticides and fertilizers are mainly used on export crops. Government programmes that encourage them to increase the use of fertilizers and pesticides have driven farmers. The aim of the government programs is usually to maintain the national market share of or quota amounts as is the case of sugar cane. The increased use of agricultural chemicals may diminish fruit quality and lessen yields. The OECS countries are unable to compete without subsidies from the U.K. market and from rents derived from sugar quotas allowed by the U.S. However, reduced production, even if it means loss of jobs and economic and financial ruin for many, may mean long run environmental benefits.

The OECS should be concerned about their over dependence on one crop since their economies are extremely vulnerable to external shocks and the negative effects on the environment. These countries are only able to export bananas because of the preferential treatment they receive. As Hallam (1995) stated, export prices of Caribbean bananas are at least 30 percent higher than dollar bananas (the longer and less sweet bananas from Central America), and it is difficult to imagine how these states hope to compete on the world market with countries that can supply the bananas at a far cheaper price.

STRATEGY FOR SURVIVAL

Given that the OECS may lose their degree of competitiveness in the export of bananas, and other plantation crops, what options are open to them? Market signals will force farmers to adjust and reallocate land, labor and capital to meet new market challenges. Farmers are likely to alter crop mix and input use. As Krissof et al (1996) stated, there are likely to be three major effects emanating from market forces: the **scale effect** in which the level of economic activity may induce pollution and environmental degradation, the **composition effect** may result in changes in intersectoral comparative advantage and shifting of resources from one sector to the other, and the **dynamic effect** may increase market access and result in the adoption of more environmentally friendly technologies. Some may argue that changes due to GATT may force the OECS to diversify and seek to induce a type of development, which reduces pollution and environmental degradation. Thus, agricultural producers should diversify and engage in the production of vegetable crops, specialty crops, eco-tourism, manufacturing, information processing, off-shore banking, and other schemes such as economic citizenship to lure investors. Each of these investment measures has been tried and each has displayed a number of disadvantages. Furthermore, most other developing countries are depending on the same strategies to bolster their economies.

The development paradigms presented to the OECS in light of changes in the global market are all dependent on renewable and non-renewable resources (Simmons, 1992). Tourism is the most important income earner in Antigua, and competes heavily with agriculture in St. Lucia, St. Kitts and Dominica, but it requires buildings that compete for land on which export crops are

produced. Tourism involves the heavy use of non-renewable resources such as sand from the beaches for construction. The increase in tourism requires the disposal of waste, which can also damage the ecosystem. Islands that have demonstrated the greatest ability to attract tourists are the ones that have the largest trade deficits. We may suspect that there is not much backward linkage with primary industries. History suggests that the hotel and catering services may be importing most of the goods used in this sector. Hence, the tourist industry may result in a drain of foreign reserves. While tourism may generate revenue and help increase the standard of living, its negative consequences have the potential of lowering the total quality of life for the tourist receiving inhabitants.

Eco-tourism has been hailed as environmentally friendly and a cure to perceived ills of traditional tourism. Proponents of eco-tourism encourage the use of the natural environment and wilderness as the main attraction. The use of the sea and wilderness means that the planners have knowledge of the absorptive capacity of the ecosystem. Biological damage is a potential concern as numbers of users increase. Davis and Tisdell (1996) stated that the public good approach resource site creates market failure. Until congestion sets in, the price of the resource is zero. Tourists may cause at natural campsites the disappearance of important woody species and reduce plant specie composition (Obua, 1997). Since the studies conducted thus far on the carrying capacity of various ecological sites are limited, planners of eco-tourism should be cautious not to embrace too rapidly this new idea since heavy use of a site is likely to lead to significant value losses, reducing aesthetic quality and wilderness experiences.

The production of vegetables and specialty fruits as a strategy for economic development has resulted in many environmental and ecological problems. The increased use of chemicals has not only caused damage to the environment, but also resulted in the loss of market access of fruits and vegetables to major traders, especially the U.S., because of heavy amounts of residual chemicals (Murray and Hoppin, 1992). Production of vegetable crops has been accompanied by massive doses of chemicals that are injurious to humans and animals. However, the islands could find a niche in producing organic foods that place less pressure on the environment. The leaders of these nations must understand that unless there is an increase in labor productivity and efficiency, any advantage they may have in production and export of organic foods may be quickly eroded since the countries within the same region compete for the same markets.

Manufacturing, as a development strategy, has not been successful. Most of the CBI countries have not been able to establish major manufacturing plants, other than those that involve the import of materials from outside markets. This result represents most clothing factories in islands. Manufacturing has experienced only modest growth over the past ten years in the OECS. Hence, manufacturing is limited in scope for most of the states.

The other trade and development option includes high-level information technology that requires skilled labor. Most countries have been incapable of maintaining a highly skilled labor force. The training of an individual is costly and it is difficult to keep individuals once they are trained. However, it is imperative that the OECS increase the cadre of highly trained and skilled manpower

in place. This involves treating trained manpower as capital, and not as a hindrance to economic development. Unless there is a cadre of trained individuals with the dedication and commitment to foster change, the OECS will be unable to seize new opportunities for sustainable development derived from the GATT and the WTO.

CONCLUSION

The changes in GATT may completely destroy the single plantation crop dependence of most of the OECS, and result in loss of employment, loss of foreign exchange, increase in indebtedness and a lowering of the standard of living. These changes may result in a number of social ills such as increases in malnutrition, infant mortality, diseases, drug trafficking, and out migration. However, the loss of the banana and sugar industries may increase the consciousness of the islanders of the effects that production and export of these crops has on the environment. On the other hand, the loss in revenue from the export of these crops could push them to seek industries which may induce greater harm to the environment than the previous plantation crops. That would be substituting one evil with another. Instead, the OECS should use this moment to harness their human resources in putting together a strategy that will seize new opportunities as comparative advantage shifts with the reduction in tariffs and other trade restricting measures. Only with the help of a creative set of technicians and thinkers can the OECS skip the development phase of manufacturing to service production without causing major social, environmental and financial disruptions.

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Table 1. Demographic, Economic and Agricultural Indicators of OECS*, 1985

	ANGUILLA	ANTIGUA	DOMINICA	GRENADA	ST. KITTS	ST. LUCIA	ST. VINCENT
POPULATION (1,000)	10	60	70	90	40	140	110
GDP/CAPITA (\$ U.S.)	6972	5595	2995	3664	5494	3932	2124
AGRICULTURAL CONTRIBUTION TO GDP (%)	-	3.6	18.6	12.1	6.0	11.0	11.4
EMPLOYED IN AGRICULTURE (%)	-	3.9	25.8	17.1	29.6	24.0	25.1
CONTRIBUTION OF AGRICULTURE TO EXPORTS (%)	-	-	50	19	40	55	80
CONTRIBUTION TO TOURISM (%)	-	70	14	50	20	-	5
CONTRIBUTION BY MANUFACTURE (%)	-	1.9	18	19	27	17	-

*OECS= Organisation of Caribbean States

Table 2. Economic Indicators for the OECS, 1986 and 1995

	ANTIGUA	DOMINICA	GRENADA	ST. KITTS	ST. LUCIA	ST. VINCENT
1 9 8 6 1 9 9 5	4.6	28	22	9.8	15.6	17.7
AGRICULTURAL CONTRIBUTION TO GDP (%)	-	52	40	62	40	80
CONTRIBUTION OF AGRICULTURE TO EXPORTS (%)	60	6.1	24	6.8	7.5	22
CONTRIBUTION TO TOURISM TO GDP (%)	3.6	18.6	12.1	6.0	11.0	11.4
AGRICULTURAL CONTRIBUTION TO GDP (%)	-	50	19	40	55	80
CONTRIBUTION OF AGRICULTURE TO EXPORTS (%)	70	14	-	20	50	5
CONTRIBUTION TO TOURISM TO GDP (%)						

Table 3. Principle Crops Produced for Export by OECS and Directly Affected by GATT

COUNTRY	CROP	AFFECTED BY GATT
ANTIGUA	Cucumbers, tomatoes, bananas	-
DOMINICA	Bananas, coconuts, coffee, cocoa, citrus	Banana, coffee, cocoa, citrus
GRENADA	Nutmeg, bananas, sugar, citrus, cocoa	Bananas, cocoa, citrus
ST. KITTS	Sugar	Sugar
ST. LUCIA	Bananas, cocoa, citrus, coconuts	Bananas, cocoa, citrus, coconuts
ST. VINCENT	Bananas, arrowroot, sugar, coffee, cocoa, citrus	Bananas, sugar

Table 4. Environmental Indicators of OECS

	ANGUILLA	ANTIGUA	DOMINICA	GRENADA	ST. KITTS	ST. LUCIA	ST. VINCENT	MONTserrat
Area in forest (000's of ha)	-	26	50	11	24	34	12	4
% of Land Forest	-	23	59	18	36	8	28	25
No. of Threatened species	5	6	6	5	6	9	6	5
No. of Extinct Species	-	-	-	-	0	1	1	-
% of Protected Land Area	-	-	9.15	-	10.00	2.41	21.3	-

Table 5. Effects of Chemicals, Fertilizer, and Labor Use on Agricultural Production in the OECS

INDEPENDENT VARIABLES	COEFFICIENTS	ASYMPTOTIC T-RATIOS	P-VALUES
Windward Islands			
Banana Production in Tons			
Intercept	-20367.16	-1.88	0.0899
PESTAREA	2149.58	4.90	0.0006
NITRAREA	-478410.00	-0.374	0.7161
POPAREA	1176016	1.95	0.0859
Year	25601	2.37	0.0392
BANQTY			
F=23.01 Adj. R ² =0.86 D.W. =1.91			
Sugar Cane Production in Leeward Islands (St. Kitts)			
Intercept	379116.00	2.96	0.013
PESTAREA	-336.23	-0.65	0.526
NITRAREA	421814.00	0.27	0.79
POPAREA	-9703.69	-3.30	0.007
Year			
F=10.41 Adj. R ² =0.67 D.W. =2.06			
Agricultural Production Index for the OECS			
Intercept	-69.06	-0.29	0.777
PESTAREA	1.62	4.59	0.0008
NITRAREA	-596.84	-0.58	0.5709
POPAREA	284.29	2.34	0.0277
F=8.15 Adj. R ² =0.61 D.W. =2.41			